



Confederation of Indian Industry



INDUSTRIAL INNOVATION AWARDS 2022

Top innovative companies and institutions

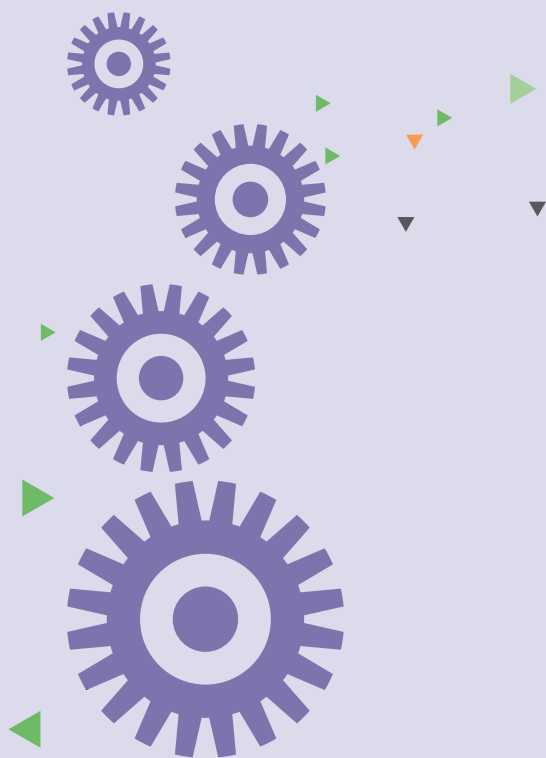






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and institutions



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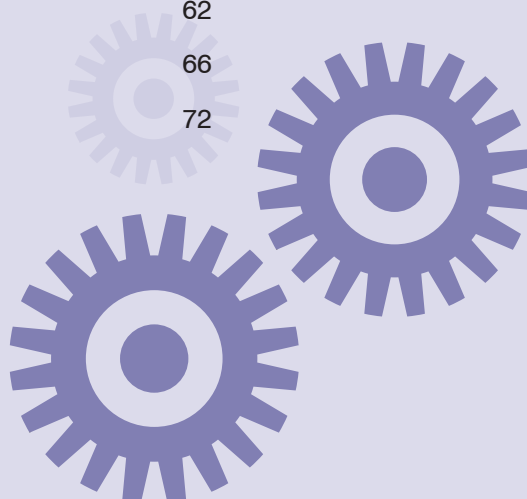
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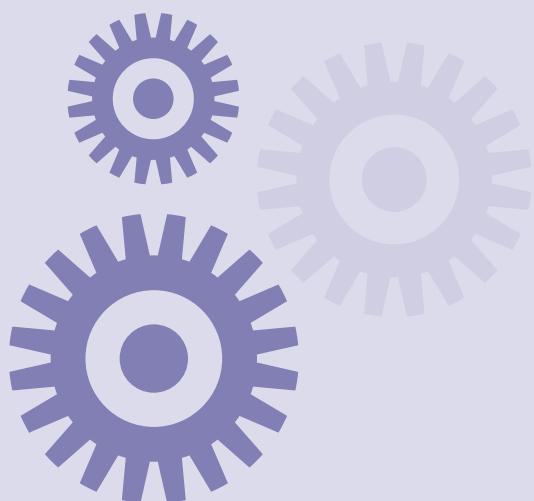
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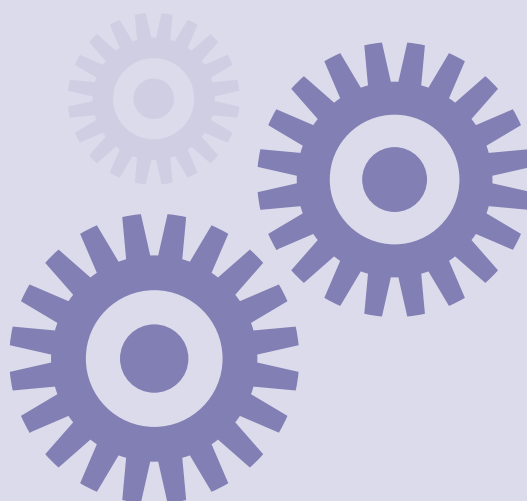
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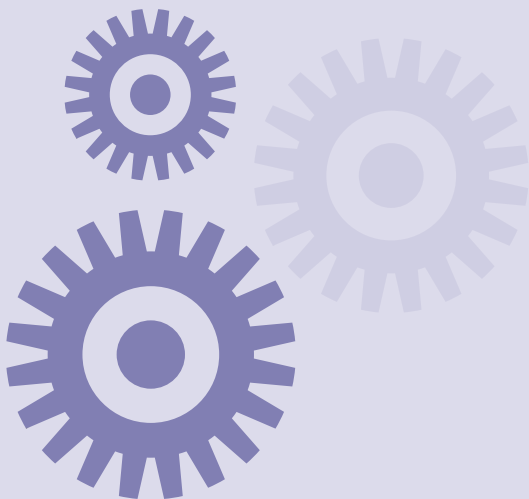


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Category Award Winners

- Most Innovative Company 2022-Grand Award
Lohum
- Top Innovative Company (Large) in Manufacturing
Tata Chemical
- Top Innovative Company (SME) in Manufacturing
Lohum
- Top Innovative Company (Large) in Service
TATA Elxsi Ltd
- Top Innovative Company (SME) in Service
GPk Logistech Pvt Ltd



Top Innovative Research Institutions

Disruptive Innovations Category

Winner:

Kumaraguru College of Technology

Thiagarajar Polytechnic College

Paavai Engineering College

Innovation Quotient Category

Winner:

IIT Roorkee

Northern India Textile Research Association

International Institute of Information Technology

Innovations Value Realized Category

Winner:

Indian Institute Of Technology Madras

Indian Institute of Technology Palakkad

Uttaranchal University

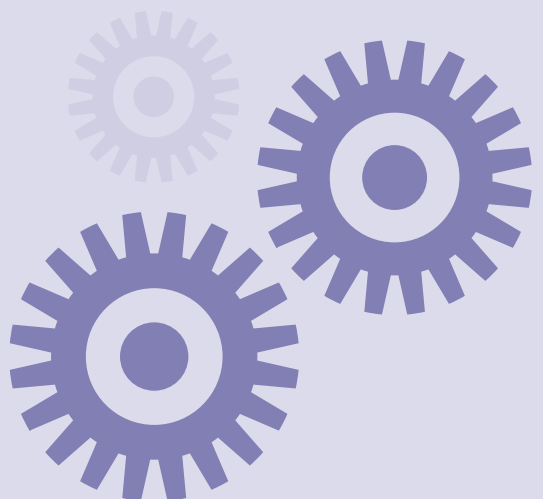
Most Innovative Research Institutions

Winner:

IIT Roorkee

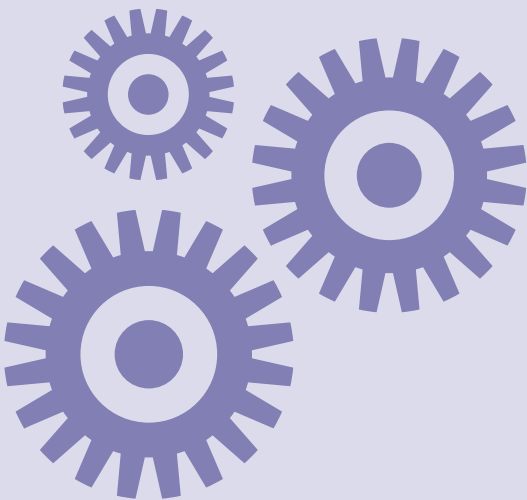
1st Runner up:

IIT Madras

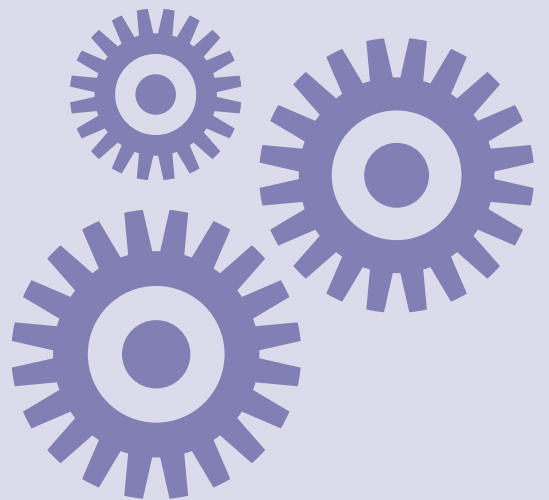


Special Award

- Driving Innovations through Industry-Academia Collaborations
Tata Consultancy Services



Top 50 Innovative Companies 2022

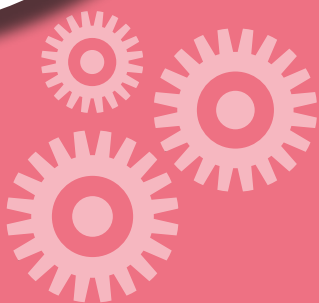


Mahindra & Mahindra Ltd



Founded in 1945, the Mahindra Group is one of the largest and most admired multinational federation of companies with 260,000 employees in over 100 countries. It enjoys a leadership position in farm equipment, utility vehicles, information technology and financial services in India and is the world's largest tractor company by volume. It has a strong presence in renewable energy, agriculture, logistics, hospitality and real estate.

The Mahindra Group has a clear focus on leading ESG globally, enabling rural prosperity and enhancing urban living, with a goal to drive positive change in the lives of communities and stakeholders to enable them to Rise.



The Innovation

The MAHINDRA YUVO TECH+ tractors have technologically advanced features that can help to increase productivity of the farmer. One of the most impressive features is its three-Cylinder M-Zip Engine, offering best-in-class mileage and Power Take-Off (PTO) HP, Parallel Cooling, and high max torque. This tractor also provides comfort seating, multiple gear options, smooth constant mesh transmission, high precision hydraulics, and a six-year warranty.

Moreover, to make the job easier, it can operate many farming implements include Cultivator, Rotavator, Thresher, Sprayer, Harrow, Potato Planter etc. Thus, the tractor can transform your agricultural business by enhancing both productivity and profit.

In the year 2002, Mahindra launched Scorpio, it was Mahindra's first vehicle for the global markets. Fast forward to 2022 and the all-new Scorpio-N is in for an even bigger shout when it comes to mass appeal. ScorpioN sets a new record such as it clocks over 25000 bookings within a minute and over 100000 bookings in under 30 minutes. It is a tough ladder-frame SUV which is easy to drive in the city and at the same time, can take on bad roads with ease.



Intellectual Property (IP) Policy

At M&M, IP policy is built on 3 pillars – Being vigilant and IP aware; Create, Protect and Enforce our IP; Respecting others' IP. Policies are based on the following principles of ethics, transparency, and accountability:

- To recognize and respect the rights of the people who may be owners of traditional knowledge, and other forms of intellectual property.
- To respect the interests of, and be responsive towards its stakeholders, especially those who are disadvantaged, vulnerable and marginalized.

Team Strength

As of now 20+ people are working as part of Knowledge Management & Intellectual Property functions.

Best Practices

Innovation, IPR protection and risk mitigation linked to NPD process

IP Cell contribution across product life cycle

Improving Innovation through Knowledge Management Index

Combining knowledge management & problem solving



BOSCH
Invented for life

BOSCH Limited

In India, Bosch is a leading supplier of technology and services in the areas of Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. Additionally, Bosch has in India the largest development center outside Germany, for end-to-end engineering and technology solutions.

The Bosch Group operates in India through twelve companies: Bosch Limited – the flagship company of the Bosch Group in India – Bosch Chassis Systems India Private Limited, Bosch Rexroth (India) Private Limited, Robert Bosch Engineering and Business Solutions Private Limited, Bosch Automotive Electronics India Private Limited, Bosch Electrical Drives India Private Limited, BSH Home Appliances Private Limited, ETAS Automotive India Private Limited, Robert Bosch Automotive Steering Private Limited, Automobility Services and Solutions Private Limited, Newtech Filter India Private Limited and Mivin Engg. Technologies Private Limited.

In India, Bosch set-up its manufacturing operation in 1951, which has grown over the years to include 18 manufacturing sites, and seven development and application centers. 18 manufacturing sites, and seven development and application centers in India.

The Bosch Group in India employs over 30,000 associates and generated consolidated sales of about Rs.11,781 crores* (1.39 billion euros) in fiscal year 2021-22 of which Rs.10,264.3 crores* (1.21 billion euros) are from consolidated sales to third parties.

Topic 1: Combi Filter for BS6 Commercial vehicle Segment in India

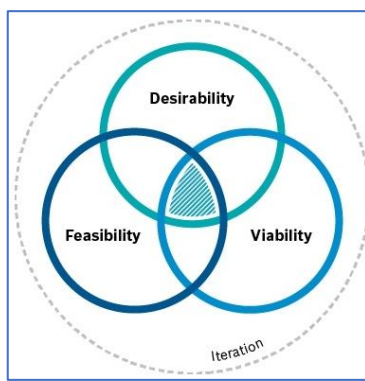
The Innovation

The Bosch Innovation Framework (BIF) provides logical steps how to transform an idea into a successful product in the market. The BIF helps to align with strategic search fields, to discover the problem space and to generate holistic business models based on the 3 innovation pillars Desirability, Viability & Feasibility.

Combi Filter is developed for one of the major BS6 Commercial vehicle Segment in India with below key features.

- Combi Diesel Filter is with vertical mounting having Increased Robustness.
- High particle and water separation Efficiency Protects Fuel Injection components
- Low cost of ownership by providing longer service duration of 60k km.
- Water separation efficiency of $\geq 95\%$ is maintained throughout filter lifetime (60k km)
- Overflow valve to regulate the flow to Fuel injection pump
- Passive Water sensor without electronics, with less Components and negligible failures in field.
- Temperature sensor with Aluminum body for better Response time on the vehicle.
- 1 Patent Filed in Indian Patent Office and series supplies started

Bosch 3 Innovation pillars:



Combi Diesel Filter for Commercial vehicle Segment in India:

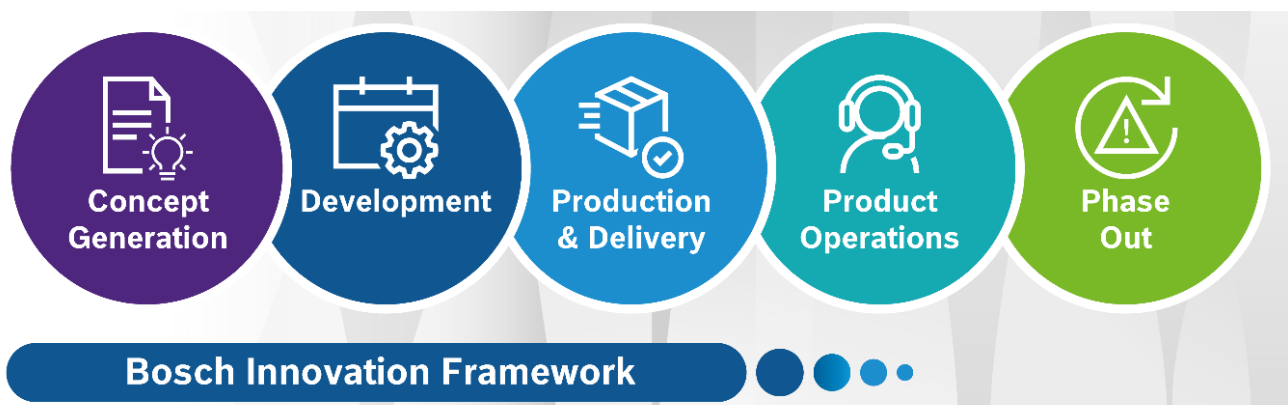


The Approach

Bosch has developed a modern Innovation process, which provides appropriate methods, tools, and criteria considering the innovation context.

The Bosch Innovation Framework (BIF) provides the platform for such processes. It is founded on the understanding of an innovative product's end-to-end lifecycle. The BIF emphasizes the early stages of innovation where ideas are refined into validated concepts fast and efficiently in order to focus our efforts on those businesses that demonstrate the most promise to scale profitably.

How the BIF fits into an end-to-end product lifecycle is depicted below:



The Benefits

Innovation in Bosch Combi Diesel Filter resulted in Successful Launch of the Product in the Market for Commercial Vehicle Segment in India with following benefits,

- Two spin on filter with common head (Combi filter) for ease of vehicle packaging.
- Low cost of ownership by providing Longer service duration of 60k km
- High Efficiency Product Protects Fuel Injection Equipment Components & benefiting End Customer
- Passive Water & Temperature sensor No Electronics failures

The Future

Launching of this Innovative Product in Indian Market since Apr-2020 has created following Opportunities for Future,

- Potential to acquire similar applications in India as well in EU Market.
- Recurring Business Opportunity in Aftermarket sales.

Project Team:

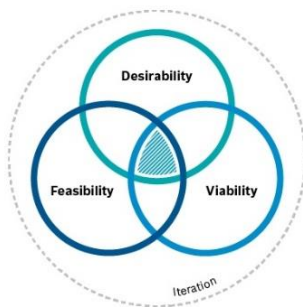


Topic 2: Innovative machine learning solution for real time load detection

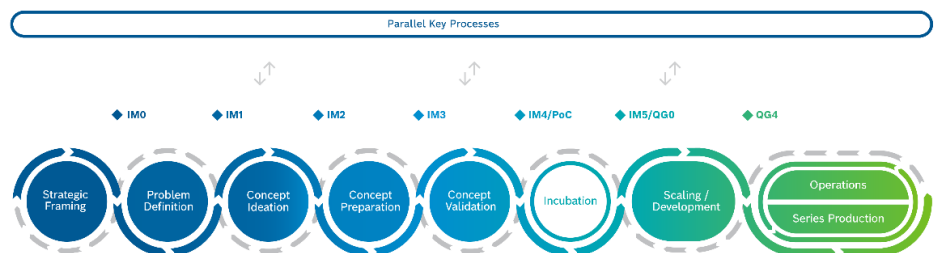
Bosch Innovation Framework

Bosch Innovation Framework (BIF) provides logical steps how to transform an idea into a successful product in the market. The BIF helps to align with strategic search fields, to discover the problem space and to generate holistic business models based on the 3 innovation pillars Desirability, Viability & Feasibility.

The 3 pillars of innovation



Innovation Gates



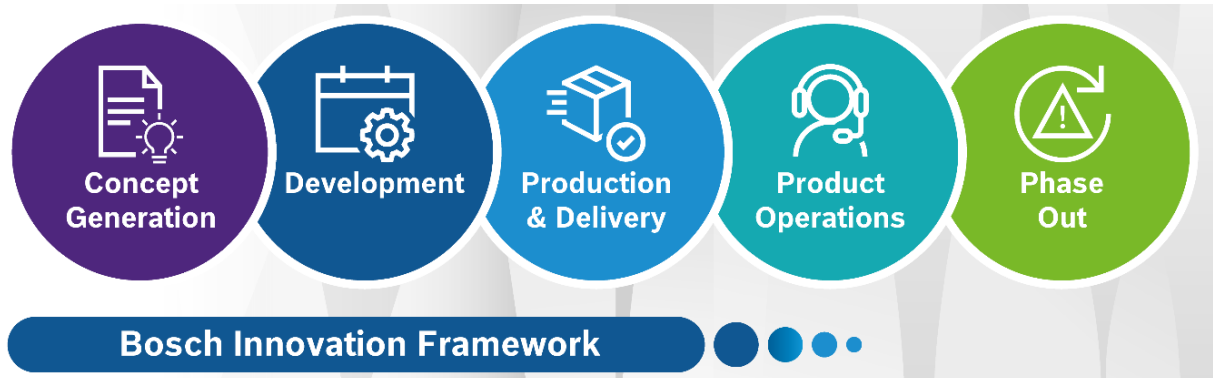
- Innovative solution for real time load detection on vehicle without additional sensors
- Broad customer coverage (B2B, B2C, B2G)
- Expected market size by volume ~ 2million (for BS4 & BS6)

The Approach

Bosch has developed a modern Innovation process, which provides appropriate methods, tools, and criteria considering the innovation context.

The Bosch Innovation Framework (BIF) provides the platform for such processes. It is founded on the understanding of an innovative product's end-to-end lifecycle. The BIF emphasizes the early stages of innovation where ideas are refined into validated concepts fast and efficiently in order to focus our efforts on those businesses that demonstrate the most promise to scale profitably.

How the BIF fits into an end-to-end product lifecycle is depicted below:



The Benefits

- Solution scalable across different vehicle platforms
- Minimizes operational cost by optimum vehicle utilization
- Savings on fuel cost & reduced vehicle down time
- Effective tracking of vehicle load violations

The Future

- First phase deployment to fleet operators via Bosch Mobility Platform
- Extend our engagement with government to automate operations like tracking load violations eg: via Vahan portal

Topic 3: Robust Airmass Estimation Without Air Mass Sensor

The Innovation:

Innovation in Robust Airmass Estimation Without Air Mass Sensor developed by us is for Indian Off-Highway (OHW) Naturally Aspirated segment to reduce the system complexity and address the technical challenge of pulsations due to layout change.

With successful delivery of BS6 on road applications focus shifts towards off road segments, where transformation from BS (Trem/ CEV) 3A to BS (Trem/ CEV) V has just begun. OHW segment in India is cost sensitive and plays a major role in economy as farm sector attributes to 20.2% India GDP as on 2020-21. Focused strategy towards system simplification is essential for customer satisfaction which in turn leads to continued business success.

Problem Definition

- Elimination of air mass sensor from the OHW Naturally Aspirated Engine Segments for TREM V emission norms. [>60% market share]

Existing Options for meeting TREM V emission norms

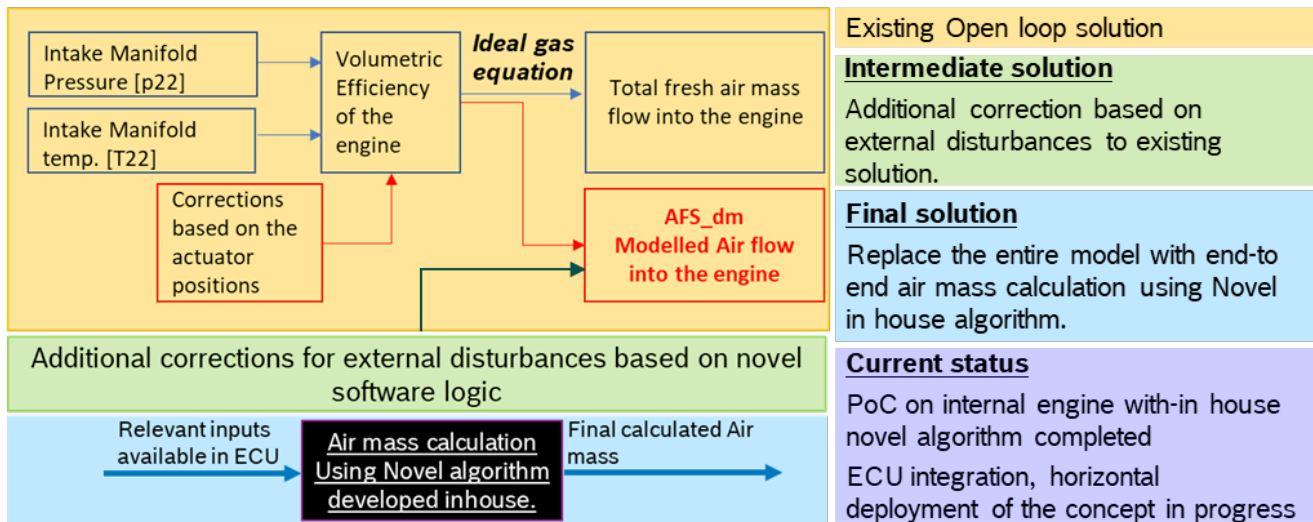
- Robust solution: Dedicated air mass sensor → adds to the cost and is sensitive to layout changes → Different layout of the same segment requires different calibration to accommodate the pulsation impact on the air mass sensor

- Customer wish: Modeled based air mass → robustness issue under all conditions.

Scope of Innovation/Solution

- Replace the air mass sensor with robust model-based air mass, under all conditions, via novel in house algorithm
- Project demonstrated on inhouse off road engine to meet the all the required KPIs with co-efficient of regression >90% under nominal and simulated external disturbances

Figure 1: Robust Airmass Estimation Without Air Mass Sensor working model



The Approach

Bosch has developed modern Innovation process, which provides appropriate methods, tools, and criteria considering the innovation context and is founded on the understanding of an innovative product's end-to-end lifecycle. The Bosch Innovation Framework (BIF) provides logical steps how to transform an idea into a successful product in the market. The BIF covers all phases of an innovation from strategic framing up through successful market introduction and operations / series production. The BIF emphasizes the early stages of innovation where ideas are refined into validated concepts fast and efficiently to focus our efforts on those businesses that demonstrate the most promise to scale profitably.

The BIF innovation phases followed for the above idea is:



The Benefits

Innovation in Robust Airmass Estimation without air mass sensor would help the OHW naturally aspirated segment in:

- System simplification maintaining robustness of the system over lifetime □ Sensor replaced by a robust model gives customer the cost benefit
- Faster time to market with reduced development time
- Retaining market position with “Value for money” solution to the customer
- State of the art for Off-Highway Naturally Aspirated engines for meeting TREM V norms

The Future

- More than 55% of total Off-Highway market is with Naturally aspirated engines (volume of >700k/annum), where Bosch is market leader with >95% market share currently.
- This innovation offers Bosch to retain the edge over the competition and to retain the market position
- Potential to horizontally deploy to 3-wheeler diesel market



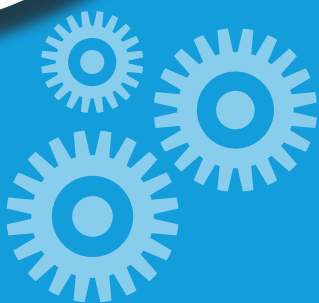
Uno Minda Ltd

UNO MINDA steers ahead as a leading Tier 1 supplier of Proprietary Automotive Solutions to Original Equipment Manufacturers (OEMs).

For more than six decades, UNO MINDA has made significant contributions to the automotive industry supply chain with innovative products, designed and engineered for efficiency with an emphasis on enhanced comfort levels and fine-tuned response.

UNO MINDA has 71 manufacturing plants in India, Indonesia, Vietnam, Spain, Morocco, Mexico Colombia, Germany design centres in Taiwan, Japan & Spain sales offices in North America, Europe and ASEAN Countries.

Technology and innovation are two key pillars of UNO MINDA philosophy. Our underlying vision is to create a culture that fosters great ideas that can be the basis for planning ingenious products, successfully manufactured to deliver value to our customers.



Innovation - 1

ADAS Camera: The market understands the need for these ADAS solutions to enhance the safety and comfort of the drivers. Automotive cameras however, are not being made in India as yet. Uno Minda has developed inhouse low cost automotive cameras that could be used for the ADAS applications and have also invested heavily in establishing the Image Quality Lab and Active Lens Alignment machine.

Innovation - 2

Telematics Unit: The GoI introduced mandatory tracking on commercial passenger vehicles through AIS-140 regulation. Uno Minda came up with the first “made in India” telematics units that has live tracking and route monitoring system; emergency buttons and complied to the regulatory requirement. To support the eco-system Uno Minda developed the V2X platform and a cloud-based solution.

Innovation - 3

Heated/Cooled Seats: In India, mainly during summers, 2W riders face issues with heated seats. These seats take a significant time to cool which further adds to driver discomfort. Uno Minda introduced Peltier effect-based temperature controlled seats that can reduce the seat temperature up to 20°C in 15 secs.

Innovation - 4

Dynamic Bending Lights: The limited illumination while taking a turn in dark is a major safety concern for the 2W riders. Uno Minda introduced dynamic bending lamps which are auto-activated during turning by use of an inbuilt gyro and lean angle sensor. Uno Minda is first in India to develop and manufacture this product locally.

Innovation - 5

Wireless Charger: Using mobile connected services while driving for long hours drains the battery. Wireless charger enables user to charge on the go without connection to cables. This avoids driver distraction and thereby improves safety. The wireless chargers are automotive grade with integrated cooling, foreign object detection and mono/dual mobile charging possibility.

Innovation - 6

Onboard Charger: To support the EV ecosystem growth in India, Uno Minda decided to develop on-board chargers locally. These chargers are equipped with unique features like serviceable input protection, IP67 compliance, CAN communication enabled and high efficiency.

The Approach

Driven by its vision, “To be a Sustainable, Global organization that enhances value for all of its Stakeholders, attains Technology Leadership, and cares for its people like a Family”,

Uno Minda has a deeply rooted innovation culture supported by multiple initiatives like setting up center of competencies, providing employee trainings and skill development opportunities and establishing rewards and recognition policies. Uno Minda has setup a defined SOP for incubation of innovative products. This process includes idea generation, capturing in Idea Bank, consolidation of ideas on basis of regulations, voice of customer and business strategy, concept development with an anchor customer and further developing it for mass production.

The Benefits

The innovative products developed by Uno Minda has not only supported the growth in revenue and increase in new product lines but also in creating new business divisions which in-turn has generated employment. Also, the competencies and IP created during the development of these products have channelized the future growth potential to venture into new product segments. Moreover, these competencies have helped Uno Minda create sustainable products for the global market.

The Future

Uno Minda aims to develop competencies in areas of ADAS, connected vehicles, electric vehicle components and personalized mobility. CREAT, the central R&D setup by Uno Minda, has setup these competencies and continues to develop multiple innovative technologies and products and for cleaner, safer and sustainable mobility for global markets.

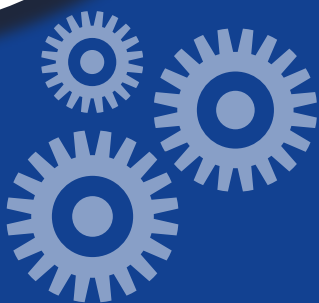
The Nokia logo, consisting of the word "NOKIA" in a bold, blue, sans-serif font, is centered within a white square.

Nokia Solutions and Networks India Pvt Ltd



At Nokia, we create technology that helps the world act together. As a trusted partner for critical networks, we are committed to innovation and technology leadership across mobile, fixed and cloud networks. We create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs. Adhering to the highest standards of integrity and security, we help build the capabilities needed for a more productive, sustainable, and inclusive world.

In India, Nokia has been connecting people since 1995 - the first GSM call was made on a Nokia handset over a Nokia built network. From enabling growth of the 2G technology, bringing high quality 3G services, pioneering 4G to now steering India towards the 5G revolution, we have been an integral part and celebrate this journey of 25 years of mobile telephony in India. The manufacturing operations, global delivery centers and research and development setups in India reflect Nokia's unwavering focus on the country and enhanced proximity to its customers.



The Innovation

- 1) **BoENG (Beacon onboarding Engine)** is a lightweight comprehensive software as a service to pre-provision for operator specific requirements. With this approach, only generic CPE variant is manufactured by Nokia compared to operator specific CPE variants in traditional method. The generic variants are then pre-provisioned via secured connection during installation phase by BoENG Service using CPE's current information like IP Subnet/SLNO/Mobile Identification provided by BoENG Agent integrated in firmware of generic CPE's.
- 2) **AMRO Autonomous Mobile Robot Orchestration** - Material Transfer is an Important process in production shopfloor of factory, materials are transferred from Warehouse to Assembly and from Assembly to Packaging. To ease the flow of process and to reduce the manual intervention of material transfers mobile robots are being used. This improves efficiency by timely delivery of the components to the required department. We have evolved from legacy magnetic tape guided vehicle to Automatic Lidar based Mobile robots of different types and brand.
- 3) **Leveraging Process efficiency thru Additive Manufacturing Technology** - Manufacturing operations are becoming more sophisticated than ever before with demanding process Quality, higher machine up time and low inventory of spares.

Advent of Additive Manufacturing Technology is changing the landscape of manufacturing industry for good with immense flexibility.

The Approach

BoENG: BoENG service is hosted in cloud as software as a service model and managed by Nokia for pre-provisioning generic variants CPE deployed for operators in worldwide. BoENG Agent integrated in generic CPE's firmware establishes secured connection to BoENG Service on CPE start-up to provide information like IP Subnet/SLNO/Mobile Identification and gets pre-provisioning configuration from BoENG Service.

AMRO: Since a fleet of Robots are being operated, many at times, they cross paths and the movement is stopped. To avoid stoppages of the robots, AMRO was developed as a solution, which covers the following,

1. Indoor precision localization system for robots and people with RF localization and video-based localization to determine position
2. Edge cloud-based decision engine to manage robot fleets, coordinate actions and avoid collisions
3. Intelligent connectivity manager to ensure selection of reliable and better network connectivity for robots
4. AMRO ensures timely delivery of components to the right department by choosing safe and quicker movement paths.

Leveraging Process efficiency thru Additive Manufacturing Technology

In Nokia Chennai, Multiple use-case-Ideas has been tried and tested to improve process quality, Spare parts readiness in short print time, Improved lifetime of spares with limitless designs and reaped multifold benefits compared to the traditional way of part manufacturing with constraints.

Using local AM ecosystem wide range of parts are developed with polymer and metal which is used for production support fixtures, IOT devices and tester spares.

Vision

An agile and smart Manufacturing Service, fully automated and green that is self-learning and able to predict and prevent: "The Conscious Factory"

Mission

Being a trusted innovative partner providing cost-effective and time to market advantages to business groups and customers using DART+C transformation to support new product introduction, volume, and end of life production.

DART+C (Digitalization, Analytics, Robotics, Transparency, Connectivity) strategy is used to drive innovation mind set based on our stakeholder inputs/expectations. We collaborate with our ecosystem partners to drive innovation to bring in new products and services. Our ecosystem partners include Nokia Business Groups, External Technology Partners & University Partners.

The Benefits

BoENG:

1. For a specific CPE type, Nokia produces at least 5 customer specific variant on the average, Saving of approx. \$ 2,50,000 Production cost.
2. Lead time for deployment efficiency increased by 66 % for new deployments.
3. Maintenance efficiency 100% as manufacturing of operator specific variants are avoided.
4. Eases the challenges in refurbishing products for redeployment.

AMRO Autonomous Mobile Robot Orchestration:

AMRO ensures timely delivery of components to the right department by choosing safe and quicker movement paths.

1. AMRO has increased the deliveries robot made per day by 20%
2. Reduced the Waiting time for components in manufacturing line by 40%
3. Reduced robot traffic related breakdowns by 100%

Leveraging Process efficiency thru Additive Manufacturing Technology:

1. Enhanced Machine design with intricate cooling path for solder paste process- 2% process scrap reduced to Zero.
2. Productivity of 5G mMIMO Filter line improved by 20%
3. Maintenance time reduced from 4 hours/day to Zero
4. Overcoming Design constraint for Process efficiency of BGA Tools- 50% cost reduction, 80% lead time reduced.
5. Improving the life cycle of consumable spare parts in Test Fixture by insertion method – 5x lifetime improved.

The Future

BoENG:

Build use cases using this framework like detection and prevention of unauthorized connection/usage of CPE's in operator network bought from other operators.

AMRO:

Onboarding multiple/new vendors with ease to the existing solution to be a user-friendly solution to the customers.

To explore the possibility of other modes of localization like on-board cameras of AIV/AGV and indoor positioning feature of 5G networks

Leveraging Process efficiency thru Additive Manufacturing Technology:

Exploring the feasibility of implementing AM manufacturing technology to manufacture low volume product parts



Dr. Reddy's Laboratories

For nearly four decades, Dr. Reddy's Laboratories have stood for access, affordability and innovation based on the bedrock of deep science, progressive people practices and robust corporate governance.

With a presence in 66 countries, we have grown steadily from its origins in bulk drug manufacturing into an integrated global pharmaceutical enterprise.

Our capabilities include research and development expertise, end-to-end manufacturing know-how and progressive digital technology to deliver on our promises to patients around the world.

Our strengths facilitated us to gain significant competitive advantages with End-to-End Process integration for being the First to Market Enabler, obtain pricing advantage, speed of development and improve reliability.

Our core value of sustainability drives our resolve to address societal needs and guides our ambitious ESG goals for the next decade, contributing to a fairer and more socially inclusive world.



The Innovation:

Our Purpose is to provide accelerated access to affordable and innovative medicines because 'Good Health Can't Wait'. We drive patient and customer focused innovation in all areas using cutting-edge science, technology and tools.

Innovation being the engine for growth to strengthen our core business (The Next) and to build the future business (The New). Purpose Driven, Future Ready and Sustainability form the key 3 levers which drive innovation engine.

Patient Centric Innovation (to meet unmet needs) forms the core to what we do, by bring in expensive products within reach through innovative scientific approaches to build novel methods and techniques that simplify complex chemistry problems.

Open Innovation Model helped us do more with limited resources and crowd-source ideas for our complex product delivery challenges. We combined our in-house efforts with an open-innovation model of partnerships to make available a portfolio that included a vaccine, and therapeutics for mild, moderate and severe COVID-19. Dr. Reddy's has led multiple consortiums bringing many initiatives to provide care and access to patients across the world.

The Approach

1. TA road-map creation
 - a. Connecting the dots to reach desired TA rank aspiration
 - b. Gather meaningful insights in disease area, pills and pills+
 - c. Building a road-map to strengthen TA presence
 - d. Identify opportunities to strengthen TA presence
2. Idea Generation & evaluation
 - a. 7 sources of idea generation
 - b. In the identified framework, respective CFT SPOCs would evaluate ideas from 7 sources of ideas.
 - c. Objective is to arrive at a TA-wise idea bank based on CFT evaluation.
3. Idea screening, prioritization & leadership presentation
 - a. Once a Final TA idea bank is prepared, ideas will be scored based on their market potential and product differentiation / concept attractiveness and prioritized.
 - b. These recommendations will be presented to leaders and shortlisted ideas will be taken forward.
4. Product Selection Process
 - a. For the shortlisted ideas, pre-apex diligence will be initiated, with the new attribute analysis and std. forecast model.
 - b. The products will be taken through the selection funnel and finally presented in apex forum for a final decision.

The Benefits

- 674 Million lives touched in 66 countries so far, through affordable innovations. Aiming to touch 1.5 bn people by 2030.
- Bringing expensive products (157 new product launches) within reach through innovative scientific approaches
- Innovating to lead & build the future from complex drugs to comprehensive disease management solutions
- Serving unmet patient needs through our COVID portfolio & differentiated generics
- Doubled product pipeline and output over 3 years - by using innovative R&D, manufacturing technologies and digital & analytics adoption

The Future

- Building the future from Complex Drugs to comprehensive Disease management solutions
- Focused on creating the future while navigating industry-wide near-term challenges. Industry is facing a shift and we are innovating to lead
- Deepening our presence in nutraceuticals, the discovery and development of immuno-oncology NCEs at our subsidiary Aurigene Discovery Technologies Limited and strengthening our CDMO services.
- We are also exploring new spaces such as digital healthcare services, clinically differentiated assets, biologics and cell & gene therapy, and disease management.
- Together, we see these businesses as our horizon 2 of growth, i.e., long-term growth prospects

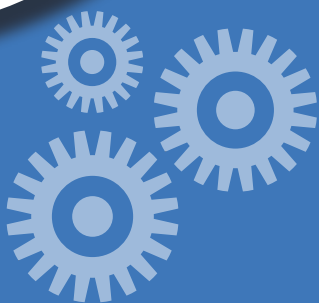


Tata Steel



Tata Steel group is among the top global steel companies with an annual crude steel capacity of 34 million tonnes per annum. It is one of the world's most geographically diversified steel producers, with operations and commercial presence across the world. The group recorded a consolidated turnover of US \$32.83 billion in the financial year ending March 31, 2022.

A Great Place to Work-Certified TM organisation, Tata Steel Limited, together with its subsidiaries, associates, and joint ventures, is spread across five continents with an employee base of over 65,000. Tata Steel has been a part of the DJSI Emerging Markets Index since 2012 and has been consistently ranked amongst top 10 steel companies in the DJSI Corporate Sustainability Assessment since 2016. Besides being a member of ResponsibleSteel TM, worldsteel's Climate Action Programme and World Economic Forum's Global Parity Alliance, Tata Steel has won several awards and recognitions including the World Economic Forum's Global Lighthouse recognition for its Jamshedpur, Kalinganagar and IJmuiden Plants, and Prime Minister's Trophy for the best performing integrated steel plant for 2016-17. The Company, ranked as India's most valuable Metals & Mining brand by Brand Finance, featured amongst CII Top 25 innovative Indian Companies in 2021 and top 10 sustainable organisations of India Hurun Research Institute in the 2021 Capri Global Capital Hurun India Impact 50, received Steel Sustainability Champion recognition from worldsteel for five years in a row, 'Most Ethical Company' award 2021 from Ethisphere Institute, RIMS India ERM Award of Distinction 2021, Masters of Risk - Metals & Mining Sector recognition at The India Risk Management Awards for the sixth consecutive year, and Award for Excellence in Financial Reporting FY20 from ICAI, among several others.



Innovation 1: Full Channel Stave Thickness Measurement Technique for Blast Furnace

A stave cooling system is a modern technology in Blast Furnaces. It is beneficial in terms of providing uniform cooling over a large area. But it is prone to continuous wear, as it forms the inner layer of the blast furnace wall, which is exposed to the relative motion of the raw material and hot gases. Therefore, periodic condition assessment of the wear condition of the staves is of high importance to prevent any catastrophic failure. In the past, 1G and 2G techniques were developed, but these are limited to thickness measurement only at a point, which is inadequate to represent the condition of the entire stave, as the wearing process is not necessarily a uniform. Hence, in this work (3G), a mini robot has been developed that can navigate through the intricate geometries of the channel and obtains the thickness profile for the entire channel.

After the success of the innovation at lab scale, it is being regularly used in all the blast furnaces of Tata Steel in India. The invention is protected for its IP rights by two patent applications, and as it is the only unique solution across the world, we are working on commercializing the solution to other steel industries also.

The innovation is achieved by combining three major technologies:

1. **Ultrasonic Thickness Measurement Technology:** Ultrasonic thickness measurement was done in water condition of the channel.
2. **Miniature Robot:** The robot enables the navigation of the ultrasonic probe through the entire cooling channel. The robot is designed innovatively with the provisions for self-guidance and alignment during the measurement.
3. **Materials Science:** The robot is made of a material, which can lose its rigidity in case of stuck-up. So, it eliminates the issue of stuck up during the measurement.

Following are the benefits of Full Channel Stave Thickness Measurement Technology,

1. **Safe Operation of Blast Furnace:** Regular condition monitoring of the staves aids in prevention of catastrophic failure due to massive water ingress from an unnoticed failure.
2. **Predictive Maintenance and Productivity:** Regular Condition monitoring of the staves not only ensures safety, but it also enable us to take proactive measures to replace the staves, so that it can avoid any productivity loss associated with it.
3. **Environmental Impact:** Running the BF with the failed stave till its repair, impairs the efficiency of the Furnace, which significantly impact the furnace performance in terms of carbon emissions.

As this technology is the only comprehensive solution across the world, it addresses the problem of stave thickness measurement for all the steel industries in addition to Tata Steel. Hence, we are working on commercializing the technology other steel industries also.

Innovation 2: WONDR - Graphene Doped Conveyance Solutions

Graphene Business is a derivative of Tata Steel's own technology material incubation. Since 2015, the business is developing applications and solutions to make this technology incubation into a profitable technology led business. For developing the same, the business has been working with the 3 pillars of technology led success –

1. **Sustainability:** Graphene is imparting strength to plastics as an alternative, replacing single use plastic and multi-layer tetra pack with recyclable single layer Sustainable packaging.
2. **Circularity:** Enabling complete multiple reuses of waste thermoplastic polymer with graphene doping. Step toward circular economy in thermoplasts.
3. **More use per unit:** Enhancing life of product with graphene infusion extracting more per unit and reduce consumption thereby resource conservation. Eg. Corrosion protection for over 7 years against 2-3 year from non-graphene paints.

The business has mastered the technology of doping graphene in thermoplastic systems for homogenous distribution of flakes imparting strength, thermal and wear properties to thermoplastic products.

The Business piloted the Brand in the market in FY22 with the name as “WONDRA – A TATA Product” and basis the response from market as well as leadership direction for accelerated growth of the product, it was re-branded as TATA WONDRA. The name WONDRA is, derived from the WONDER material Graphene. This Graphene enrichment tends to give a technology edge to the product over the competition. The fluid convenience product provides following benefits over the contemporary products –

- Improved abrasion value: HDPE Pipes for Slurry and Water Conveyance)
- Higher thermal stability & Pressure rating: CPVC pipes (Hot water, chemical conveyance)
- Both Solutions available with plastic welding to give excellent leak protection.

The envisioned world of WONDRA is to be a constructions solutions provider with following products categories,

1. HDPE Pipes – Water Projects & Industrial Uses
2. PVC Pipes – Plumbing, Agriculture & Soil Waste Rainwater Pipes
3. Construction Chemicals - Adhesives, Sealants & Water Proofing
4. Structural Solutions – Industrial Paints, Cements, Defenders, Protectors, Finishers & Decorators.

In 2019, Graphene business was integrated with New Materials Business Division of Tata Steel, embarking the commercial journey. Tata Steel made a double-digit revenue figure in FY21 and the business also showed a 7X growth in FY22. Currently the business has already delivered more than 100 Cr. in revenue till Q1 FY 23. This growth has come from WONDRA range of products, which contribute to more than 70% of the total business revenue. The Business envisions WONDRA to be a USD \$1Bn brand in the construction solutions segment by FY30.

Innovation 3: Sustainable Battery & Electrode materials from Steel Plant By-Products

The development is of confidential in nature, we won't be able to put up much info on this subject in public domain. Hence please do not include this case in compendium.

Innovation 4: Journey of Remote Operation Centre

TSL's journey of Remote Machines started back in 2000, when an indigenously developed Handheld remote was installed in a maintenance crane. Over the years, many of the overhead crane's operation converted into remotes but in 2016 we got a major technical breakthrough. For the first time in Steel Industry in India, Tata Steel converted one Torpedo (for carrying molten hot iron metal) Locomotive into Radio remote functioning for 24*7 Operation. After successful trial in one torpedo, the invention has been proposed for horizontal deployment. By 2018, all Torpedo locos inside Tata Steel Jamshedpur works have been converted into remote mode of operation.

Although the machines are enabled with onboard driverless operation, they had to be operated from the vicinity of the assets with a Joystick. Hence, the customer was not satisfied fully due to remaining safety hazards associated. So, it was envisioned to achieve a centralized remote machine operation centre first at a local site and then migrating to a further far site location with all integrated facilities. This required in-house expertise on two things –

1. Seamless machine control radio communication
2. Latency free Video streaming.

Seamless Fault free control communication was achieved through FHSS (Frequency Hopping spread spectrum) implementation in Hot Metal Torpedo locos. However, Focus was needed on achieving latency free Video transmission. Bench marking results was achieved in 2017, when the team provided a blast proof wall in Vessel Control room and successfully operated critical converters with the help of real time Video walls.

With the knowledge imparted from seamless radio & latency free video communication, the team attempted real time centralized remote operation of mobile machines at local site through the learning of Man-less Crane project whose proof of concept (POC) was successfully done in 2019. In that POC the team achieved auto and semi auto controls of scrap charging operation in a EOT (Electric Overhead Travelling) Magnetic crane.

This was 1st-of-its kind operation achieved in steel melting shops in Asia. The idea was seamlessly horizontally deployed in all scrap crane operations in Tata Steel Jamshedpur works. Now after benchmarking remote mobile machine operation in a local site, it was decided to strive for the next phase, which is operating an integrated plant from an integrated facility at far site location.

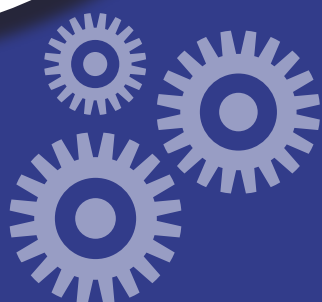


Forbes Marshall

Forbes Marshall helps build and sustain highly efficient plants by reducing waste, optimising process and energy efficiency, and by complying with regulatory requirements.

Forbes Marshall is a leading provider of energy and process automation solutions worldwide through innovative and differentiated offerings. Our distinctive sales approach delivers customer benefits. We have always taken pride in the way we offer solutions, exceeding customer expectations on quality and delivery. Over the decades, we have built a great place to work; one that thrives on diversity and benefits communities around the areas we operate in.

Forbes Marshall offers a wide range of products, solutions and services to help bring down the cost of steam throughout the process. With our instrumentation solutions we help Industry achieve better throughput, and reduced process time, resulting in better productivity and reduced cost of operation. Our range of water quality analysers and emission monitoring equipment help Industry comply with norms and regulations and reduce environmental impact.



The Innovation

With diverse industry experience and process knowledge, Forbes Marshall helps to improve quality, consistency and accuracy of processes in Industry. We provide complete turnkey solutions from design, detail engineering, drawing, documentation, supply, installation and commissioning of the simplest to most complex industrial processes.

Plants often face hurdles in achieving KPIs, like

- Lower availability of raw material but higher plant installed capacity
- Variation in raw material quality leading to varying product quality
- Variations due to manual operation
- Productivity during peak season
- Rising cost of fuel.
- Capacity utilisation
- Price realisation of end product on account of variations in quality
- High energy consumption
- Lack of sustenance of the energy efficient techniques employed

This results in stress on the profit margins.

Through our range of intelligent MAC systems, Forbes Marshall delivers an end-to-end solution for higher productivity, energy efficiency and consistency in quality to help address these issues. The MAC packages are customised for high steam consumption applications that are critical to product quality, in industries like Food and Beverage, Pharmaceutical and Chemical, Textile and many more. Some of these are

- Desolventising toasters in solvent extraction plants (CII Most Energy Efficient Product Award, 2020)
- Multiple effect evaporators in process as well as for ETP applications
- Dryers for process drying
- Vertical drying range in textile plants

The optimisation control algorithm for the MAC packages is based on artificial intelligence and machine learning to minimise the human set point interference and deliver higher benefits.

The performance of these systems is further enhanced by digital services which ensure timely intervention of experts to ensure 90% system uptime and sustain the savings.

The Approach

The Forbes Marshall MAC packages have been developed systems with a very thorough, knowledge centric approach.

The methodology included a well defined need finding process documenting customer observations. Quality of raw material, which is not control of the plant, is the biggest contributor to variation in input parameters. The PAC packages are designed to handle variations in input parameters such that the system manages and controls set parameters, and the output does not vary much.

The Benefits

A typical 20% steam saving is observed. However, parameters vary from plant to plant, and, and a thorough understanding of operations is required before the final potential is mapped. Even if input raw material is changed, the set points adjust themselves in due course, eliminating the need of different set points and different tabs for different input material.

Consistent output quality and better control on output parameters at part loading are added benefits.

The Future

Taking forward the recorded success, developments are on for an extended application list. The control philosophy is being standardised to smoothen the installation and commissioning procedure. Plants will thereby gain flexibility in operations.

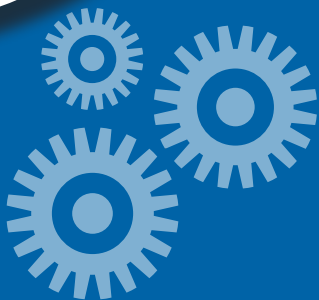


KONE

At KONE, our mission is to improve the flow of urban life. As a global leader in the elevator and escalator industry, KONE provides elevators, escalators and automatic building doors, as well as solutions for maintenance and modernization to add value to buildings throughout their life cycle. Through more effective People Flow®, we make people's journeys safe, convenient and reliable, in taller, smarter buildings. In 2021, KONE had annual sales of EUR 10.5 billion, and at the end of the year over 60,000 employees. www.kone.com

About KONE India

KONE's presence in India dates back to 1984 and today it is the leading elevator company in India. Based in Chennai, KONE India serves customers all over the country through its 50+ branches and provides sustainable People Flow™ solutions for India's rapidly growing cities. It employs 5000+ people in the country. KONE's production unit in Chennai produces elevators for the Indian market as well as for Bangladesh, Bhutan, Nepal and Sri Lanka. KONE's global technology and engineering center in Chennai, which is one of the largest global R&D centers, which supports the latest technology and development of future KONE solutions. www.kone.in



The Innovation

Together with our customers and partners, we constantly strengthen our position as innovation leader in our industry. Awarded 8 times, The world's most innovative companies by FORBES and the only elevator company to feature there. At KONE, with our strong R&D we hold more than 3,000 patents across our businesses.

It is by understanding urbanization; focusing on improvements for people and anticipating the needs and opportunities for people – that we can develop innovations and breakthroughs which help improve People flow in buildings and make our cities better places to live. Few examples of KONE's breakthrough innovations

- **KONE ECODISC® MOTOR**

The KONE EcoDisc hoisting motor is the heart of KONE's elevator solution. The machinery was completely renewed in 2012 providing several advantages. The new innovative copper winding system reduces the amount of energy lost as heat, making KONE elevators even more energy efficient than before. The compact design eliminates the need for machine room in the building, thereby saving construction time and space. This innovation not only changed the elevator industry but also impacted the construction industry in the way the buildings are built across the world. <https://www.kone.in/about-us/kone-as-a-company/innovations/>

- **KONE ULTRAROPES®**

The latest in a long line of technological breakthroughs, KONE UltraRope®, sets a new benchmark for high-rise buildings. The super-light KONE UltraRope technology provides unrivalled elevator eco-efficiency, reliability and durability, while also improving elevator performance. It eliminates the disadvantages of existing steel ropes – high energy consumption, rope stretch, large moving masses, and downtime caused by building sway. KONE UltraRope can enable future elevator travel heights up to 1,000 meters. <https://www.kone.in/about-us/kone-as-a-company/innovations/>

- **KONE DX CLASS ELEVATORS - CONNECTING MORE THAN FLOORS**

KONE DX Class elevators, the world's first elevator series with built-in digital connectivity. KONE DX Class elevators bring a new user experience to life through a combination of design, technology, new materials, apps and services.

The new KONE DX Class enables customers to tailor and plug in additional software and services for elevators throughout the entire lifetime of a building. By using open application programming interfaces (APIs), KONE's approach makes it easy to manage and integrate with our elevators different smart equipment, devices, apps and services in a building. For elevator passengers this brings a host of new, multisensory experiences inside the elevator, combining physical hardware and digital services. <https://www.kone.in/dx-class-elevators/>

The Approach – DX Class Elevator Series

We have adopted customer centric approach to conceptualize, design and build the DX solution. Bringing capabilities to co-create with customers and partners helped us to best meet fast-changing requirements. Our approach with the new technologies like Application Programming Interface (APIs) enabled an adaptable solution to the changing building needs by integrating different smart systems in a building space providing a Seamless People Flow Experience for the users.

As new ecosystems emerge around smarter cities and smarter buildings, the DX class elevators provides huge potential with the integration of building design services and other utilities in the most Sustainable ways possible.

The Benefits

For buildings that aspire to be forever Intelligent, every KONE DX Class elevator provides:

- The option for customers to easily and remotely activate digital services when they need to, like KONE 24/7 Connected Services, Elevator remote call, Media screens etc
- Secure APIs for third-party solutions, which create new and exciting possibilities to integrate with other service providers like robotic systems, access control, Visitor management systems and other smart building applications to bring new levels of sophistication to the people flow experience.
- To the end users we bring in multi-sensory experience with Advanced Dynamic Display of sound and light transforming the ambience of the elevator.
- Mobile applications that empower our customers with flexibility to enable different services for ex KONE Remote Call, KONE Sound Light etc

The Future - DX Class Elevator Series

At KONE, we are merging the technologies of tomorrow with the buildings of today to put the 'SMART' into Smart buildings. KONE DX Class revolutionizes the role of elevators in future smart buildings: the elevator is no longer merely a way to travel between floors, but an integral and integrated platform that offers intuitive, ambient and connected experiences that extend from the lobby throughout the building. For KONE customers the key advantage is the ability to adapt and upgrade the elevator experience according to needs now and in the future thereby future proofing the buildings.



Bharat Heavy Electricals Limited



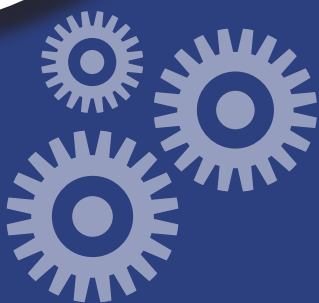
BHEL is India's largest engineering and manufacturing enterprise in the energy and infrastructure sector. Established in 1964, we are a leading power equipment manufacturer globally and one of the earliest and leading contributors towards building an Aatmanirbhar Bharat. We serve our customers with a comprehensive portfolio of products, systems and services in the areas of power-thermal, hydro, gas, nuclear & solar PV; transmission; transportation; defence & aerospace; oil & gas and new areas like BESS and EV chargers.

Right from developing country's power generation capacity to creating multiple capabilities in country's core industrial & strategic sectors, BHEL is deeply aligned to the vision of a selfreliant India. Consistent expenditure of more than 2.5% of its turnover on R&D and innovation; establishment of worldclass manufacturing assets, development and absorption of new technologies; and creating sustainable business solutions and initiatives in skilling youth, promoting health & hygiene, education, cleanliness and environment protection, stand as a testimony to our commitment to contribute not just to our business interests, but also to society at large. A skilful and motivated workforce, currently more than 30,000 strong, is the driving force behind our journey over the years.

Company's pan-India presence includes a network of 16 manufacturing facilities, 2 repair units, 4 regional offices, 8 service centres, 3 active joint ventures, 15 regional marketing centres, 3 overseas offices and current project execution at more than 150 project sites across India and abroad. BHEL manufactures a wide range of high quality & reliable products adhering to national and international standards.

The worldwide installed base of power generating equipment supplied by BHEL exceeds 194 GW, making it the undisputed leader amongst Indian power plant equipment manufacturers. Having installed more than 1000 thermal, hydro, nuclear, gas and solar PV based power generating sets in the country, the company is actively engaged in building strong foundations for cleaner and greener energy generation and usage in future with critical technologies coal to methanol.

BHEL is a name to reckon with in various sectors of Indian capital goods industry. This is evident from supply of traction equipment for significant number of locomotives & EMUs of Indian Railways; commissioning of 225+ electric substations and 6 major HVDC projects in the country; being the largest manufacturer and supplier of power transformers and electrical AC machines in the country, and 1.2GW+ solar portfolio spread across the country.



The Innovation:

BHEL has been a leader in the area of R&D and innovation in the country and over 21% of the company's revenues have been achieved from in-house developed products, systems and services in FY 21-22 and 5,208 IPR's have been filed till date. The company has one of the highest R&D spends in the engineering industry with consistent expenditure of over 2.5% of its revenue over past many years. Major themes taken up under BHEL's R&D program are in sync with the national priorities and company's long term vision.

With the ongoing energy transition and focus on clean energy and the country's imperative to utilize its vast reserves of coal for energy security, BHEL has taken-up clean coal technologies as a major focus area. To provide cost effective and efficient solutions for reducing emissions from thermal power plants, your company has been focusing on indigenization of various products and systems for emission control equipment. Concerted efforts in the past year resulted in-house development of cost effective corrosion resistant polymer coating to replace imported and expensive C276, slurry recirculation pump, oxidation blower, etc., for FGD systems.

The company has also completed the design of Advanced Ultra Super Critical (AUSC) technology jointly with NTPC and IGCAR having best-in-class efficiency and lowest emissions. BHEL has also indigenously developed gasification technology for high ash Indian coal and commissioned a 0.25TPD coal to methanol demonstration plant at Hyderabad. Focused efforts are now being made for indigenization of syngas to chemicals technology which will help reduce the country's import bill. Usage of coal will necessitate requirement of technologies for Carbon Capture and its utilization as well as sequestration wherein BHEL aspires to be a leading player.

The Approach

The R&D structure of the company is headed by Director (E, R&D), supported by Corporate Technology Management (CTM) and Corporate R&D divisions, at apex level. While CTM is mandated to formulate company's innovation/ technology strategy, Corp R&D Division works towards in-house technology development. The R&D efforts are complemented by a dedicated Research & Product Development (RPD) group, in various product groups at manufacturing units.

These groups are well supported by well-equipped state-of the- art R&D infrastructure. BHEL has 14 Centres of Excellence at Corporate R&D Hyderabad (e.g. Intelligent Machines and Robotics, Machine Dynamics, UHV Laboratory, Computational Fluid Dynamics, Permanent Magnet Machines, etc.), HPBP Tiruchirapalli (e. g. Coal Research Centre) and EDN Bengaluru (e. g. Power Electronics, IGBT & controller Technology).

BHEL also has 5 Specialized Research Institutes, namely Pollution Control & Research Institute (PCRI), Haridwar, Welding Research Institute (WRI), Trichy, Ceramic Technological Institute (CTI), Bengaluru, Centre for Electric Transportation (CET), Bhopal and Amorphous Silicon Solar Cell Plant (ASSCP), Gurugram.

Industry-academia collaboration is a key determinant of success of application of innovation for product as well as process improvements. BHEL has partnered with leading academic and research institutions of the country including IITs, NITs, CSIR, ARAI, etc. to carry out research in identified areas.

The Benefits

BHEL's R&D efforts for development of new and improved products, processes and systems have resulted in following major developments:

- BHEL has indigenously designed, installed and demonstrated a 0.25 TPD methanol generation technology demonstration plant using high ash Indian Coal at Hyderabad. The plant has produced Methanol with purity of more than 99%. Conversion of high ash Indian coal to methanol through gasification route is the first of its kind technology demonstration in India.
- BHEL has manufactured and supplied electrics for 3-phase Ethernet-based AC Mainline Electric Multiple Unit (MEMU) train with state-of-the-art Train Control Management System and Regenerative Braking system.
- BHEL has developed a compact 122 kW DC fast charger for charging Electric Vehicles (EVs) to meet the emerging way side charging infrastructure business, which has successfully passed the certification tests at ARAI, Pune.

- BHEL has developed 3-5 kW Proton Exchange Membrane (PEM) Fuel Cell Stack with high power density fuel cell for E- mobility applications.
- Successfully developed 4 inch C150 Class Motor Operated Gate valve and tested at Fluid Control Research Institute (FCRI), Palakkad for Nuclear power plants applications.
- Successfully designed, manufactured & tested highest rating 1605 kW / 6.6 KV motor for export project, in line with IS/IEC 60079-7:2015 with additional purge facility for hazardous area application motors.

Under “Make in India” initiative:

- Indigenously designed, manufactured and tested prototype slurry recirculation pump for handling wet limestone based slurry for FGD application.
- Developed aero-thermal design of top pressure recovery turbine (TRT) of 30 MW capacity and generation of performance maps with inlet guide vane mechanism (IGV) for blast furnace application in steel sector.
- Developed aero Mechanical design of motor driven multistage axial compressor 5,40,000 Nm³/Hr capacity with multistage guide vane system for blast furnace application in steel sector.
- Completed design and development of Oxidation blower with handling air capacity of 9650 Nm³/hr with Shear ring design for 1x660 MW Flue Gas Desulphurization (FGD) applications.
- Developed, tested and supplied one Air to Air Heat Exchanger (AAHE) for Su-30MKI aircraft.
- Developed Pre-cooler for Advanced Light Helicopter.

The Future

BHEL's R&D focus is building and consolidating R&D capabilities in the following emerging and existing areas

- Total solutions for rail transportation in areas of three phase AC drive system for electric locos & Electric Multiple Units (EMU), high powered locomotives.
- Post successful development & demonstration of coal gasification technology, specifically for high ash Indian coal, your company is working to develop indigenous technology to generate chemicals and green fuels (methanol, hydrogen, etc.) from syngas.
- Development of high efficiency solar cells, grid connected renewable energy Solar PV applications.
- Products and systems such as aero structures, marine gas turbines, Li-ion battery system, heat exchangers, etc., for defence and strategic applications.
- Development of solutions for E-mobility ecosystem including power train, charging stations, energy storage systems, etc.
- Products & systems for Hydrogen economy and fuel cell applications.
- Application of Industry 4.0 with deployment of new technologies including intelligent machines & robotics and Advanced Manufacturing Technologies.
- Products for downstream oil and gas sector
- Products and systems for Nuclear power plants.
- Products and systems for digital substation and advanced power transmission like ± 800 kV HVDC, 765 kV, 1200 kV transmission systems.
- Indigenization of higher capacity axial compressors for blast furnace in Steel industries under the AatmaNirbhar Bharat Abhiyaan
- Indigenization of Flue Gas Desulphurization (FGD) systems technology which will also help reduce the import bill of the country.



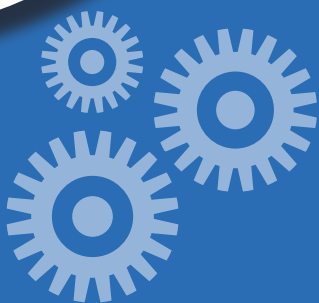
Tata Chemicals Limited

A part of the over \$100 billion Tata Group, Tata Chemicals Limited is a global company with interests in businesses that focus on essentials for LIFE: Living, Industry and Farm Essentials. The story of the company is about harnessing the fruits of science for goals that go beyond business. The Company manufactures inorganic chemicals, crop protection, agriculture inputs, and nutritional solutions.

The company has a strong position in the crop protection business through its subsidiary company Rallis India Ltd. Tata Chemicals has world class R&D facilities in Pune and Bangalore.

Our Innovation Centre, today, is home to world-class R&D capabilities in nanotechnology and biotechnology.

- Delivering high performance for stakeholders
- Caring for the community
- Nurturing a committed and passionate workforce



The Innovation

High Dispersible Silica:

High dispersible silica (a patented product) produced by Tata Chemicals Limited (TCL) is amorphous in nature developed through patented processes from an agro-waste. Novel method of synthesis, customization of structure, morphology, particle size, surface area & particle porosity makes it unique for making greener tyres and replacing carbon black.



Fructo-oligosaccharides:

Fructo-oligosaccharides (FOS) are the prebiotic dietary fibre to address lifestyle related disorders such as obesity, diabetes, digestive and cardiovascular ailments become major concerns in recent times. TCL's Innovation team developed fermentation based, solely indigenous, patented, economically viable and competitive process for production of FOS. Technology allows transforming sugar into a prebiotic molecule used as a sugar replacer without adding any calories. FOS is a dietary fiber and replaces sugar without adding calorie.



Foam Admixture for Precast Concrete

Our pre-cast cement admixture performs better than the standard cement in terms of high early strength (40% more day one strength), rapid hardening, high density and whiteness.



Aeroponics and Hydroponics for High Value Extracts

A sustainable process of growing plants in an air without the use of soil, reduces the water usage is leveraged to grow high value medicinal plants to increase the efficacy of bioactive compounds to address health and wellness areas has been implemented.

Tata Chemicals has developed the Biobased Surfactant which is a Replacement of dominant petroleum-based surfactant. Part of it's sustainability objectives Tata Chemicals has established UK's 1st Industrial scale Carbon Capture and utilization plant (liquid CO₂) to manufacture Food and Pharma Bicarbonate. Tata Chemicals shall continue to develop sustainable technologies based on the principles of green chemistry.



Tata Motors Passenger Vehicles Ltd

Tata Motors Passenger Vehicles Ltd



Bharat Fritz Werner Ltd. (BFW)



Bharat Fritz Werner Ltd. (BFW) is India's leading machining solution provider with the most comprehensive range of offerings in all types of CNC machines, automation, and aerospace applications. BFW started our journey in 1961 and was the first Indian Private Sector company to introduce CNC Machining Centres. Over 60,000 BFW machines are in use in 15 countries worldwide. Most of the best-known companies in manufacturing use BFW machines for very critical applications. BFW's commitment to customers has led it to hone its skills in design, innovation, and technology and create more futuristic products which have been recognized with various awards for decades. With 1000 plus professionals, 500 plus engineers, and a well-resourced Dr. Kalam Center of Innovation, BFW has created internationally recognized product breakthroughs.

Headquartered in Bangalore and a Kothari Group company, BFW has Two Digitally connected factories and 48 Sales and Technology Centres.



The Innovation

A Spindle Expert System is proposed to bring ease for spindle designers where the pre-calculations and a data library can make the spindle design process faster and more accurate. In another project, the spindle variants were brought down to 1/3rd of the existing types of spindles. This ultimately helps focus on a few variants for their improved quality. A modified version of the motorized and the inline high-speed spindles has been designed and analyzed as an improved product in the spindle portfolio.

The research project related to the development of alternate materials for the machine tool structures has now been identified with the name of iCTech, one of the patented trademarks of the BFW R&D center. Several machine structures were transformed into stiffer vibration reluctant components with this technology. The R&D looks further to bring iCTech into the standard machine range as a green, cost-effective, and quality performance option.

A novel intelligent real-time thermal control model (iRTC) has also been patented and is ready for commercialization. The first module is dedicated to controlling the smart technique of chiller coolant. The second module addresses the impact of ambient temperature fluctuations on the machine structure. The third module focuses on the compensation of the tooltip due to thermal distortions inside the spindle while running at different speeds. Altogether these three modules address most of the thermal issues while leading to the best possible precise components.

For the sake of the future of nature and the planet, a novel technology has been developed to transform industry and foundry waste into value-added civil construction materials. The lightweight foam concrete bricks were developed using up to 90 weight percent made of industrial waste materials. Moreover, a novel concrete material that can act as a raw material for concrete 3D printing has been developed.

The Approach

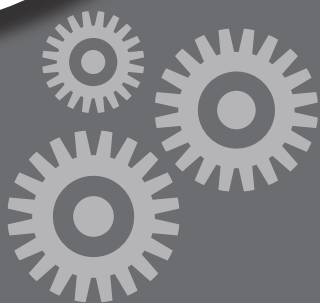
The basic theme of R&D works on four major pillars of the machine tools system. The Spindle, being the most important, is a major stream for R&D to innovate continuously. It is followed by machine structures where the machine design, joint design, and the machine structure material are considered as fields where R&D can introduce breakthrough innovations. The third pillar is technology development with which existing machines can be leveraged to their smart and intelligent versions. The fourth pillar of R&D is the stream where nature-caring sustainable techniques and products are being innovated.

The Benefits

This innovation made it possible to march into the category of high-speed high-precision machining centers. The spindle division introduced high-speed spindle development capabilities along with a spindle expert system. The structures hereafter are compulsory to go under the FE analysis in static and frequency-based mode shape analyses. This project produced world-class technologies with disruptions. It encouraged the industry to address the issue related to industrial waste material by focusing on sustainability. It has motivated the team with the publication of 10 patents and 8 proceedings as an output.

The Future

The roadmap ahead is to horizontally deploy this development across various machines across the product line. The waste-to-best project came well and has possibilities to establish as a new business under the naming of 3D concrete printing. The machine learning and Artificial Intelligence expertise will be expanded further keeping in mind the future of the industries.



SHRIRAM PISTONS & RINGS LTD.

Shriram Pistons & Rings Ltd.

SPRL is the largest Manufacturer of Piston, Rings, Piston Pin and Engine Valves in India with dominant Market Share in all Product Categories.

Being established in 1972, SPRL is now celebrating 50 years of excellence in manufacturing.

SPRL has KS Germany & HF Japan for Piston, Riken for Rings and Fuji Oozx for Engine valves as collaborators with equity participation of KS & Riken.

Manufacturing locations are spread over 3 locations (In UP & Rajasthan).

Turnover Target for the year 2022-23 is Rs 2500 Crore (with growth of 20% over 2021-22) with workforce is 5700+.

The Company Sales has grown at 2.5 times CAGR in the recent decade compared to Auto industry growth.

The company has a State-Of-Art Tech Centre to Support this Growth.

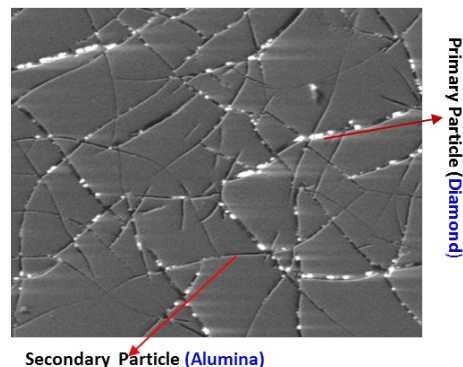
The Innovation 1 - New to Firm

New Surface Coating (CPC 500)

Development of Diesel engines in future will put the piston rings under severe heavy working environment of high pressure and temperature resulting into lower durability and reliability. However only strengthening the piston ring coating poses a challenge of high wear of its mating component i.e. cylinder wear.

Therefore to strike a balance between scuff/wear resistances of piston ring and avoid excessive wear of cylinder liner, CPC-500 surface coating is invented.

Novelty of this innovation is to create a multilayer coating film of chrome composite with dual size crack matrix with combination of dual particle having different wear characteristics with specified aspect ratios like diamond and alumina. This Innovation involves innovative work in the field of measurement technique for process and product quality characteristics & innovative machining/validation processes.



The Approach

After a thorough literature search on the subject of various research papers by institutions / laboratories, the team conducted various experiments to create different types of coating films having different tribological properties. Through these experiments, the various quality aspects were optimized to make a suitable balance between the tribological properties (wear & scuff resistance) of the layer & its impact on the mating component. Once the layer quality was optimized, the machining parameters were established on one hand and the measurement techniques were innovated for maintaining the process & product quality aspects for 'productionization' of the coating on other hand.

The Benefits

Durability of Piston ring Increased by 40% which enables OEM to guarantee B-10 life of 7 lac Km against existing norm of 5 Lac Km. for Heavy & Medium commercial vehicles.

This innovation also helped in reducing 'AIR POLLUTION' by complying ONBOARD DIAGNOSTICS (OBD 2) norms.

The Future

The Euro 7 emission regulation norms like cumulative NOx reduction per km and for CO & particulate number for heavy duty applications are being announced to be implemented in Europe. The same is also expected to be implemented in India very soon. This innovation will help to take care of the durability/reliability requirement of engine manufactures in the future for piston rings of Heavy duty application.

The Innovation 2 - New To Market

Friction reduction in Z-series Engine

Reduction of CO2 emission is a key challenge for all OEMs. In this journey of CO2 emission reduction, reductions of friction generated by Piston & Rings are essential. Friction reduction of these components is essential to meet target of CO2 emission reduction.

Technical studies done in past indicates that piston assembly contributes almost ~25% of the frictional losses in an engine. Within this Friction losses, Piston skirt alone contributes 14% in this friction loss.

To meet CAFÉ - 2 norms (for CO2 emission), one of the leading OEM gave us a target of 13% reduction in piston skirt friction.



The Approach

Optimization of Piston skirt roughness profile along with skirt coating plays an important role in friction reduction under mixed lubrication & hydro-dynamic lubrication condition of engine under operation.

The engine conditions along with skirt roughness & various available coating options were simulated through softwares to funnel down the options for experimentation.

Further physical samples with 3 roughness profiles with 2 coating options were but to test to see the effect of friction reduction.

The Benefits

Based on the optimized solution greater than 20% reduction of friction force was achieved at the RIG testing done at Tokyo University, Japan under both mixed & hydrodynamic lubrication.

This achievement has enabled SPR to secure the business from the OEM.

The Future

As more focus is given to CO2 emission reduction for New engine development, SPR`s innovative approach will allow us to participate in more business & help the Customer/Country to achieve its goal of CO2 emission as committed in COP26.



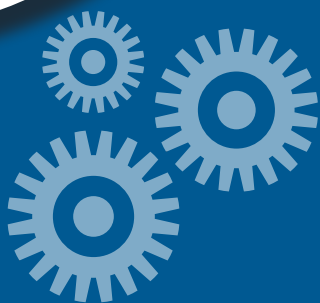
SEG Automotive



SEG Automotive (erst while a division of Bosch) is a company with a good standing in the automobile components sector for more than 100 years delivering high-performance, durable and competitive products with uniform quality standards to all OEM's worldwide. This global strength has its foundation through a cross-cultural team of over 7,000 employees in 14 countries in the world's most important automotive markets.

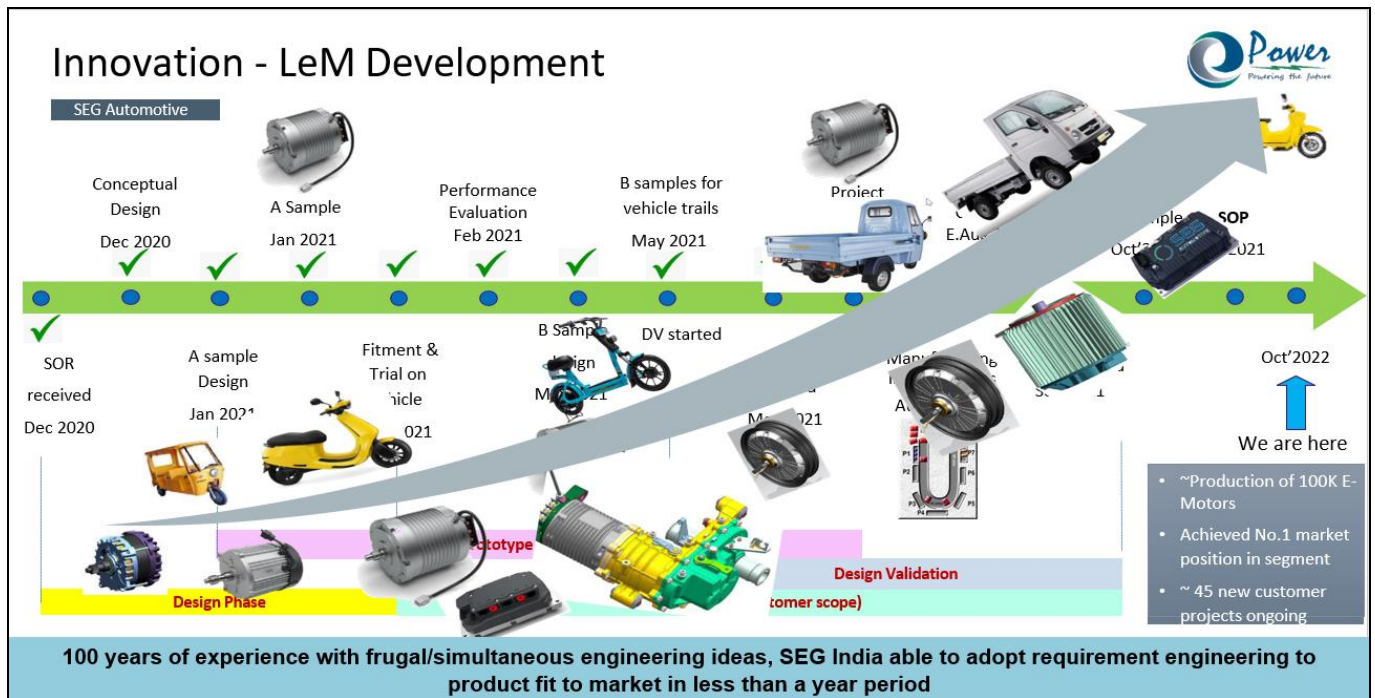
With its Innovative approach, new product development, application engineering and operational excellence, SEG continuously strive to meet their customers' requirements.

SEG Through its innovative products and solutions contributes to environment by significantly reducing CO2 emissions from passenger cars and commercial vehicles across all powertrain technologies in India and globally.

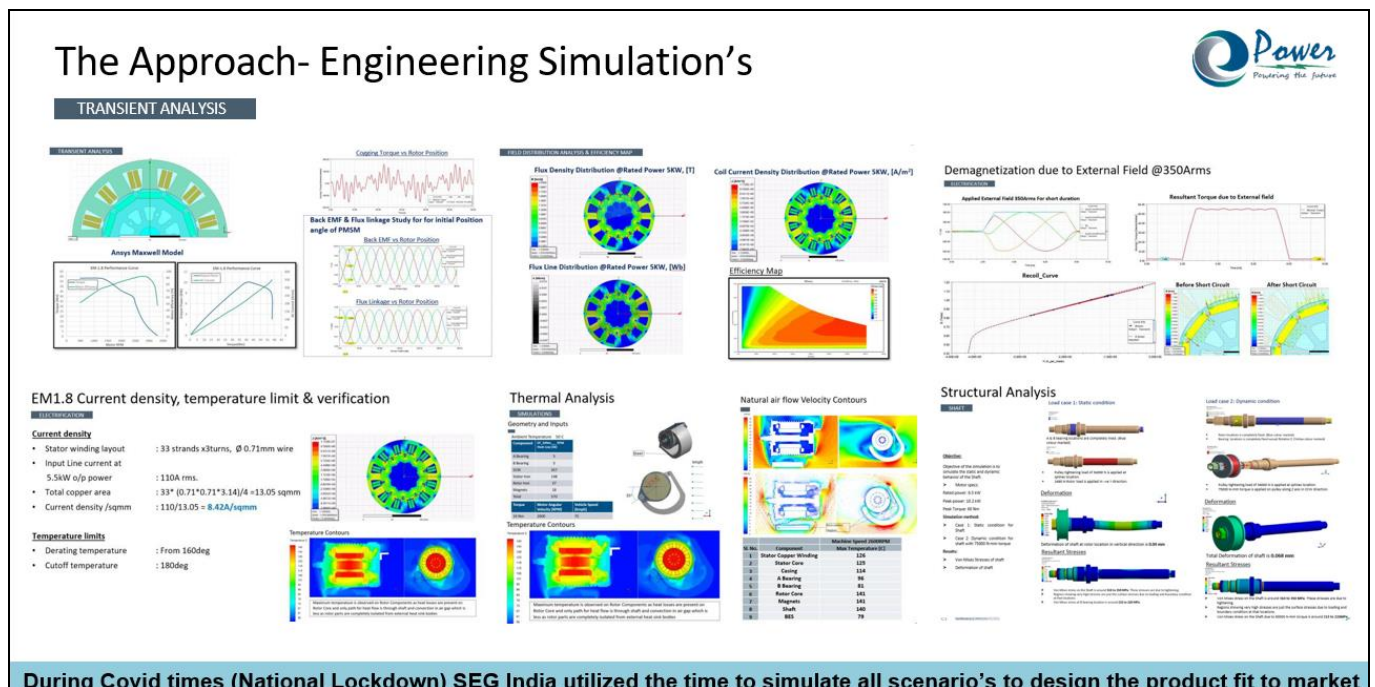


The Innovation

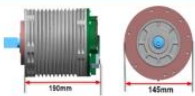





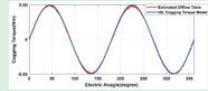
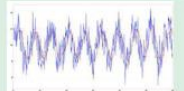


Pioneering Introduction of Light Electric Mobility to cater to emerging mobility market through Design and Development, Supply chain development and establishment of manufacturing capability/facility ensuring >80% localization to promote "Make In India". SEG introduced wide range of mid mount and hub mount motor solutions to cater to the growing needs of LEM market.



The Approach



The Benefits

SEG USPs	Customer Benefit
<ul style="list-style-type: none"> Modular Concept 	<ul style="list-style-type: none"> Easy upgrade Quicker time to market Manufacturing synergies 
<ul style="list-style-type: none"> Customized solutions for vehicle architecture 	<ul style="list-style-type: none"> Enhanced user experience Multiple drive modes 
<ul style="list-style-type: none"> PMSM technology w/ Sinusoidal wave form >90% efficiency 	<ul style="list-style-type: none"> Increased range Better control Improved thermal stability, reduced heat losses 
<ul style="list-style-type: none"> Low cogging torque 	<ul style="list-style-type: none"> Smooth ride Optimized NVH Performance 
<ul style="list-style-type: none"> Optimized system solution Motors, Controller, Gearbox, Display unit w/ IOT 	<ul style="list-style-type: none"> One stop solution 

The Future

SEG Automotive Future	<ul style="list-style-type: none"> E-machine: SEG Automotive to develop scalable e-machine concept for the entire portfolio <ul style="list-style-type: none"> Phase 1: LEM – India as engineering competence centre Phase 2: Light commercial vehicles – Explore strategies Phase 3: HV – Global synergies Controller: Partners / in-house, to be evaluated per segment Gearbox for 3wh ✓. Transmission solutions for other segments – Global synergies Voltage level 48V up to 800V
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Thermax

Incorporated in 1966 as Wanson India by A.S. Bhathena, Thermax Group is headquartered in Pune, India. The Group has grown into a leading conglomerate in energy and the environment space, strategically spreading its operations to markets worldwide, catering to a gamut of industries. Thermax offers integrated solutions in heating, cooling, power generation, water treatment and recycle, air pollution control, and chemicals with a focus on ensuring clean air, clean energy, and clean water. We operate globally through 34 international and 22 domestic offices, 14 manufacturing facilities – 10 in India and 4 overseas, spanning Europe and South East Asia. Thermax's presence extends to over 90 countries and support customers through an extensive service network spread across Asia, South East Asia, the Middle East, Africa, Europe and the Americas. The Group consists of 10 wholly-owned domestic subsidiaries and 22 wholly-owned overseas subsidiaries.



Innovation 1: Coal to Chemicals

India has taken initiatives for utilizing coal through 100 MT coal gasification by year 2030. Thermax and IIT-Delhi have jointly developed Oxy-blown fluidized bed gasification (FBG) technology with indigenous efforts for a variety of Indian coal (Ash range 15%-50%) and have established a demonstration plant at Pune with support of DST, New Delhi. Fluidized bed gasifier converts high ash coal into syngas which is purified by passing through a gas clean-up system and finally converting the syngas to chemicals. FBG has advantages as it doesn't require coal washing or blending with high calorific value fuels and also works fine on lower coal size (<6mm).

The Approach

- Process integrates coal gasification, Syngas clean-up, CO₂ capture, and chemical conversion.
- R&D focused on catalyst, coal gasification, gas clean-up, materials along with IIT-Delhi.
- Industrial scale demo pilot plant.

The Benefits

- Indigenous technology providing opportunity to reducing India fuel import bill (\$110 billion).
- Benefiting steel industries: Replacement for coking coal by high calorific value syngas.
- Sustainable: CO₂ neutral coal utilization and converting it into value added chemicals.

The Future

Thermax's coal gasification technology provides pathway for establishing economically viable CO₂ neutral coal to chemical plants (~medium scale plant ~1000-2000 TPD coal).

Innovation 2: Revolutionary Air-Conditioning Technology THVAC for buses

Thermax's consistent quest for sustainable solutions resulted in THVAC for mobility industry. Catering to the most common demand of cabin comfort in buses and trucks with readily available engine exhaust heat, THVAC offers unique and efficient waste heat recovery (WHR) based comfort cooling solution. THVAC works on solid sorption heat pump principle & incorporates innovations like new sorbent materials, exhaust heat recovery and smart hybridisation with compressor to maximise fuel savings.

The Approach

- Develop pair of sorption materials & establish dry heat pump system.
- Smart hybrid with VC to provide cooling in case of exhaust heat deficit.
- Smooth integration with Bus without affecting regular operation.

The Benefits

- Fuel Saving with use of T-HVAC expected to be 40-60 % of conventional HVAC.
- Bus Fuel economy (FE) improvement of 5-7% (1.5-2.2 lit/100km).
- Use of natural refrigerant and >5% lower CO₂ emissions.

The Future

- Commercialization of THVAC in India for bus application and expanding it to global markets.
- Build new applications like truck cabin cooling, cold chain.

Innovation 3: Capacitive Deionisation

Capacitive Deionisation (CDI) technology which is an alternative to RO-based water purification system. CDI is a technique that uses charged, porous carbon-based electrodes to electrostatically remove ions from water. Upon application of a charging voltage, salt ions are transported and trapped within electrical double layers (EDLs) inside the porous carbon through electro-adsorption. The cell is then regenerated by discharging to release adsorbed ions. Thermax has developed and successfully demonstrated CDI technology to provide treated water as per the IS Standard 10500 and retains the required natural mineral.

The Approach

- The CDI system is designed to retain the natural minerals, hence remineralization is not required unlike the RO during drinking water treatment.
- In CDI, targeted pollutants viz, Arsenic, Fluoride, Nitrate etc. can be removed maintaining healthy minerals

The Benefits

- CDI provides 70 to 75% water recovery compared to 30 to 40% in RO.
- Operating power of CDI is 40% lower than RO.
- Make in India initiative by Thermax with in-house development.

The Future

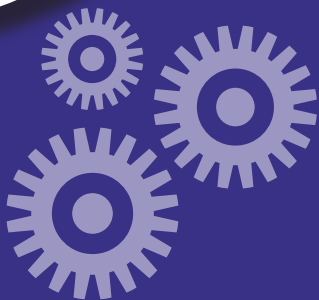
- Community drinking (Water ATM)
- Reuse of Wastewater
- Application in alkaline water & softening



National Engineering Industries Ltd. (NBC Bearings)

NBC Bearings is the brand of National Engineering Industries. Founded in 1946, National Engineering Industries Ltd (NEI) is India's leading bearings manufacturer and exporter, part of the US\$ 2.4 bn CK Birla Group. NBC manufactures over 200 million bearings per annum offered in 2300+ variants to serve a host of customers in India and over 30 other countries across five continents in automotive, railways, aerospace and industrial segments. NBC also serves the Indian aftermarket through a countrywide network of 550+ authorized stockists and thousands of retailers.

With an employee strength of over 2,800, NBC has five manufacturing plants in Jaipur, Newai (Rajasthan), Manesar (Haryana) and Vadodara (Gujarat) and one of the best R&D centres in India. In 2020, NBC acquired Kinex Bearings based in Europe. In 2022, NBC Global Ag opened its Global Technology Centre in Germany to support innovation and provide support to NBC's global growth.



The Innovation

‘Optimo X’ upgraded Class E Cartridge Taper Roller Bearings for Railways: To cater to high speed locomotives, the existing Class E CTRB bearings in wagon wheel application required to be upgraded to a maximum speed limit of 150 KMPH and load capacity 25 T per axle. NBC has come up with various design improvements for both requirements. For example, to increase speed and load capacity -finishing of raceways is improved, grease is changed to withstand high temperature at high speed, polyamide cage from steel cage to minimize friction and low torque seal. Further to validate the design changes, testing was carried out as per international standards. This resulted in Increased average speed of wagons resulting in more coverage miles in the same duration. Further, with increased capacity of bearings, wagons can carry 10% more weight of goods.

Low Torque Bearings: Only 10-15% of the fuel of automotive vehicle actually move the vehicle whereas the remaining fuel is lost in friction, pumping and heat losses. This situation increases overall cost of operating as fuel prices are increasing year on year. To overcome the current situation, at NBC, we have taken target of reducing up to 50% friction of existing bearings from current level. This demanded changes in internal design and geometry of raceway surfaces. After testing we were able to achieve the required results and same has been demonstrated to our customers.

Sensor Integrated Bearings: Currently EV motor manufacturers are using toothed gear with sensor for torque control of motor. This arrangement requires it's own space to accommodate in motor space, limiting motor designers for lightweight design with reduced space. NBC's Sensor integrated bearings provides required data for torque control of motor. Product has been tested against all mechatronic related tests to fulfill the requirement. Similar product technology is developed for 2W wheel application for ABS functioning which replaces conventional mechanical toner ring with speed sensor.

The Approach

NBC's R&D Centre is equipped with the latest CAD/CAM, tribology lab, material lab, smart bearing ecosystem, testing equipment. We constantly study trends shaping up around the world to get an understanding about the types of products that may be finding their way to the Indian markets. We are also closely engaged with our customers to understand their issues on the current products and provide best possible solution which often results in product innovations. While these innovations have ensured technological leadership, the experience gained in designing these are the most asset for the future.

The Benefits

‘Optimo X’ upgraded Class E Cartridge Taper Roller Bearings for Railways: This product enables saving natural resources, manpower efforts and enhance efficiency of Railways by reducing transportation cost and delivery time. Reduced friction in bearings will save fuel/electricity consumption during transportation.

Low Torque Bearings: With low torque bearings OEMs are able to increase fuel efficiency of their upcoming vehicles. At the same time, we are supporting our customers to meet government regulations of CAFÉ norms.

Sensor Integrated Bearings: This product would help OEMs to further reduce space and weight of system and thus enhance the fuel/battery efficiency. Additionally, OEMs need not maintain another child part in their scope.

The Future

NBC Bearings is focused on providing innovative and effective technological responses to help develop the right products for the industry worldwide. Our superior manufacturing capabilities, innovative design and product development combine with a flexible approach will continue addressing the market challenges and supporting nation-wide initiatives like Digitization, Care for environment, resource conservation etc.



Pidilite Industries Limited

Since its inception in 1959, Pidilite Industries Limited has been a pioneer in consumer and specialities chemicals in India.

Pidilite is a consumer centric company committed to quality and innovation. For decades, we have been pioneering products for small to large applications, at home and industry, which have forged strong bonds with people from all walks of life.

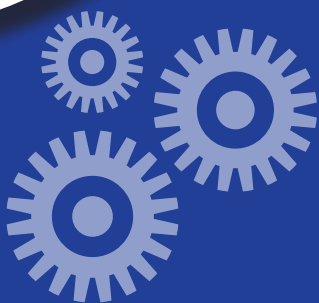
From adhesives, sealants, waterproofing solutions and construction chemicals to arts & crafts, industrial resins, polymers and more, our product portfolio is as diverse as it is ever evolving. Today, our brands are trusted household and industrial names, and we are the market leader in adhesives.

A robust and growing network makes our products accessible across demographics and geographies.

We also embrace our responsibility towards the community through social initiatives in rural development, education and healthcare.

Pidilite has been focusing on an innovation philosophy of Fewer, Bigger, Better, Faster, & Greener solutions.

We search for new ideas in everything we do. Our ideas often come from our customers. Understanding the market place and working with actual customers help us recognise new opportunities.



Pidilite's range of products in the bazaar segment solve unique problems for their users/ consumers and create value through superior performance, high convenience, and time/effort/ cost savings.

Similarly, its innovations for B2B segment provide unique, environment-friendly solutions for specific needs & applications. They deliver high-performance, cost-effective solutions which are compliant with stringent global standards.

Our approach & guiding principles are a) Build categories from underserved segments- identify, innovate & create iconic brands, b) Drive pioneering categories – partner with industry specialists, c) Link Organization to Innovation

- Over the last 4 years, PIL's Innovation Rate has improved from 2.5% to 7.5% (YTD 22-23) against internal ambition of 5% by 2023 and 10% by 2025 to rank amongst top decile Specialty Chemicals Innovators
- High proportion of Innovation success rate and acceleration in per Innovation Value
 - Average Revenue Potential/ Innovation has increased ~ 9x, from Inr 20 Cr/ Innovation as against historical average of Inr 2.2 Cr/ Innovation
 - 62% innovation projects in the portfolio
 - Focusing on Faster, Greener and Stronger solutions
- Innovation Pipeline Sufficiency is monitored and refreshed annually by all Divisions, and is adequate until FY 23-24
 - Healthy new products pipeline in place to meet the targeted Innovation rate
 - Overall contribution of New Products (including Critical/Star) in pipeline is maintained at > 60%

As a pioneering organization in future as well focusing on fewer, bigger, better, & greener Innovation as core to our vision, we would continue to create/build new categories from underserved segments and drive pioneer categories by partnering with industry specialists.



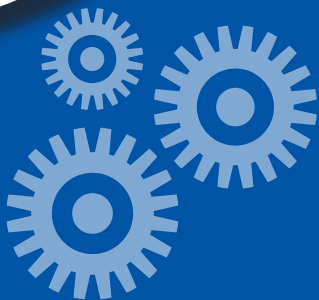
Dalmia Cement

Founded by Mr Jaidayal Dalmia in 1939, Dalmia Cement is one of India's pioneering homegrown cement companies. The company operates a manufacturing capacity of 35.9 MnT per annum (MTPA), across 14 cement plants and grinding units which are spread across 10 states.

The company offers a range of cement variants through its brand portfolio of three marquee brands: Dalmia Cement, Dalmia DSP and Konark Cement. Dalmia Cement is India's largest manufacturer of slag cement and is a category leader in super-specialty cement used for oil wells, railway sleepers, and airstrips.

Dalmia Cement is 13.3 times water positive and will be 20 times water positive by 2025. The company has also been ranked No. 1 in the global cement manufacturing sector by the Carbon Disclosure Project (CDP).

With 11,286 crores in revenue and 280.3 billion market capitalization, the company is building a beautiful tomorrow with a 'Future Today' thought process.



The Innovation

Infrastructure development is a necessity for a rapidly growing country such as India. The relentless surge of population needs to be matched with rapid development of urban infrastructure in a sustainable manner. In order to match the tremendous pressure from the infrastructure segment and drawing upon our “over 7-decades” experience and understanding of the dynamic Indian construction market and our passion to innovate to better serve our customer needs, a carefully engineered proprietary solution has been developed for Infrastructure segment - a HIGH PERFORMANCE cement called as Dalmia InfraGreen (Both Fly ash and slag based) conforming to BIS standard. This specially engineered cement is precisely aimed at speeding up infrastructure development and boost nation building process. Both the patents of the two variants of this cement have been granted by Government of India. It is a chemically modified proprietary cement with highly improved performance having clinker factor as low as 55% making it greener than any other commercially used high performance cement, at present. The use of very expensive performance enhancers like silica fume, micro silica etc. in concrete and shotcrete can be majorly or completely eliminated and the amount of chemical admixtures can be substantially reduced by using Dalmia InfraGreen in the concrete mix design. This makes the cost per cubic meter of the concrete cheaper than/comparable to conventionally used concretes and shotcretes. Dalmia InfraGreen has been assessed by several government institutions such as CSIR-CRRI, IITs etc. and is currently being used by several infrastructure projects of AAI, NHAI, Metro Rail Projects etc.

The Approach

With so much heavy-duty infrastructure construction to come across the Nation, a cement that could act as a one-stop solution i.e. build durable infrastructure FAST, use LESS cement and resources, avoid use of several additives like shrinkage-compensating compound, waterproofing compound etc., Dalmia InfraGreen was thus conceived and developed and thoroughly tested and performances verified at multiple customer sites and reputed government institutes.

The Benefits

1. Water conserving- needs 15-20 % less water compared to normal OPC.
2. Up to 20% improved strengths at an early and late ages, with lower cement use.
3. Low shrinkage compared to OPC – hence better shrinkage related crack control of large sections.
4. Low porosity and ultra-low water permeability: Superior water ingress resistance providing enhanced longer-term durability.
5. Low heat of hydration for large/mass concreting compared to OPC.
6. Runways, highway stretches, metro sections can be opened in 3 to 7 days post laying of concrete, instead of normal 21 to 28 days.

The Future

Working towards further customizing and developing variants of Dalmia InfraGreen to meet specific client-needs but with the central idea of enhancing the green coefficient further without impacting the cement's performance.

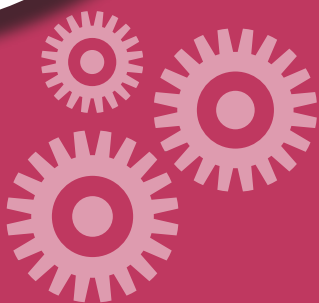


Adani Defence & Aerospace

Aligned to Adani's vision of nation-building, Chairman Gautam Adani wants to leave a legacy through Adani Defence & Aerospace by creating a vibrant ecosystem in defence and aerospace technologies within the boundaries of our nation, working with best in class partners who are committed to help establish indigenous design, development and manufacturing capabilities.

The Adani Group functions as a set of adjacent businesses reinforcing synergies and scale economies across the portfolio. Being the largest energy and utilities player with global leadership and committed investments of \$70 billion in renewables and hydrogen, leader in transport & logistics with 15 seaports and 8 airports, leading the agenda in data centres and digital, we have grown faster than any other company in India with our market cap standing today at 250 billion dollars.

Adani Defence & Aerospace has exhibited its commitment to research and innovation, and to next generation technologies as critical elements for long term sustainability and for staying relevant in the global and Indian markets.



The Innovation

Russia's war on Ukraine has proven that the cost of direct military invasion can be very high; this war has not been merely kinetic but, has reinforced the convergence of physical, informational and cognitive tactics underpinned by intelligence, information processing capabilities, use of drones and unmanned systems, javelins and stingers, and cyberspace for dissemination of information and disinformation.

Intelligence, Surveillance and Reconnaissance across our land, air and naval borders is a key priority in Adani's portfolio which will require the next generation technologies in unmanned, cyber and satellites; Adani has been the pioneer in unmanned technologies in India having established a robust ecosystem in Hyderabad and Bangalore, and placing India on the global map for exports. From long endurance, large payloads down to the swarms, unmanned aerial and ground, defence and civil platforms, payloads across EO/IR, COMINT, ELINT and MPR, we have a comprehensive offering along with our Indian suppliers to deliver on "Buy Indian" requirements for these state of the art platforms.

Adani has been leading the agenda working closely with DRDO to offer a comprehensive suite of general purpose bombs, missiles and precision guided munitions in the "Buy IDDM" category. Very short range air defence (VSHORAD) had successful controlled flight trials a few weeks back, unmanned launched precision guided missiles have been demonstrated successfully to our users, long range guided bombs have been integrated and tried from Su-30 fighter aircrafts, and the Next generation Anti-radiation Missiles (NGARM) for Air Force are undergoing rapid industrialization between Adani and DRDO.

Being the first private sector company to have set up an end-to-end development and manufacturing ecosystem of Small Arms including assault rifles, light machine guns, sniper rifles, carbines and pistols, we have successfully delivered indigenously developed equipment to Tri services and Special Forces. We have further gone up the learning curve and introduced Artificial intelligence embedded in our rifles during the Defexpo 2022.

The Approach

Adani Defence & Aerospace has aligned its roadmap with India's requirements, and prioritised areas of technology & innovation which will drive the future of warfare. The company takes pride in investing in a few but critical technologies and platforms ahead of time, building true skills and manufacturing capabilities at sub-systems and component level rather than just assembly, testing and integration (ATI), and having a workforce which is trained with an export orientation mindset on globally accepted processes and workflows, quality management systems and "zero defect" on-time delivery.

There is a big thrust by Adani to incubate start-ups within their umbrella and provide resources, network and mentoring to foster innovation and design process. The investments in AI/ ML capabilities of Meslova, design capabilities in electronics and avionics of Alpha Design, new age agri and surveillance drone capabilities of General Aeronautics is a reflection of Adani's strategy to complement the manufacturing capabilities with R&D capabilities in India and outside.

The Benefits

Innovation requires collaboration between Armed Forces, Industry and Academia for effective and efficient outcomes. DARPA and Israel Innovation Authority have successfully adopted these models with co-location of the required stakeholders. Adani has setup close collaboration between DRDO, Armed Forces, and Academia (e.g. Delhi Technology University) – it has yielded successful outcomes in Meher Baba Swarm Drones competition in which Adani has been awarded after two years of rigorous trials; in the history of DRDO, ten months from design to trials got achieved bringing together Adani's capabilities in UAVs with precision guided munition.

The Future

True success of Atmanirbhar Bharat initiative and India's leadership in defence would require a sustainable approach in future ready technologies. It requires a mindset shift from "Me Too" technologies from partner countries, and requires Indian industry to leapfrog through fundamental innovation and design; India with its wide consumption base will have a convergence of technology between defence and civil domains e.g. logistics drones are critical for Infantry, Indian Army in Ladakh and is as useful for transporting goods in hilly regions in Himachal for civil purposes.



Pricol Limited

Pricol Limited commenced operations in 1974 with headquarters in Coimbatore, India

9 Manufacturing Locations

- 7 Manufacturing Plants in India
- 1 Subsidiary Plant in Indonesia
- 1 Subsidiary Plant in India

3 International Offices in Dubai, Tokyo & Singapore
350+ Engineers; ~ 2.7% spend on total revenue for R&D

Total Consolidated Revenue (INR In Crores)

FY 2020-21 : 1420.95

FY 2021-22 : 1553.51

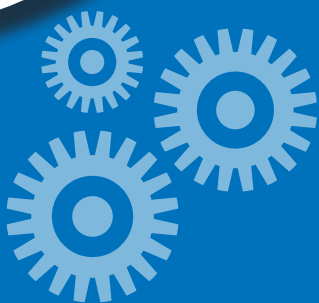
Quality Certifications

IATF 16949:2016

ISO 14001:2015

ISO 45001:2018

ASPICE CL2 in Practice for Systems & Software
(Obtained ISO 9001 in the year 1993)



The Innovation

1) Bluetooth Integrated 2Wheeler Digital Driver Information System (DIS)

Break Through Technology for 2Wheeler:

Cost effective & Indigenously Developed Connected DIS with LCD Technology



Uniqueness And Break Through Features

- **India's First Bluetooth Connected LCD Cluster** for 2W segment to enhance rider convenience
- Full Digital Cluster with 60+ Features
- **Turn by Turn navigation** provided **First Time in 2W segment**
- Supports connectivity with both **IOS & Android** based mobile phones.
- Multi-Mode Display – Sport & Street
- **New Technology product developed & launched in 15 months**
- **10+ Lakh numbers of Connected DIS with LCD** are successfully running in field
- **This helped customer to strengthen the 2nd position in Scooter segment in Indian market!**

2) 5" TFT Connected Driver Information System (DIS) + BCM for High end Motorcycles

Break Through Technology for 2Wheeler :

Cost effective & Indigenously Developed Connected TFT DIS with BCM



TFT : Thin Film Transmitter

Uniqueness And Break Through Features

- India's First Intelligent Bluetooth Connected TFT DIS with Body Control Module (BCM) for 2W segment.
- Full Digital Cluster with 100+ Features
- Different Themes for Different Ride Mode – Urban, Rain, Track, Street to assist rider to select appropriate mode based on the road / climate
- Diagnostic Capability & Head Lamp brightness control
- Auto & Manual brightness control in DIS
- Able to store & view Digi Docs like RC card, Driving License in DIS
- Over Speed warning basis on set speed limit defined by rider
- Dynamic revolution limit indicator to alert the rider for enhancing Safety & Engine Durability
- Day trip meter to track & display ride statistics like distance traveled, duration, average & peak speed and fuel consumed etc.,

Achievements

- New Technology product developed & launched in 11 months
- 100K+ 5" TFT Connected Clusters are in the field
- 100+ Features built in Connected Technology DIS, Customer Named it as "Multi Information Race Computer".

3) Low-Cost Driver Information System (DIS) with Hybrid Display (TFT+LCD) For 2Wheeler

Technology Breakthrough for 2Wheeler with Hybrid Display :

Cost effective & Indigenously Developed DIS with Hybrid Display



TFT : Thin Film Transmitter

Uniqueness and Break Through Features

- India's First Digital DIS with Hybrid Display (TFT + LCD) for 2W segment
- Mobile Connectivity for displaying News, Social media & Document Transfer

- Cost effective Solution by using Hybrid Display
- Dual Controller Architecture for Greater Performance with Increased Software Security
- Supports Multiple Ride Mode Display – Sport & Street
- Day & Night mode Themes for Rider's convenience
- Impetus to Customer Market Growth with Low Cost TFT Solution!

Key Benefits

- Dual Processor architecture supports for enhanced Data Security to the end user
- Turn By Turn Navigation supports to the rider for hassle free driving
- Digi Doc storage facilitates the end user to store & retrieve the documents like Driving License, Insurance documents, Vehicle RC, etc. whenever required.
- Caller Display Profile helps to find its importance & decide.
- Alert messages to the Rider - Service alert, Caller notification, SMS notification, Social Media notification
- Accept or reject calls on the go with the control cubes, set DND for incoming calls, SMS notification and auto-reply SMS
- Rider Performance - Information on parameters like max acceleration/deceleration, fastest lap, top speed, Best 0-60 and 0-100 and a lot more.

Future Enhancements

- Firmware Over Through Air (FOTA) supports to update SW / Graphics contents such as User Configurable Themes, Widgets, etc.
- Remote Diagnostics helps to diagnose the Vehicle & Guide the Rider to go the nearest Service Centre for Critical Maintenance
- Music/Album Info – Displays current music information with Play / Pause indication
- Music Control – Supports for track change, Play / Pause while riding
- Reduced Map – Face lift of Turn-By-Turn Navigation and rider can feel like On-Board Navigation



Merino

Since our inception, the decorative laminate industry has evolved significantly, and we have been a pioneer in the industry. Consumers today place a higher value on the attractiveness and visual elegance of their living space and workplace than ever before. This has increased demand for various interior products like laminates, wood panels, particle board, plywood etc.

Over decades, Merino has established itself as one of the leading manufacturers and marketer of Interior Solutions. Our focus has always been to provide the best value possible across our consumer segments. Our consistent innovations and investments towards enhancing and diversifying our portfolio have led to incredible results. We have established state-of-the-art manufacturing units which have enabled us to create value across our segments allowing us to have better engagement with our consumers. We have curated different approaches for different business segments to ensure that we maximise our efficiency.



The Innovation

FR+

Protection against fire calamity as it provides more critical time for people to escape. increased fire safety protection.

AB+

Protecting the users against the spread of harmful bacterias in public areas like restrooms, travel hubs etc.

ESD+

Help avoid fire / sparks at the workplace. Charge dissipation of gadgets providing a safer work environment.

LUVIH

Laminates developed to cater the premium segment which gives a complete surface solution. Customisation across categories through cross-pollination of various ideas.

SABER

To declutter the restroom queue at the public area Light occupancy indicator would help users to identify the occupancy from a safe distance.

FOOTLATCH

A complete handsfree solution for restroom door opening providing protection against transfer of harmful bacterias/viruses.

PURIWASH

A decentralised modular hand washing device which enables people to wash hands safely without touching any surface.

The Approach

Speed. Scale. Sustainable. OUR STRATEGY TO SUCCESS.

As one of the leading laminate manufacturers in India, we at Merino have been investing in futuristic laminate and related interior products to meet evolving consumer needs. In this pursuit, we prioritised three strategic areas:

Speed

Our ability to respond quickly to any situation; be it capitalising on opportunities, innovating products, managing risks, addressing customer needs, have enabled us to stay ahead of the curve. We will continue to leverage this edge going forward.

Scale

The Group is among India's largest laminate manufacturers with a capacity of 215 lakhs laminate sheets per annum. We focus on utilising this capacity and sustain our market position while focusing on quality and bringing world-class surface solutions for our customers.

Sustainable

At Merino, we believe that long-term values are created by achieving a balance between economic, environmental, and social performance. Thus, we are committed to ensure that all our business operations and actions protect the interests of all our stakeholders.

The Benefits

FR+:

- Low Spread of Fire
- Self Extinguishable
- Halogen Free
- Class 1 Certified as per ASTM E-84 Standards

AB+

- Anti-Bacteria
- Anti-Fungal

ESD+

- Protect against Voltage Changes
- Dust Repellent
- Increases productivity of Electrical Appliances
- ESD S41 Certified

Luvih

- Zeroprint - Anti fingerprint
- Stardust - Surfaces embellished with glitters, granules & stones
- Onetone - unicolor panel
- Bloc - Decorative surfaces
- Flex - Flexible laminates for curved surfaces
- Edge - Providing edge to edge finish

SABER

- Better visibility & reduction in queue inside the washroom

FOOTLATCH

- Protection against germs & viruses
- Handsfree operation, eliminating any touch in public restroom

PURIWASH

- Anti-Bacterial
- Portable
- No plumbing required
- Takes Less Space
- Handsfree operation
- Impact-Resistant

The Future

Product innovation:

New product development to meet changing consumer needs has been a key strategic pillar of our growth. This will help us grow our customer base as well as enhance brand value.

Facility expansion and upgradation:

To meet growing demand and future needs of consumers, we focus on strengthening our manufacturing capabilities through periodic expansion and enhancement.

Strengthening our global footprint:

Expanding into new geographies and deepening our presence across existing markets have been a key strategic area for Merino Industries.

Amplifying our brand:

Another strategic lever of our growth is enhancing our brand through various mediums including television commercials, digital marketing and dealer engagement programmes.

**Tata Hitachi Construction Machinery
Private Limited**

**Tata Hitachi Construction Machinery
Private Limited**



Garrett
ADVANCING MOTION

Garrett Motion

Garrett Motion is a differentiated technology leader, serving customers worldwide for more than 65 years with passenger vehicle, commercial vehicle, aftermarket replacement, and performance enhancement solutions. The company's cutting-edge technologies enable vehicles to become cleaner, more efficient and connected with a comprehensive portfolio comprised of turbocharging, electric boosting, and software solutions.

Garrett is a pioneer in turbocharging systems for a wide range of engine applications, including gas, diesel, and natural gas. Garrett has developed in-house electric-boosting technologies for use in electrified powertrains, primarily hybrid and fuel cell vehicles. Garrett is introducing automotive software solutions in cybersecurity, energy management and guided diagnostic technologies for secure and safe operating environment and transition to electrification.

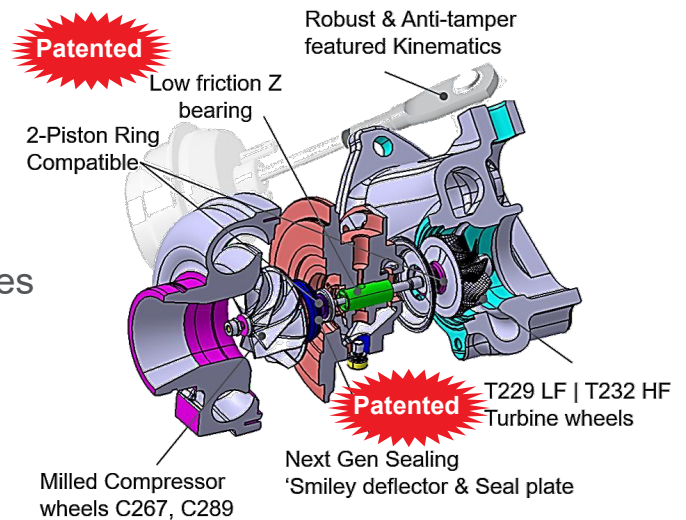
Garrett's turbocharging in the racing streams has won podium positions with enduring success at most of the famous race events like in Formula one, Indy car, FIA World Rally or Le Mans 24 Hours.

Garrett India established in 2005 in Pune operates with 700+ employees with manufacturing plant serving Indian OEM's and exports markets. It will be the first one to launch locally manufactured VNT™ gasoline turbochargers in India. Garrett's Research & Development Center in Bangalore established in 2008 is a center for Global & Regional new product innovations. Garrett also has an IT digitization and software development center based in Madurai, established in 2019.

The Innovation

Indian Farm sector is a unique market contributing to ~19% GDP and employs ~50% population. Farm productivity has been lower compared to other countries, hence needs higher mechanization penetration to improve yields and savings. Tractor market caters to low cost of ownership with challenging operating requirements with various implements & duty cycles, Low maintenance and abuse, Interface with human and edible usages. The market needs were captured at end users & OEM levels, these needs were translated into innovation in turbocharger features through Garrett Innovation Process in New Product Introduction.

The “Tractor Series Turbo” is an “India for India” product locally developed through innovations in critical areas for differentiated offerings in Product & Engineering, Sourcing & Quality, Serviceability and Customer reach.

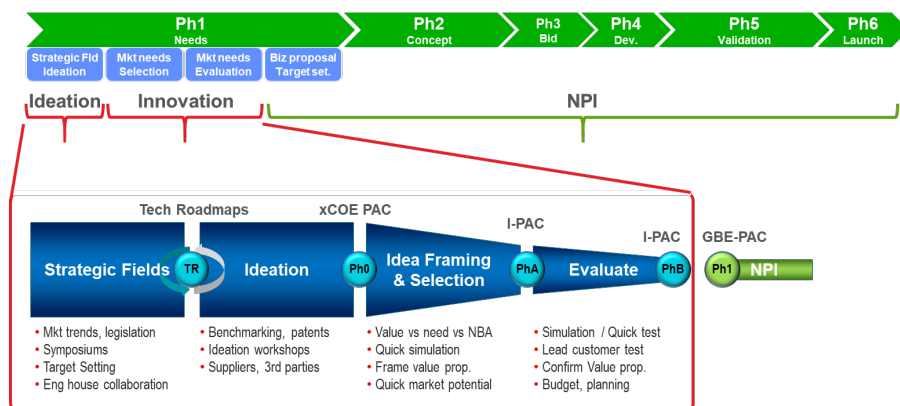


- One turbo size for 30-75HP engines with low inertia and high efficiency and wide flow wheels developed for high performance in Torque, transient response, fuel efficiency and enabling EGR for Tier 4&5 emissions.
- Bearings with low friction loss and oil flow for improved oil contamination and marginal lubrication wear addressing improved reliability and low maintenance
- Robust Patented sealing feature for oil and blow-by improving downtime, maintenance and service costs under adverse operating conditions
- High standardization of components, tools, validations driving low cost
- Providing high access to Serviceability in remote areas by expanding service network, offering repair kits, turbo knowhow & trainings, supply chain efficiency.

The Approach

Garrett's Innovation approach is embedded in the New Product Introduction process. It follows a structured approach of bringing Strategic fields, Market needs, Ideation, evaluation, and selection to innovate differentiated solutions. The innovation projects are reviewed and managed at various levels through specific Innovation governance Council team.

Garrett innovation process



The Benefits

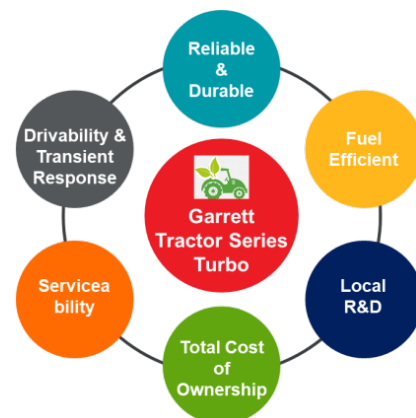
Garretts “Tractor Series Turbo” offers improved engine performance parameters like fuel economy (+5%), low end and backup torque, transient response (+10%).

Improvement in tractor uptime with reliability and serviceability life requirements like reduced oil sealing (2x) & blow-by (2x), increased resistance to oil contamination and low lubrication in all adverse operating conditions.

Low Cost of acquisition through compact designs (>20%), 1 Turbo size standardization for multiple engine 1.5-3L (30-75HP), +95% localization, Concurrent engineering.

Enables meeting emissions with improved performance also benefits engine standardization and consolidations with reduction in development efforts.

Provides high access to Serviceability in remote areas with expanded service network, offering repair kits, turbo knowhow & trainings, supply chain efficiency.



The Future

Successful launching of this Innovative product “Tractor Series Turbo” in Indian Market has enabled improved performance, fuel consumption, emission compatibility Tier4 & 5, asset utilization, serviceability & cost of ownership.

Garrett leverages this product innovation to other regions for global programs. Garrett endeavors to innovate further in improving tractor asset utilization and efficiency through “connected tractors” in software technologies combining physics modelling and Machine learning.



Sona BLW Precision Forgings Ltd

Sona BLW Precision Forgings Ltd



NESTLÉ India Limited



NESTLÉ India Limited is a food & beverage company headquartered in Gurgaon, Haryana. The company has a strong product portfolio across categories such as food, beverage, chocolates & confectionaries, nutrition, dairy etc. The company has 9 factories and 4 branch offices in India. The company had sales figures of 146,377 million INR for the year 2021. The company has an employee base of 7910 for 2021.

The Company continuously focuses its efforts to better understand the changing lifestyles of consumers and anticipate consumer needs in order to provide Taste, Nutrition, Health and Wellness through its product offerings. The Company strives to create value that can be sustained over the long term by offering consumers a wide variety of high quality, safe food products at affordable prices.

NESTLÉ India manufactures products of truly international quality under internationally famous brand names such as NESCAFÉ, MAGGI, MILKYBAR, KIT KAT, BAR-ONE, MILKMAID.



The Innovation

Product Innovation:

- i) **NESTLÉ** aims at healthier products with Zero added sugar. Launched LACTOGROW which is a nutritious milk drink with Zero added sugar for growing children (2-6 yrs.). It contains nutrients that help support normal – immune system function/physical growth & development/brain and bone development. This contains whey protein which is easy to digest. In LACTOGROW, we have developed a unique biscuity-vanilla flavor to reach the desired sensory profile for product acceptability. LACTOGROW was voted “Product of the Year 2021”, an internationally recognized certification and the world’s largest consumer-voted award.
- ii) **Introduction of NAN®LO-LAC** which is enriched with nutrients that help manage secondary lactose intolerance. We have renovated NAN LO-LAC in 2021 with the addition of few essential amino acids to deliver composition closer to Mother’s Milk. It contains low lactose content which improves in early weight gain in infants with acute diarrhea. It also has high quality protein with added essential amino acids to help meet the increased nutritional needs and are the key building blocks in the overall growth and development. It is also enriched with immuno-nutrients/ALA/Nucleotides/Zinc/Vit A&C to support the immune system function.

Packaging Innovation:

- i) **NESCAFÉ RTD** is the FIRST Dairy-based beverage in India to switch to paper straws. 33+ Million straws eliminated since launch, partnered with sustainability advocates to spread the message. 80% positive reactions to the brand, 200+ organic posts and mentions, ~8 million organic reach.
- ii) **KitKat**: Glow-in-the-Dark packaging launched in KitKat (chocolates) for the first time in India. This digital campaign co-created with FB team, resulted in a 10% increase in market share and 34% engagement rate. NESTLÉ India has received Global World Star Award (excellence in innovation - Printed packaging) in 2021 for this consumer engaging campaign.

The Approach

Our organization leverages the Idea to Launch framework. The framework uses the stage gate approach.

The I2L (Idea to Launch) project flow consists of 4 stages - Identify, Refine, Prepare, Deliver and 3 Gates: agreed Business Opportunity, Business Case and Business Plan.

The I2L project governance model enhances autonomy and enables flexibility to support agile project management. The I2L process supports the acceleration of innovation and renovation.

The Idea to Launch process provides a design thinking perspective with fully transparent project knowledge building using the Innovation Framework generated by an inclusive cross functional team like marketing, manufacturing, regulatory, consumer insight and consumer services.

The Benefits

- i. LACTOGROW was voted “Product of the Year 2021”, an internationally recognized certification and the world’s largest consumer-voted award.
- ii. NESCAFÉ RTD - 33+ Million straws eliminated since launch, partnered with sustainability advocates to spread the message. 80% positive reactions to the brand, 200+ organic posts and mentions, ~8 million organic reach.
- iii. KitKat- 10% increase in market share and 34% engagement rate.
NESTLÉ India has received Global World Star Award (excellence in innovation - Printed packaging) in 2021 for this consumer engaging campaign.

Innovation and Renovation pipeline of products continues to be a thrust area across all categories.

The Future

Overall innovation drive is helping us to increase our portfolio to as what matters the most. This is leading us towards organic foods, vegan concepts, ancient grains usage and more healthy portfolios.

Steps are continuously being taken for innovation and renovation of products including new product development, faster introduction of new products in the market, improvement of packaging and enhancement of product quality, to offer better products at relatively affordable prices to the consumers. Digitalization is a growth accelerator for your Company and will continue to be so in the future.



beyond tomorrow



Sterlite Technologies Limited (STL)

Sterlite Technologies Limited (STL) is a global leader in end-to-end data network solutions. We have designed and deployed high-capacity converged fibre and wireless networks. With expertise ranging from optical fibre and cables, hyper-scale network design, and deployment and network software, we are the industry's leading integrated solutions provider for global data networks. The company partners with global telecom companies, cloud companies, citizen networks and large enterprises to design, build and manage such cloud-native software-defined networks. STL has strong presence in India, Italy, China, UK and Brazil.



The Innovation

Opto-Blaze terminal enables subscribers connect to a fiber distribution hub to access high speed broadband. It is the final access point in the homes passed access network to which subscribers connect to for FTTH services. Drop cables connect to residence of subscribers to the Opto-Blaze terminal.

Opto-Blaze terminal is a high-density and greener IP68 ruggedized pre-terminated solution that provides fast and error-free end-user connections in an ergonomic low-profile housing. It is designed for OSP applications and can be installed in a hand-hole, into a pedestal, on a utility pole or over-head cable and secured to any flat surface. A universal mounting bracket is included with each OPTO-BLAZE with a hang-and-lock mechanism to allow onehanded mount/dismount.

The terminal is delivered pre-stubbed, which makes it an ideal choice for reliable deployment of the access network. It is perfect both for the PtP network and can be also used as a GPON distributor within preassembled PLC splitters. The OPTO-BLAZE Terminal is available in a 4-port, 8-port, or 12-port configuration with pre-loaded splitters.

The Approach

Exponentially increasing demand of high-speed network services and the number of subscribers, requires ability to quickly provide connectivity to subscribers in the existing space-constrained environment especially in multi-dwelling units and dense areas. Hence, a robust high-density terminal is needed that can be installed with low skilled workforce with an error free connectivity as a much faster pace. These requirements were collected because of STL's co-creation initiatives with several customers in Europe.

Starting with an IP landscape and state-of-art search, STL's in-house design teams in India and Italy participated in a series of design-thinking workshops along with field team, manufacturing team and sales team. The resultant staggered-port arrangement was a culmination of these workshops. Requirement of a high degree of robustness made IP65 a critical milestone. We collaborated with our academic and industry partners on materials, heat management, environment protection and aesthetics.

It result was a beautiful, compact and green optical fiber terminal that enables swift connectivity and swift deployment of network by low-skilled teams in an error free manner.

The Benefits

Opto-Blaze terminal is a plug and play FTTH solution that can be installed in a compact constrained spaces by low skill teams, enabling error free connectivity to subscribers. Opto Blaze is backward compatible with existing connectors and passive network equipment.

The Future

STL is on a mission to provide connectivity to every home on the planet. Opto-Blaze is one of our offerings that aid faster 5G deployment and robust network connectivity.

Fluid Controls Private Limited

Fluid Controls Private Limited



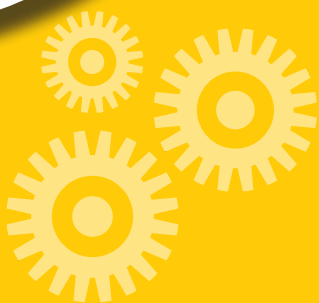
Polymed



We touch millions of patients daily around the world with the products manufactured in our facilities. We have been serving the patients and healthcare providers for over two decades. We are one of the leading Medical Devices company and exporter in India. We have been recognized as the “Medical Devices Company of the Year 2018” by the Department of Pharmaceuticals Ministry of Chemicals & Fertilizers, Government of India. We have been also recognized as the Largest Exporter of Medical Devices from India for six years in a row.

We, at Polymed have a strong track record of manufacturing high quality medical devices (more than 125 products) in 8 state-of-the-art manufacturing facilities across the world. We stand for Innovation, Safety and Quality.

We believe in making high quality, safe and innovative medical devices that not only believe in empowering the medical fraternity in being effective and efficient in their work but also provide the highest quality of healthcare to the patients.



The Innovation

To keep pace with the ever-changing market requirements, Polymed has a fully staffed and highly equipped R&D / Innovation section approved by Ministry of Science & Technology, Government of India to design & develop new and innovative products. We have developed several Innovative products since inception and the zeal will continue to serve mankind in all possible ways.

Few of the innovative products developed and made available commercially in the recent past are as follows: -

- | | |
|--|-----------------------|
| 1) Polysafety BC | 2) VTM Kit |
| 3) Dialyzer | 4) Pre-Filled Syringe |
| 5) Diagnostic Kit (Covid 19 Test Kit, Dengue, HBV,HCV,HIV Kit) | 6) AD Syringe |

Snapshot of two of the most innovative products in terms of satisfaction as exemplary service to mankind are described below:

- 1) Polysafety BC (IV Cannula):** Infusion therapy involves the administration of medication through a needle or catheter. It is prescribed when a patient's condition is so severe that it cannot be treated effectively by oral medications, the medications are introduced to the vein through a catheter.

Normal IV Cannula however has one big challenge i.e. Blood spillage during and after cannulation. Spillage may lead to Hospital Acquired Infections (HAI) to paramedical staff or anyone who comes in contact of infected patient. High number of deaths are reported worldwide owing to HAI.

Polysafety BC is a novel idea to stop any blood loss or spillage during and after cannulation process. The product is conceptualized and developed successfully to eliminate blood spillage with an added safety feature to prevent Needle prick injuries too thereby protecting everyone from infections.

- 2) VTM Kit:** VTM kit was desperately needed by the man kind which everyone knows. At that time, we stepped up our innovation initiatives and traded on an uncharted path and managed to develop and commercialize it successfully. It was developed in record time of about 3 months.

The diagnosis of COVID-19 viral infection relies on the collection of proper specimens and proper care to protect the virus in the specimen from environmental damage and the use of an adequate transport system to maintain virus activity.

The Approach

A lot of research and data collection was done to begin with to understand the need of product precisely. Following steps ensured rest of the proceedings goes as needed and planned:

- Collecting appropriate data / inputs and selection of core team
- Selecting right partners / suppliers and providing them right inputs / insight
- Design conceptualization and review with Cross Functional Team
- Simple yet concise project planning and scheduling
- Focus of unknown territory first i.e. parallel / early working on them to avoid last minute surprises
- Prototyping, wherever possible. Instead of going with large cavity production moulds, Proto / Bridge mould were made to have early outcome and once the design is validated, large production moulds were kicked off.
- Parallel process was targeted to minimize development time.

The Benefits

Innovation culture leads to numerous benefits like:

- Existing processes like Quality, Production gets improved significantly
- Innovation created new knowledge about filling and capping of intricate devices demanding high level of accuracy
- Overall market share increased
- Profitability increased considerably
- Brand equity increased
- Collaboration with stake holders increased sharply
- Had positive social impact

The Future

Prime focus is to upscale R&D and Operations thereby accelerating growth in developed countries.

Aim is to become a Globally recognized solution provider of infection reduction technologies and fluid management products.



Praj

Praj, India's most accomplished industrial biotech company, is driven by innovation, integration, and delivery capabilities. Over the past four decades, Praj has focused on the environment, energy, and agri-process industry, with 1000++ customer references spanning 100+ countries across all five continents. Bio-Mobility™ and Bio-Prism™ are the mainstays of Praj's contribution to the global Bioeconomy. The Bio-Mobility platform offers technology solutions globally to produce renewable transportation fuel, thus ensuring sustainable decarbonization through a circular bioeconomy. The company's Bio-Prism™ portfolio comprises technologies to produce renewable chemicals and materials, promising sustainability while reimagining nature. Praj Matrix, the state-of-the-art R&D facility, forms the backbone for the company's endeavours towards a clean energy-based Bioeconomy. Praj's diverse portfolio comprises Bio-energy solutions, Critical process equipment & skids, Breweries, Zero liquid discharge systems, and High purity water systems. Led by an accomplished and caring leadership, Praj is a socially responsible corporate citizen. Praj is listed on the Bombay and National Stock Exchanges of India.

Innovation

The use of pure gasoline leads to an increase in GHG emissions while blending ethanol in gasoline reduces emissions. This helps in greening India's energy portfolio. The use of ethanol for blending in gasoline will accelerate the fulfillment of NDCs made in Panchamrit at COP26. India will be able to maximize its captive bio-based resources to produce biofuels in line with the National Biofuels Policy (NBP-18) and help realize Gol's target of E20 (20% ethanol-blending in gasoline) by the year 2025.)

Our BIOSYRUP® produced from Eco-Invert technology: Sugarcane juice/syrup a product of sugar mills obtained by crushing sugarcane is the feedstock to produce biofuels (ethanol). Being a perishable commodity, the shelf life of sugarcane juice/syrup is very limited to just a few days.

Praj Industries has developed a revolutionary technology to process sugarcane juice into a new sustainable feedstock BIOSYRUP® for round-the-year ethanol production. Praj's time-tested innovative technology: ECO-INVERT processes sugarcane juice into conditioned BIOSYRUP® which can be stored for up to 12 months without any loss of sugar and/or contamination. This solution enables sugar mills and distilleries to optimally sweat their assets by maximizing ethanol production. Thus, sugar mills will be able to store sugarcane juice/syrup as feedstock to produce biofuels, for a longer duration. This will facilitate sugarcane juice based-ethanol production beyond sugar season.

BIOSYRUP® process: During sugar season, sugarcane syrup of 55-60 Brix concentration is used for ethanol production. This syrup has a high contamination level and a shelf life of 24-48 hours. Praj integrated technology concentrates the feedstock to a level of 80-85 Brix. Converting the sugarcane syrup to BIOSYRUP® also lowers the contamination level and increases the shelf life to about 10-12 months. This technology also leads to a 90% reduction in fermentation water consumption for the ethanol production process.

The Approach

Praj has adopted a very structured new product development and introduction approach i.e. From "Lab-To-Commercialization" for the proposed solution. BIOSYRUP® R&D began in 2020. Following stringent quality and testing process, it was successfully piloted and successfully implemented on a commercial scale in 2021.

M/s Vasantdada Sugar Institute (VSI), India's premier sugar and allied industry research and development organization has tested and validated this technology. VSI has validated the 'yearlong storage' of sugarcane juice by converting it to BIOSYRUP® at M/s. Jaywant Sugars Limited, Karad. The testing results showed no change in the characteristics of stored syrup.

The Benefits

The technology benefits can be summarized as follows:

- Round-the-year operations for sugar mills with distilleries resulting in maximizing production by up to 50% with minimum investment.
- Reliability is ensured by zero-bacterial contamination level.
- Ensuring flexible operations by providing a balance between sugar and Ethanol production.
- Easy storage of concentrated sugar cane juice/syrup for year-round operation.
- FRP rate would increase, an added revenue to the farmer
- Effective feedstock for standalone distilleries
- Higher Production Yields with low effluent generation & lowest operations cost. Sugarcane juice and B-heavy molasses show a 0.5% increase in overall production yield when compared to C-molasses
- Lower OPEX
- Assured ethanol supply to OMCs during the off-season
- This helps reduce overall water, energy, and carbon footprint

The Future

BIOSYRUP® would help reduce the carbon intensity to produce ethanol which would be blended with gasoline or used as a raw material for jet fuel. It would have round-the-year availability.

Ethanol being a derivative agricultural feedstock additionally creates revenue streams for the farming community besides employment and entrepreneurship opportunities.

Lifeline for the sugar industry by minimizing sugar glut as sugarcane juice is diverted to ethanol production instead of producing excess sugar.

BIOSYRUP® commercialization is seen as a milestone development in the realization of the Prime Minister's vision of an energy-independent India by 2047.



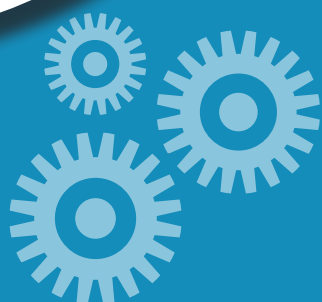
Meteoric Biopharmaceuticals Pvt Ltd.

An innovation-driven, diversified global biopharma leader Meteoric Biopharmaceuticals today services over 500 customers in diverse industries across the world.

The company aims to work continuously towards introducing novel cost-effective ingredients and formulations in the biopharmaceuticals market by innovative research. India-Ahmedabad: headquartered Meteoric Biopharmaceuticals is ready to take the new quantum jump in growth.

A B2B company, Meteoric Biopharmaceuticals has become a one-stop solution for all biological requirements across Enzymes, Probiotics, Nutraceuticals, Finished Formulations and Animal Healthcare products and solutions. The company also offers product customization, concept-based formulation, and contract manufacturing under one roof.

Shortly the company is working with newer isolated strains of bacteria (Probiotics) and some more Novel enzymes and Bioactives for Pharma and Nutra. The company also plans to launch more concept based finished Nutra products. The company is also working to expands its portfolio in the animal healthcare segment.



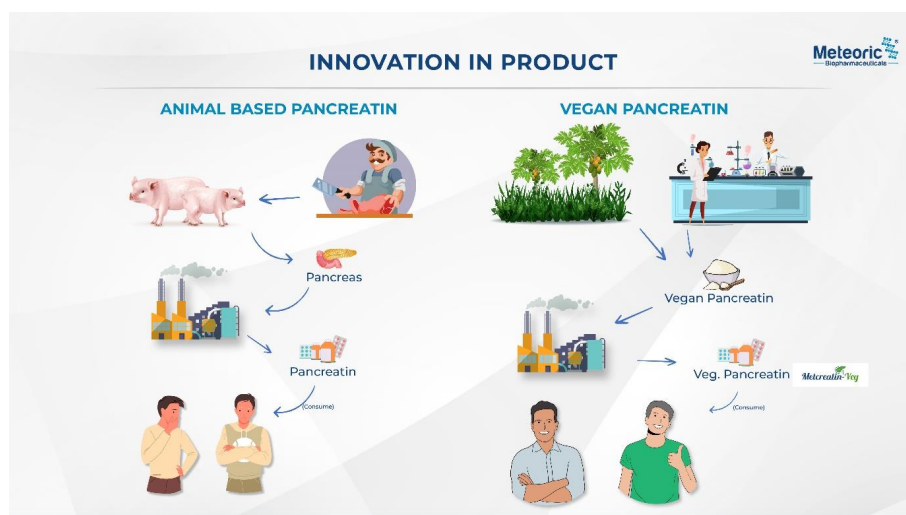
Innovation - 1

Meteoric biopharmaceuticals has come up with vegan alternative of animal set of enzymes. Veg-pancreatin is most innovative product catering to the large sector of animal dependent biopharmaceutical. This innovation and concept is very well accepted by large sector of pharma industry globally

In a world where people are shifting their diets and adopting vegan lifestyle for its own benefits, it becomes difficult to consume pancreatin that originates from the animal source. Meteoric Biopharmaceuticals Pvt. Ltd. Has come up with an innovative product that can be replaced with Pancreatin.

Enzymes from animal origin (Pig, Ox, Cow) consists of largest portfolio of pharmaceutical enzymes. These are not only hurting religious sentiments but also vector to some viral and another deceases and contamination.

The major impact that the product has had on the society is that it has increased the accessibility or availability to the people in need. As mentioned, it can be consumed by any individual of any community without worrying about its origins.



Analysis on Innovation & Finger Printing:

They are method of analysis established in our own testing laboratory. We are continuously working and obtaining innovative technology and processes for their analysis by various instruments and protocol to establish their quality as required by industry.

The Approach & Benefits

Innovation in Methodology

Since we have established our own state-of-art analytical and microbiology laboratory-Cum-R&D center, we have focused on new analytical developments, adopted new technologies and protocols of analysis and setting up quality parameters which has established a new benchmark in Biologics industry. We are continuous working to update our QC analysis strengths & capabilities with time. As we are dealing with number of products in Enzymes, Nutraceuticals, Phytoextracts products & Veterinary products our motto is each product should be tested in our lab in all respects. There are multiple factors companies and institutions are not focusing in lab development (in-house & outsourced) for enzymes testing because of time consuming, higher costing of reagents, equipment etc complex testing steps. Therefore, our contribution and recognition has excelled at many fronts in analytics space of Biologics.

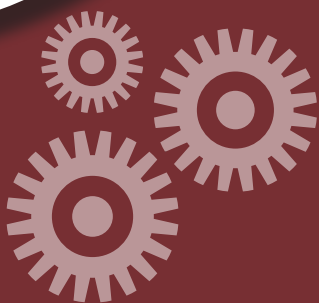
The Future

Meteoric Biopharmaceuticals is set to be a global biopharmaceuticals company, as we are working rigorously on a number of promising products and novel solutions. Apart from biopharmaceuticals, we are targeting more industries in the field of bio agriculture, biosimilars, crop science, and bioenergy in the upcoming years. Besides being operational in the human healthcare segment, we are also very active in the realm of animal healthcare, offering end-to-end biological solutions devoid of hazardous chemicals and antibiotics. Meteoric is focusing on offering different solutions backed by very stable and science-driven ingredients. The company spends between 12-14% of its revenue on R&D.



Kohinoor Elastics

Founded in 1986, Kohinoor elastics is one of India's leading manufactures and most trusted name in Narrow Woven Fabrics. Starting from Plain elastics and Knitted Elastics we now have one of the biggest Capacities of Jacquard Elastics in India. During this journey we are proud to be associated with the best-known brands in the world. With the Innovations in our Genes, we aim to keep innovating new products and technologies making the making our products and processes sustainable and.



Innovation

Machine / Process Improvement:- Process of covering involved making the bobbins from spandex covered with the Yarns these bobbins were then used to make the beams Our engineering team along with the Production team innovated an attachment using which we are directly warping the covered spandex on the beams this eliminated the process of coning.

Covering Machine:- Our covering machines which is an integral part of production used to cover the spandex with polyester. This machine is available in the 96 Ends. The machine was manufactured for the coarser counts from Europe and the motor efficiency was not utilized completely in our product due to the use of finer counts. Our engineers modified these machines to include 144 ends using the same motor. We now get the production of 3 machines from 2 machines. We worked with machine manufacturers for developing and optimizing the technology this led to them making this higher efficiency machine as a standard product for the industry.

Weaving Innovations:- We have innovated the weave where we have reduced the need of 2 dyed yarns for creating a logo on the elastic making the same appearance of the logo using just 1 dyed yarn and 1 raw yarn. This is ecologically more viable as the need for dyed yarns is reduced to half.

Thermochromic Finishes:- The Elastics finished using this finish changes its color once the temperature of the elastic increases over a certain limit. This opens up a number of application and we are still assessing the usage in high performance and medical application.

Photo Chromic Finishes:- An Elastic appears to be white but once exposed to sunlight it changes the color and gives a new look to the garment.

- Fragrant Finishes: -
- Moisture management finishes: -
- Multi size fitting in 1 garment

Double Heald Looms:- With making a few modifications to the machine we have increased the production to double. We have changed the conventional loom by adding additional needle Heald wires, needles and weft needle to make 2 elastics from a single head of the conventional machine. Impacts: 1) Now 1 Operator can now handle double the production. 2) Increased Production.

The Approach

Our Approach to innovation is driven by the zeal for improving in all the possible aspects of our Industry improving the final delivered product. We find solutions using any and every possible resource may it be association of industries or College Students.

The Benefits

The benefits of Innovations are seen through overall improvements in Quality, production, Efficiency and Higher performance products. Innovation gives us an edge over the competition in terms of new possibilities. Innovations for us have led to increasing the machine efficiency by up to 200% and reduction in manpower for some operations up to 35%. These innovations have not only increased the efficiency but have also improved the quality of our products.

The Future

We look forward to finding more sustainable and ecofriendly solutions by re-engineering existing products using more sustainable raw materials, upgrading our processes and equipment to meet requirements of higher efficiency and reduced wastage. We look forward to evolve into a more sustainable industry.

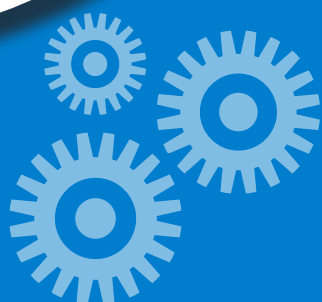
Microlit



Established in 1991, Microlit is one of the world's leading manufacturers & exporters of laboratory liquid handling instruments. Our product range includes micropipettes, bottle top dispensers, electronic burette, electronic pipette filling device and other micropipette accessories. With our patented products, innovative technologies & unfaltering trust of 8000+ consumers in 95+ countries, we are recognized as a respected & dependable brand in Healthcare and Life Sciences industry. Our offices are located in India (HQ), USA & Brazil.

With a research-oriented & customer-centric team of product design engineers, our product design blends the best of functional performance & user experience. Our innovative products have helped us carve a niche in R&D industry while providing our users high level of precision & accuracy in their research work.

During the 30 years of innovation & constant product improvements, Microlit has stood by its vision of "To be the preferred choice of high precision liquid handling instruments for leading labs of the world".



Innovation 1: First Miniature Micropipette in the world with ‘Tip Ejector System’ and Two-Step Plunger Operation

Lilpet Pro is a fixed volume miniature micropipette designed to be distributed as part of the diagnostic test kits and to perform sensitive laboratory operations with safety, accuracy and ease. It is optimally designed - 130 mm in length and 12 grams in weight, to fit inside test kits and in our users' hand ergonomically. The two-step plunger operation of Lilpet Pro enhances the accuracy of tests by enabling last drop dispensing. The presence of a tip ejector has extended the use of this mini pipette to the healthcare industry wherein it is extremely important to dispose tips without the risk of cross-contamination.

Innovation 2: Unique ‘Single Operation Calibration Mechanism’ in micropipettes

Microlit NERO is a next generation micropipette with patent-pending UniCal™ technology. The UniCal™ mechanism allows our users to re-calibrate their micropipettes conveniently in a single operation. This eliminates any trial and error as prevalent in the calibration procedures of other micropipettes. Users also do not need to disassemble the pipette for recalibration as is required by other single operation calibration procedures. Microlit NERO also has a unique μ Air™ technology which ensures minimum dead air space between the piston and the liquid in the tip for improved accuracy and precision.

Innovation 3: Bottle Top Dispenser for Hydrofluoric Acid

Microlit LENTUS™ is a high precision liquid handling instrument engineered with carefully selected and tested materials for use with Hydrofluoric Acid, high purity media and acids and bases for trace analysis. Built by our in-house team of products design engineers, LENTUS™ houses Springless Valve™ technology for high chemical compatibility and the recirculation valve to avoid spillage of hazardous chemicals when the instrument is not in use.

The Approach

Our innovation objectives are defined based on the customer feedback and product lifecycle. For each new product/feature, in-depth analysis of market size, competition and scope of improvement is thoroughly studied. A project report is then created defining detailed product specifications, development time, target cost and necessary vendor collaborations. The prototyping step includes the development of core product technology to mitigate technology risks. We then proceed with industrial and engineering design adhering to product design guidelines to manufacture robust and aesthetically attractive products. Educating our users about the new features and technologies is also a key component of our innovation process.

The Benefits

Innovation 1: The presence of tip ejector in Lilpet Pro miniature micropipette has made it a perfect fit for the diagnostic test kit industry as it enables the disposal of pipette tips without the risk of cross-contamination.

Innovation 2: The introduction of patented UniCal™ Single Operation Calibration Mechanism in NERO micropipette has enabled quick in-lab calibration without using the hit & trial method. This has reduced the recalibration cost and time and has also enabled frequent recalibration.

Innovation 3: Microlit Lentus™ has enabled safe and accurate dispensing of Hydrofluoric Acid and other corrosive chemicals in the lab at a minimal pricing.

The Future

In the near future, Microlit R&D will be focusing on electronic instruments and software innovation for workflow automation of our user processes. For instance, our 21 CFR compliant E-Burette software is a necessity for FDA regulated pharmaceutical customers to securely store and access their experiment data.



VST Tillers Tractors Ltd.



VST Tillers Tractors Ltd. was established in the year 1967 by the VST Group of companies. With a legacy of more than 54 years, VST continues to drive farm mechanization and empowerment of Indian farmers.

The organization is the largest Indian manufacturer of Tillers, 4WD Compact Tractor and amongst the leading producers of the other category Tractors, Engines, Transmission, Power Reaper and Precision Components. VST also exports products to European, Asian and African markets.

To further strengthen its product portfolio and offer world-class technology customized to match the needs of Indian customers, VST has entered into strategic alliances with Pubert from France for Power Weeders, Farmech from Taiwan for Brush Cutters and Zetor from the Czech Republic for Higher HP Tractors.

VST believes in leveraging electric, driver optional, and connected vehicle technologies to offer sustainable, productive, and profitable farming solutions and has made a strategic investment in Monarch Tractor (Zimeno Inc) – Maker of the World's First Fully Electric, Driver-Optional Smart Tractor.



Innovation

VST MT 932 (30 HP)

Over the past one decade there is a spurt in the demand of compact segment Tractors ranging from 20-30 HP, specifically for the medium farmers for fulfilling their multiple needs of inter-cultivation, spraying, horticultural applications etc. Also, concurrently there was evolution of compatible implements technology like electrostatic sprayers, reversible plough, Multiple PTO speed implements etc. which called for more technologically sophisticated compact Tractors.

Visualising the need VST decided to bring in the most advanced featured compact segment Tractor in the 30 HP segment with built in features like:

1. Powerful 30 HP engine
2. 9+3 Synchromesh gear box
3. Mid PTO
4. Multi Speed Live PTO
5. Reverse PTO
6. Highest Lift capacity of 1250 Kgs
7. Best ergonomically designed operator control systems
8. 4 WD for maneuvering in toughest conditions
9. Hydrostatic Steering system for easy maneuverability and achieving the lowest Turning radius which is the basic need for row farming, spraying and inter-cultivation

The challenge was to embed the above technologies into a compact segment tractor which VST achieved through a systematic and customer centric approach.

VST 95DI IGNITO

Power Tillers are the wonderful technological machine for small farmers who cannot afford Tractors. However, these are basically walk behind machines and also most of the powertillers are to be started manually with a starting handle which is cumbersome and tricky. With the invention of compact powertillers and power weeders even woman can operate a tiller ,however the manual starting is difficult with women , hence provision of electric starting is most convenient as it can be operated without any manual effort just by ignition switch.

VST also visualized the need for a compact powertiller so that narrow horticulture & vegetable farms was in requirement of a little higher power machine as presently these lands are only cultivated by power weeders which cannot do primary operation and also weeders cannot be used in wetland.Hence VST 95 DI IGNITO is a gift to the small farmer wherein because of its compactness it can be operated even with a narrow width of 2 feet and with its self starting feature the drudgery of manual starting is eliminated. This Wonderful machine has a very wide acceptance with vegetable farming,horticulture,sugarcane and other critical row farming sectors.

The product is designed by focusing on MDR Technology (Maneuverability, Durability, Reliability) and product is the best performer among the segments.

The Approach

In both the product innovations the basic approach was CUSTOMER CENTRIC wherein to identify the basic needs of the end user i.e. farmer, through frequent one to one interactions to assess the present as well as future requirements of the farmer. In order to have futuristic approach a large sections of younger generation farming community was interacted to understand the pulse and future product requirements.

These requirements and the present available products were bench marked and through a statistical method the results were analysed and world gaps (basic requirement by the end user which the present products does not have the feature) were identified and concentrated on fulfilling these world gaps through systematic design approach and achieved the desired results which made VST the first mover in both the products through customer centric innovations.

The Benefits

The new innovative feature compact tractor of 30 HP has enabled VST to expand the market base across India as the Tractor can be used in Multiple applications such as in row farming & spraying as well as open land applications. The new operator friendly features such as synchro, side shift comfortable adjustable seat has captured the younger generation of farming community which is a very prospective approach to bring back the younger community back to farming.

The new innovative featured power tiller, due to its compactness and starting comfort has captured large segment of farmers who owns small farms of vegetables and horticulture. With the provision of self starting device and compactness this can reach to very narrow 2 and 2.5 feet row plants in horticulture and can perform efficient soil preparation activity.

The Future

VST being the front movers in bringing Mechanisation to the small and medium farmers by introducing power tillers and compact tractors, has drawn up an ambitious plan for the next 5 Years to bring the best technological innovations to this sector thereby farming will no longer be a burden but will be a pleasure.

To augment the vision, VST has prepared a technology road map such as HST Tractor, Electric Tractor, IOT enabled implements etc. And In the SFM sector, VST has plans to revolutionise through new technologies such as electric weeders, autonomous power tillers and Reaper binder etc.

The ELICO logo is displayed in a white rectangular box. It features the word "ELICO" in a bold, blue, sans-serif font, followed by a registered trademark symbol (®).

ELICO



Elico's genesis in the year 1960, laid the foundation for the Analytical Instrumentation Industry in India. As a pioneer, the leading Analytical Instruments Design and Manufacturing company is headquartered in Hyderabad, Telangana and serves customers both domestically and internationally.

Corporate vision at Elico has evolved over the years, into becoming a 'Globally-renowned Smart Analytical Solutions Provider.' The company's current focus is to assist customers by providing holistic solutions that is based on our application specific instruments and services. This has not only created an inherent long-term value for our customers, but presently enables designing of total solutions imbibing digital technologies such as IOT, Cloud, AI & ML which cater to high value niche market segments.

Investments in R&D has led to consistent innovation in designing, patenting, developing, and manufacturing a wide range of high technology instruments in the field of Electrochemistry, Spectroscopy and Chromatography, which are used for chemical & biological analysis, that find applications in the sectors of Agriculture, Water, Research/Academia, Food/Beverage, Defense/Homeland Security etc.

ELICO has substantial base of intellectual property rights (IPR), has more than 100 intellectual property rights. The past six decades has seen the company achieve market leadership in developing & manufacturing Analytical Instruments, which play a major role in improving the quality of life & the well-being of people as well as the quality of the environment.

Innovation

Providing safe drinking water, improved sanitation, and better hygiene are a pre-requisite for improved public health. Further, several water-borne diseases can be prevented with regular water quality testing and timely remedial action. Better Water quality monitoring & surveillance will not only save people, especially children, from falling sick but will also be helpful in saving precious lives.

The conventional approach towards water quality surveillance involved

- Setting up well-equipped water quality laboratory
- Transportation of treated samples with preservative chemicals from the remote locations to the laboratory
- The sample analysis is a tedious process, and this requires use of multiple instruments - pH Analyzer, TDS Analyzer, Turbidity Analyzer & Spectrophotometer

Lab testing and analysis takes time, hence doesn't reflect the real time water quality measurement due to delay in transportation and sample analysis

Over the past few years new technologies have been developed, which overcome the limitation of a well-equipped static laboratory, wherein water testing is simplified and can be performed at the field level with lab precision.

To overcome the limitations of Lab testing, ELICO has developed Innovative products **"Portable Multiparameter Water Quality Analyzers (e-Jal & e-Jal mini)"**, which have integration of multiple detection techniques – Potentiometric, Electrical Conductivity, Colorimetric & Nephelometric to provide a comprehensive on the spot water quality analysis for rural and urban water quality surveillance, which are IoT & Cloud enabled systems **"Bringing Lab to Field"** instead "Sample goes to Lab".

The product e-Jal will be able to test more than 25+ chemical parameters in water using with a single instrument on the spot. The methods of analysis used in the instrument are as per APHA, DIN, BIS methods available globally.



The Approach

1. **Market Survey:** Systematic identification of unmet needs in Rural & Urban Water Quality Surveillance.
2. **Problem Identification:** To develop a product(s) for comprehensive water analysis for major chemical parameters on the spot, which is simple to use and give quick results, The product(s) should be able to capture the GPS location and transfer the results online for predictive analysis.
3. **Feasibility Study:** Existing Field technologies like Photometer, Sensor measuring instruments have been studied, However most of them use either single measurement or dual measurement techniques, which restricts to limited number of chemical parameters that can be analysed using the single instruments. Sensor based instruments are not accurate and rely on lab instruments calibration.
4. **Finalization of Product Specifications:** The critical chemical parameters are identified for water quality testing along with standard methods (APHA, BIS, DIN etc.) and meets the requirements of Drinking Water Quality Surveillance framework, Jal Jeevan Mission & IS 10500

5. **Patent Filing:** Multiple ideas/concepts have been reviewed and finalized for patent filing
6. **Product Design & Development:** Agile Methodology has been used during the product development phase with closed feedback
7. **Product Validation:** The Product results have been validated with Third Party Laboratory results as per APHA, BIS DIN standards.
8. **Pilot Batch & Commercial Launch**

The Benefits

1. Reduce Laboratory Infrastructure & Operation Costs by 35 to 50%, and NO REQUIREMENT FOR DEDICATED LABORATORY SPACE.
2. Routine measurements in water, wide-ranging laboratory testing tasks.
3. It replaces multiple instruments in the Laboratory like pH Meter, EC/TDS Meter, Turbidity Meter & Colorimeter/ Spectrophotometer with a Single instrument with LAB PRECISION
4. Simple to use, SEMI-SKILLED MANPOWER will be able to operate the instrument
5. Supports Multiple Languages, Step by Step Instructions are given in Hindi and can support local languages.
6. READY TO USE REAGENTS eliminate the complexity of preparing chemicals.
7. The data captured from the instrument and stored on the cloud can be used for identifying the patterns and PREDICTIVE ANALYTICS

The Future

1. Working towards Mission of ensuring “Clean Drinking Water” and contributing towards UN Sustainability Goal of “Clean Water & Sanitation”.
2. Portable Multiparameter Water Quality Analyzers (e-Jal & e-Jal mini) provide a comprehensive on the spot water analysis for rural and urban water quality surveillance.
3. As part of Govt of India’s Jal Jeevan Mission to provide 100% tap water to rural households, there is a requirement for setting up Water Testing Laboratories at the block level & Surveillance at Village Level. Using Portable Multiparameter Water Analyzers, you would be able to test the water samples with Lab precision on the spot, instead of transporting the sample to the laboratory, thereby helping to ensure clean drinking water and take necessary corrective actions.

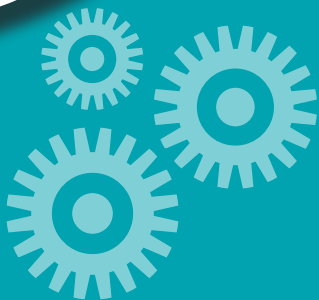


Matrix

Established in 1991, Matrix is a leader in Security and Telecom solutions for modern organizations. Matrix offers a comprehensive range of solutions for IP Video Surveillance, Access Control, Time-Attendance, and Telecom applications.

As an innovative, technology-driven, and customer-focused organization, Matrix is committed to keeping pace with the revolutions in the Security and Telecom industries. With around 40% of its human resources dedicated to developing new products, Matrix has launched over 60 cutting-edge products and solutions.

IP Video Surveillance provides solutions like Video Management Systems, Network Video Recorders, and IP Cameras. Likewise, Access Control and Time-Attendance solutions include Visitor Management Solutions, Elevator Access Control, Panels, Door Controllers, and Readers. Telecom solutions include Unified Communications, IP-PBX, Universal Media Gateways, VoIP and GSM Gateways, and Communication Endpoints.



Innovation

Trucks and heavy vehicles are a medium of transporting goods from one location to another in Industries such as Mining, Metal, Quarries, Iron, Steel, and many more. Ensuring that the right material is delivered and there is no manipulation of data entries is a matter of prime concern for these industries to prevent losses.

Conventional weighbridges depend heavily on the operator for weighing vehicles and capturing the data for reference. Outdated data capturing means can lead to problems like overloading, pilferages, and data spoofing. To make matters worse there is a lack of evidence in the case of infringement.

Matrix Weighbridge Monitoring System is an ideal solution for manufacturing industries as it provides end-to-end integration and comprehensive reporting of inward and outward material movement. The software's ability to integrate with Weighbridge Software at the database level provides visual evidence of the entire process, putting an end to all disputes.

The innovation involves capturing data like the license plate of the vehicle, a snapshot of the vehicle from the overhead camera, and the weighing scale. They will also capture details like the driver's picture and the picture of the location when the truck was being loaded. These cameras are integrated with the weighbridge software to give visual evidence of the vehicle being empty before loading.

The same process is repeated after loading giving proof of the material loaded on the truck. Thus, ensuring that absolute transparency is maintained, and all essential details are captured to rule out disputes at a later stage.

The Approach

The solution involves three cameras, one focusing on the truck's license plate, one overhead camera to take a snapshot of the container, and a third camera to capture the weighing scale. These cameras work in synchronization with weighbridge software and are designed to capture the details before and after loading the truck.

A single receipt capturing details like - date of loading, time of loading, transaction Id, license number of the vehicle, a snapshot of the container, and weight of the vehicle before and after loading is captured. The receipt acts as proof of the quantity loaded on the truck thereby making the loading process easier and dispute-free.

The Benefits

The biggest benefit of Weigh Bridge Surveillance Solution is that it generates automated receipts as proof of the quantity loaded making the entire process transparent and eliminating chances of a dispute. Additionally, instances of human error and data spoofing can be ruled out leading to reduced pilferage and material loss in the supply chain process.

The solution helps reinstate customers' trust by eliminating false claims. It automates internal processes which enables the generation of reports and quick review in case of infringement.

The Future

Weighbridge will be further integrated with the Intelligent Transportation Systems by designing over-the-top business logics on IP Video Surveillance infrastructure. As a result, inefficiencies in the supply chains will be reduced to contribute to the National Logistics Policy. It will improve Logistics Supply Chains by reducing data inconsistencies, onsite fatalities, and raw material theft.

Lohum

Lohum



Ramelex Pvt Ltd.

Ramelex Pvt Ltd.-Established in 1990.

1st ISO certified Company in Maharashtra under Electrical Category

RPL is the first recipient of WASH Certification & ZED (Gold) Certification under power Sector in India

Class 'A' registered Electrical Contractor.

NABL accredited laboratory for Electrical & Mechanical discipline as per ISO/IEC 17025:2005.

R&D center registered with Department of Scientific and Industrial Research (DSIR), Government of India.

Patents for Tower Stub Strengthening, Compression Type Power Connectors & RPL Saver Assembly Gadget (PP).



Innovation

RPL SAVER ASSEMBLY GADGET: INNOVATION ADDRESSING TO POWER SECTOR'S SEVERE ISSUE OF CONDUCTOR SNAPPING

We at Ramelex with the support of in house R&D centre and testing Lab always remain profound with Innovations pertaining to the Power sector with the motive of Optimization of Power Systems Operational & Maintenance cost leading to maximization of its availability thereby adding to the overall National Economic Development

RPL Saver Assembly Gadget is proved to be effective Techno-economic Solution to safeguard the failure of Dead End Connection in Transmission Towers thereby preventing the severe incidences of Conductor Snapping.

Key Savings/benefits of Innovation:

- A) Can prevent "Loss of Human & Animal Life; Loss of Nation's Infrastructure "
- B) Min. INR 60 Lakhs revenue saving per Incidence to Utility
- C) Adverse impact on the industrial Operation and revenue Loss can be prevented



RPL Saver Assembly Gadget (Installed on 220kV TL- ADANI-MUMBAI REGION)

The Approach

Conductor Snapping in transmission network -Area of Concern

- Conductor in TL is affected by the electro-mechanical, operating and environmental conditions that deform and eventually break the dead end / conductor.



Dead End Fitting of TL –Point/Location of Conductor Snapping

- Incidence Of Conductor Snapping- Mumbai Transmission Network-@ 220kV TL in Urban Area



conductor snapping-mumbai region-2015

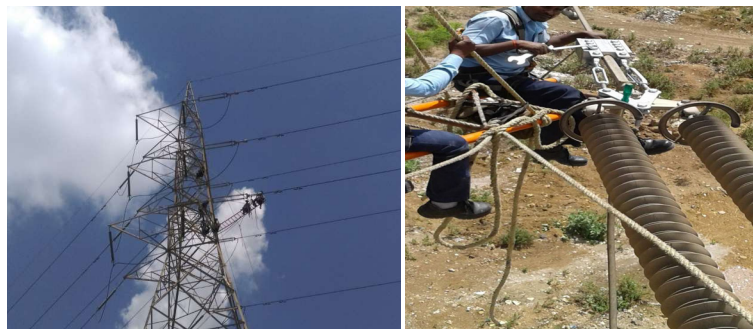
- Considering the adverse impact of the occurrence of incidence of Conductor Snapping, it should be assumed to be of more prominence with intent to strengthen power corridors or to Maintain TL operational availability thereby meeting continues rising Energy Demand.
- Ramelex has addressed this issue of Conductor Snapping in Power Sector, thereby leading to the Development of Innovative solution- RPL Saver Assembly Gadget; with Below Objectives
 - To mitigate snapping of conductor on tension towers due to dead end failure
 - To prevent loss of life & property due to such snapping.
 - Enhance availability of Transmission Network



RPL saver assembly gadget

- DEMO INSTALLATION- 220KV TL IN MUMBAI

The proto sample was installed on 220kV line, tower no SS 267 to check the feasibility & its effectiveness on dated: 29.05.2016



The Benefits

- RPL SAVER ASSEMBLY GADGET developed by Ramelex has been successfully brought into implementation and is found out to be the best and only techno-economic solution for Conductor Snapping.
- IMPACT OF INNOVATION ON BUSINESS OUTCOME
- Saving in Direct revenue of @ INR 0.6 Cr (Min) per tripping to the licensee & Indirect Multiple Liquidated Damages to the Nation.
- Eliminate damage to property of other utility such as Railways, Roads, Forest, Power utility etc.
- Prevent loss of life & Improved life of assets.

RPL SAVER ASSEMBLY GADGET- BEST SOLUTION FOR TRANSMISSION LINES TRAVERSING THROUGH/OVER VARIED GEOGRAPHIES/TERRAIN WITH CRITICAL-

- RAILWAY LINES
- SLUM AREA
- URBAN ROAD/HEAVY TRAFFIC AREA
- FOREST AREA
- CREEK OR RIVER



The Future

RPL SAVER ASSEMBLY GADGET (Next Gen. Solutions for Transmission Line Conductor Snapping)

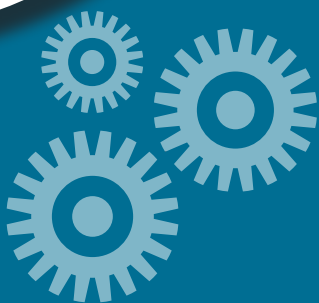
- With Continuous Research and Development at In-House R&D Centre with Testing at Inhouse RTRI Lab; RPL SAVER ASSEMBLY GADGET solution suitable for different configuration and voltage level is developed successfully (up to 3rd Gen)
- For all the above configurations 4th Gen. Saver Assembly gadget (IoT based) is under R&D
- RPL SAVER ASSEMBLY model for the prevention of conductor snapping from MIDSPAN JOINT of the conductor is under R&D



Paques

Paques, originated in The Netherlands, has around 50 years of experience and has grown into one of the leading players in water and gas treatment. We are the worldwide key player in anaerobic wastewater treatment and biogas desulphurisation and help companies & municipalities to contribute to the major challenges of today: “to reduce their water and carbon footprints and reclaim valuable resources.”

Paques is now a part of the German Family Owned Clean-Tech Company, SKion Water and we feel extremely honoured to be the part of the global portfolio of water technology companies of SKion along with Ovivo, EnviroChemie, ELIQUO WATER GROUP, Ecopreneur, ADASA and Matten. Collectively, we will continue to provide fresh water and wastewater treatment solutions to both municipal and industrial customers worldwide.



Innovation

Closed loop system (ZLD) is not operating successfully anywhere in the OCC mills in Asia. Previously, Paques India had implemented closed loop concept in India by gaining knowledge from our Parent company (Europe). With this holistic knowledge we had designed and started one closed loop in 2019, but we failed to execute the technology successfully. However, we understood that Indian raw material characteristics are severe than global raw material characteristics, especially the concentration of calcium, SCOD and VFA. Instantly, we formed a team to mitigate the issue in the year of 2020 and start working based on Indian closed loop for Indian market condition. Later in the year 2020, we started our 1st closed loop at Akshera Papers. The plant is in operation for more than 2 years in closed loop condition and they are successfully producing odor free paper. Also, they are recycling the entire treated water to their paper mill for producing the odor free paper. With this approach their freshwater intake is equal to evaporation loss.

The Approach

Our approach to Indian pulp & paper industry started from our failure and experience. With our know-how we succeeded the closed loop operation in recycle industry and can successfully integrate ETP with the paper mill. With this approach all our customers are able to produce odor free paper and are getting consistent order entry.

The Benefits

Paques implemented closed loop system has below benefits to the environment as well as the industry-

- i. Organic pollution converted into usable energy as biogas.
- ii. Reducing greenhouse gas emission.
- iii. Generated biogas can be utilized as alternate fuel for vehicle post purification.
- iv. Industry can produce odor free paper.
- v. Machine run ability will improve hence 5 to 10% production rate will increase with same manpower and energy utilization.
- vi. Limited fresh water required.
- vii. Affordable operational expenses as tertiary not required.

The Future

The implemented closed loop (ZLD) will have huge impact in the Indian OCC paper industry as it controls odor in the paper. Post Covid the ecommerce, online food delivery business growth has seen double digit CAGR where packaging material should be odor free. Also, government has banned Single Used Plastic (SUP), hence the odor free paper will be the very good alternate for areas where SUP was used earlier.

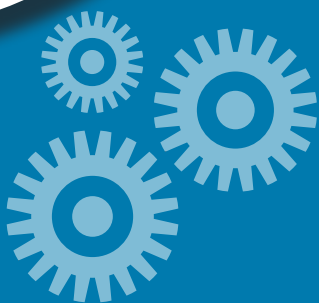


Sahajanand Technologies



Sahajanand Technologies is a global provider of cutting-edge engineering solutions for the diamond industry. The company develops, manufactures, and markets laser, artificial intelligence and robotics based technology solutions for every stage of diamond processing. We offer comprehensive technological solutions for the diamond industry. Our extensive product line consists of diamond planner systems, laser-driven diamond processing equipment, auto blocking and polishing machines and more, all of which are utilised at various phases of the diamond manufacturing process.

Sahajanand Technologies Private Limited has excelled in the diamond processing sector for more than 29 years. The company has installed more than 16000 machines globally. STPL is the first company in the world to build a diamond processing laser system, that too entirely in India. Currently, our operations span five continents and more than 30 countries. We have also developed the world's first fully autonomous robotic system for diamond processing. We have received 16 patent grants and filed for 65 patents to date.



Innovation

The advancements and innovations indicated in the application will be utilized primarily in diamond processing companies where a substantial quantity of diamonds are processed. This breakthrough will alter the course of industrial history by processing diamonds at an unprecedented rate. This innovation has boosted the value of diamonds, to the benefit of the processing facilities. Precious stones have been processed manually, but to speed up the process and increase the quality yield, automation is needed and that can only be met by laser technology. We have invented fully automated rough diamond analysis & planning system which analyzing rough diamonds using Vision technology & AI to generate best polished diamond yield. We have designed laser for cutting and shaping of rough diamonds with ultra-high precision, accuracy and lowest material loss. We have invented fully automatic Robot for Laser diamond shaping process and Laser diamond cutting process which utilizes laser technology to increase accuracy of diamond setting process, which was previously done manually by operator.

The automation can enhance production speed by 30 percent and precision by 25 percent. In the case stated above, the requirement for automation was essential. The innovations are equipped with sophisticated vision technologies that utilize vision technology to read/scan the diamond's marking. This breakthrough eliminates all manual labour. The operator need only place the diamond on the machine's conveyor belt. The improvements have the capacity to hold 600 jewels simultaneously and automatically transport diamonds into the machine through a conveyor belt. In addition to the diamond industry, we have created a 3D Printer with a 600 x 600 x 600 mm build volume capacity. As part of our development work, we are also involved in medical industry innovations such as a Proprietary drug coated coronary stent system, a Laser-based balloon catheter welding system, and Emergency Resuscitation device.

The Approach

We discover the business challenges faced by customers and understand their business needs. Turning innovative ideas into business case to present to the management for project approval. Periodic review of the project with stake holders for necessary guidance and improvement.

Since a very long time, we have been utilizing the KAIZEN technique to enhance all our operations, including the reduction of raw materials without compromising product quality, the enhancement of product output efficiency, and the expansion of production. We utilize DCR (Design Change Requirement) method to increase the product's efficiency. We periodically analyze DCR for reduction of raw materials and improvement of product performance. We have Performance linked incentive system to keep the team well motivated & rewarded.

The Benefits

Reduction of diamond waste is the greatest benefit of this innovation. Accuracy results in flawless sawing, which produces precise shapes with better yield. A well-cut diamond is more valuable, which promotes industry expansion. Additionally, this reduces labour efforts and overall manhours. This breakthrough will establish new industry standards, such as allowing one operator to simultaneously operate five machines. We held market share of around 80% of the supply for STPL products. Material loss around 2-3% during cutting process through STPL's innovation in Laser cutting system. Global expansion of diamond processing industry and created 1.5 to 2 million new employments.

The Future

Move in the direction of DARK FACTORY, which requires less human interaction. We have built a platform for AI, Robotics, Laser Technologies, and Vision Systems to meet future requirements and provide opportunities for Indian talents. STPL is a proud Flag Bearer of the Make in India campaign, exports its innovative products to more than 30 countries worldwide.



avantel

Avantel Limited



Avantel limited is a technology driven AS 9100D, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, ISO/IEC 17025: 2017 & ISO 27001:2013 certified company with a legacy of more than three decades in the industry. The company is well known for its capabilities in Design, Development, Manufacturing, Installation & Commissioning, System Integration, Testing & Evaluation of Defence Electronics, Satellite Communication Systems, Radar Systems and Embedded & Application Software.

Avantel has excellent R&D set up which is state of the art and enables contemporary Design, Development and Manufacture of MIL-grade Electronic Equipment. Avantel has been contributing immensely towards “Self Reliance” in the Defence sector with its fully indigenous / import substitute products over the years. The company spends around 10 to 15% of its revenue on an average on various R&D initiatives year on year. For Avantel innovation in its all activities is the key and “Nation First” is the mantra whatever it does.

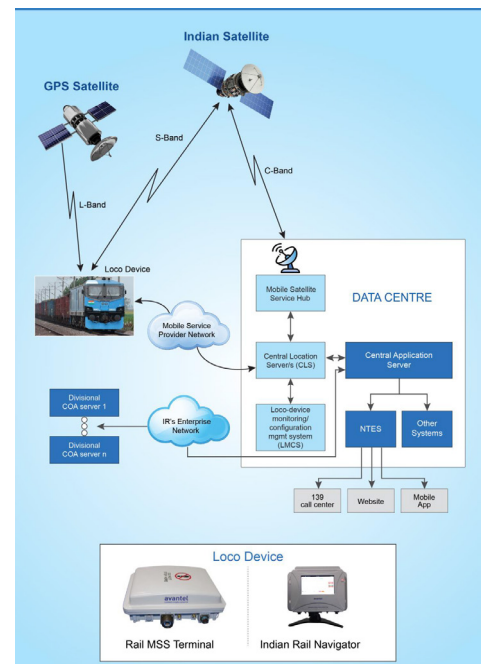
Innovation - 1

The MSS MK-II Airborne – Helicopter version had involved substantial innovation to cater to the RF losses induced due to the rotating blades. The Rotating Helicopter blades above the terminal cause considerable losses in the transmit and receive paths due to masking. These blades also introduce “Burst errors” on reception when the blades are above the terminal. The solution is adaptation of state of the art Low Density Parity Check (LDPC) error correction coding that handles burst errors and also works at lower signal to noise ratio. The Key innovation was applying LDPC in a memory constrained FPGA (Field Programmable Gate Array) environment. Further, the Mark II version adopts Digital Beam Former technology to achieve higher gain facilitating higher data rates and Voice communications. Avantel is the first company in India to offer indigenous SATCOM Airborne equipment and hold a patent for the same.



Innovation - 2

The system for Real Time Train Information System (RTIS) is a GNSS based navigation system integrated with the MSS terminals in the locomotive for tracking the position of locomotives, generation of events like station Approach/Arrival/Departure//Run through/Unscheduled Stoppage. The events are then transmitted to the Central Location Server (CLS) of Indian Railways Control Center located at New Delhi through the Satcom medium or the 4G networks. The information collated at the control centre is used for control office automation without manual intervention. The system is being installed on all locomotives of Indian Railways Pan India. The innovation in this product lies in integration of MSS, 4G, GPS and Zig-bee Technologies and the Automatic Satellite beam switching for seamless coverage across satellite footprint.



Innovation - 3

The 1 KW HF Transceiver System is a software-defined transceiver equipment is designed for voice and data transmission and reception. Avantel has won the project with Indian Navy against competition under Buy & Make (India) category and the equipment has substantial indigenous content. The equipment has been indigenously developed for the first time in India and consists of the latest state-of-art technology that includes FPGA, DSP, Direct Digital frequency synthesis, Management of HF frequency selection, Automatic link establishment using 3G (STANAG 4538) and 2G ALE to enhance functionality in the synthesizer, audio and IF, which is designed to support the latest developments in high-speed data waveform technology. Avantel has achieved the required indigenous content through innovation in various indigenous technologies required to realize the final product.

The Approach

Avantel mission statement reads “Centre of Excellence through innovation to achieve the dream of self-reliant, strong and prosperous India”. Our approach to any problem is ingrained by this thought process and enables us to look at various alternatives and arrive at the most optimal solution vis-à-vis the customer requirements through adoption of innovative solutions across the development and production cycles. Avantel has been regularly rolling out various indigenous / innovative products as per the market / customer requirements. Each of these products have contributed to India’s “Self Reliance Goals” and have involved innovative designs / solutions for making them either competitive or totally new products which have not been offered by any other company in India.



The Benefits

The benefits of innovation in development of Avantel products are:

- Fully indigenous solutions for the Indian Strategic ecosystem thus contributing towards “Self Reliance” / “Atma Nirbharata”
- Continuous improvement of existing products to enhance capabilities & operational effectiveness
- Quick adoption of new technologies and offering solutions at par with Global OEMs
- Very cost effective solutions leading to enormous savings in FOREX
- Customer Centric orientation during R & D phase
- Product innovation to meet customer requirements at competitive costs
- Excellent After Market support in situ

Three Metrics that make innovation unique at Avantel are:

- Indigenous R & D
- Uniqueness in Solution
- High Quality yet Cost Effective

The Future

Avantel has been consistently reinventing itself to enhance its portfolio and add new product lines as part of its diversification strategy. In the recent initiatives, Avantel has embarked on development of Software Defined Radio (SDR), Radar systems and High Power HF systems. We would further strengthen and streamline our processes for better innovation management and enhance innovation culture within the organization.

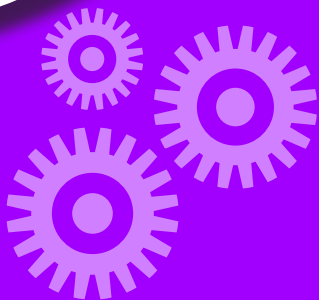
Global Engineers Limited

Global Engineers Limited



Accenture

Accenture is a global professional services company with leading capabilities in digital, cloud and security. Combining unmatched experience and specialized skills across more than 40 industries, we offer Strategy and Consulting, Technology and Operations services and Accenture Song — all powered by the world's largest network of Advanced Technology and Intelligent Operations centers. Our 721,000 people deliver on the promise of technology and human ingenuity every day, serving clients in more than 120 countries. We embrace the power of change to create value and shared success for our clients, people, shareholders, partners, and communities.



Innovation

Project Horizon

Social network platform bringing the trainees - workers, NGOs and donors together. The blue-collar workers see an increase in the job opportunities and learning time. This platform serves as a tracker for long term ROI for donors and NGOs. The Innovation brings

- Significant increase in time spent on learning by workers
- Increase in potential job opportunities

Future roadmap by inclusion of more NGOs & different Sectors catering to million+ users

f-NFT Powered Content Exchange

The concept of fractionalized NFT will drive crypto based valuation and blockchain based trading of content. Making the NFTs investable will help monetization of content without IP loss.

This solution can bring in a potential revenue realization in billions for studios and broadcasters while also allowing investors to hold stakes in NFTs which are otherwise extremely expensive. Key impacts of the solution will be

- Monetization without IP loss
- Potential est. revenue opportunity in billions
- Value unlocking of library

Further prospect of making green content by ESG evaluation and Ethereum 2.0 framework.

Accenture myNav[®]

Brings together all the capabilities companies need to succeed in a full-spectrum cloud platform. Discover and assess existing business needs, architect optimal cloud solutions, execute cloud migrations and continuously innovate the cloud journey.

We bring industry, business, and technology acumen to yield holistic cloud solutions that help you establish a robust foundation for growing, innovating, and re-imagining your business.

- Significant savings from faster business cases— from months to weeks
- Lower cloud migration cost
- Continuous cost optimization
- Carbon emissions savings over a typical migration.

The Approach

Accenture has created an 'Idea to Value' framework which enables the end-to-end journey of an idea from ideation to becoming a value creator. Every idea is assigned with a mentor, to evaluate the feasibility, desirability, and potential benefits. The innovators are extended with the ecosystem support and the funding needed if the idea is meeting the criteria ensuring we are not losing any potential innovations that creates value for our clients, our community, or our people. These Innovations are a testimony of the framework we have built. The approach for every idea is on continuous innovation, which involved iterative development, and continuous feedback loop from the users.

The Future

With the strong foundation and a matured Innovation framework enabling Innovation at scale, Accenture will continue to deliver 360-degree value for our clients, and our community, while remaining the #1 Innovation partner.



Tata Power

Tata Power is India's largest integrated power company with a significant international presence. The Company has presence in all the segments of power sector, viz. Fuel & Logistics, Generation (thermal, hydro, solar and wind), Transmission, Distribution and Trading, EV, Home Automation etc.

It has successful public-private partnerships in Generation, Transmission and Distribution in India namely

- Tata Power Delhi Distribution Ltd. with Delhi Government for distribution in North Delhi,
- Powerlinks Transmission Ltd. with Power Grid Corporation of India Ltd. for evacuation of Power from Tala hydro plant in Bhutan to Delhi
- Maithon Power Ltd. with Damodar Valley Corporation at Jharkhand.

It is one of the largest renewable energy players in India and has developed the country's first 4000 MW Ultra Mega Power Project at Mundra (Gujarat) based on super-critical technology. Tata Power has signed a Distribution Franchisee Agreement (DFA) with Ajmer Vidyut Vitran Nigam Limited (AVVNL) and formed a Special Purpose Vehicle (SPV) "TP Ajmer Distribution Limited" (TPADL), to cater to the power requirements of customers in Ajmer for a period of 20 years. Tata Power now distributes power to the entire state of Odisha.

Tata Power is today one of the country's largest integrated power companies. With a bold aspiration to become the 'Most Preferred Green Energy Company', we are proactively investing in a greener portfolio, and innovating with smart technology for a future-ready business.

Innovation

Tata power has a purpose driven innovation ecosystem with focus on cutting edge technology, sustainability, and energy equity. It gets nurtured by Tata group's core value system of business for the larger benefit of society. The structured approach of building an innovation ecosystem is leading to serial innovations throughout the year.

Listed below are few of the latest innovations across TATA Power.

- Tata Power Renewable Microgrid business model for sustainable energy in rural areas, helping in reducing carbon footprint, supporting rural markets, electrifying villages.
- Bottom Ash Concrete Tetra Pods: concrete structures made by using ash from the thermal power plants to preserve the coast from wave erosion.
- Distributed Acoustics Sensing (DAS) system implementation for Transmission lines
- Dyke Wall for Maximizing Dam Capacity: It accommodates additional 48MCM water without acquiring and submerging the additional land.
- Virtual forecasting: First of its kind initiative in India for consumer behavior based forecasting.
- Green Power tariff: Empowering Consumers to opt for 100% Green Power.

The Approach

TATA Power follows a structured approach to generate, develop, and convert an idea to its final product/solution. There are multiple steps involved in the complete process like: participating in strategy formulation workshops, periodic meetings with cluster heads, business functions and all stakeholders across value chain for sourcing problem statements. Attending external forums like exhibitions, business events, startup meets, conferences etc. for sourcing problem statements as well as for mapping innovations happening in the GTD, EV, HA, ESCO and future clean technologies. The problem statements directs to areas of collaborations/ innovation opportunities with the relevant stakeholders. Basis, cost benefit analysis, detailed project plan is prepared and the proof of concept is developed. The progress of the projects is monitored through periodic reviews. The results from the pilots are analyzed and validated. The findings are presented to top management team for taking a decision on scaling up / commercialization or archiving the project. The archived project is subjected to further review for exploring any new application opportunity.

The Benefits

The benefits of all around innovation touches each and every one directly or indirectly. With continual innovations across value chain there are lots of benefits for the stakeholders. The benefits have been in form of cost reduction owing to process improvements, technology implementations, employee engagements etc. and in terms of the improved brand image and value, enhanced trust amongst the stakeholders and improved the profitability.

For example, Tata Power Renewable Microgrid is supplying power to rural areas and helping to create circular economy for local community. Similarly The Tetra Pods made from ashes helped to attain an ecofriendly solution for the cost lines. Green Tariff empowered the consumer to opt for more renewable power, hence supporting the renewable power consumption.

The Future

The encouraging results of the innovative solutions across TATA Power is acting as a firm base to address the new world challenges with more enthusiasm. In future these solutions will be taken up for expansion and horizontal deployments. Also more diligent analysis will be done for identify the opportunities to either improve the solutions further or take the learning to develop new product and services.

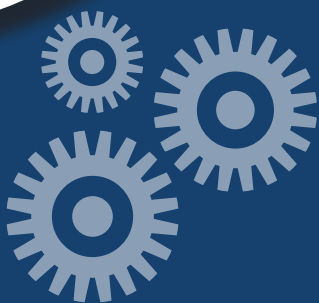


Tata Elxsi



Tata Elxsi part of the multi-billion-dollar Tata Group, is a premium engineering service provider worldwide and amongst the leaders in the automotive, media, broadcast, communications, and healthcare industries. Tata Elxsi brings together the best technology and user-centric design expertise to help customers deliver innovative solutions and great consumer experiences. Our integrated Design and Technology teams help enterprises reimagine their products and services – from strategy, consumer research, and insights, to service and experience design, technology implementation, integration, launch, and beyond.

At Tata Elxsi we work closely with customers - right from advanced R&D in new technology and system architecture exploration to actual development, validation, and deployment. This includes emerging technologies such as IoT (Internet of Things), cloud, smart mobility, and artificial intelligence. Thereby creating new opportunities for businesses to improve operational efficiency, reduce costs and deliver new services to their consumers.



Innovation

The details of innovations highlighted in the CII application are as below;

- **Future of Connected TV:** With the growing popularity of smartphones and OTT, consumer behavior & expectation towards TV and services offered on it are rapidly changing. The rapidly changing consumer expectations are further fragmented by age groups and individual preferences. The objective of our innovations is to help content providers to enhance the viewing experience for consumers and provide better monetization opportunities. These innovative services were prioritized based on consumer needs, market opportunities, scalability, and the uniqueness of the User Experience.
- **TETHER-HyperScalar Unified Smart Mobility Platform:** In automotive industry customer experience is critical, providing hyper-personalization through CASE (Connected, Autonomous, Electric, and Shared) making driving safer, comfortable and efficient. OEMs are looking at ways to unify, synergize data, introduce analytics across product development, enable customer use cases, and integrate allied businesses. TETHER is an award-winning, cloud-native, hyper-scale IoT platform that integrates OEMs with their eco-system partners to provide data aggregation, and governance and enable agile digital services as a connected vehicle platform. TETHER is implemented in TML, powering data aggregation for 500,000+ vehicles on-road, spread across an entire range of EV, CV, and PV variants offering 40+ features.
- **Smart Parking Pilot (Learn | Detect | Self Park):** Tata Elxsi's Smart Parking Pilot solution is a scalable parking solution that can be customized based on parking environment, parking infrastructure support, existing sensor configuration on the vehicle, based on different geographic markets and level of automation. Smart parking solution is a "one single solution with 4 different approaches" - Park by Memory (PBM), Parking Slot Detection (PSD), Infrastructure parking and Autonomous Valet Parking. As part of this technology, a patent for improvising navigation system has been proposed to determine an optimal path to safely maneuver the vehicle to park in a vacant slot by minimizing maneuvers with limited space constraints.

The Approach

With a mission to be a preferred design, technology and innovation partner, creating differentiated products and services that delight customers and drive business growth, we continuously strive to innovate for our customers in all the industry segments of our choosing.

Tata Elxsi 'Innov@TE' framework (Innovation @ Tata Elxsi) is a holistic and inclusive approach towards creating a culture of innovation. This tool-based workflow strives to shape and mature an idea through a process of nudging, social proofing, hackathon, customer validation and constant mentoring into business-relevant products and services.

'Think big and be open to taking risks' is one of the key value statements that drives Tata Elxsi's 'way of living' and establishes Tata Elxsi as a home to a billion possibilities.

The Benefits

Future of Connected TV:

- The innovation has been attributed to a 30% growth in revenue YoY
- Account Growth Rate in Broadcasting Industry grew by 30% YoY
- Average Revenue Per Account in Broadcasting Industry grew by 28% YoY

TETHER HyperScalar Unified Smart Mobility Platform

- Product Revenue increase of 100% through this product sale and associated engineering expenses

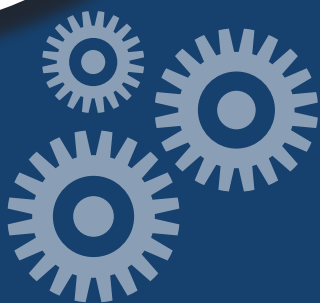
Smart Parking Pilot (Learn | Detect | Self Park)

- New technology/Capability Development
- Reduction of time to Market for our customer

The Future

Innovation will continue to be critical to the success of Tata Elxsi in serving its customers. With a focus on Patents and IP development, the company aims to double its revenue from IP lead business fostering customer-led innovation.

Tata Elxsi is enhancing its current collaboration with research and academic institutions and is building a multi-channel idea crowdsourcing platform to accelerate innovation to create a greater impact on business and society.



CitiusTech

CitiusTech is a leading provider of digital technology and consulting services to payer, provider, medtech and life sciences companies. With over 8,000 healthcare technology professionals worldwide, CitiusTech powers healthcare digital innovation, business transformation and industry-wide convergence for over 130 organizations, through next-generation technologies, solutions, and products.

With end-to-end offerings across consulting, digital & product engineering, healthcare data interoperability, analytics, and AI/ML, we enable healthcare and life sciences organizations to reinvent themselves and deliver better outcomes, accelerate growth, drive efficiencies, and ultimately make a meaningful impact to patients.

We have a strong organizational commitment to create a strong innovation-driven culture, with significant focus on building new technology capabilities, healthcare domain expertise and end-to-end solutions. We also enable healthcare and life sciences organizations to scale and accelerate innovation across their own organizations, by building intellectual property (frameworks and products) specific to their business needs.

Innovation

Our teams continuously monitor the healthcare and technology landscape to identify market trends and make corresponding investments in digital innovation – across technology, domain competencies and development of new solutions. The following innovations represent some of the key focus areas of the healthcare and life sciences industry:

1. Digital Front Door: Enhancing patient experience

Leveraging digital technology to enhance experience and engagement across the patient / member journey, from the viewpoint of business, clinical, and operational objectives, and addresses fragmentation holistically. CitiusTech has built a holistic approach to the digital front door – including maturity assessment, systems interoperability (back-end enablement), streamlined and tailorable processes (integrated operations and process), data integration, analytics, and AI/Machine Learning to drive insight and personalization.

2. PERFORM+: Improving healthcare data and performance management

Our PERFORM+ suite of products is used by healthcare organizations to address complex business needs such as data scalability & interoperability, contracts management, quality management and regulatory compliance. PERFORM+ includes multiple products that can operate in an integrated environment, allowing organizations to significantly lower time-to-market and scale value across their performance management programs.

3. Medictiv: Enabling AI/ML adoption in healthcare

First-of-its-kind open healthcare AI model directory to foster cross-industry collaboration and accelerate AI/ML adoption across healthcare organizations. Medictiv contains a curated list of 250+ ready-to-use healthcare AI models, selected after evaluating more than 2,000 research papers, open-source models and commercial algorithms, drawing on CitiusTech's strong Data Science expertise and AI/ML engagements. Medictiv is a public resource that allows Data Science and digital innovation teams to consume, as well as share, healthcare-specific AI models, public data sets and research papers. (<https://medictiv.citiustech.com/>).

The Approach

Our innovation strategy rests on three pillars.

1. Meaningful Impact

- Leveraging technologies to address objectives around care quality, cost of care or patient / physician experience, e.g., Digital Front Door
- Enhancing or transforming existing industry approaches through collaboration and reimagining processes

2. Ahead of curve

- Developing digital capabilities and platforms that anticipate market demand
- Creating end-to-end solutions and platforms that simplify and accelerate business transformation, e.g., PERFORM+

3. Scaling and Imbibing into Culture

- Building scalable, repeatable solutions, aligned to complex industry challenges, e.g., Medictiv
- Supporting acceleration groups, technology communities to research, share and incubate

The Benefits

Our innovation approach helps our clients remain at the cutting edge of new trends in the healthcare industry by continuously evaluating emerging regulatory, technology and consumer trends, gauge their impact on businesses and drive adoption of technologies, such as cloud, next-gen enterprise applications, analytics, and AI/ML.

We focus on creating packaged solutions such as Digital Front Door, PERFORM+ and Medictiv that combine multiple technologies, to help accelerate the digital transformation journey of healthcare organizations. These solutions are being used by several organizations today to drive significant impact in patient experience, performance improvement and clinical decision support.

The Future

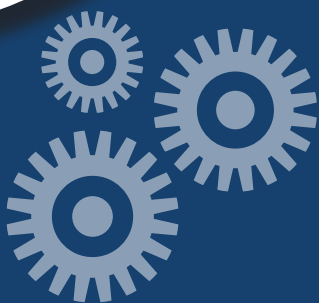
Healthcare and life sciences organizations worldwide need to adopt digitally enabled and patient-centric care delivery models, powered by specialized, next-gen healthcare technology. With its focus on innovation, CitiusTech is well placed to help organizations execute sustainable, long-term digital transformation strategies that align with new business models and changing patient expectations.



Access Healthcare

Access Healthcare is one of India's largest and fastest-growing Healthcare BPO and IT services providers. Since 2011, we have been a trusted partner to clients in the US healthcare industry – delivering financial, administrative, and clinical services and administrative services. Our team of 27,000+ professionals and 3,500+ virtual bots serve over 500,000 medical practitioners, hospitals, and payers, enabling them to provide quality healthcare services to millions of patients.

Access Healthcare was recognized as a Leader in Everest Group's Healthcare Provider BPO – Service Provider Landscape with Services PEAK Matrix™ Assessment 2022 and Top 100 Healthcare Technology Companies of 2022 by The Healthcare Technology Report.



Innovation

Access Healthcare has developed a robotic Process Automation (RPA) suite called **echo** that leverages AI and ML to improve productivity, quality, and cost-effectiveness in BPO services. We have achieved hypergrowth in the past few years because of enhanced delivery efficiency through an optimal combination of trained staff and automation. Our vision of a digital-first future enables seamless remote working models through a unique blend of **echoremove**, integrated with our **arc.in** workflow and workforce management platform, and the **Jobs** app for digital sourcing.

Access Healthcare Jobs App allows job seekers to apply and complete all hiring process steps, from candidate registration, document upload, online interview, training, assessments, offer letter issuance, and acceptance on a smartphone. The candidates do not need to be present physically in our delivery centers. New team members onboarded can work from home (“Home Pod”), leveraging our remote work platform to achieve a better work-life balance. The platform even includes lean apps to accommodate slower internet connections in rural India.

echoremove offers unparalleled security in remote work environments, including face recognition to verify employee identity for secure login. We utilize advanced intelligent analytics to monitor the area in the immediate proximity of the system for detecting the presence of camera lenses and other image capture devices. The system automatically camouflages the data and images in case of data leakage or data theft risk. Such security measures are essential in the healthcare BPO industry, where data confidentiality is paramount.

The **echoremove** ecosystem includes the unique capabilities of **echo**lock+ for productivity management in remote work environments through non-intrusive monitoring of work sessions. By presenting activity reports to the users, we can improve enterprise productivity by 7.5%.

The Approach

Access Healthcare’s innovation framework leverages two distinct approaches - a business transformation group and crowdsourcing of ideas. The Business Transformation group analyses processes in each client program to identify opportunities for improving productivity and efficiency and works with clients and operations stakeholders to drive efficiencies through automation and process redesign.

The crowdsourcing model of innovation recognizes that every member of the workforce can drive innovation. They submit ideas on our **arc.in** platform for evaluation by respective stakeholders. Based on the value derived from their ideas, we reward them commensurately.

The Benefits

Access Healthcare’s **echoremove** platform secures remote environments to improve accessibility to jobs and promotes equality in the knowledge economy. Remote work offers professionals in rural India, women returning after career breaks, and physically challenged individuals a chance to earn dignified livelihoods.

Our **echo** RPA suite, a highly configurable industry-agnostic RPA engine, improves human productivity by over 50%, and reduces the cost of building and running automation solutions to half. **echopay** improves productivity by 3x and reduces the costs of processing healthcare payer remittances to a third. **echo**lock+ delivers a 7.5% enterprise productivity boost. Broadly, the **echo** suite offers over 50% reduction in effort and 30% quality enhancement.

The Future

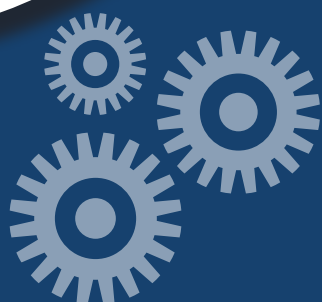
Access Healthcare envisions a digital-first future that promotes inclusive economic development. We prioritize and deliver value-centric innovation, continuously driving productivity while saving effort and reducing costs. Technology is leveraged to enable social progress, eliminating gender-specific, social and geographic barriers, promoting equitable and sustainable development.



Syngenta Biosciences Pvt. Ltd.



Syngenta Biosciences Pvt. Ltd. is a Center of Excellence in Chemistry analytical sciences focusing on chemical innovation and technology development, is part of the global Syngenta crop protection research function. The state-of-the-art facility has over 200 FTE's with about 35 postdoctoral and PHD scientist and a laboratory space of 16000 sq. meters. The Centre has been contributing significantly to accelerating innovation of new chemical entities, process development and technology translation on scale, product life cycle management and analytical data generation for registration work. The scientific excellence has resulted in IP generation of over 70 patents in the past 5 years. The focus area of the center has been on its people and on health safety and environment. The center's analytical facility has been recognized as a GLP facility by authorized regulatory agencies.



Innovation

The three recently launched new AI's where the teams have significantly contributed along with the global partners includes Tymirium® Technology, Spiropidion® Technology and the Plinazolin® Technology. The Tymirium® technology is a breakthrough innovation against plant-parasitic nematodes and soil-borne diseases. The technology also preserves soil biodiversity and promotes soil health. Spiropidion® is an innovative product that can be used to protect crops from sucking pests and Plinazolin® technology is a broad-spectrum insect control active ingredient which can be used to protect around 40 crops. The teams based out of Goa contributed at various stages from discovery optimization, process development, scale up technology and synthesis of innovative reference standard to support development, registration and launch of these technologies in the market.

The culture of Innovation at the center is driven by a seamless communication and alignment towards the business strategy, cross functional teams to promote excellence via collective scientific temperament, adaptation to new and emerging technologies, collaboration (industry and academia) empowerment, reward and recognition of the scientist. The innovation management is through clear strategy, tangible goals and aligned resource. This includes an emphasis and importance of continuous improvement mindset, upskilling and development of individuals, teams and functions. The innovative culture on site promotes cross fertilization of ideas and co-development of prototypes and brings synergy in innovation and scientific excellence from our scientist

The contributions of our teams resulted in more than 70 patents and >30 publications in the last 5 years. Our collaboration with various universities and institutes has built a strong brand for Syngenta Biosciences Pvt. Ltd. within Indian academia and Industry. The strong brand has been a source for attracting the best talents across the country thus building a diverse and inclusive work force.

Sustainable technology mindset is key to the future of innovation and could be delivered via technologies that promote this endeavor including machine learning, digitization of chemical innovation space encompassing the sustainability and green chemistry principles. This culture has enabled the adaption of new and emerging technologies and practice sustainable and green chemistry solutions.

Supermarket Grocery Supplies Pvt. Ltd.

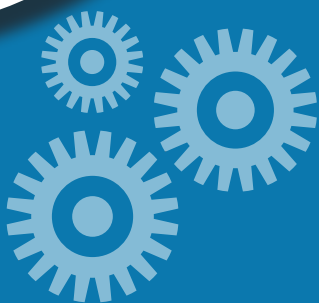
Supermarket Grocery Supplies Pvt. Ltd.



Adani Transmission Limited



Adani Transmission Limited (ATL) headquartered at Ahmedabad in Gujarat, is one of the largest private sector power transmission companies in India with a presence across all the regions of India. ATL owns and operates various High voltage AC transmission lines and substations of 132kV, 220kV, 400kV, 765kV voltage level and also High Voltage DC transmission lines and substations of +/- 500kV voltage level. Today, ATL has portfolio of more than 18,500 ckt km of transmission lines and around 38,600 MVA of power transformation capacity. ATL primarily aims at addressing the vast potential in India's transmission sector and has set an ambitious target to set up 20,000 circuit km of transmission lines by 2022. ATL has invested in the latest technologies resulting in the highest network availability of over 99.76% in the country, which corresponds to the best global standards.



Innovation

During tender stage of Kharghar Vikhroli Transmission Line Project, we had planned to connect with Substation gantry with 2 Auxiliary tower & 1 Dead end tower (Total 3 nos of Towers) due to narrow angle diversion. ('U' turn). We had visited the place for tower spotting during check survey. We came to know that construction of 3 nos. of towers is not viable.

Major challenges we observed are Dense habitant area (Metro city), Limited time to execute the project, RoW (Right of Way) Issue, Material storage & theft and Restriction in heavy Vehicle movement inside the city to supply material.

So, had to think most optimum solution which can resolve all above challenges with respect operational & Commercial perspective.

With respect to constrain at Site condition and challenges, team has conducted a brainstorming and came out with unique and special structural design named as Aeroplane Shape Tower (AST).

The Approach

The team has designed and developed a prototype and verified through simulation whether the expected results are meeting. Upon successful trial commission process initiated. While designing, Chances of unwanted stress in tower/fitment which may lead to tower collapse has been envisaged and taken care. Also, it has been found that there are chances of error can occur in dimension of Stub back-to-back and diagonally due to wrong Slope of Stub during casting, with the help of clear SOP and instructions the same has been taken care.

The Benefits

Saving in tower & Foundation cost is approx. 78.28 Lakhs. Saving In Right of Way cost (Metro Region), Saving in Hardware/ Insulator/ Accessories Cost. Replaced 2 Auxiliary tower & 1 Dead end tower (Total 3 nos. of Tower) by a Single Tower. Saved Construction & Execution time & cost for Two Locations.

The Future

This Tower can be used for LILO arrangement. This can be used elsewhere in the future if we have same requirement.

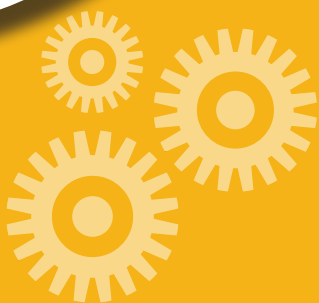


Mercedes Benz Research and Development India (MBRDI)



Mercedes-Benz Research and Development India (MBRDI) is the largest research and development centre for Mercedes-Benz Group AG outside of Germany. Established in 1996, the Bengaluru-headquartered organisation plays a prominent role in the development of new technologies like connected, autonomous, shared, and electric in the mobility world. Known for its engineering innovations, MBRDI has grown to a team of over 6,500 employees, and is one of the earliest technology and innovation centres of a global automotive company to set up a strong presence in India.

In line with the global ambitions of the Mercedes-Benz Group, MBRDI plays a prominent role in innovating and accelerating the future of sustainable mobility. Over the last 25 years of its presence in India, MBRDI has established itself as an innovation powerhouse. MBRDI harnesses the role of IT in accelerating the future of automotive technology in terms of engineering, digitalisation, testing and simulation, and data science.



Innovation

Innovation is a priority for the Mercedes-Benz Group to develop sustainable, competitive and industry-leading products, services and business models that are transforming the category. MBRDI imbibes and fosters innovation with comprehensive automotive expertise to help shape the future of mobility by stitching the culture, inclusivity and strategy together to build impactful innovations. This approach connects business problems, technology, and the external ecosystem to curate solutions to address global mobility needs.

Our innovation spectrum is as shown below:

- **Technology innovation:** With a wide-ranging patent portfolio, we focus on leveraging the latest technologies to derive product and process innovations focused towards key areas such as luxury, future of mobility, sustainability and social impact. Some of our tech innovations developed in collaboration with our global team include MBUX, support for Drive Pilot for autonomous driving, and sustainable material development for car interiors, among others.
- **Intrapreneurship at MBRDI:** We nurture entrepreneurial potential at MBRDI through a well-defined process of providing necessary support and mentorship to budding entrepreneurs. We have fostered an internal startup 'Evnnovator', focused on accelerating EV adoption in emerging markets.
- **Co-creation with the Indian innovation ecosystem:** We collaborate with homegrown startups through 'Startup Autobahn' - an initiative to solve complex problems pertaining to Tech in Mobility. We also work with academia partners such as IITs, IISc and BITS Pilani towards exploration of future tech areas. Currently, we are collaborating with both startups and academia partners to nurture further innovation for the mobility world.
- **Supporting Social Innovation:** With our strong engineering research capabilities, we have supported social enterprises in developing unique products, which have significant impact on priority needs.

The Approach

We leverage both the centralised and de-centralised models to nurture a culture of Innovation. Our strategic framework 'Innovation Engine 4.0' supports this well.

The central team:

- Defines a broad & inclusive organisation-level strategy, formulates frameworks and methods for people to adopt & follow
- Enables platforms for learning, collaboration and experimentation, and
- Celebrates innovators and innovations alike

Our dynamic engineers from across departments work closely with business stakeholders, internal & external eco-system players (startups, academia, and industry players) to experiment and ideate on key focus areas aligned with our business strategy. This is complemented by the strong intrapreneurship culture, aiming at fast-paced implementation.

The Benefits

Over the years, MBRDI has witnessed significant overall growth in size and value of contribution to our parent company - Mercedes-Benz AG Group. The patent portfolio has seen a rise in contribution not only in conventional areas of product development but also in the emerging areas of Connected, Autonomous and Electric powertrain. These areas, as widely acknowledged, hold the potential to redefine the future of mobility. The areas of innovation, highlighted above, further substantiate this point.

The Future

MBRDI takes pride in being a digital-led organisation that has successfully managed to attract the right talent mix with progressive skillsets. With the global strategy relying heavily on digital, MBRDI is fully equipped to build and design the products of the future.



T|second

Tsecond

Revolutionizing the way big data is captured, stored, processed and moved at modern edges

We are pioneers of big data capture and migration

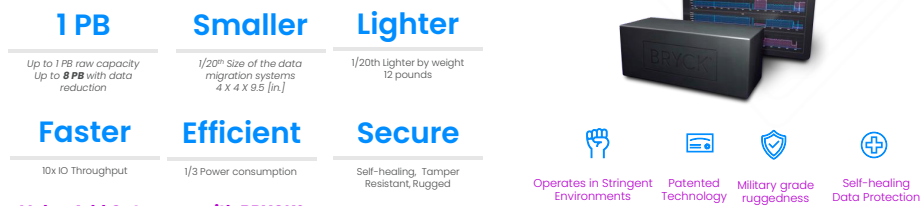
Founded in Nagpur, Tsecond believes that technology must be advanced and leveraged to help organisations become more efficient. In 2020, Tsecond expanded as a growth stage portfolio company of AEI HorizonX (a strategic venture capital fund anchored by Boeing) at San Jose, California, USA.

We help enterprises and organizations activate big data thus enabling them to drive faster data-driven insights. Tsecond offers petabyte-capable differentiated platform-‘BRYCK®’ that allows organisations to securely Capture, Process, Manage, Move and Store data from any Edge Environment to Data Center/Cloud.



Innovation

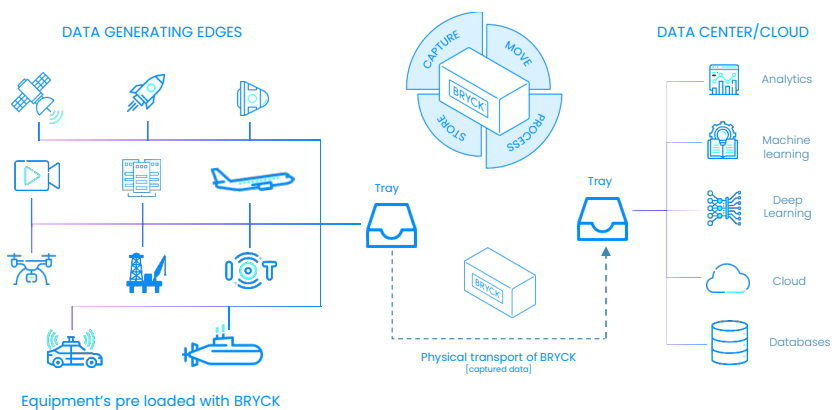
BRYCK Platform qualified to meet your growing Big Data needs



Value Add Outcomes with BRYCK®

Turnaround time	Lower Cost	Parallel Users	Better Analytics	Higher Capacity
80% faster	95% Saving in Shipping Costs	5X Parallel users	100x more data 10x Faster	8X More Data Storage

The Approach



Customer pain points

- **Unable to capture** large data in modern edges that has low space, weight, power budget and operates in stringent environment
- **Unable to process** large data captured in reasonable time due to throughput limitations
- **High-cost and Slow transport** of the data to datacenters due to low-speed networks or network unavailability

Problems with existing solutions

- **Not deployable in all edges** due to their large size and heavy weight
- Unusable in big data environments due to **low capacity**
- Slow data processing and data transport due to **low throughput**
- **Not usable in all infrastructure** due to proprietary implementation designed only for cloud migration use cases.

Solution with BRYCK

- BRYCK transparently integrates with existing infrastructure
- BRYCK enables large data capture at the edge
- Enables data analytics applications process data fast in place at the edge
- Cost effective and fast physical transport of data from any edge to data centers/cloud

BRYCK® Applications

- AEROSPACE & TRANSPORT**
Capture and move big data from flights to the ground data center, quickly and easily.
- CONTENT EXCHANGE**
Exchange up to a petabyte of data easily, cost-effectively, and securely to clients, partners, and branch offices.

- AUTONOMOUS VEHICLES**
Easily migrate big data to the cloud with speed and efficiency.

- FAR-EDGE APPLICATIONS**
Capture and process big data at any depth or height - from the bottom of the sea to space.

- CLOUD DATA CENTER**
Easily migrate big data to the cloud with speed and efficiency.

- GOVERNMENT & DEFENSE**
Speed access to big data and accelerate mission-critical decision-making

The Future

Data is the heart of digital transformation which is growing worldwide at the rate of 59% per year. Every industry is expanding its use of data to empower its leaders take data-driven decisions in time. To get the information into the right hands at the right time, it is important to mobilize the large data being generated efficiently and cost-effectively. The green data center market is expected to grow at a CAGR of 7.5% from \$36 billion in 2021 to reach \$55 billion by 2027. Today, the evolving industry needs superior data capture capability, instant data upload and access, high speed data analytics and sustainable storage.

BRYCK, a comprehensive yet flexible solution, unlocks the potential to derive insights from the huge amount of data that isn't captured and transmitted at any depth or height - from the bottom of the sea to space.

Move the data, that moves the World with BRYCK®!



IntelliSmart Infrastructure Private Limited

IntelliSmart Infrastructure Private Limited is India's leading smart metering and digital solutions provider. It is a joint venture of Energy Efficiency Services Limited (EESL) and National Infrastructure Investment Fund (NIIF), established with the core purpose of becoming the most preferred digital partner of the utilities. Our organisational culture is built on the core values of Integrity, Respect, Innovation and Sustainability, which influence our everyday endeavours and collective practices.

IntelliSmart, as a digital solutions provider, aims to create a difference in the power distribution sector with digital interventions while shouldering the responsibility of mass-scale rollout of smart meters under RDSS. With smart meter infrastructure, consumer data management and AI/ML-based analysis, the company seeks to create considerable value for state utilities by enabling them to develop additional revenue sources. In the long run, smart metering will help create a robust, resilient, flexible smart grids that can integrate renewable energy seamlessly to meet India's growing power demand.



Innovation

'Smart Meter Operations (SMO) App'

To carry out centralized management and critical field activities like monitoring of consumer indexing, meter installation, operation & maintenance and WHM activities, IntelliSmart has developed a mobile software application solution, Smart Meter Operations (SMO). This solution uses the power of a GIS platform to support correct data collection, workflow optimization, visualization of information/data and analysis for improved control and accuracy, with maximum security. In the O&M module, the system raises automated tickets for meter faults like read unavailability, defective & burnt meters, RC/DC command failures, non and never-communicating meters, etc. through integration with the Head-End System. It also provides a GIS-based map view to support energy accounting at both DT and Feeder levels which enables Discoms to track power distribution end to end across the value chain. SMO app also supports accurate location pinpointing of CI surveyor – the backend application will pull a predownloaded map where the surveyor will have to fix location accuracy to be able to complete CI process.

'Process Innovation in Smart Metering'

Since the rollout of the programme, the projects had experienced implementation failures which resulted in substantial revenue loss for the utilities and implementation partners. Issues like non-communicating and never-communicating meters, ghost meters, incomplete saturation, inadequate awareness and integration of consumer mobile app, unavailability of a rigorous user access control process and policy, restrictive measures on reconnection-disconnection of smart meters, etc. had made the functioning of AMI unsynchronised and inefficient.

The Approach

The experience of implementing more than 30 lakh smart meters in different states and across the country has given IntelliSmart an exhaustive, practical understanding of the technical challenges, tactical gaps and grassroots issues which have the potential to render the smart metering programme inefficient and ineffective. Issues like wrong bills, inflated bills, non-functional meters, defective process, non-receipt of bills, no revenue collection from consumers, meter swapping, etc. result in increased consumer dissatisfaction, higher consumer resistance and poor Discom performance, thereby damaging reputation of the programme.

It was realised over time that for smooth on-ground implementation and integration of the various critical components for efficient communication between different touch points of the smart meter AMI value chain, it is necessary to create an innovative yet simple technology that can provide complete control on the functional process and plugs the existing loopholes in the key operational areas viz. Consumer Indexing, Meter Implementation, Operations & Maintenance, Warehouse & Supply Chain Management and the GIS module.

The process innovation was approached simultaneously, taking in view the larger project beyond meter installation and integration to apply tech-induced solutions that catalyses transformation of the industry through digitalisation, while further amplifying the impact of the operational solutions.

The Benefits

The SMO mobile app has automated the CI/MI process, reduced the turnaround time of all O&Ms and increased efficiency gains which benefit both Discoms and consumers. It has also enabled centralised management and monitoring of operations. The various applications of the app have further corrected and improved the large-scale data collection process and created workflow optimisation for improved control and accuracy, while maintaining focus on security.

Process Innovation (PI) has further plugged execution loopholes and strengthen the end-to-end work process which have significantly improved billing and collection efficiency for Discoms and created an industry benchmark for the national smart meter programme.

The Future

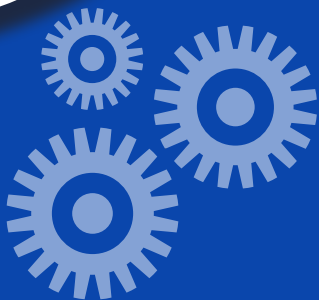
While India has set itself a target of implementing 25 crore smart meters by 2025, about 10 crore smart meters allocated for priority areas will have to be done by 2023. It means the industry will have to create a capability of rolling out about 1.4 lakh smart meters, with a synchronously operating AMI, per day or 20x its current rate of 1.5 lakh smart meters per month. To be able to meet the required demand means the industry will have to undergo a paradigm shift to be able to support such exponential growth. Our aim, as a leader of the smart meter industry, is to drive innovation, propelled by digitalisation, at scale to optimise technical variables and operational productivity to set the smart metering initiative of the country on the exponential growth curve.



Plutomen Technologies Private Limited

Plutomen is an Augmented Reality platform that enhances frontline capacities through self-assisting interactive resources, digitized workflow & SOPs, and collaboration with remote experts. Their digital platform empowers industrial customers across sectors like Industrial Equipment, Automotive, Telecom, Oil & Gas, Aerospace, Smart Cities etc. to improve productivity, extend frontline capabilities, reduce operational costs, and maximize revenue growth while promoting sustainability and worker safety.

Plutomen is one of the top 5 AR based startups as nominated during NSA 2020 & 2021. They are recipients of the MEITY Tide 2.0 Scaleup grant. They are incubated at GUSEC and are part of Nasscom Deeptech Club. They are also selected in Microsoft for Startups and Salesforce Startup Program.



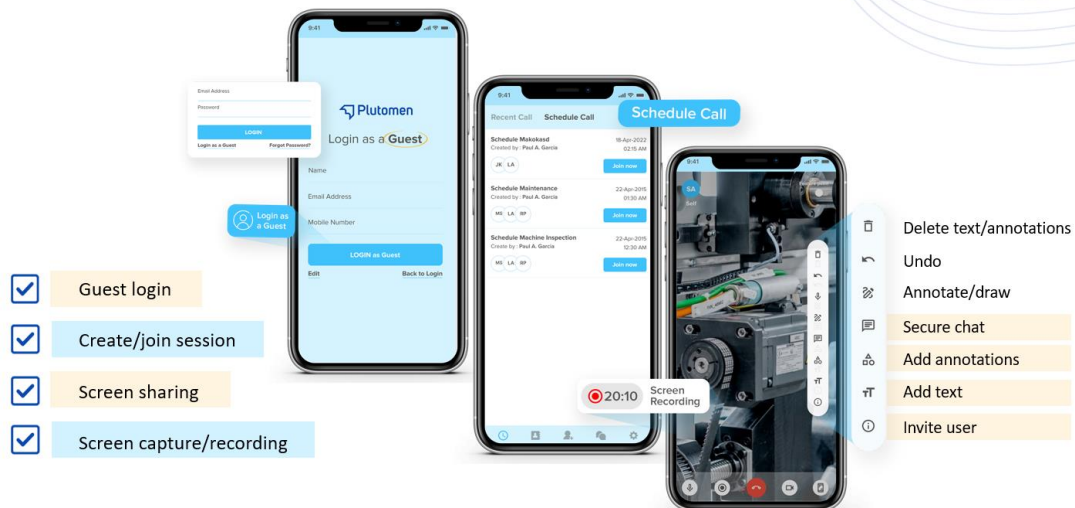
Innovation

Remote Assistance (Plutomen Connect)

Connect is an innovative remote service and maintenance solution powered by latest smart glass technology. It helps enterprises and organizations to significantly speed up reaction times, while simultaneously reducing travel time and costs for experts

With Connect the remote expert can see exactly what the person on-site is seeing and as a result is able to provide instant, targeted feedback and instructions by video, audio, text, markers, and document sharing. The exclusive possibility to have multiple users in one call, allows for verified external experts to take part in a call even if outside of a company network.

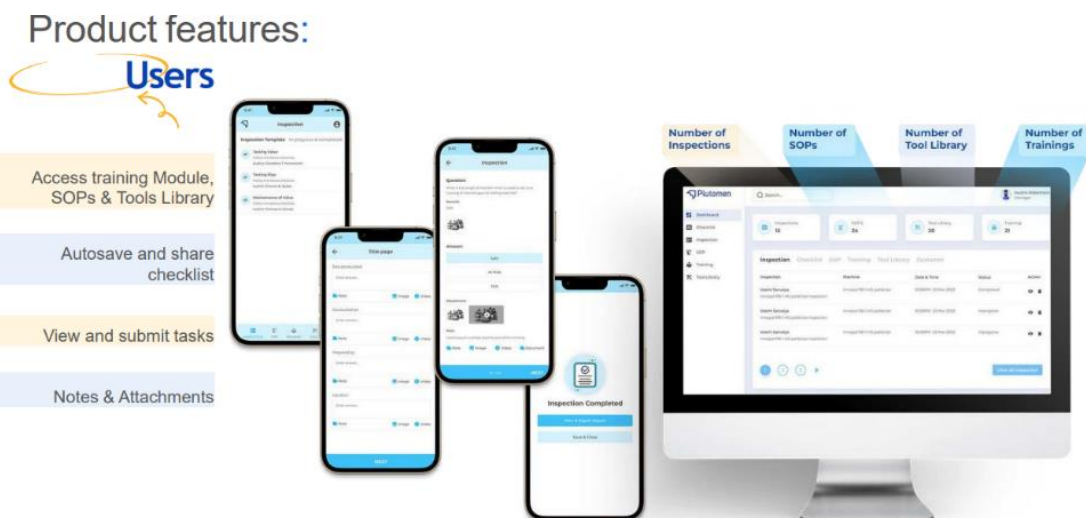
Product Features: App users



Digital Work Assistance (Plutomen Workflow)

Digital Work Instructions is an innovative “inspect-by-vision” solution targeting all kinds of service & maintenance processes in various industries. These types of activities usually occupy both hands of a service technician. At the same time, digital information, and instructions such as maintenance procedures are needed to conduct the task.

With Digital Work Instructions all relevant information like guidelines, check lists, visualizations, circuit diagrams, etc. are always right in the field of view without compromising the workers’ mobility. In case on-site technicians cannot resolve a problem, remote experts may be consulted for advice. With the No-Code Low Code user interface modeler, new use cases can be built by any workforce even without IT know-how.



Self-Assistance (Plutomen Assist)

Assist is an innovative “3D Step by Step Guide & Immersive Training” solution targeting all kinds Training & Step by step inspection in virtual environment or overlying the virtual information on the Physical product itself. These types of activities usually occupy the time and physical presence

With Assist all relevant information like Training guidelines, 3D visualizations, etc. are always right in the field of view without compromising the workers' mobility. Enterprise can create themselves the 3D models and step by step instruction with our Assist Authoring Platform.

The Approach

When it comes to working in the field of XR, we have over 8 years of experience. When we were providing services, we realized that the industrial domain is a segment where this technology is perceived more in terms of training, operational effectiveness, and productivity. We obtained customer feedback on how these technologies can best assist them in their everyday routines. POC paralysis is common in the industrial sector. To break the POC paralysis, we thought that if we had a ready-to-deploy solution, the pilot could be completed faster, resulting in faster development. So that was the approach we took to begin working on a solution.

We started with remote support because we saw that any company looking for digital transformation could benefit from connecting frontline workers or operators with experts. Going back to customer understanding, digitalization of SOPS and checklists is critical. When we offered 3D modelling services, we were aware of the bottleneck of engineering drawings and resources whom can understand the product and convert it to training material. So we decided to launch a complete suite of remote assistance, work assistance, and self assistance tools for empowering frontline workers.

In simple way, our approach is getting the first cut ready, then validating and working collaboratively with customers inputs before rolling out another

The Benefits

Reduce Costly Time On-Site

Fix, repair, and resolve problems faster by helping the frontline team with real-time AR support from your most experienced team members. Eradicate unnecessary travel costs and costs associated with recurrence visits.

Robust Safety and Compliance

Maintain field technician's safety while they operate or repair hazardous machinery in tedious environments. Experts help field engineers with AR annotations in live view pointing to exact details, hazards, or actions to take to bypass errors and mishaps.

Enable On-site Self-Assist

Reduce overall downtime to resolve on-site issues instantly. Connect directly with the expert and troubleshoot to resolve issues fast.

Flexible Deployment

Install the solution on-premises or in the cloud with on-site training & easy adaptation.

Enterprise Back-End Connectors

Integrate & connect your enterprise's existing back-end systems to SAP or other ERP with ease.

Device-Agnostic

Compatible across a wide range of devices like smartphones, laptops, realwear handsets, tablets, and operating systems.

Reduces in-person availability:

Eliminates in-person hefty visit costs to boost resource delegation and increase productivity.

The Future

Our vision is of how easily an industrial enterprise can benefit from the journey of digital transformation. While there are numerous solutions and technologies available, the main issue is that each technology generally operates in silos. While we are already device agnostic, we are looking to become system agnostic by focusing on two major initiatives over the next 6 to 9 months. The first is that we are working to make ourselves system agnostic by making our extensions being available on major ERP like salesforce, microsoft, SAP, and making our API open so that any third-party field service or ERP application can also be integrated. On the second hand, we are considering developing a complete end-to-end MRO field service suite like early mentioned solutions Remote assistance, work assistance and self-assistance.

As the popular saying goes, “Built in India, built for the World,” and we want our product to be used by frontline workers all over the world.



GPK Logistech

GPK Logistech, with its headquarters in Mumbai, is India's first tech enabled platform for logistics related services with pan india network. We offering services such as land auditing, warehouse management system (WMS), Warehouse Insurance, Structural Audits of Warehouses, and Buying/ Selling & Leasing of warehouses. Since there is no manual intervention during registration, they offer an AI/ML-based app called StoreMart that gives 100% genuine information regarding registered warehouses. More than 3500 warehouses, built to accommodate land parcels, and more than 1 crore 45 lakh square feet of space have been registered using this app.



Innovation

StoreMart is the only comprehensive tech platform in the marketplace that facilitates storage, warehousing across the country with the most authentic information. The app provides a seamless experience throughout the various processes like shortlisting and contracting the warehouses and signing the contract, all on the app itself. Highly flexible and reliable service is offered in finding apt storage spaces as per their commodity.

StoreMart Eye is a patented (applied for) platform powered by a proprietary AI/ML algorithm. This algorithm automatically calculates and collects images of warehouse facilities, requiring only minimal manual intervention. The platform provides detailed information about warehouses located throughout the country. To provide the facilities to the customers, the algorithm captures and uploads photographs and creates a walkthrough of the warehouse. This greatly aids in the development of trust among potential customers. Recently, we have also introduced the Panoramic Mode where it stitches multiple images of a warehouse at the same time from the same camera together to create one single, wide Photograph to be visible as Panoramic view.

Furthermore, the In-house StoreMart WMS software assists businesses with warehouse inventory issues. Most traders do not have an appropriate WMS and keep their inventory on an excel sheet, resulting in a significant difference in their inventory. Invoicing also becomes complicated because it is linked to dispatch and must be done separately. The company's WMS enables businesses to digitally manage inventory. An operator can use the app to pick and dispatch inventory as well as create invoices in real time. Furthermore, StoreMart completely automates the value chain of warehouse space leasing. This includes listing, discovery, selection, deal negotiation, and paperwork completion.

This app address customers' major pain points like lack of knowledge about the Warehouses, lack of transparency, lack of clarity in terms and conditions, fewer options, high commission charges, local intervention, and multiple agent involvements.

The Approach

StoreMart approach has been extremely simple and four sided.

We have a direct Sales team who create Franchisees in the given state and also handhold them to register the warehouses across the state. We have a team of 26 Sales and 78 franchisees with us.

We also have a Customer acquisition team who handle our corporate accounts and have major task to create / generate leads

We have a marketing team who handles social media platforms such as Linked in, Instagram, Facebook etc. We have a SEO for our website growth through organic methods. We have also got an ASEO who handles the growth of our Android as well as IOS App

We participate in various industry specific seminars, exhibitions, Award shows and etc

We also have a no parking board strategy which are put on the gates of all registered properties

The Benefits

At StoreMart we are proud to have the most authentic information of the app, with it solution it has reduced the leap time from 15 to 20 days to 20 minutes only. We have all the filters which are required to find an apt warehouse as per the need. StoreMart is the only PAN India platform which helps everyone to find warehouses of different sizes and shape. With our software in the app all measurements, floor detection, photographs upload, panoramic view are all through the app with multiple of checks

StoreMart deals in all kind of storage space, even though it has all kind of spaces listed, it is the cheapest in brokerage

The Future

StoreMart is the future of adhering to Logistics policy of the country and organizing the industry which is highly un-organized

In next three years StoreMart will be the preferred platform for sourcing warehouse across the country. We are on the track for achieving our goal as we already have over 1.40 crore sq feet under supervision, We will also be a source developer for all the services required to have a robust supply chain

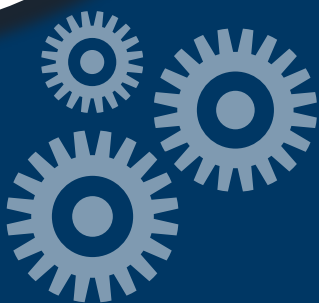


Judge India Solutions



Judge India Solutions is a 100% subsidiary of The Judge Group, a seasoned international professional solutions provider with a legacy of 50+ years. We provide solutions for prestigious global brands that include over 50 Fortune 100 companies & more.

We were established in India as an Offshore IT & Learning Center in 2016 and within this span of 6 years, we're all set to pioneer the field of IT, Learning, e-Governance, and Talent Solutions. At Judge India Solutions, our primary strength lies in the people-powered and people-centric approach that helps us to deliver excellent results.



Innovation

Brihha LMS

Brihha is the revolutionary Learning Management System developed to solve the collaboration issue in the online environment for universities and corporates. We focused on designing and building a product that can use by all age groups users in different environments. It provides centralization of all the features that learners and administrators require for knowledge retention and increased engagement.

Vardaan

Vardaan is a comprehensive Disaster prediction and management system where government and disaster management organizations can predict future disasters and prepare infrastructure and resource plans to manage relief activities. The solution will provide Incident Reporting, tracking, and resolving framework to the involved authorities. The solution will also provide the citizen-side interface through web and mobile portals and applications to enable access to e-Market, e-Pass, Telemedicine, and Telehealth. Simultaneously authorities can keep a track of movement through live GIS tracking.

JeCity

JeCity is an end-to-end IoT platform applicable for any scale of enterprise IoT projects for Smart City. It provides a range of features that enable System Integrators to build advanced applications for smart products, flexibly manage their connected devices via the cloud, orchestrates end-to-end data processing, analyze device telemetry, and many more.

The Approach

We use our experience in technology and align our set approach to catalyze innovation. Our approach consists of 5-steps:

- Innovation Strategy
- Idea Iteration
- Initial Concept
- Market Analysis
- Innovation Sustainability

The Benefits

Brihha LMS

- It optimizes the end-to-end process with the help of dynamic learning paths and practical models
- Establishes classroom environment with video conferencing, gamification, and real-life simulation with virtual reality integration
- Enable experiential learning that reduces time and cost at the same time

JeCity

- Increase operational efficiency by collaborating effectively and providing better decision support
- Increase profitability by consolidating operations and reducing energy use
- Increase availability in preventative maintenance and technical engineering services costs

Vardaan

- AI-enabled disaster prediction
- Enhanced announcement and communication in case of any disaster
- Real-time tracking management, incident management, disease management, patient management, and facility tracking

The Future

We are committed to making a smart future happen with:

- Quantum computing for drug discovery in a multi-verse
- Digital Twin in a Meta Verse for Agile Manufacturing
- Building a sustainable tech future environment that includes initiatives for smart energy, smart manufacturing, etc.



Online PSB Loans Limited (OPL)

Online PSB Loans Limited (OPL) is a revolutionary digital credit infrastructure company that develops and integrates cutting-edge technologies to automate and digitise the lending process for both borrowers and lenders, by creating a completely scalable system. The company offers credit delivery to MSMEs and retail borrowers by addressing their pain points. They roll out unique analytics and algorithms for AI/ML-based credit products and provide high-end Fintech solutions and high-quality data to credit institutions helping them make credit decisions faster. OPL has already built and is constantly scaling up the highly advanced technology for the Lending ecosystem. The speed and agility of execution are the best in the Fintech Industry. OPL delivers customised digital lending solutions that include STP processes and digital monitoring that encompasses the lending lifecycle.

PSBLoansin59Minutes.com platform was launched for the automation of credit to borrowers. The platform is mapped to all current lending processes irrespective of the type of bank/lending institution. Currently, there are 87,000+ branches integrated on the platform with more than 1,50,000 bank users using it. It has processed more than Rs. 1,10,000 crore applications with more than Rs. 71,000 crores of disbursements. Today, the company has uniquely positioned itself in the digital lending credit ecosystem.

Since its launch, Online PSB Loans has witnessed a huge flow of loan applications and more than 5,000+ video testimonials have been received from borrowers showing gratitude for timely help and support.

Innovation

The infrastructure has been tested across many users and different segments in the country. For the first time, bank-level integrations are made possible for real-time user management, product, and scoring model creation, credit appraisal, and decision-making in line with the existing credit policies, real-time reporting, and monitoring. The Platform integrates advanced technologies like AI and ML to automate and digitize the lending processes for Borrowers and Lenders. Approval of MSME/Retail/ Mudra loans have been 'fast-tracked' and a digital approval is provided in 59 minutes with a considerable reduction in TAT of 7-10 days.

It is easy to access all the key data through APIs in the platform. 1000+ data points are analysed from various sources such as IT returns, GST Data, bank statements, MCA21, bureau and fraud database in real-time while capturing the applicant's basic details using smart analytics and any new data point can be easily integrated into the platform.

Proposals are screened and processed with a rules-based engine, built using banks eligibility criteria helping save substantial time and cost for banks. The platform is mapped to all current lending processes irrespective of the type of bank/lending institution and provides bankers with real-time data availability to monitor the performance of the bank across branches, regions, and zones.

Entire track/chronology of a loan application has digital footprint. None of the MSME loan application is missed out at any stage. All bank head offices can have MIS report of all loan applications at state, district and taluka level. This comprehensive & unique platform is integrated seamlessly with the existing infrastructure of lenders. The platform is capable enough to enable lenders to create loan products in-line with their existing credit policies. PSB59 is based on strong technology infrastructure and architecture that helps in adapting any micro services with the lenders' ecosystem either partially or completely. The infrastructure can support any lending transaction irrespective of the lender - public sector banks, private sector banks, rural banks, cooperative banks and other lending partners.

Our lending infrastructure is based on micro-services driven architecture. Each module is divided into micro services. Such modules can be equipped with the ecosystem of various lenders partially or fully, depending upon their requirement. The entire platform is scalable and can be easily adapted into any lender's ecosystem. we have developed various, white-labelled solutions for prominent lenders in India.

The Approach

In 2017 sales and purchases data was digitised. This was critical in MSME financing. OPL merged the four pillars - GST data, ITR, Bank Statement and four bureau to make a single format and presented to bank which has highly appreciated by SIDBI and banks. This process considerable reduced the time of MSMEs. The process which took one day was then further reduced to one hour and in 2018 the was platform launched.

The base of technology depends on micro services driven architecture. PSB59 is a platform based on this infrastructure. The modules on this can be used as micro services by different banks, depending on their respective lending requirement. Each lender can utilize these micro services at a full scale or at a partial scale. There is lot of diversity in terms of usage of modules from a lender's perspective. The whole process is automated and the entire decision is analyzed and taken by the system. On an average, it takes a week to equip such modules with lender's ecosystem and it's function is ready to go live. Hence, this platform is fully scalable and the infrastructure delivers beyond conventional lending setup of lenders.

The Benefits

Lenders/borrowers can avail various benefits through this innovative platform.

Benefits to Lenders

- Real-time product and scoring creating in-line with credit policy
- Receive screened proposals on dashboard
- Digital data collection and parameter checking
- Real-time digital credit decision making
- Increased efficiency to handle more proposals
- loan sanctioning and disbursement time has been cut by 75%.
- Transparent Approval – no human bias, AI/ML based digital approval for loan

Benefits to Borrowers

- Contactless Real-Time Digital Approval within 59 minutes for MSME/Mudra loans & 15 minutes for retail loans
- Disbursement TAT of ~ 7-10 Days instead of 31 days
- Convenient to apply from anywhere anytime without visiting bank branch
- Standardized form for all Lenders

The Future

Our vision is - To be India's best and leading digital lending infrastructure, where every financial institution uses any one aspect of the platform for any lending activity. Apart from this there are many other products that are in the pipeline to launch, like

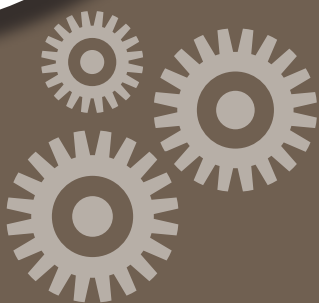
- a. Dealer & Vendor Financing solutions for all key Industry Majors
- b. Bill Discounting solutions
- c. Invoice Financing Solutions
- d. Agri Lending Solutions
- e. Innovative finance Schemes through Local Governments initiatives

The TMS logo consists of the letters "TMS" in a bold, sans-serif font, centered within a light gray rectangular box.

TMS Technov M Systems P Ltd.



TMS Technov M Systems P Ltd, was incorporated in 2007, to commercialise Field research driven technology. patented bearing Pat no 253287, 250627,250491, - The Magnetic resonators for Gas turbines, Boilers, Ovens and Furnaces fired by Liquid and Gaseous fuels (HFO, HSD, NAPHTHA, PNG, CNG, NG, LPG, Propane, etc) and to develop systems for manufacturing such as Customized ABC, ABM, Utility value maximization, etc. We have executed more than 4000 projects-Fuel management By installation of Magnetic resonators until now, for manufacturing, comprising of Oil and Gas, Fertilizers, Power (NTPC & IPGCL), Heavy engineering, Heavy forging, Auto motive, Auto components, Cement, FMCG, STEEL, Alumina etc; Presented peer reviewed tech papers, by TMS & Its clients in (Centre for High tech, GOI, Petrotech 2007, 2009, 2016, AEMAS, Institute of Chem Eng, CII ETC.)



Innovation

Our innovation is initiated with Field research, that balances on Customer driven ideation and feedback. Most significantly, our innovation focuses on generation of customer trust, building a prototype fulfilling pain points, using patented technology, practice customer collaboration and creation of niche markets fitting the Cost benefit analysis of our client. Continued application of innovation helps creating niche brand. Innovation is our bedrock. Our paradigm is based on GRID, comprising of variables, Market segment – Technology - Process. Triggering any variable in GRID kickstarts business process.

The Approach

Institutionalising our innovation and building mutual trust vide collaboration. Complete implementation of innovation using evaluation template to document actual performance of technology deliverable. Technical cum emotional training of manpower to face challenges with a reward and compensation system in place, satisfying the employee goals. We focus on timely resource availability, quick accessibility and planning timely resource utilization.

The Benefits

Fuel management By Installation of Magnetic resonators helps in Improvisation of combustion process of the utilities. Application of magnetic resonance for dynamic polarization of hydrocarbon fuel that will readily react with air, thus for same mass flow we have increased reaction rate forms the basis of the application of Generic technology.

Reduction of Input costs in manufacturing, namely reducing the fuel consumption. The technology not only helps to save the hydrocarbon fuel but also, burning less fuel for same output means less emissions of carbon di oxide, unburnt hydrocarbons and other toxics into the atmosphere.

The Future

TMS is poised to achieve its future business objectives thro exports. Institutionalising the technology has been our forte being achieved by publishing ours and our esteemed customers' peer reviewed papers in tech meets and journals. Our focus for future involves replicating our established business paradigm in our export initiatives to build a globally sustainable ecosystem.



Ekta Telecommunication & Systems

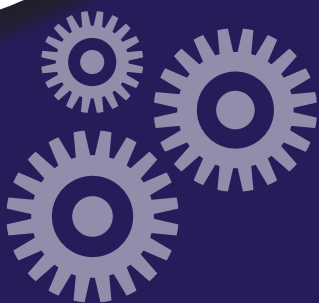


Ekta Telecommunication & Systems is an ISO 9001:2015 certified (Design, Development and Manufacture) "SE 2B" Rated a leading Industry of India of MSME Sector at Adityapur Industrial Area, Jamshedpur since 1994 Registered and Products approved by GeM, Railway, Hindustan Aeronautics Limited, CPP, Defence Tata Group etc. We are 100% Approved OEM at GeM and 100% Trusted Industry certified by Tata Group. We design, develop and manufacture Power Systems Products, Line Conditioners Products, UPS, Products based on Non Conventional Energy Sources, Medical Equipments and Device etc.

It is also engaged in R&D in the field of Electronics, Defence and Aerospace, Non-Conventional Energy Source, Nano – Technology, Bio-Engineering and Artificial Intelligent Systems Communication device and Systems.

We have been Honored by PRESIDENT OF INDIA – Dr APJ Abdul Kalam (2 Times) for our Achievement in in-house R&D/Innovation and Awarded Three NATIONAL AWARDS by Government of India Including Award for Excellence In Electronics.

We have also been conferred JHARKHAND UDYOG RATNA and "STATE LEVEL OUTSTANDING ENTREPRENEUR AWARD" consecutively for 12 years for our outstanding performance by Government of Jharkhand. We have been also Awarded Entrepreneur of the Year 2015.



Innovation

Early Kidney Diagnosis Device

It is Nano-Electronics – Bio Engineering based a very unique Medical Device that can diagnose the status of CKD patient smartly using urine at very low cost as Rs. 10-15.

It also analyzes the albumin, creatinine level and their ratio using smart Electronic Device. The device gives results in 30 seconds for each test. We have two separate assays in device for albumin and creatinine.

The risk of chronic kidney disorder, preeclampsia, and other diseases that affect the albumin and creatinine level can be detected earlier by the albumin and creatinine ratio.

According to many reports, including WHO in year 2021, 10-18 % of the world population is affected by kidney-related diseases. There are more than 10 million cases every year of chronic kidney disease (CKD) in India. Preeclampsia is another life-threatening disorder that occurs during pregnancy (affecting 1 in 20 pregnancies), childbirth, and postpartum. It causes high blood pressure and a significant amount of protein in the urine. Proteinuria is one of the significant features of preeclampsia, one of the most common and potentially severe pregnancy complications.

We believe our this Innovation will proof Blessing for CKD patient of the World.

The Approach

The Idea of this innovation has come in our mind when my (Niraj Mishra) both kidney failed in year 2018. During treatment we observed that there is no a no any diagnosis Kumar systems available properly, standard to diagnose the renal disorder, diseases at early stage and hence no any prevention. We found that maximum failure of kidney can be prevented if we diagnose it at very early stage at home. It gives an approach to move towards idea of innovation applying nano technology and electronics in bio- engineering.

The Benefits

- Early diagnosis of CKD
- It will Prevent Kidney Failure
- Very Cheap diagnosis
- 'As it is very Cheap , very useful and feasible for Rural Population
- It is exportable and thus generate Foreign money
- Very simple operation, if a child can use.
- It will help pregnant women

Many more

The Future

We are making this device more useful by adding more innovative features like connecting with mobile application etc

We have also started working of SMART LLA GLUCOMETER WITH VERY LOW COST STRIP. We have also plan to develop Nano Technology based Artificial Kidney



Revayu Energy

Revayu Energy is an innovation driven cleantech startup in the field of solar and small wind energy and Hybrid Energy



Innovation

With Industrial Exhaust Fan Energy Recovery Turbine, we are able to recover energy from the wasted artificial wind using our applied for patent Wind Turbine Generator technology to feed the power back into the grid. Being exposed to continuous power generating source, it provides more consistent and reliable power output.

With Telecom Tower Top Innovation, we provide clean & cost effective power to one of the largest diesel consuming industry. Wind turbine on top of existing tower saves on cost of structure, space and capital as installation without usage of heavy machinery like crane within 1-2 days is not only innovative & sustainable but also cost effective.

The Approach

Revayu's approach is to provide solutions which fulfill the criteria of problem solving, customer satisfaction, striving for perfection, cost effective and value for money viable solution.

The Benefits

Sustainable, environment friendly, saves on operating cost, hassle free, pocket friendly and technologically advanced Hybrid renewable energy solutions.

The Future

Cost effective & sustainable clean energy solutions with niche applications and minimum competition with Indian and global market has an immense scope of scalability. Within last one year since its seed funding, Revayu has already achieved 10 times its last year revenue. With clients like Birla Ultratech, IOCL, BPCL, DRDO, ITC Hotels, etc.



Webskitters Technology Solutions Pvt. Ltd.



Webskitters Technology Solutions Pvt. Ltd. is a well-known, award-winning, internationally-acclaimed name in the IT industry. We are a proud National MSME Award 2022 (1st Prize) Winner that acknowledged our dedication and commitment toward our clients. Starting its journey in 2013, the company rose to its current stature through quality deliverables, on-time project delivery, and unparalleled customer support.

Providing high-end UI/UX Design, Web Development, Mobile App Development, Digital Marketing Services, Artificial Intelligence Services, and Internet of Things Solutions are our forte. We have achieved to become the one-stop destination for our clients across the globe. Offering unique, innovative, and customized solutions according to our client's business requirements have always been our company's core objective.

Upholding a strong work-life culture, we hand-pick our talents from the international market and give our efforts to cultivate a healthy work environment; for we believe only happy employees can deliver impressive results!



Innovation

Webskitters believe in utilizing technologies for the benefit of society and fulfilling our social responsibility. Taking initiative in research and development, we have set up a separate wing that develops, tests, and implements the technologies in improving societal conditions. Our advanced technological help has already been used as a flood alert system using IoT, controlling security appliances that can be managed through a single tap on a phone and others.

We have also entered the energy efficiency and home automation sector by developing some innovative products and services for our clients. As the green revolution is bringing a huge change in the market, we are supporting our clients to embrace simple and cost-effective automation services, which allow them to carry their home in their smartphone, and pay lesser bills than ever!

We mold your current infrastructure and upgrade it to deliver a high-end solution, which can be controlled through any corner of the world. Utilizing the IoT technology, we introduce it to your day-to-day lives, creating a significant change in your lifestyle, and bringing comfort to your fingertips.

The Approach

Having been in the market for more than a decade now, Webskitters has a clear approach to rising the ladder of success. We aim to be the No.1 IT company in the country. With our committed services and dedicated solutions, we have achieved various milestones from time to time. We have expanded in terms of our revenue, manpower, and the industries we cater to. In the coming year, our vision is to get the benchmark of 1000 employees and achieve the CMMI Level 5 Certification.

The Benefits

Webskitters is a hub for all IT aspirants and individuals who are willing to take their careers to the next level. With amazing-quality international projects, we provide our employees with the opportunity to challenge themselves and develop a wonderful understanding of the market. It is also an amazing prospect for them to put their creativity to use and innovate a new technology/design/service they always remain proud of.

We also provide twice-a-year performance appraisal, on-job training for improved technical skills, free healthcare, and remuneration according to the market standard.

The Future

Writing the future with their own hands, Team Webskitters is working to have more than 1000 employees by the end of 2023, with 2 new branches overseas in UK and Canada. The company is also opening its operations in a few other states across India; hence expansion is in its pocket. By the end of 2023, Webskitters is also planning to open its hardware design and manufacturing unit!



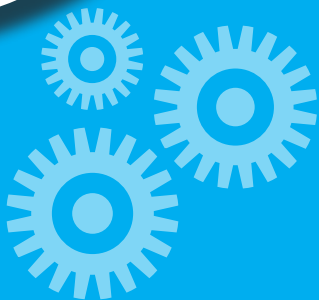
SONA COMSTAR

Sona Comstar

Sona Comstar is among India's leading automotive technology companies. It designs, manufactures, and supplies highly engineered, mission-critical systems and components for automotive OEMs globally for electrified and non-electrified powertrain segments.

It is a global supplier, and around 70% of its revenues are from international sales. It is one of the leading suppliers of battery electric vehicles (BEV), with 25% of its revenues derived from the BEV market.

Sona Comstar is a technology-driven company. It develops mechanical and electrical hardware systems and components, along with base and application software solutions, to meet the evolving demands of its customers. With product offerings spanning all types of conventional and electrified powertrains, the company is one of the few automotive technology manufacturers well-positioned to capitalise from traditional platforms and evolving high-growth electrification trends.



The Innovation

With its strong focus on research and development, Sona Comstar is now one of the few companies globally possessing the ability to design high-power-density EV systems, handling high torque requirements with a lightweight design while meeting stringent durability, performance and NVH requirements, thereby enabling EV manufacturers to enhance the vehicle range, acceleration, and overall efficiency.

Having been aware of the continuously evolving needs of the market, we recognised the trend of electrification early on. We built a strategy to enter this market by developing suitable products based on our core strengths. So, we started developing driveline parts for the highest-performance BEV cars, followed by the premium and mass BEV segments. For driveline, our strength is in high-torque applications. Similarly, for motors, our strength is in offering high power density at low voltage. So, we started developing the traction motors for the lowest power segment, electric two-wheelers, followed by three-wheelers and other higher-powered vehicles.

To enhance our existing materials, mechanical, and electrical capabilities, as well as to add new capabilities of electronics and software, we invested INR 2,223 million in R&D, added two new R&D centres, and hired various R&D engineers. Apart from these in-house efforts, we have partnered with companies grown out of universities, such as Enedym (from McMaster University, Canada) and C-Motive (from University of Wisconsin-Madison, USA), to develop motors based on new technologies to suit the needs of the end consumers.

As a result of these efforts towards focused innovation to meet the need for rapidly rising electrification in automotive, we developed 11 new products in the last five years.

The Approach

We have been able to develop a large number of new products in a relatively short time with our four-step process of innovation – Search, Select, Implement, and Learn. First, we studied the market needs and mapped the type of electric vehicles against the required power rating. Then considering our core strengths, we decided on a targeted strategy to build new products to address the market needs. For this purpose, we made significant investments to build new R&D centres and our capabilities in designing, testing and validating the EV products being developed. With continuous learning from our innovation and market requirements, we are expanding our technology roadmap for the future.

The Benefits

Our innovative process and the introduction of many new products prepare us for the rapidly changing automotive landscape. Now we have various offerings for various EV segments, be it cars, LCVs, or two- and three-wheelers. It has also helped us from the perspective of risk diversification and future growth. In the last two years, we have grown our revenues from INR 12,201 million to INR 21,306 million and also won several new EV programs across many global customers.

The Future

We are continuously studying the market needs beyond the newly developed products and identifying areas of innovation. We have expanded our technology roadmap, and now we are developing many more products to address both the revolutions in mobility: Electrification & Automation.



bigbasket

bigbasket is India's largest online grocery store. The company commenced operations in 2011 and has since grown to cover the length and breadth of the country providing grocery to both retail and wholesale customers with over 18,000 products and 1000+ brands. The company operates in cities and had a turnover of Rs 7000 Crore in the financial year ended 31 Mar 2022.



Innovation

Overview of the challenge: Present Cold Room (-18 °C) is highly energy intensive.

a. Where along the value chain this challenge is pronounced and why:-

This is in the Last mile segment in the 5 K stores and this problem is exacerbated by frequent door openings due to the picking and Stacking Activity.

b. Data points, published where possible, that substantiate the problem to be solved:-

Frequent Door openings and improper door closure leading to higher energy Consumption.

Non availability of Wi-Fi coverage inside -18 °C cold room due to non-availability of suitable Wi-Fi routers.

Wearing specialized jackets by the pickers and stackers to withstand the sub-zero temperatures.

The problem of door frequent door opening and closing which results in higher energy consumption is sought to be controlled by making a rack with multiple doors where selected items would be kept in the shelf behind each door. Thus, the picker or stacker would only open the relevant door to take out or stack the item. He would not need to enter the cold room. This has been done by checking on the heat load calculator of the expected SKU and the ambient temperature and the required temperature for maintaining the product on the shelf.

c. Internal air circulation & duct design is a very new and unique approach in the forced draft cooling system. Each individual door could be loaded to full storage capacity without affecting the temperature profiles across the doors.

The Approach

The idea is to Break up the larger cold room into multiple smaller modules. This would ensure that only the relevant door is opened, and items are picked. Thus, it would reduce the energy cost. In order to achieve this goal bigbasket took part in the Tech-emerge challenge and the project was partly funded by IFC. The design for the system was finalized and two different vendors were asked to manufacture the equipment as per the requirements. To monitor the expected results the equipment was monitored remotely through temperature monitoring and energy monitoring devices after loading the products into the shelf. The approach was to make the equipment modular, easily transportable, plug and play rather than the conventional approach of building cold rooms.

The Benefits

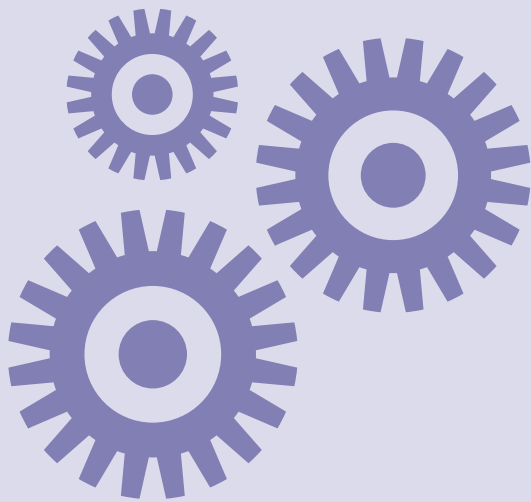
The benefits accrued include: -

- Energy savings
- Modularity
- Ease of operation for pickers and stackers
- Plug and play approach
- Easily relocatable.
- Space utilization.
- Increased storage capacity.

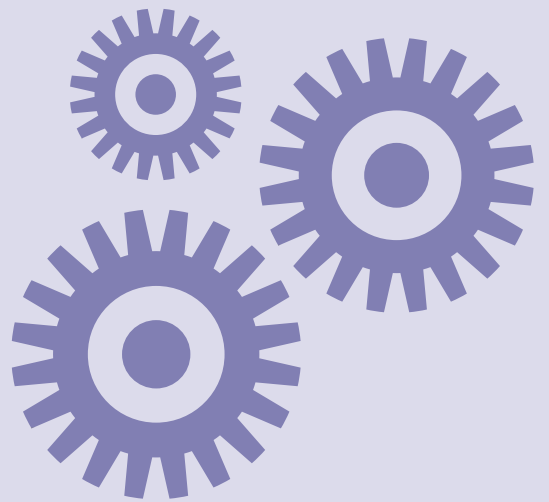
The Future

The system has already been scaled up to over 300 stores pan India and is utilized in various temperature segments to store chilled and frozen items. The equipment would become the standard fit for most lines of business going forward. This is so because it is modular, and it can be scaled as required due to its plug and play nature.

Reference- <https://www.techemerge.org/pilots/bigbasket-modular-cold-racks/>



Special Award Fostering Industry Academia Interactions



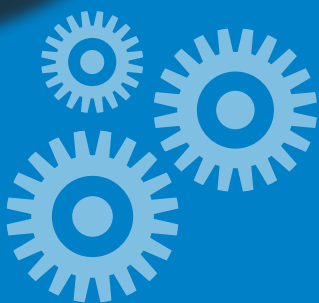


Tata Consultancy Services (TCS)



Tata Consultancy Services is an IT services, consulting and business solutions organization that has been partnering with many of the world's largest businesses in their transformation journeys for over 50 years. TCS offers a consulting-led, cognitive powered, integrated portfolio of business, technology and engineering services and solutions. This is delivered through its unique Location Independent Agile™ delivery model, recognized as a benchmark of excellence in software development.

A part of the Tata group, India's largest multinational business group, TCS has over 528,000 of the world's best-trained consultants in 46 countries. The company generated consolidated revenues of US \$22.2 billion in the fiscal year ended March 31, 2021 and is listed on the BSE (formerly Bombay Stock Exchange) and the NSE (National Stock Exchange) in India. TCS' proactive stance on climate change and award-winning work with communities across the world have earned it a place in leading sustainability indices such as the MSCI Global Sustainability Index and the FTSE4Good Emerging Index. For more information, visit www.tcs.com.



The Innovation

TCS Academic Interface Programme (AIP), as a function, started over 20 years ago in a humble way with a vision to bridge the gap between Academia and fast evolving IT Industry and to enhance the employability skills amongst the students.

As the Technology is advancing rapidly and Industries are orienting themselves to this rapid change, the gap between Industry and Academia is widening. In this context, TCS designed AIP framework to collaborate with Academia at various levels like, Institute Management, Faculty, Students, Heads of the Department, Training and Placement Offices, etc. to bridge this gap. Under this framework, AIP conducts various activities for Academia to create awareness on latest and emerging technologies, enhancing employability skills to make the students industry ready, offers internships to the students, support curriculum enhancement through participation in various academic boards, designing / delivering various credit and elective courses based on industry needs, etc.

Approach

TCS AIP team, in collaboration with academia, conducts various activities to upskill the knowledge of latest technologies and improve employability of the students, enhancing the subject knowledge of the faculty by bringing industry perspective through Faculty Development Programs and the overall development of the institutes. Some of the key activities are as follows:

- Workshops for students on technical topics and soft skills
- Faculty Development Programs for faculty
- Designing / delivering credit / elective / value-added courses / degree programs
- Participation in various Academic Boards
- Participation in Contests, Events, Hackathons etc. as Knowledge Partner
- Internships for students
- Industrial Visits for students

Benefits

Key benefits for the academia are as follows:

- Enhancement of students' quality and make them industry ready
- Improved employment opportunities
- Curriculum alignment with industry needs

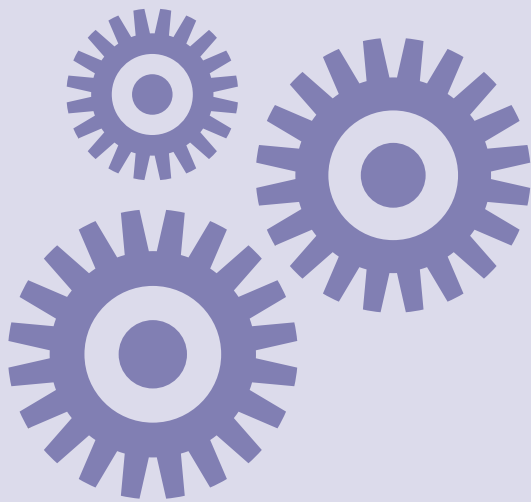
Key benefits for the Industry are as follows:

- Increase in industry ready talent pool
- Opportunity to give back to Society by contributing through education eco system
- Improvement of TCS brand in academia to attract the talent pool

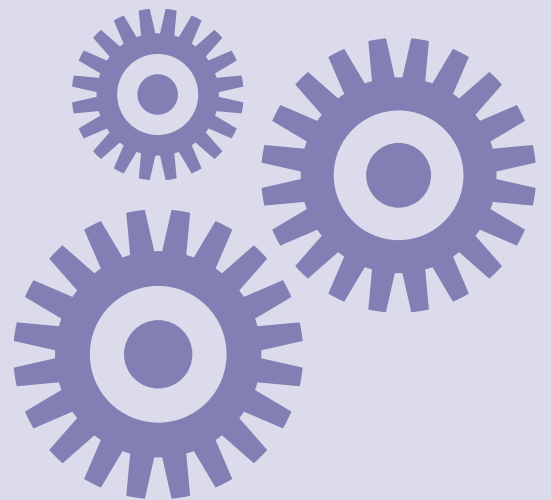
The Future

The focus for future is on the following:

- Expand our reach to institutes and students from Tier-2 and Tier-3 places
- Influence the curriculum through academic board memberships
- Enhance subject knowledge of faculty by bringing industry perspective through Faculty Development Programs



Top Innovative Research Institutions





IIT PALAKKAD

Indian Institute of Technology Palakkad



Indian Institute of Technology Palakkad embodies a prestigious global brand in Indian higher education in Science, Technology, Engineering and Mathematics (STEM disciplines). One among 23 such Institutes of excellence in India today, IIT Palakkad was announced by the Government of India in 2014. Operations commenced the very next academic year, 2015-16, mentored by IIT Madras, and by admitting students to the B. Tech. courses in Civil Engineering, Computer Science & Engineering, Electrical Engineering and Mechanical Engineering. Within a short span of two years, Master's and Doctoral programs in Engineering, Mathematics, Physics and Chemistry were rolled out. Today, the 1200 strong vibrant academic community drawn from different parts of the country; is a true microcosm of India. Upcoming world-class infrastructure and top notch research facilities here include state-of-the-art centres, workshops and R&D laboratories in areas like data science, computational imaging, high performance computing, micro-nano fabrication, materials and manufacturing, and instrumentation.



The Innovation

The Technology Innovation Foundation (TECHIN), launched in 2020, is the innovation, incubation and startup vehicle of IIT Palakkad. It was set up as a collaborative company formed for innovation and incubation of ideas that emanate from us and our collaborators.

Covackathon, a Covid focused hackathon; a Global Sanitation Centre of Excellence in partnership with HDFC Parivartan, Bill and Melinda Gates Foundation, and others, a MedTech Research Centre of Excellence in partnership with West Pharmaceuticals and MAGIC (MulticoreWare Academia Global Innovation Centre) are some offshoots. The Department of Science and Technology's National Mission on Cyber Physical System initiated Technology Innovation Hub on Intelligent Collaborative Systems (TIH-ICS), managed by IIT Palakkad Technology IHub Foundation (IPTIF), is on a firm footing to make India a leader in Cyber-Physical Systems (CPS) technology. IPTIF has made significant headway in accomplishing its mission with the technological journey in 2021-22 by implementing nine ongoing projects with IIT Palakkad and one with IIT Madras under the technological development vertical. Various entrepreneurial and skill development initiatives such as Entrepreneur-In-Residence (EIR), Pitch Aarambh, I-Skill, UG Fellowships (Known as Agni Fellowships), and Doctoral fellowships have been rolled out. The CSquare Innovation Lab at IIT Palakkad is a well equipped facility for the fabrication of any prototype, proof of concept idea, or project work, open to the IIT Palakkad community and to the general public. The Innodeate Bootcamp, a unique 6-day workshop on the Basics of Entrepreneurship, is organised periodically by CSquare innovation lab to promote the theme: Ideate, Tinker, and Innovate. Regular lectures and knowledge sharing events are conducted to promote innovation. MoUs for bilateral Collaboration with IIT Palakkad and facilitated experience sharing, such as by the Ministry of Innovation and Technology, Ethiopia, Dambi Dollo University and Ministry of Education, Ethiopia is just one example of IIT Palakkad's global reach for Innovation supporting partnerships.

The Approach

The Centre for Industry Collaboration & Sponsored Research (IC&SR) at IIT Palakkad was set up to promote, facilitate, coordinate and administer all the sponsored and consultancy projects of the Institute. A total of 92 Sponsored Projects and 19 Consultancy Projects with a budget of over 3 billion rupees were handled by the faculty members between June 2021 and May 2022. In addition to Sponsored Research Projects involving external funding sources, and International Research Collaborations, IC&SR supports Industry Sponsored Projects and Industrial Consultancy, Conferences/Seminars/Symposia /Workshops for knowledge dissemination as supported by project grants, IIT Palakkad sponsored research projects (e.g. Faculty Seed Grants) and Patenting of scientific and technological inventions.

Benefits

The thrust areas of research and innovation by the Institute are topics of great significance to the local ecosystem, which include, but are not limited to Agricultural Engineering and Food Science, Water Resources and Hydrology, Geotechnical Engineering, Ecology and Sustainability, Health and Biomedical Sciences & Engineering, Cyber Security and Technologies for Energy and Safety. Development of cost-effective, AI-based agricultural technologies, agricultural sensors, artificial intelligence, Robotics and automation, IoT, and associated embedded systems are priorities. IIT Palakkad also collaborated with industries, hospitals and the general public to battle Covid 19 through design and development of Low- cost Medical Ventilator, Automated Lung Ultrasound for COVID-19 Screening and Monitoring, and Pulse Oximeter among others.

Future

The motto of the institute is 'Nurturing minds for a better world' and IIT Palakkad aims to realise this via the demographic dividend of the median age in India being 28.7 years by

- Nurturing students into technically competent global citizens, both perceptive and responsive
- Expanding the frontiers of human knowledge and creativity through R&D
- Serving as a knowledge partner to society and industry.
- Collaborating with educational institutions in the region to increase access to quality education.
- Active public outreach, especially among children, to ignite curiosity and develop scientific temper



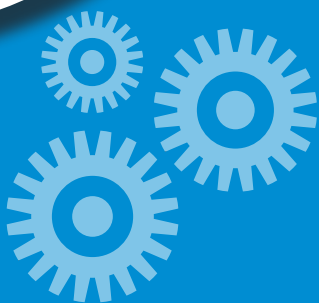
International Institute of Information Technology, (I²IT) Pune, India

I²IT was established in the year 2000 by Late Shri. Pralhad. P. Chhabria, Founder Chairman of Finolex Group of Companies, a well-known philanthropist and former President of Mahratta Chamber of Commerce, Industries and Agriculture (MCCIA).

Dedicated to the service of the Nation at the hands of the former President of India, His Excellency, Hon'ble Dr A. P. J. Abdul Kalam in the year 2003

I²IT is a Research Focused Higher Education Institute offering Undergraduate Programs : Computer Science, Information Technology and Electronics & Telecommunication Engineering

Dedicated in-house Research, Development, Consultancy and Collaboration Cell (RDCCC) known as the Pralhad P. Chhabria Research Centre (PPCRC) established in the year 2016.



The Innovation

Nurturing Industry Ready Professionals

In India, the chasm between industry and academia has always been bane and there has been little to no efforts to bridge this gap making both entities grow apart further. The effect of this outcome often impacts students' career. In March 2020, we tried something unique. Through PPCRC, our team comprising of faculty and students got a wonderful opportunity to design and develop an enterprise platform for 'capital equipment planning and procurement of medical technologies' through a healthcare consultancy firm from scratch. What started as a team of 2 faculty members, 3 students ended up becoming a 15-member team including external consultants who were hired for a few specific tasks. This way we created a pool of trained resources who worked on real time IT projects with latest technologies such as ReactJS, Angular JS, Spring Boot, Node JS etc and cloud based solutions for product design, development, testing, support, training and delivery at par with industry standards. This has solved two major existing challenges of industry i.e. Training resource pool on latest technologies and Recruitment. This way, we became tech partners of the industries and made a significant contribution in handling such greenfield projects which saved overall production and delivery cost to industry partners. Our team of students who worked on such projects became industry ready professionals who not only learnt coding but also the processes such as standup meetings, client meetings, requirement analysis, JIRA based user stories creations, end to end IT product development cycle.

The Approach

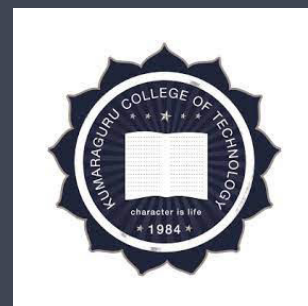
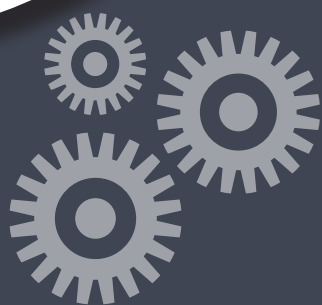
With this experience in end to end IT product development and intention of creating a conducive ecosystem for research and industry ready professionals, we initiated the Internship Programme in November 2021 and floated the idea among the then T.E. (Third year Engineering) students,. Those who came on board were able to continue to work on the consultancy and in-house projects till the completion of their degrees. Six groups were tasked with topics based on 1-on-1 discussions and each project group consists of 3-4 students along with a faculty mentor from their respective department. Each group was assigned real time problem statements available with the institute in achieving operational excellence such as process automation, hostel room reservation system, QR based security surveillance and patrolling system, Automatic entry and exit pass system, event management system etc. And simultaneously, based on the requirement of ongoing consultancy projects and anticipated projects, we take up students to train the skill set required for executing those projects. These students over the time get exposed and habituated to the working culture of industries.

Benefits

Over the 2 years we have matured and become more confident with our innovative processes, practices and approach to managing such agile based IT product development projects. And today, we have clients approaching us to take on their software development projects and become their tech partner. Although being situated in the heart of an academic institute, we could generate revenues worth more than INR 3 Crores through our consultancy, training and capacity building services within a short span of 3 years. This not only added to creating an industry ready trained resource pool but created a high rate of employment opportunities for our students working under these consultancy projects compared to their counterparts in other institutions. Today we have our own in-house team of senior solution architect, senior developer, UI/UX, testing, training, support team. Only the junior developers team keeps on floating with students coming in and graduating out.

Future

Currently, we are working with 2 overseas clients for the design and development of software solutions based on their requirements with a team size of 12 members. We aim to take up many such IT consultancy projects in the coming future through our channel partners and industry collaborations. This will help our current in-house team size to scale to over 50 members in the next 3 years. We are confident enough to take up greenfield and brownfield IT development projects. Being part of an undergraduate academic institute, we have a constant inflow of young talents year on year to match the requirement of recurring projects.



Kumaraguru College of Technology, Coimbatore

Kumaraguru College of Technology (KCT), Coimbatore is a private Engineering College started in 1984 under the auspices of Ramanandha Adigalar Foundation, a charitable educational trust of Sakthi Group. Situated in a sprawling 156-acre campus in the IT corridor of Coimbatore, KCT is an autonomous institution affiliated to the Anna University, Chennai and approved by All India Council for Technical Education (AICTE). KCT was granted Five Year Accreditation status in its first cycle of accreditation. Later, in the second cycle, with a CGPA of 3.21 on 4.0 scale, A Grade was awarded which was valid till 02 December 2021. In July 2022, following the NAAC Peer Team visit for third cycle of accreditation, KCT has been awarded A++ Grade, the highest grade awarded to institutions by NAAC with KCT securing a CGPA of 3.62 on a 4 – point scale. And all the eligible UG programs have also been accredited by National Board of Accreditation (NBA).

The able guidance and patronage of Arutselvar Dr. N. Mahalingam, Founder, Sakthi Group along with the efficient administration of Dr. B. K. Krishnaraj Vanavarayar, Chairman, the resourcefulness of Sri. M. Balasubramaniam, Correspondent and the foresightedness of Sri. Shankar Vanavarayar, Joint Correspondent have equipped the College with excellent facilities, spacious classrooms, seminar halls, well-equipped laboratories, sporting amenities, dedicated high-speed internet connectivity (broadband) and well-qualified faculty.

1) i-Pract-ace:

The Innovation

With advancing automation technologies, self- serving and intelligent bots mark a promising future for enhancing sports practice. Though India contributes 9.2% to the global tennis population (according to the International Tennis Federation), it lacks potential support and technological assistance in aiding aspiring tennis players. Despite the beneficial usage of self- bowling tennis machines world- wide, currently there is no native manufacturer for tennis bowling machines in India. Dotting this problem, ideations, and prototypes were made to produce a solution. i- Pract-ace is designed to be a cost efficient and automated self- bowling tennis machine. With an easy-to-use mobile application and the portable bot, it is for players who want to practice all types of shots in any available positions on the court. This makes it a user friendly bot / coach helper for any tennis player.

Benefits

i-Pract-ace being one of India's first automated tennis bowling machine, its beneficiaries include remote live streaming and coach monitoring access. It addition, it hold smart features like customizable drills, mobile applications for Android and iOS. The technical solution proposed also holds cost efficiency and is solar powered- making it an energy efficient solution.

Figure 1: Internal structure of i-Pract-ace

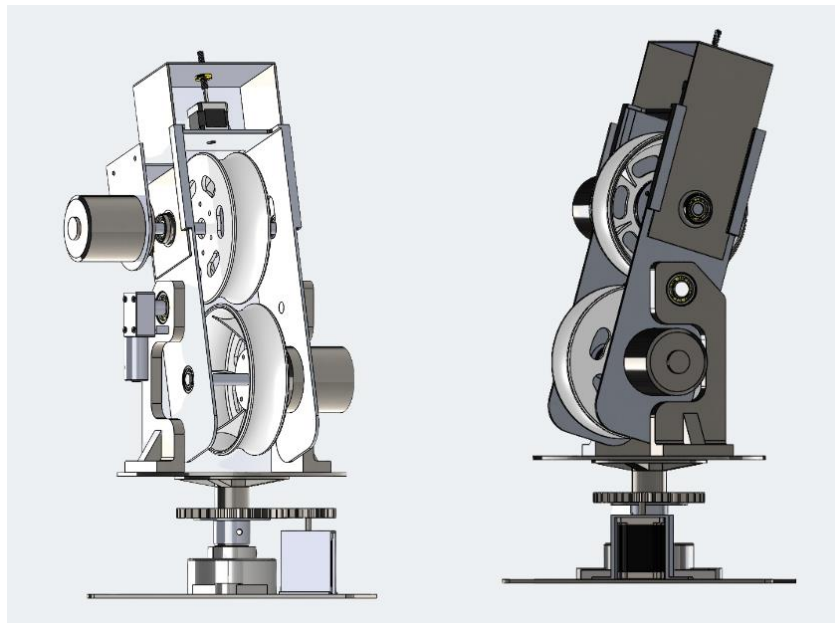


Figure 2: The team



Figure 3: Team with the revised prototype



2) Hybrid Membrane bioreactor for hospital wastewater treatment

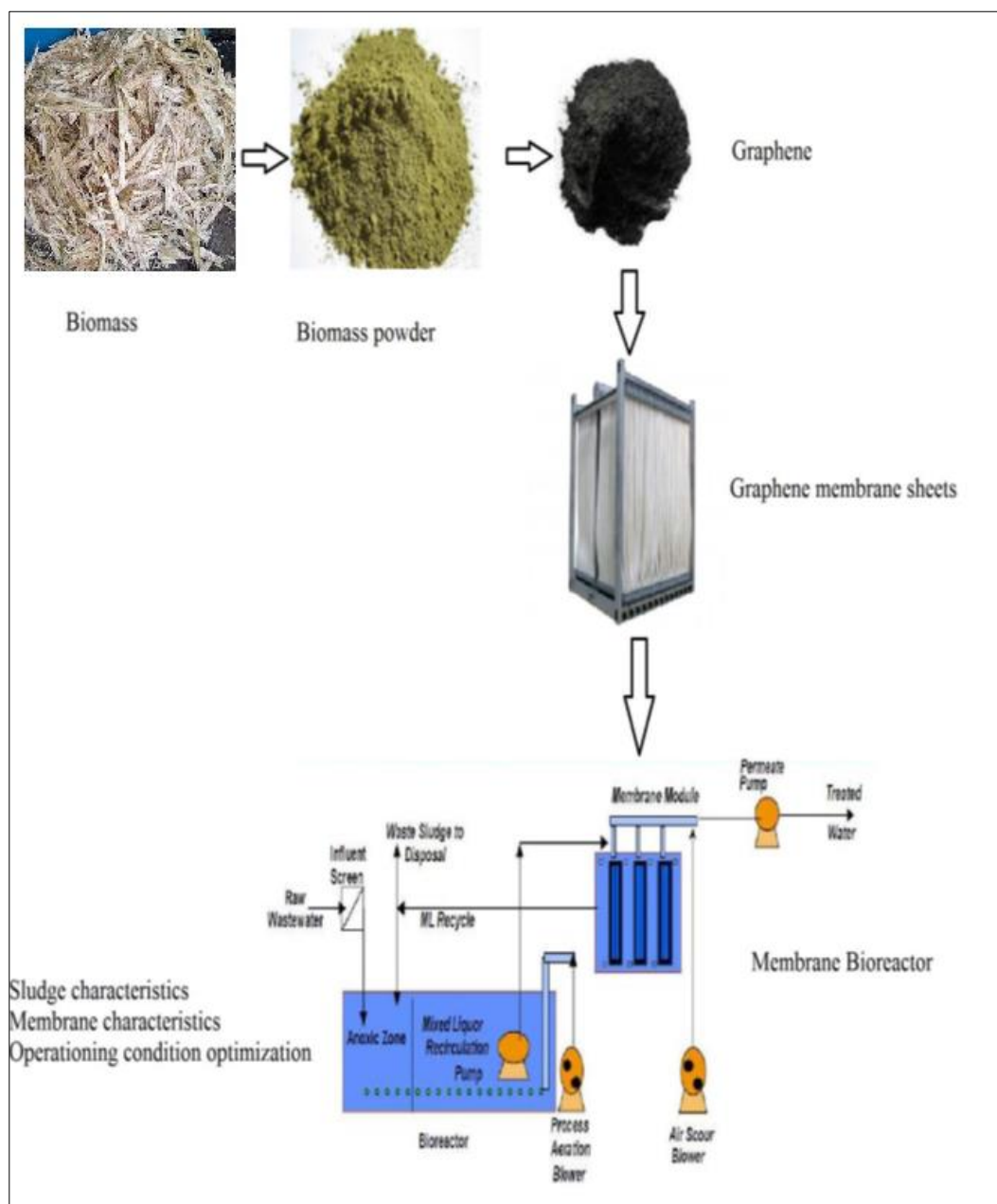
The Innovation

The present invention relates generally to treat pharmaceutical industrial waste water, particularly to pharmaceutical industrial waste water treatment by a unique membrane bioreactor which is functionalised with graphene materials. More particularly, the present invention relates to a novel graphene blended membrane mounted bioreactor as an effective tool for the treatment of pharmaceutical industrial waste water at low operation cost.

Benefits

High efficiency and low operation cost of this kind of membrane bioreactor will be an effective tool for the treatment of pharmaceutical industrial wastewater. Graphene has unique electronic properties, high tensile strength and impermeability to small molecules is now a well determined fact and these have been utilized to construct extremely thin membrane with size tunable pores (for molecular sieving) allowing for high flux. Therefore, it will be advantageous to have membrane bioreactor which is functionalised with graphene materials for use in pharmaceutical industrial waste water treatment.

Figure 4. Hybrid Membrane Bioreactor Process Diagram



3) Casting unburnt, ambient cured, sustainable red mud bricks

The Innovation

Red mud bricks (RMB) are produced exclusively using industrial by products (no natural soil is added). These ingredients are red mud (RM), fly ash (FA), ground granulated blast furnace slag (GGBS), and quarry dust (QD). As the industrial by products are used to produce bricks, top cover of the soil, a depleting natural resource is saved. Use of these industrial by products converts it to an effective value-added building material, which otherwise could be a burden on landfills in terms of disposal, deposition, and maintenance.

The unique feature.

1. The bricks are produced using large amount of industrial by products as against dumping these materials in landfills. The encapsulated form of these waste materials into bricks avoids the land, water and air pollution caused due to disposal in landfills. Also, saves natural soil used in the conventional clay burnt bricks.
2. The bricks are casted using alkali activators (Sodium silicate and sodium hydroxide), thus avoiding addition of cement which reduces the CO₂ emission in the atmosphere.
3. These bricks are neither furnace burnt, nor water cured, thus saving the energy bills. On the other hand, these are cured at ambient temperature utilizing the natural energy sources is a welcome method.
4. The requisite strength is achieved on third day after casting, could be ready for field application. By the same time, there is a continued improvement in the strength till 28 days, thereafter very marginal improvement of the strength continues.
5. The entire process of production is simple, easy and less time consuming.

Benefits

1. The industrial by products are transformed into a useful eco-friendly green product.
2. The RMB reduces the carbon footprint, as no cement is added and not furnace burnt.
3. The RMB is an ambient cured product, utilizes the natural energy for curing thus, saving the energy bills.
4. The entire construction industry will get benefitted with this product if commercialization takes place.

Figure 5. Ingredients



Figure 6. Red mud bricks

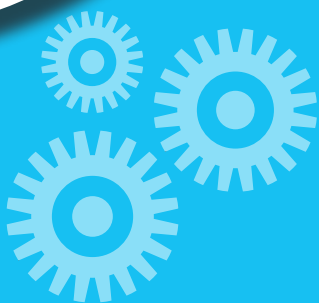




Northern India Textile Research Association (NITRA)

Northern India Textile Research Association (NITRA) is one of the prime textile research institutes in the country. The textile industry and Ministry of Textiles, GoI jointly established NITRA in 1974 for conducting research and providing support services to Indian textiles industry. NITRA's prime activities include R&D, technical consultancy, quality evaluation of materials, manpower training and technical publications. NITRA has a clientele of about 1200 textiles and allied sector units. The portfolio also includes overseas clients from U.K., Spain, Indonesia, Thailand, Ethiopia, Sudan, Bangladesh and Nepal.

NITRA's infrastructure facilities for quality evaluation includes six NABL accredited (ISO/IEC 17025) laboratories capable of analyzing materials as per national and international standards. With support from MoT, a Centre of Excellence (Protech) for protective textiles is established at NITRA in the year 2009.



The Innovation

- Development of air cleaner home textiles to reduce indoor air pollution
- Development of Work wear for Cement Porters
- New Approaches to Reduce Water Consumption in Textile Wet Processing
- An apparatus to determine Air Pollutant Gas Adsorption Capability of Fabric
- A process for preparing water repellant milkweed floss/fibre for preserving thermo-regulatory property thereof
- A water saving hank dyeing machine for dyeing textile yarns
- A process for fiber extraction from Pine Needles
- Development of Improved version of body protector for riots control
- Development of Flash resistance hood for Indian Navy
- Development of improved stab and impact resistant material for anti riots body protector
- Development of Multi Layered Flame & Thermal Resistance Fabric for Fire Fighter Clothing
- A process for preparation of regenerated bamboo fibre from indigenous bamboo
- Development of Synthetic blood penetration tester
- Development of Coat combat disruptive
- Development of Reusable sanitary pads and diapers

The Approach

The approach is to interact and collaborate with the Industry and plan innovations to fulfill their requirements. Research Advisory Committee consisting of experts from Industry and academia meets every year at NITRA with a view to assess the progress of NITRA's ongoing R&D projects and to make necessary modification on those, if required. The committee also suggests areas to be considered for NITRA's future R&D activities.

Benefits

Research outcomes are presented in Technical Seminars/ Workshops where industry personnel participate and discuss about the findings. Many of Research outcomes have been implemented by the textile units.

Research activities are also published in national/international journals/on-line publications to benefits the industry and associated stake holders.

Research outcomes are utilized in providing the consultancy services to the industry. These have resulted in energy savings, manpower rationalization, quality & productivity improvement, reduction in waste etc.

Once industry is benefitted society in general is also benefitted

Future

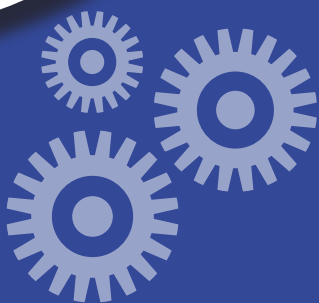
- R&D initiatives on Use of long natural fibres into technical Textiles
- Indigenous development of specialized fibre
- DEVELOP New Processes and IMPROVE Existing Processes for productivity improvement and cost reduction.
- Development of eco-friendly & sustainable processes/products
- INNOVATION for new products using latest technologies



Paavai Engineering College

Paavai Engineering College was established by Shri.CA.N.V.Natarajan, chartered accountant, Chairman, in the year 2001. Our vision is to be a globally model Institution all set for taking 'lead role' in grooming the younger generation socially responsible and professionally competent to face the challenges ahead. Paavai Engineering College is an autonomous, self-finance institution and accredited by NAAC with "A" grade. At present the college offers 19 UG programs, 7 PG programmes and 4 programmes recognized as research centers and CSE, IT, EEE, ECE, MBA are permanently affiliated programmes. Our college has established MoUs with Taiwan universities and totally 65 MoUs are made Industries and Institution in India and Abroad.

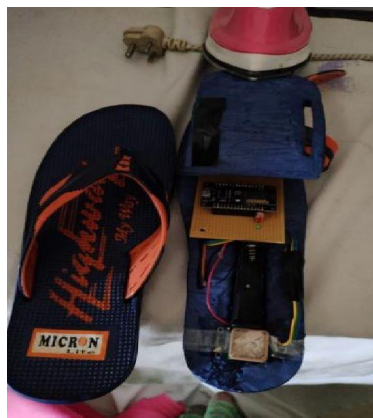
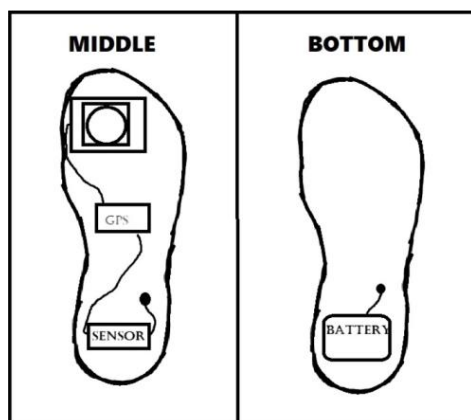
Obtained AICTE-CII platinum status for the past six years. Categorized as Performer in ATAL Ranking of Institutions on Innovation Achievements. Received all India level first rank – Best internship record during internship day organized by AICTE and Internshala for the past three consecutive years. Achieved champions of champion's trophy in Sports among Anna University affiliated colleges for the past six years. Our college has received "Top Innovative Research Institution Award – 2nd runner up in the category of Top innovative research institution (Other engineering colleges)" from CII.



The Innovation

Innovation I: Women Security Foot Wear

The main aim of our project is to look forward to the safer India where all men and women are independent and safe particularly in night times. The security alert system which creates an alert to police patrol and any of the family member via SOS/IMEI when pressed a small button on the middle layer of the foot wear. A micro GPS Tracker is fit in the middle layer which sends the location of the person who is wearing the slipper. An application is designed which sends an SOS/IMEI call or alert. Sometimes by mistake if a person long presses the button, so we can cancel the call anytime into that app. This app is both applicable in android and IOS. Battery percentage is shown in the application anytime. The slipper has solar strips which makes the battery re-chargeable. Max cell battery Cr2032 coin battery is used in this system. Wires and batteries are covered with plastic wrappers in order to prevent shocks while walking on water.



Innovation II: Eco-Inverter

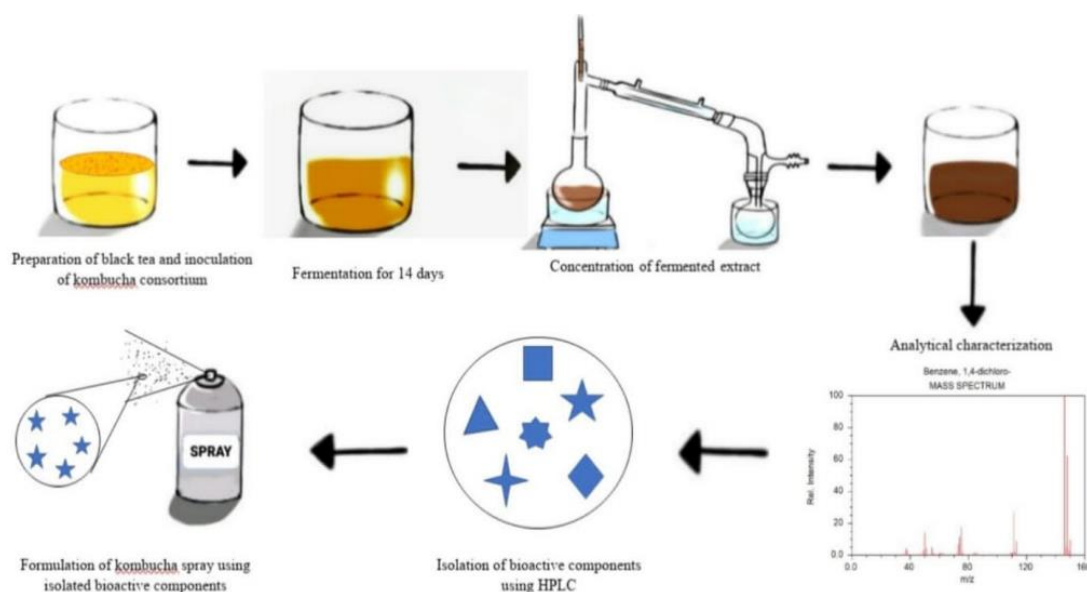
The objective is to reduce electricity charges and to use renewable resources like solar energy, to avoid air pollution and global warming. The concept is to create pollution free and reproducing electricity from refrigerator. In our working model, Eco inverter circuit is looped to perform a single input connection which produces electricity from the refrigerator by using the reverse thermoelectric reaction. All our appliances and refrigerator are controlled by using IOT (internet of Things). The innovation is producing electricity from refrigerator with minimum electronic components without a using CFC. Using semi conducting (Diode) material (Peltiereffect) has been used as main component (Refrigerator) that split it by four modules and the 1st three are the input module and the 4th module is the output which gives approximately (12V-15V), and it is stabilized to constant 12V Output to our Battery backup to store the electrical energy or the electricity can be used directly Oscillator



to convert our DC 12V to AC 24V and it is boosted by using step-up transformer to produce 240V which is equivalent to 850WH for consumption it can be used for commercial purpose. On the output energy converter circuit has been used to convert 240V in to 12V to charge our battery and live connection for the oscillator circuit and here the connections are looped using single time power input to the whole circuit by using solar panel the additional power source to power this circuit is not needed.

Innovation III: Formulation Of Anti-Inflammatory Drug From Fermented Kombucha Beverage

The main aim of this project is to formulate an ointment with improved bio-availability and also natural based drug. The ointment/Spray have developed naturally obtained bio-active components extracted from the fermentation of black tea with kombucha consortium, which is a traditional beverage having immense pharmacological values. Black or green tea is further fermented to increase these bioactive components. An attractive bio process consists on the degradation of glucose and fructose to the fermentation action of a bacterial and yeast consortium called kombucha. Fermented beverage such as kombucha has also as source of anti-inflammatory are immune modulatory ingredient but just a few studies have been already published. The black tea kombucha is able to inhibit the activity of 5'lipoxygenasa enzyme involved in fatty acid conversion to leucotrienes and implicated in the inflammation. The current study focused on the development of non steroidal anti- inflammatory drug based on the phytocomponents obtained from the fermented kombucha beverage which is natural based and cost efficient.



Approach

Paavai Engineering College strives and makes consistent efforts to provide an atmosphere of Innovation ecosystem for the students and teachers, so that they develop solutions for real life problems. The college practices multi-disciplinary approach towards the research activities. The collaborative efforts and team work of the students and teachers are encouraged at all levels, irrespective of their departments to motivate the students on their idea creation, technology upgradation, and product development. The college believes that the innovation and startup is the need of the hour and the platform is being provided to the students' community and teaching fraternity to promote the research culture of the college. The students are mentored by the faculty members using the resources of Centers of excellence such as MSME business Incubation center, Paavai soft Innovation center, Institution's Innovation cell, Entrepreneur development cell and so on.

Benefits

The college regularly adopts the research activities through faculty members and students, so as to benefit the society. The advancement in the technology and research breakthroughs in the college helps the teachers and students to inculcate a culture of inquisitiveness, critical thinking and making them to learn continuously through exploring their area of interest and opening avenues for them to create and ideate. The college practices interdisciplinary research as well as development of solutions which fulfill the needs of society. The three referred innovations i.e, Women Security foot wear, Eco-Inverter and formulation of anti-inflammatory drug from fermented kombucha beverage which is the immediate need of society.

The Future

The college has a regular exercise of ideation through various Ideation boot camp, hackathan, project expo and final year projects. The centers of excellence are utilized for research and which pave the way for publishing journals and patent, which has been considerably improved. Now, our futuristic action is going to be focused in creating more Startups, product enhancement and commercialization. The institution aspires to continue to move forward in the direction of progress in innovation and start-up . CII innovation award has provided us an opportunity to look into the innovation of our Institution at the right time and it further boost the efforts in the direction of improvement and success.

Creativity and innovation are the pivotal point of research and Paavai Engineering College practices interdisciplinary approach to promote the research climate of the college. The research culture of the college amplify the technical, soft skills and professional skills of the students.

The CII innovation award strengthened the alliance of different branches of engineering, industry-Institute interaction and it gave an insight to develop further, for better technology improvisation which benefits the society”.



Thiagarajar Polytechnic College (TPT)



Thiagarajar Polytechnic College (TPT), a Government Aided Institution was established in 1958 immediately after post-independence by the Philanthropist Sri.Karumuttu Thiagarajar and nurtured by Sri.M.S.Chockalingam. The Institution offers 12 diploma programmes in various branches of engineering/technology and has produced more than 60,000 diploma technocrats who lead in various capacities in top ranking organizations across the globe.

TPT has crossed Silver Jubilee, Golden Jubilee and now successfully treading in the Diamond Jubilee phase under the leadership of the Chairman Sri.C.Valliappa, Vice-Chairmen Sri. Chocko Valliappa, Sri.Thyagu Valliappa and Principal Dr.V.Karthikeyan.

The Institution always promotes quality Technical Education, Research, Innovation, Entrepreneurship, Industry Institute Collaborations, Start-ups, etc. and as a result, TPT has been conferred with many significant laurels like third term NBA accreditation for five diploma programmes for six years, AICTE-CII Mentor Award, National Level CII Industrial Innovation Award 2021, Performer in ARIIA Ranking 2021, Best Polytechnic College Award by Government of TN, etc.



The Innovation

1) Paver Blocks with Partial Replacement of Plastic Waste Powder



Plastic waste increases day by day and pollutes the land and water bodies. Waste plastics disposed into the water bodies like river, sea, lake, etc., affect the water living animals like fishes, whales, sharks, and the like. One of the ways to manage this plastic waste is to re-use it as a useable material. This waste plastic powder can be partially replaced with sand to produce paver blocks. These paver blocks can reduce the pollution problems due to disposal of waste plastic in land and water. Paver block is cost effective and requires little or no maintenance cost.

2) Smart Organic Pesticide Dispenser Vehicle

This product aims to reduce the cost, time and is beneficial to small scale farmers as it is convenient and economical to use. The organic pesticides are to be sprayed within the stipulated time. This uses simple mechanism with IOT. The Solar Controlled Smart Organic Pesticide Dispenser Vehicle consists of pump, two spray nozzles, fluid tank, pressure gun, manually operated trolley and solar panel on top. The farmer can control the machine with his phone to avoid wastage of time and is cost saving.



3) Malseever



Malseever is a compact vehicle for doing agricultural work for land preparation. It helps in feeding solid manure directly in the fields for small scale farmers, utilizes technology to prepare the lands for agriculture and reduces labour work. It is a smart vehicle, compact in size and cost affordable, which has an inbuilt chopping system, attachable plough, seed sowing system and is remote controlled. It can be charged using solar power or from grid. This product will suffice the needs of small and marginal farmers.

The Approach

The institution follows Innovation Management System through standard practices being adapted. The first step is the ideation process which invites new ideas through Competitions, Conferences, Workshops, Trainings, Tech Talk, Speakers' Forum, Technical Lectures, Project Works. During this process, the gaps are analysed by Brainstorming Sessions, Pitching Activities, Formal & Non Formal Technical Reviews. Thereafter, the impact of each idea is measured through Publications, Competitions, Mentorship Programmes. Finally, the best ideas are selected on merit basis and they are encouraged for Patent Filing, Start-up Registration and Funding. The various centres viz., IPR Activity Centre, IIC, EDC, IIPC, etc. help in nurturing the innovations.

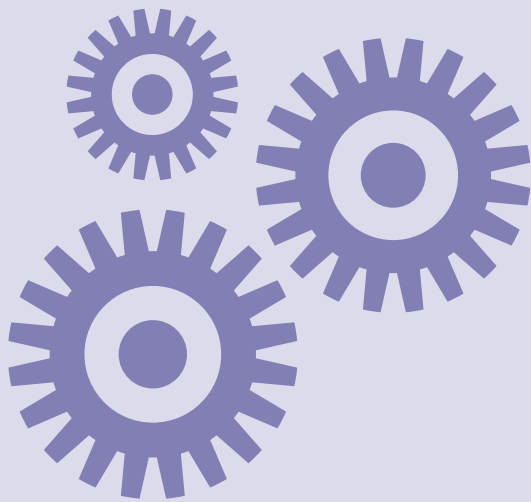
Benefits

The avenues for the innovations in the Institution benefit the students as they are provided with a number of platforms to explore their innovative ideas along with the help of their Professors and involve themselves in generation of new ideas, product developments and thereby encourage them in becoming successful entrepreneurs.

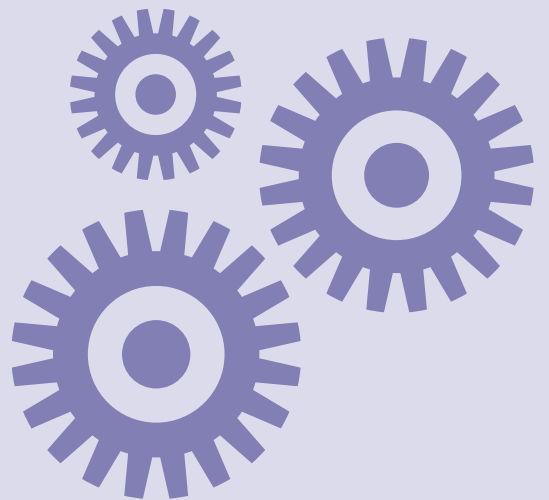
TPT's Innovations have been beneficial to the Public, Farmers, Agricultural Sector, Construction Industry, etc. It also has served the society during the pandemic. The Institution has created more number of start-ups through its Innovations and Best Practices. The Institution also contributes in fulfilling the UN's SDGs.

The Future

TPT firmly believes in nurturing innovation, research and entrepreneurship among the students in alignment with its vision to produce world class technocrats. More number of collaborations will be made with the industries to provide solutions to the industrial problems and enhance the start-ups. Aptly, CII Innovation Award will further motivate us in this direction.



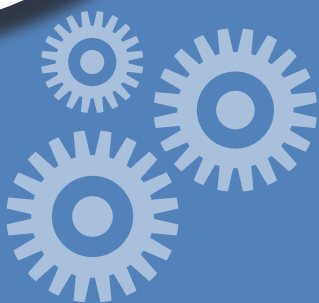
Most Innovative Research Institutions





Indian Institute of Technology Roorkee

Indian Institute of Technology - Roorkee is among the foremost of institutes of national importance in higher technological education, fundamental and applied research. Institute also has dedicated departments catering to high quality research and education in management, architecture and planning and, humanities and social sciences. Since its establishment, the Institute has played a vital role in providing the technical manpower and know-how to the country and in pursuit of research. The Institute ranks amongst the best technological institutions in the world and has contributed to the development of all technological domains. IIT Roorkee has completed 175 glorious years since its foundation in 1847. Institute has a strong innovation and incubation system consisting of Intellectual Property Rights Cell, Technology Innovation Hub, Technology Incubation and Entrepreneurship Development Society to translate the outcomes of research into products and technologies useful to society. Institute provides research and consultancy services to industries and provides educational training to working professionals through its E-learning and continuing education centers.



The Innovation

1. Making biodegradable low density Polyethylene using thermoplastic starch: solving problem of polybags to make it environmentally friendly.

This invention relates to formaldehyde modified thermoplastic starch and its blending with low density polyethylene (LDPE) for biodegradable packaging bags. The invention provides a method of making a thermoplastic starch, where the thermoplastic starch is a blend of starch with a plasticizer to improve gelatinization and another plasticizer to reduce retro gradation in a thermoplastic starch. In accordance with one embodiment of the present invention, a thermoplastic starch is disclosed that comprises about 50 to 70 wt. % of at least one starch, from about 30 to 40 wt. % of at least one polyol and from about 1 to 5 wt. % of at least one low molecular weight aldehyde. In accordance with another embodiment of the present invention, a biodegradable film is disclosed comprising about 50 to 70 wt. % of one thermoplastic starch, 20 to 30 wt. % of one polyolefin and about 10 to 20 wt. % of one copolymer of polyolefin-alcohol copolymer.



Benefits

The developed technology is expected to have immense value in view of the large quantities of starch produced in India and the environment friendly nature of the solution. A countrywide ban has already been imposed on plastic carry bags having a thickness less than 75 microns with effect from September 30, 2021. From December 31, bags with a thickness less than 120 microns will also be banned.

2. Sodium ion battery – Safe, reliable, efficient and ecofriendly battery

Indi Energy is an energy storage startup from IIT Roorkee with years of experience in developing energy storage technologies like Sodium-ion batteries, Solid-state batteries, etc. The startup works for development and commercialization of Sodium ion (Na-ion) battery and its components technology. The Na-ion batteries are cost-effective and in line with Aatmanirbhar Bharat's objectives. It is noteworthy the startup develops all the necessary components locally to commercialize the battery technology.

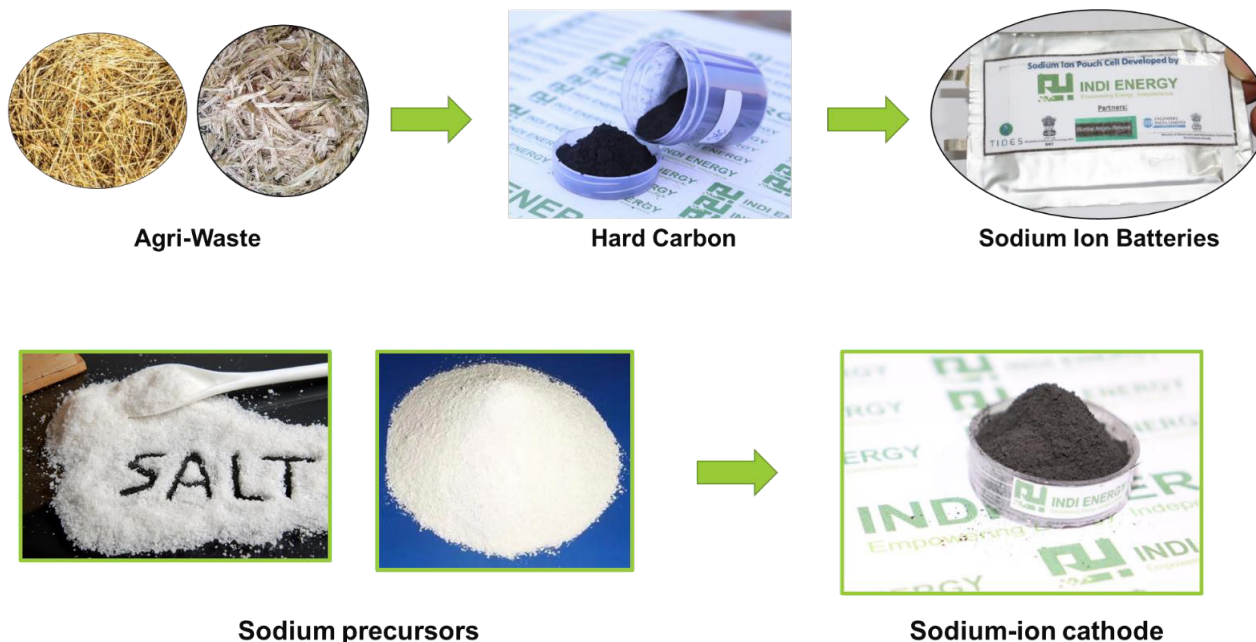
As an alternative to Li-ion battery, Indi Energy's Na-ion battery (which is safer and more sustainable), will indeed prove itself to be a 'Common Man's Battery'!

Indi Energy is India's first company to have successfully (indigenously) developed a Sodium-ion pouch cell with the highest performance in bio-waste/agricultural waste derived commercial Hard Carbon (patented technology).

Apart from using bio/agricultural waste for making Hard carbon anode, Indi Energy also uses earth abundant materials like Sodium salt precursors to synthesize patented, low cost and high-performance Sodium ion cathode. No use of import dependent and expensive lithium, cobalt or nickel resources.

The innovations can provide indigenously developed, low cost, safe and high-performance Sodium-ion battery technology for applications like solar and wind grid storage, electric scooters/E-rickshaws, SLI batteries, batteries for solar street lights, drone batteries, inverter batteries, batteries for small applications like Emergency lights, toys, UPS batteries etc.

The innovations would help in improving socio-economic value of rural India. It would lead to increase of farmers' income by selling of bio-waste/agricultural waste to Hard carbon manufacturing industries. The innovations would also promote local manufacturing of Sodium ion batteries which would eventually make India more self-reliant in its energy storage needs. Since bio-waste/agri-waste are abundant biomass sources, the cost of making high performance batteries would decrease which would be beneficial for both manufacturer and end consumer. This would lead to increase in adoption of electric vehicles and renewable energy in India, which would eventually cut down country's oil import bill and pollution from Indian cities.



Benefits

Indi Energy Sodium ion battery materials are made from agricultural waste/bio-waste and earth abundant materials like Sodium salt precursors, which are abundantly available in India. Sodium ion batteries are estimated to be 25%-30% cheaper than presently commercialized Lithium-ion batteries but deliver similar battery performance as Li-ion. Indi Energy Sodium ion batteries are also having 3-4 times higher energy density than lead acid batteries. The potential applications of Indi Energy Sodium ion battery include electric two wheelers or three wheelers' batteries, energy storage systems for solar and wind energy, drone batteries, SLI batteries, inverter batteries, UPS batteries, toy batteries, batteries for emergency lights etc.

3. A Low-Cost Ecofriendly Process for the Recycling of Waste Polyethylene Packets to Prepare Paver Blocks and Wall Tiles

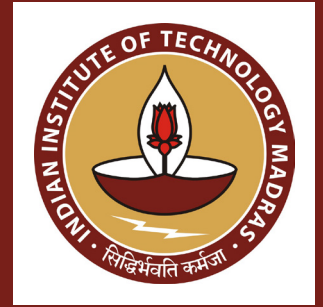
In India waste plastics form widespread littering on the landscape due to the lack of proper management techniques which produces harmful environmental consequences. However, due to user friendly nature (lightweight, durability, energy efficiency etc.), ban of plastics could not succeed in India. Therefore, a suitable technique is required for sustainable utilization of the waste plastics. Preparation of paver block from waste plastics can be such an option.

The present invention provides a method for preparation of interlocking pavement block and wall tiles using waste polyethylene packets such as milk packets, oil packets etc. as a principal binder without creating any pollution in surrounding. It proposes to prepare paver blocks and wall tiles through thermal route by using as whole binder with some low-cost additives/ hard stone dusts. No separate melting of waste plastics and mixing with stone dust is needed. The invention focuses on the utilization of waste packets as the binder in mix of the paver block with the help of thermal treatment and provides a low-cost ecofriendly process for the recycling of waste plastic. The present process produces cement less paver blocks using waste plastic packets which are mainly made up of low-density polyethylene. The plastic aggregate/granules are simultaneously heated with additives to given homogenous properties of product.

Benefits

It uses waste polyethylene packets such as waste milk packets, oil packets etc, which creates more environmental problem by choking sewer lines. The process produces agglomerates/granules and uses such chemicals/materials that generate no emission/smell. The cost of production is less as it uses lower temperature and the process is feasible even in small scale operation. The design of the blocks gives more interlinking and stability/life of the pavement. The system is simple and eliminates the use of cement (which produces greenhouse gases) for paver block preparation and will have some resale value after the end of life.





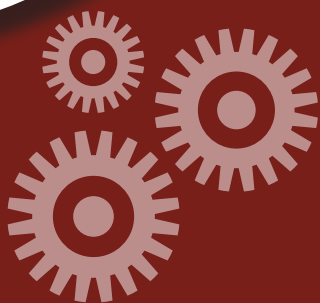
Indian Institute of Technology Madras



The Indian Institute of Technology Madras was established in 1959 by the Government of India and it is one among the foremost institute of national importance in higher technological education, basic and applied research. It has been consistently ranked as the number 1 engineering institution in India right from the inception of NIRF, Govt. of India, seven years ago.

IIT Madras at present has nearly 610 faculty members, 10,400 students and 1200 administrative & supporting staff. The Institute has sixteen academic departments and a few advanced research centres in various disciplines of engineering and sciences, along with nearly 100 laboratories. IIT Madras has produced about 57,000 well trained graduates so far.

The institute has Centre for Industrial Consultancy and Sponsored Research (IC&SR) for facilitating institute's research activities, intellectual property protection & its commercialisation and industry interface. Institute has a Research park, a facility to encourage start-ups and nurturing Industry-Academia collaboration.



The Innovation

About 940 new technologies (IPs) were innovated and Applications were filed in India & abroad during the last Five Financial years (2017-18 to 2021-22) by the researchers in IIT Madras cutting across engineering disciplines. A brief description of few innovations are given below.

- **5G Core Software**

The 5G Cellular Network System consists of three major components, as defined by the 3GPP Standards Organization: Radio Access Network (RAN), Transport Network and 5G Core software. The 5G Core software is based upon the Service Based Architecture (SBA), where the Core functionality is realised using a set of Virtualised Network Functions (VNFs) and developed with solid software engineering principles. Indian software companies can license this software and gain significant advantage in terms of reducing their time to launch their respective 5G software products for the market.

- **Fiber optic sensor platform technology for clinical, water & food safety and pharma applications**

The fiber optic chemical and biological sensor platform can be utilised for detecting environmental pollutants such as heavy metal ions, antibiotics and food toxins. This sensor technology involves a simple measurement of the change in light intensity through the especially U-shaped fiber optic waveguides using a simple light source and photodetector, making it more cost-effective than many optical sensors in the market.

- **Intelligent assessment and prediction framework for Carbon Emissions of Healthcare Systems**

Our inventions have developed a multi-modal learning framework that intelligently predicts and assesses carbon expenditure caused by various sources of the complex healthcare chain. This set of patents attracted attention of global industry that are providing solutions for monitoring and mitigating carbon induced climate change. This is the first such IP generated from IIT Madras in this frontier space of technology for climate change and first such IP licensed to an Indian startup that is in global markets.

Approach

Researchers at IIT Madras have identified existing product's weakness/drawbacks; addressed the same through innovative solutions to arrive at much more versatile/ novel versions of the same. In the case of 5G Core software, importance was given for easy deployment on container/Virtual machine-based deployments in cloud data centers of service providers without compromising quality. In the case of Fiber optic sensor platform technology, the emphasis was to develop affordable optical sensor and improved user-friendliness. In the case of Intelligent assessment and prediction framework for Carbon Emissions of Healthcare Systems real-time emission monitoring and assessment were given importance.

Benefits

Innovations at IIT Madras enhances efficiency of existing processes/systems in the broad areas of Civil Engineering, Communications, Clean Drinking water, Data Analytics, Education, Energy, Environment, Healthcare, Manufacturing, Power, Processor, Software, among others. It has helped to solve the requirements of industry and society at large. Examples of recent innovations to industry that have addressed needs of common people are Communications, Drinking water, Motors & controllers, Fiber lasers, Fiber Optics, Solar power, Wheel chair, Health monitoring Modules/Device, Communication protocols for Electric Vehicles, Air-conditioning system, and Tracking information flow in Android devices.

The Future

Researchers at IIT Madras are motivated to work much harder and file more patents, and protect more intellectual properties and thereby contribute to the nation becoming a technology superpower in this Amrit Kaal.



Confederation of Indian Industry

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering Industry, Government and civil society, through advisory and consultative processes.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, with over 9000 members from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 300,000 enterprises from 294 national and regional sectoral industry bodies.

For more than 125 years, CII has been engaged in shaping India's development journey and works proactively on transforming Indian Industry's engagement in national development. CII charts change by working closely with Government on policy issues, interfacing with thought leaders, and enhancing efficiency, competitiveness and business opportunities for industry through a range of specialized services and strategic global linkages. It also provides a platform for consensus-building and networking on key issues.

Extending its agenda beyond business, CII assists industry to identify and execute corporate citizenship programmes. Partnerships with civil society organizations carry forward corporate initiatives for integrated and inclusive development across diverse domains including affirmative action, livelihoods, diversity management, skill development, empowerment of women, and sustainable development, to name a few.

As India marches towards its 75th year of Independence in 2022, CII, with the Theme for 2021-22 as **Building India for a New World: Competitiveness, Growth, Sustainability, Technology**, rededicates itself to meeting the aspirations of citizens for a morally, economically and technologically advanced country in partnership with the Government, Industry and all stakeholders.

With 62 offices, including 10 Centres of Excellence, in India, and 8 overseas offices in Australia, Egypt, Germany, Indonesia, Singapore, UAE, UK, and USA, as well as institutional partnerships with 394 counterpart organizations in 133 countries, CII serves as a reference point for Indian industry and the international business community.

Confederation of Indian Industry

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