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THE MACHINIST

ULTIMATE GUIDE TO PROFITABLE MANUFACTURING

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Volume 17 Issue 7 ● July 2022 ● Rs 75

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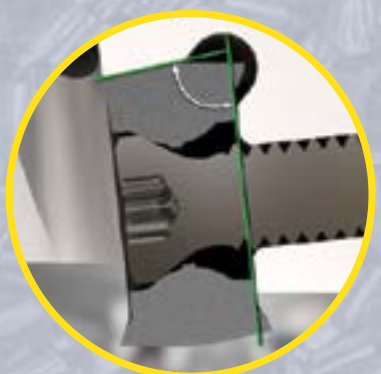

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MAKE IN INDIA: CAN WE?

Self-reliance, Make in India, and even Make for World, which is being discussed everywhere today, is not new concept for us. Self-reliance has been the way of life in our country.

The 'Make in India' campaign is the need of India today, giving usa chance to showcase our potential to the world. If a country exports raw materials and imports manufactured goods from the same raw materials, it will be a deficit situation. On the other hand, if a huge country like India remains just a market, then it will neither be able to progress nor will it be able to provide opportunities to its younger generation.

And these days, especially, we are seeing how the issue of the supply chain has shaken the world economy. While on the one hand we find that the need for 'Make in India' has become all the more evident when there is such a big crisis and the situation suddenly turns bad, on the other hand, we should see if there are any positive elements which motivate us to 'Make in India'.

Today, the world is looking at India as a manufacturing powerhouse. India's manufacturing sector accounts for 15 per cent of our gross domestic product, but 'Make in India' has endless potential. We must work hard to build a strong manufacturing base in India. Central government, state governments, private partnerships and corporate houses; how can we all work together for the country? We need to promote 'Make in India' for those goods whose demand is increasing in the country today. Now there are two issues - one keeping exports in mind and the other meeting India's needs.

Suppose, we are not able to become competitive in the world but we can provide quality material as per the requirements of India so that India does not have to look abroad. We can do this. Hon'ble Prime Minister, Narendra Modi had mentioned 'Zero Defect, Zero Effect' during his address from Red Fort. Our products should not be spoiled at all because quality matters in a competitive world. Today, the world has become environmentally conscious. Therefore, zero impact on the environment and zero defects are two mantras that we can adapt to meet the challenges of quality and global warming. Similarly, in the same way, the way technology has changed and is changing today, as there has been a tremendous revolution in the world of manufacturing. We have no option but to become self-reliant in the field of semiconductors.

I believe that there are new possibilities in this area for 'Make in India'. We must be visionary. This is our need as well. From the point of view of the security of the country, it is more important for us to pay attention to this. Looking at the environment, now people are getting attracted to electric vehicles and their demand is also increasing. Can't India do something new in this field? Can't India manufacture these electric vehicles? Can't Indian producers play a lead role in this?

I think we should move forward with the spirit of 'Make in India'. Indian manufacturers should see that the country's dependence on foreign countries is minimized. Hence 'Make in India' is the need of the hour.

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ULTIMATE GUIDE TO PROFITABLE MANUFACTURING

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CONTENTS

COVER STORY

Smart Manufacturing

CORRECTION
This is to rectify an error that went editorially in the CG Tech article in the June edition of The Machinist. The print edition of the magazine incorporated an incorrect by-line in the CG Tech article, wherein the article was wrongly attributed to Ansys.
We apologise for the editorial error and the inconvenience caused.

Start-up Talk

INTERVIEW

Tech Talk

Automotive Business

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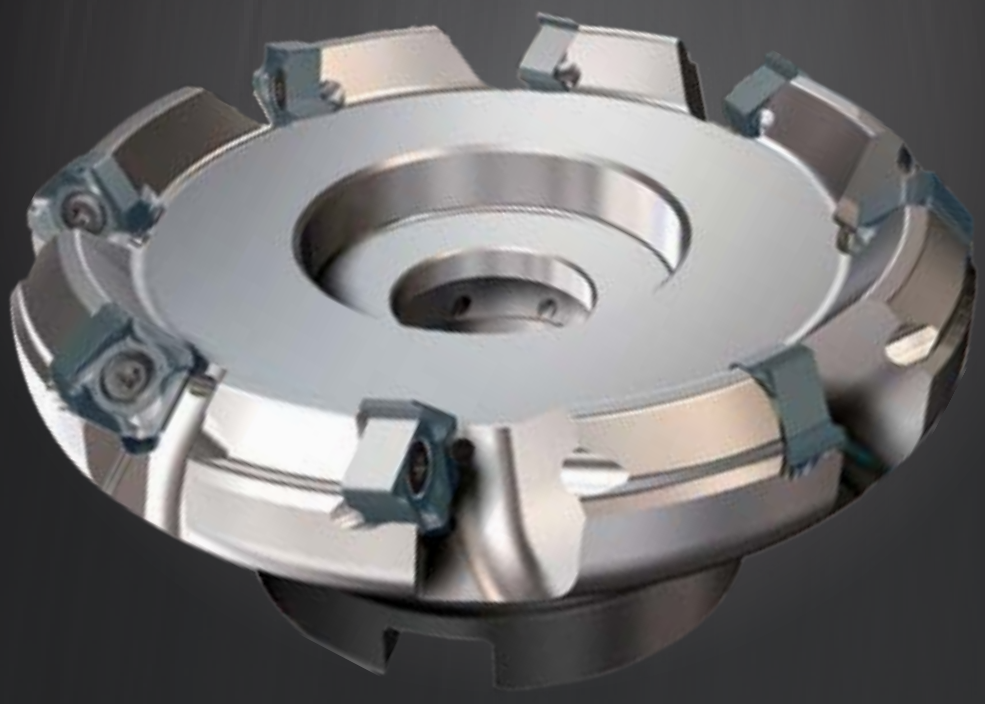
DIA EDGE



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YOUR GLOBAL CRAFTSMAN STUDIO

Croyance's Launches Electric Four-Wheel Cargo Vehicle

CROYANCE AUTOMOTIVE, a four-wheel electric vehicle manufacturing company, inaugurated its new unit and office on 26 June 2022 in the Thane district of Maharashtra. The company also launched its first four-wheel electric cargo vehicle, the 'Elecro J 0.8'.

Founded in December 2015 by Kapila Sandeep Soni and Sandeep Soni, Croyance aims to provide new business opportunities in India. The company plans to play a transforming role in the growth of the electric automobile segment in the country.

The company's four-wheeler cargo vehicle, Elecro J 0.8, will provide new business opportunities in India. This cargo vehicle can carry 600-800 kg of weight and once charged, can run up to 150-190 km.

As its tagline says, 'Taakat bijli ki, bachat paison ki', these vehicles will be a companion for all-around progress, being lightweight, timesaving and pocket friendly. Whether rural or urban, the vehicle aims to be beneficial in every small and big industry due to its energy-saving capacity.

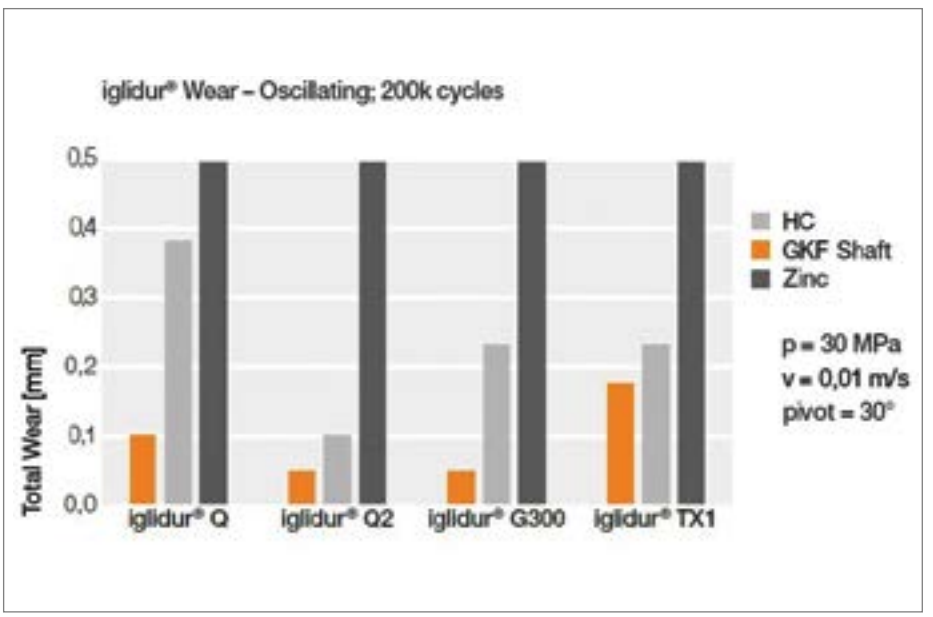
Lubrication-Free Polymer Bearings From Igus Improve Lifetime In Heavy-Duty Applications

Heavy-duty applications for plain bearings, generally seen in construction machines, agricultural equipment, hydraulic cylinders, mounting brackets, etc., have very challenging technical requirements considering the harsh and dirty environments these machines are used in. Generally, metallic bearings used in such applications are heavily greased. Adverse weather conditions can lead bearings to corrosion and premature failure in case of missing lubrication or insufficient lubrication.

The motion plastic solution provider igus offers multiple polymer plain bearings as an alternative to frequently used lubricated metal bearings. The range of heavy-duty polymer bearing from igus includes injection moulded plain polymer bearings from materials like Iglidur Q, Iglidur Q2, Iglidur Q2E, Iglidur Z, Iglidur G etc. These materials can offer long service life at high loads with extreme conditions. For example, a material like Iglidur Q2 offers a high wear resistance with a maximum permissible compressive strength of up to 130 Mpa. Further, fibre wound plain polymer bearings from materials like Iglidur TX1 and Iglidur TX2. These bearings are made of high-strength filament fabric. The extremely strong filaments in its specially interwoven design ensure maximum wear resistance and a maximum permissible compressive strength of up to 400 MPa.

All iglidur plain bearings, including materials mentioned above, are self-lubricating and operate in dry condition. This prevents dirt from adhering to the bearing points. It reduces maintenance and repair costs and machine failures due to insufficient lubrication. With Iglidur bearings, customers not only save on the cost of lubrication oil (or grease) and maintenance time but also release no lubricant in the environment. This accounts for increased sustainability requirements. A 16-tonne excavator needs between 50-60 litres of lubricants per year, ending up in the soil. With Iglidur bearings in use, contamination of soil can be reduced.

Iglidur polymer materials are extensively tested on the indoor and outdoor test rigs in the 3,800 square metres igus test laboratory. Pivot tests at 30 Mpa pressure and a pivoting angle of 30 degrees were carried out for 200,000 cycles on multiple Iglidur materials with various shaft combinations. It showed wear results of as small as 0.05 mm in some heavy-duty materials in combination with GKF shafts. GKF treatment is a surface technology solution from igus that protects shafts from corrosion and wear. In this process, the shafts are gas nitride, and their tribological properties are optimised in additional processes.



Alstom To Supply Metro Trains & CBTC Signalling For MPMRCL Metro Projects

ALSTOM, a global leader in smart and sustainable mobility, has been awarded the contract by Madhya Pradesh Metro Rail Corporation Limited (MPMRCL) to deliver 156 Movia metro cars with 15 years of comprehensive maintenance for the Bhopal and Indore metro projects. Valued at €387 million (over Rs 3200 crores), the order includes installing the latest generation of Communications Based Train Control (CBTC) signalling system and train control and telecommunication systems, each with seven years of comprehensive maintenance. This project will benefit over 5.7 million people in both these cities.

Alstom is responsible for designing, manufacturing, supplying, installing, testing, and commissioning 52 standard gauge Movia metro passenger trainsets of 3-car configuration each. To be built at Alstom's state-of-the-art rolling stock manufacturing facility in Savli (Gujarat), these ultramodern, light-weight trains will operate at a top speed of 80 km/h across the 31 km line in Bhopal with 30 stations and the 31.5 km line in Indore with 29 stations. 27 trainsets will be for Bhopal and 25 trainsets for Indore. This is the second combined order in India for Alstom after the Agra-Kanpur metro projects.

Alstom India has a history of successfully delivering world-class metro trains for major cities, including Delhi, Chennai, Mumbai, Lucknow, and Kochi, in India and internationally for Sydney, Queensland, and Montreal. The company manufactures metro trains for Agra-Kanpur, Mumbai Metro Line 3, and modern trainsets for India's first semi-high-speed Delhi-Meerut RRTS project.

The Movia metro family offers the latest technology and proven and reliable components. Built with light but strong stainless steel car bodies, the air-conditioned cars are developed with a strong emphasis on eco-friendly design to eliminate hazardous substances providing a safer environment for passengers. The trains are powered with modern energy-efficient propulsion systems with regenerative braking, making them a sustainable alternative to other modes of transport, thus reducing energy consumption.

Alstom in India is a team of over 10,000 employees, and the company aims to expand its talent pool by 15 per cent this year. With six industrial sites and four engineering centres, Alstom has a strong footprint in India to cater to domestic as well as several international projects. Movia metros have been delivered to many cities worldwide, such as London, Delhi, Stockholm, and Singapore.,

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IMTEX Forming 2022 Witnesses Strong Response From Manufacturing Industry

SOUTHEAST ASIA'S largest exhibition on forming technologies, 'IMTEX Forming 2022 along with Tooltech and Digital Manufacturing,' was inaugurated today at Bangalore International Exhibition Centre (BIEC), Bengaluru.

IMTEX is back in its physical avatar after around 30 months of Covid-induced gap. Exhibitors display forming technologies such as presses, welding and joining, high-speed laser machines, robotics and automation in sheet metalworking, additive manufacturing, metrology, and CAD/CAM, which are essential for manufacturing.

The exhibition was inaugurated by Shri Dr Ashwath Narayan C. N., Hon'ble Minister of Higher Education, IT & BT, Science and Technology and Skill Development, Government of Karnataka, and Dr K. Sivan, Dr Vikram Sarabhai, Distinguished Professor and Former Chairman, ISRO.

Ravi Raghavan, President, IMTMA, Rajendra Rajamane, Vice President, IMTMA, and P.J. Mohanram, Principal Advisor, IMTMA were also present.

Lauding that around 50 per cent of the machine tool production happens in Karnataka, Dr Ashwath Narayan said that there is a need to scale up in developing the quality of skilled manpower. He stressed that the confluence of IT and manufacturing would make Karnataka a leader in digital manufacturing technologies.

Reminiscing about his journey in ISRO, Dr Sivan said that the machine tool industry plays an important role in manufacturing high precision and complex parts required by space and strategic sectors. He urged industries to come forward to participate in ISRO activities like building and launching satellites. Dr Sivan said that the INSPACe initiative promotes private participation.

Earlier, while delivering his welcome address, Raghavan said, "The Indian machine tool industry is expected to reach around Rs. 9,500 - 10,000 crores in the year 2022-23. The outlook is positive."

A Comprehensive Report on Indian Metal Forming Machine Tool Industry - 2022, along with the IMTEX Forming 2022 Exhibition Catalogue, was released at the inauguration.

IMTEX Forming continues to be a market leader in propelling business growth for India's machine tools and manufacturing industries, regardless of tough market conditions, economic slowdowns, or pandemic disruptions.

IAMPL Signs Mou For Expansion Of Manufacturing Facilities In Hosur

INTERNATIONAL AEROSPACE MANUFACTURING PVT. LTD. (IAMPL), a joint venture between Rolls-Royce and Hindustan Aeronautics Ltd., has signed a Memorandum of Understanding (MoU) with the Government of Tamil Nadu to support the setting up of new manufacturing facilities in Hosur, Tamil Nadu. The MoU was signed in the presence of the Chief Minister of Tamil Nadu, Thiru. MK Stalin. This deal will facilitate the expansion of IAMPL's manufacturing operations through single-window clearances and incentives.

IAMPL has announced its intent to expand its operations in Tamil Nadu to support the aerospace parts global supply chain on the side-lines of the Tamil Nadu Investment Conclave 2022. The proposed expansion aims to enhance IAMPL's existing capabilities in India to manufacture complex components for the global supply chain for civil and defence aeroengines.

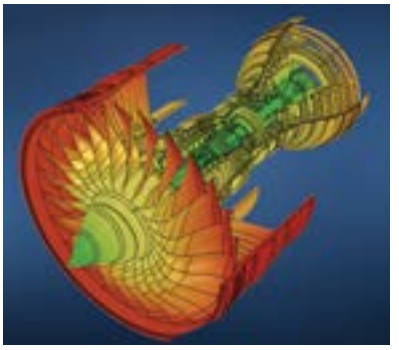
Speaking on occasion, Seenivasan Balasubramanian, Chief Executive Officer, IAMPL, said, "At IAMPL, our constant focus is on delivering operational excellence and leveraging India's supply chain advantages. We are delighted to partner with the Tamil Nadu government to make Hosur the new destination for our upcoming expansion project. We will continue to develop the capability and capacity to be the best-in-class supply chain partner to the global aerospace supply chain ecosystem."

Established in 2010, IAMPL is a 50/50 joint venture between Rolls-Royce and HAL to manufacture high-precision aero-engine compressor and gas turbine parts. Over the years, IAMPL has evolved into a fully accredited benchmark facility within the high-performing aero-engine global supply chain. Today, IAMPL supplies over 200 parts for multiple technologically advanced civil aero-engine programs, including the Trent and Pearl family of civil aero-engines at Rolls-Royce. IAMPL has adopted global quality standards, the latest digital production systems, and advanced manufacturing techniques for competitively manufacturing a broad spectrum of aeroengine components.

Hexagon Announces Open Platform For Smart Manufacturing, Nexus

HEXAGON, at its recently hosted HxGN Live Global 2022, announced the launch of its real-time data sharing platform. Nexus, for different design, simulation and production application. It will connect different applications to form workflows and combine technologies to develop unique solutions to engineering and manufacturing problems, from concept to delivery. It will empower cross-functional teams to leverage fragmented digital data by improving visibility and connectivity. It will help them gain unprecedented insight, bring their ideas to life faster, and produce higher quality results.

Nexus is the foundation for Hexagon's new solutions in the smart manufacturing space going forward. It can leverage Hexagon data sources across the vast portfolio, connecting hundreds of Hexagon design and engineering, production and metrology software tools and unlocking new insights from metrology devices and connected machines. Additionally, first-in-class cloud-native visualisations



and data management solutions such as HxGN Metrology Reporting and MaterialCenter have been built as cloud-native connected applications, and will be connected through Nexus.

Hexagon is also developing purpose-built solutions through the platform that combine multiple technologies to help users improve productivity and digitally optimise complex processes and workflows. One example is a "ready-to-go" workflow for 3D printing an optimised reverse-engineered part that could be used, for example, to streamline the repair of grounded aircraft components. This workflow connects data from a 3D laser scan to Hexagon products such as RECreate, MSC Apex Generative Design, MaterialCenter and Simufact Additive. It connects to a third-party market-leading application called CADS Additive to significantly improve productivity and enable rapid collaboration to address production issues.

Parth Joshi, Chief Product and Technology Officer for Hexagon's Manufacturing Intelligence division, said: "Our customers are managing increased complexity in the market, dema

nding faster innovation than ever. Siloed tools, rigid systems and inaccessible data are increasingly ill-suited to the manufacturing industry's needs and pressures. Our vision for Nexus is to enhance the products our hundreds of thousands of customers have come to know and love with additional capabilities powered by the cloud, AI and Machine Learning, real-time collaboration and advanced visualisation.

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By Rahul Kamat

"WE HAVE UNLOCKED BILLIONS OF DOLLARS TO EMPOWER BUSINESSES IN CASH FLOW PLANNING"

It is established now that the new normal is digital-first. Both large and small businesses are now realising that streamlining and digitalising accounts receivables and payables can free up working capital and make room for business growth. Global PayEX, a cloud platform for working capital optimisation, is helping organisations, such as Stanley Black & Decker, manage the new shape of data flows, elevate cost savings, and unlock millions locked up in cash flow. **Abhilash Edakadampil, CTO,** in an interaction with The Machinist, elaborates on how the company unlocks value to empower businesses in cash flow planning and deployment while also creating value for their dealers and channel finance

What are the key services you offer?

We provide key automation solutions on both the Account Receivables (AR) and Account Payables (AP) sides. On the AR side, FreePay: The Electronic Invoicing Presentment and Payment (EIPP) with straight-through reconciliation. FreePay delivers actionable invoices in real-time on mobile or desktop and enables payment in time which helps in accelerated collections, reduction in DSO, reduction in disputes/billing adjustments and reconciliation errors.

Our solution, AlgoriQ is an AI-powered intelligent fund application (IFA) solution for end-to-end automation of AR reconciliation. It auto-reads payment advice and bank receipt reports (MT940 etc.) in various formats and does multi-point data match of invoices for straight-through reconciliation in the ERP. The product also brings in sophisticated deduction management with aggregation, limit checks and dispute resolution to minimise unauthorised deductions.

Our other solution FinEX is a financing platform for AR and AP which extends working capital for both the channels and the vendors from a variety of lending partners.

Global PayEX has processed over $50 billion in transactions since 2015 while digitising 90 per cent of B2B payments for its customers. We have delivered a 20 per cent reduction in Days Sales Outstanding (DSO) while delivering actionable insights to CFOs. Several Fortune 1000 companies

have adopted our FreePay, and AlgoriQ, an ML-based automated reconciliation/deduction management platform for institutional customers and their vendors.

How does AI/ML power your ALGORIQ engine?

AlgoriQ automates multi-way reconciliation using AI/ML for our customer's modern trade, e-commerce, or institutional clients. The ML engine extracts the content and context of data from multiple formats of scanned data and direct downloads. Rule-based validations and enhancements are performed on data as the machine builds related lexicons at the customer and domain process levels. The machine-learning algorithm then performs intelligent record matches based on the context extracted and rules defined. Full matches are reconciled, and partial matches follow learning workflows. In addition, AlqoriQ now supports extensive deduction management.

Locked up working capital has been a pressing concern for B2B players. How did GlobalPayEX manage to address this concern?

Traditional methods and manual processes of AR continue to lock up billions of dollars of working capital across the globe. Our technology unlocks this value to empower businesses in cash flow planning and deployment while also creating value for their dealers by having better access to digital payments and channel finance. To cite an example, we managed to automate more than 70 per cent of a homegrown brand Goldmedal Electricals Account Receivables (AR) through FreePay. This translates into unlocking the potential of working capital worth Rs 1,000 crore nine days earlier.

With the adoption of the AI-powered cloud-based Software-as-a-Service (SaaS) solution, Goldmedal Electricals has seen the faster digital collection, 2X faster reconciliation, and a nine-day reduction in DSO, which together have enhanced working capital efficiency and increased visibility on company cash flows by 99 per cent. Around 3,000 dealers of the company have opted for EIPP, with an average addition of 75 dealers every month since June 2019. We provided Goldmedal Electricals with a real-time dashboard that tracks invoice status and payments received, which helps in reconciling the payment against the invoice into its ERP. In addition to automating AR, Goldmedal leverages the platform to offer multi-slab discounts, and product and season incentives by region to its dealers and distributors, most of whom are MSMEs.

You are also working with Stanley Black & Decker Inc. What solutions have you provided?

Stanley Black & Decker Inc. (SBD) is a Fortune 500 company and one of the largest American manufacturers of industrial tools and household hardware, and a provider of security products. It has a growing network of over 500 active dealers across India, SBD India team struggled with highly manual treasury workflows. Its AR teams spent a significant amount of time making calls and emailing dealers to follow up on payments and reconciling them against paper invoices using traditional excel spreadsheets. Further, with dealers paying via a combination of cheques and cash as well as electronic transfers, SBD also faced challenges in reconciling its cash flows across the various channels, resulting in delays in collecting payments and reduced working capital efficiencies. To address this, SBD collaborated with us and the association resulted not only in a 50 per cent cash conversion cycle by accelerating the collection of payments from dealers and reducing the day sales outstanding but also helped SBD unlock approximately $1.1 million in working capital through quicker cash conversion.

What's your take on the increasing use of data analytics in improving working capital management?

One of the key indicators of the financial health of an organisation is its working capital management. Every CFO we meet has a clear agenda to improve its account receivable and account payable processes to release cash strapped in their operations. Digitalisation and automation of processes are great steps in reducing working capital. However, any measure implemented needs to be continuously monitored to make it effective. Data analytics, thus, becomes a key to having those proper insights into the challenges in the current as-is processes and the constant improvements happening due to the automation measures.

For example, tracking DSO is an effective way of understanding the reasons for a higher DSO like collections, credit terms, payment mechanisms, or disputes, and how effective the process change or automation is in helping to reduce the DSO. In addition, PayEX provides working capital analytics for corporates, with DSO tracking, cash forecasting, buyer payment behaviour, etc., which helps in a better return on capital employed. Our payment data and payment behaviour analytics is also aiding credit decisions by our panel of embedded banks and NBFC lenders for both AR and AP financing.

By Anvita Pillai

"MANUFACTURING CELLS IN INDIA, FOR INDIA, SHALL GO A LONG WAY"

In tête-à-tête with Akshay Singhal, Founder & CEO, Log9 Materials, wherein he discusses how Log9 is redefining the mobility sector, why cell manufacturing is vital for India, EVs helping India become net-zero, and more. Excerpts…

There are several start-ups in the mobility and energy sector. How is Log9 Materials redefining the mobility sector?

The focus at Log9 is to design cell and battery technologies specifically for Indian conditions and requirements while considering the constraints we have in India in terms of materials and supply chain gaps. So, considering India-centric parameters, like extreme temperature variations, types of vehicle platforms, their usage pattern, material availability in the country, etc., we are working on cells and batteries that provide us with an edge not just in terms of technological relevance but resilience in the market. By offering B2B last-mile logistics and delivery players our batteries, which can be charged 9x faster, last 9x longer and offer 9x higher performance and safety, we are redefining the EV industry's standards in the fight against climate change.

Most battery manufacturers aren't working on the same lines; instead, their push is just on achieving a more extended range. And that's why we nowadays see mishaps, like electric vehicles catching fire, because these batteries were never designed to operate in high-temperature conditions.

Let me hold you to that. In the past month, EVs catching fire and lack of R&D have been widely discussed. So, which are the key areas where are our manufacturers falling short?

Manufacturing cells in-house is the top and foremost thing that nobody in India is doing. When you don't have your cell, you depend on another country to procure it. And when you're procuring, are you making the right choices? And what parameters are you guided by? Many Indian companies have included NMC-based cell chemistry as the chemistry of choice for their products, which is extremely sensitive to temperature.

On the other hand, LFP and LTO, based on Log9 batteries' cell chemistry, have been globally known to be more resilient. When developing our cells, we are, of course, taking care to make them safe and suited as per Indian requirements. Finally, when we put these cells together, the kind of cooling systems, thermal management and electronics systems that go into it collectively ensures that the battery pack is safe and provides advanced features like rapid charging, long life, etc.

In my opinion, battery manufacturers no longer have a choice now; cell manufacturing

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along with battery manufacturing has become a necessity. The need of the hour is to provide safe and resilient technologies in the market, and to this end, manufacturing cells in India, for India, shall go a long way.

Net-Zero is India's ultimate goal and EVs are a part of the means to the end, however, does not check a lot of boxes for sustainability. When it is clear sustainability is the core agenda, why aren't the EVs produced in India sustainable from the get-go? How can the outlook now be improved?

Not really, but I agree that certain choices are being made wrong. Just like the upfront cost of EVs is higher, the upfront carbon footprint is also higher, but the footprint reduces through its lifecycle with the vehicle's running. This is because EVs must have very high utilisation to create a positive climate impact. That's why, at Log9, all our offerings and solutions are for the commercial utilisation of electric vehicles.

When we're at scale running commercial electric vehicles, whether it's with food delivery, e-commerce delivery, etc., we can have a positive impact from day one. So, the ultimate solution here is two-fold. One, to start with pushing more and more electrification of commercial vehicles. And secondly, to improve the contribution of renewable energy on the grid, because as we have more and more renewable energy, let's say, for example, if our Prime Minister's dream of 500 GW of renewable energy generation is successful, then that 100,000 km. threshold (also known as the 'green threshold' for EVs) comes down to 35,000 kilometres, essentially making any EV greener from day one.

With other far more sustainable vehicle models coming up, such as green hydrogen, which offers better mileage/range and lesser anxiety, do you think EV as a model is here to stay?

EVs are not a temporary solution, in my opinion. Because if you look at hydrogen, when you use it, hydrogen fuel cell technology is only 30 per cent energy efficient. Whereas, if you're charging a battery with solar power, if you have 100 units, it will be 90-95 per cent energy efficient.

The bottom line is, as far as mobility is concerned, fuel cell technologies, whether it is with hydrogen or aluminium-based technology, will only be relevant in mobility for long-haul mobility applications. Because in the short-term, it does not make economic or business sense to go with a 30 per cent efficient technology.

What are Log9's long and short-term plans?

The long-term plan is to pioneer cell technology in India and look at the development and conditions in the domestic market. We eventually plan to scale up these technologies from the cell to battery pack level. One of the crucial challenges we've taken up is to ensure that global supply chains can be set up correctly. We plan to work with different parties and players to ensure they start producing materials locally. By September this year, we will commission and scale up our cell line. On the Log9 battery packs' front, we have already gone from 5,000-50,000 units production per year capacity, which we will be further ramping up to 300,000 units capacity by March of next year. We are happy to announce that Log9 experienced over 10x scale up in the last year and a half.

By Rafiq Somani, Area Vice President – India and South Asia Pacific, Ansys

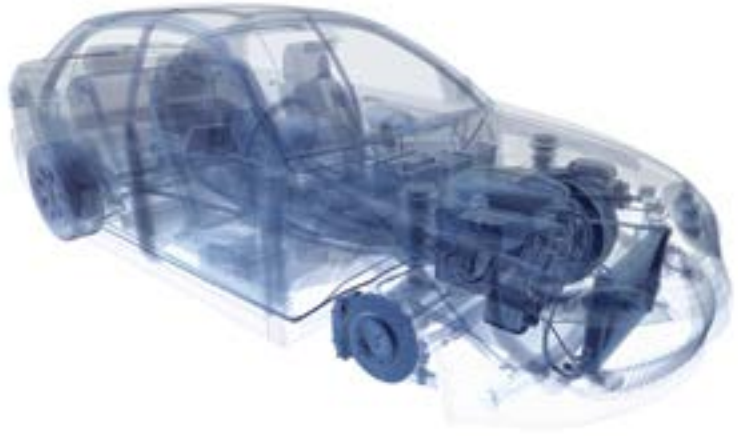
DEMOCRATISATION OF CAE WORKFLOWS

CAE allows engineers to gain complete and meaningful insights into the design and functioning of their products and processes before even the prototype is made. Hence, it naturally forms an important part of the entire engineering product design and operation process.

Rafiq Somani

All engineering products have product design as a critical step in their life cycle. And where there is product design, there is CAE or Computer Aided Engineering. Application of CAE in an engineering products design phase is done across a wide range of industries including, but not limited to automotive, aerospace, defence, healthcare, process industries, electronics, energy, healthcare, consumer goods, etc. The products using CAE can be as small as an IC chip, to large aircraft, bridges, power plants and even space telescopes!

CAE allows engineers to gain complete and meaningful insights into the design and functioning of their products and processes before even the prototype is made. Hence, it naturally forms an important part of the entire engineering product design and operation process. CAE helps by simulating and predicting real-life end-to-end solutions for the entire product engineering process right from the early conceptual and planning phase, complete product verification to validation design V-cycle and product optimisation, to plant engineering, inventory and even materials management. Thus, making CAE a truly pervasive engineering solution.



DEMOCRATISATION OF CAE

Democratisation in CAE-based product development means empowering the non-experts to take advantage of the available simulation technology. CAE experts can put the power of simulation safely into non-experts' hands to overcome the general lack of CAE engineers. Democratisation, therefore, changes the landscape completely and helps in reach as well. It helps leverage the skill of CAE experts by consequent reuse of verified and validated workflows. It also includes the standardisation of repetitive CAE workflows independent from user and region and means an expert focus on product and design expertise and not simulation skills.

Simulation workflows are set up, parameterised and automated for democratisation. Due to the parameterisation, different designs can now be evaluated and the parameters made available to the user via a web front-end. Workflow automation and democratisation yield huge benefits that include reducing time and cost in product development and design optimisation.

AUTOMOTIVE SECTOR

In the future, the mobility and transportation industry will see a substantial overhaul. The demands will be driven by key aspects such as sustainability, reliability, safety and

low cost of ownership. Most of the current existing automobiles - ICE, EVs or hybrid – have multiple and highly complex systems which the OEMs need to continuously innovate and upgrade to match and exceed the market expectations and regulatory standards.

For example, in the automotive industry, it is a requirement for vehicle manufacturers to have a virtual and empirical validation of parts and processes for generating a request for quotation (RFQ), which many times becomes a deciding factor while declaring industry and business awards. Hence, overall efficiency is key for OEMs and suppliers to be able to remain relevant in the market and leveraging CAE for the same is no longer an option they can avoid.

CHALLENGES

Even today, most companies that leverage CAE fail to realise the benefits of the tools and technologies at the different stages of the design life cycle. As suppliers to major automotive, small to medium enterprises (SMEs) are responsible for the majority of product design across different automotive sub-sectors. Yet these organisations face significant challenges as they try to expand their CAE capabilities in an attempt to speed time-to-market and stay ahead of the competition.

High fidelity multiphysics simulations require advanced simulation techniques, intensive training, expertise and experienced CAE users. Most of these expertise people are spending time on setting up the simulation workflow which is highly manual in many situations. It is in turn affecting productivity and efficiency.

Many a time, product design organisations experience efficiency loss within the product design cycle due to the long turnaround times needed for complex simulations. They are also largely limited to the number of simulation models they can run at a single time. This also means a limitation to the size and complexity of the models that it can create.

There are also a lot of delays in productivity due to hardware constraints and most of the time there is no effective utilisation of resources and technology due to isolated hardware. There is a need to scale simulations to an HPC or a high-performance computing cluster. Managing the simulation process and CAE data is one of the major challenges across the different industries, and the automotive industry is no exception to this.

RESOLUTION

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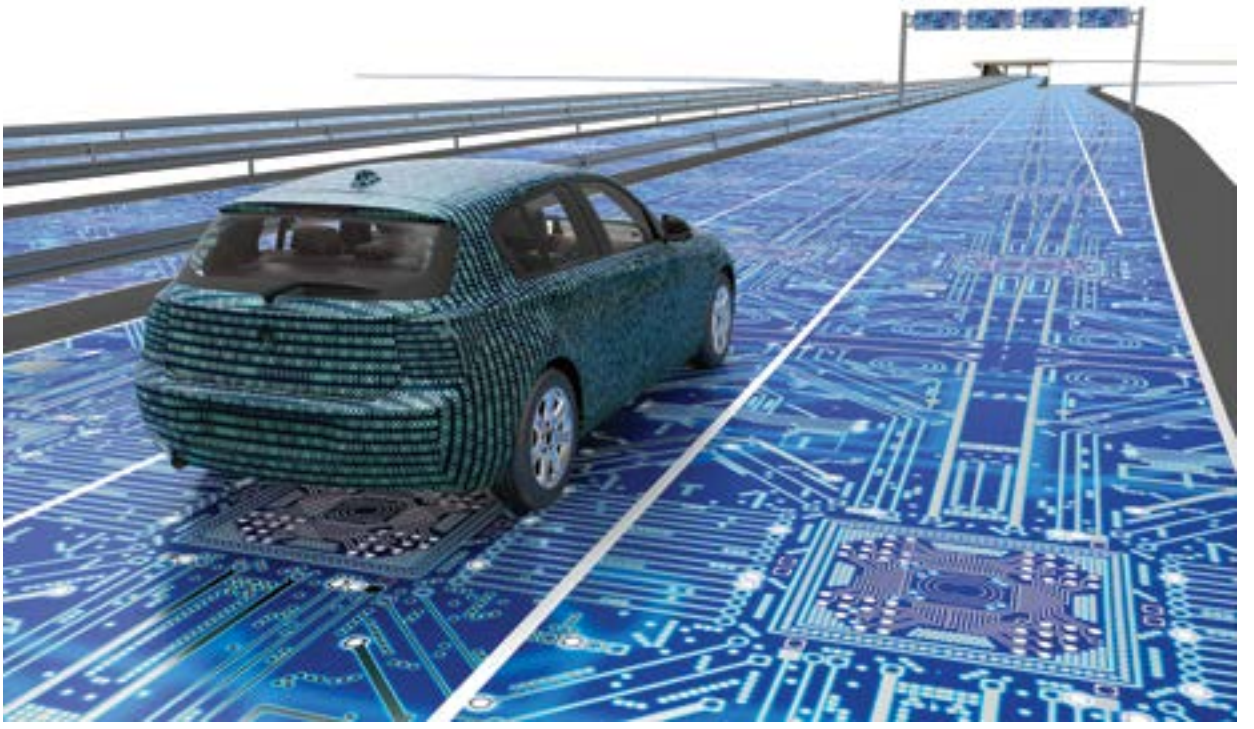

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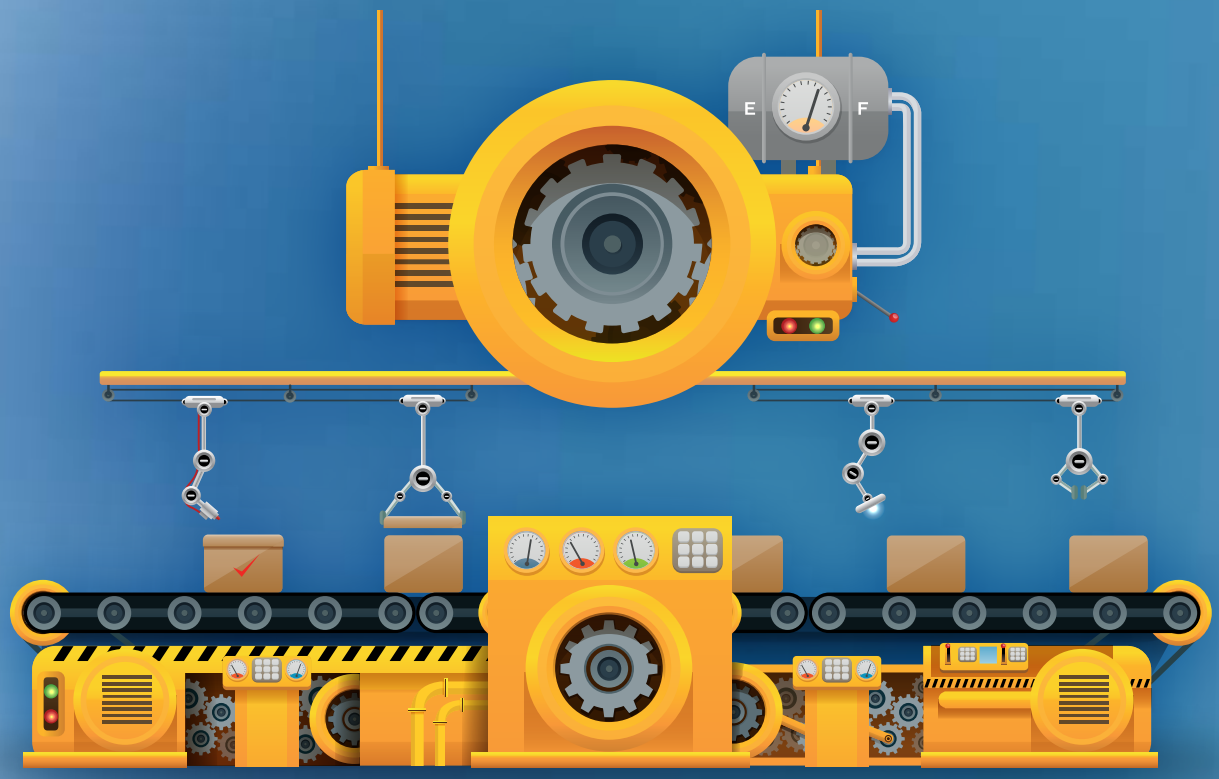

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proach to simulation saves time and effort on prototyping as you explore multiple design concepts in real-time with no need to wait for simulation results. "By using Ansys Discovery solutions, many of our customers reduce their concept design time in the range of 20-50 per cent in automotive applications".

Automating, integrating and creating easy to use simulation templates can bring the power of simulation to the simulation non-experts with shorter learning curves. They can use these templates to run the complex multiphysics applications in a quick turnaround time. Ansys provides multiple customisation solutions to create simulation templates and automated workflows. Ansys customisation toolkit-based workflows yielded a 25 to 30 per cent improvement in overall engineering productivity, which led to a savings of approximately three man-months per engineer for tier-I automotive suppliers.

Many times, automotive companies perform experimental designs to study the effect of its parameters on the performance, reliability, light-weighting and efficiency of the product. Ansys parametric solvers can help companies in solving the DOE studies which further can be extended to extract the response surfaces and reduce order models (ROM). These ROMs can be used for simulating quick design changes and can also be used in system-level simulations. Customers observed a 40 per cent reduction in design cycle time with simulation software and a 4x increase in the number of simulations.

Scaling simulation workloads from isolated workstations to an HPC cluster means a reduction in runtime and an improvement in engineering productivity by supporting multiple complex simulations at a single time. It not only increases the utilisation of resources, but is also easy to deploy, configure, and operate. Around 90 per cent efficiency for parallel and up to 10x the improvement to product development productivity, insight, and performance.

Ansys Minerva can boost engineering productivity with an efficient simulation process and data management. Companies will be able to secure critical simulation data, provide process and decision support, and deliver immediate benefits by connecting powerful simulation and optimisation solutions to your existing ecosystem of tools and processes.

With CAE, design decisions can be made based on performance impact and can be evaluated and advanced using simulations rather than physical prototype testing. CAE can deliver faster performance insights when design changes are less expensive to make, especially when it is earlier in the design cycle. It also aids engineers in recognising the performance implications of their designs as well as the risks. With proper integration into product and manufacturing development, CAE allows quicker resolution to the problem that brings down the cost. Also, the warranty exposure is reduced by identifying and eliminating potential problems.

WHY SIMULATION?

With the CAE workflow process, there is no need for companies to build physical prototypes. This means faster product development, especially in the early stages of development. In the past 10 years, computer simulations have replaced time-consuming and costly physical prototypes with computer-generated models that fuel innovation. From concept to reality, simulations provide a fast and efficient information-based development process.

Engineering simulation, coupled with high-performance cloud computing ensures that the overall development process and also the cost and time of each iteration cycle reduces significantly. Through simulation solutions, simultaneous design evaluation of thermal, stress and dynamic performance is possible. There can also be a concurrent development of multiple design proposals and a full assessment of design performance.

CONCLUSION

The democratisation of CAE workflows empowers experts to apply established simulation workflows to improve their design decisions even in agile development scenarios. It allows increased automation, increased design and analysis output, bringing up of analysis upfront the design cycle, a more thorough evaluation of design proposals and over 90 per cent reduction in FEA (finite element analysis) analysis time.

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By Jigyasa Kishore, Vice President – TAAS, Enterprise Solutions, Moglix

PROCUREMENT SHARK TANK: HOW TO PITCH INTERNAL PROCUREMENT TRANSFORMATION

Disruptions have become the new normal of today. Amidst disruptions, procurement disruption goes beyond simplistic calibrations and calls for a more extensive ecosystem reboot. The article elaborates on how procurement heads can enable this transformation while prioritising the company's customers and finances

Supply and procurement chains have been tested to the brink and beyond in the aftermath of the pandemic. These disruptions have shed a spotlight on the inefficiencies and leakages within the value chain, and procurement officers across industry segments are pinning their hopes on the company leadership to redress these seminal problems as soon as possible.

Jigyasa Kishore

Procurement transformation is a continuous process evolving with technological leaps and digital revolutions. However, companies that wish to stay ahead of the curve must execute a fundamental, comprehensive procurement transformation that can lay the centre stone of the company's future progress in the coming decades. Touchless procurement, ease of discovery, catalogue-based buying, sustainable procurement, catalysed ESG policies, and visibility across the value chain are some benefits that can emerge from a procurement transformation if executed with precision and fastidiousness.

However, pitching for procurement mutation can be a tricky task. One would require the prudence to pitch the benefits strategically to the procurement team for them to envision the benefits arising from the exercise.

PITCHING TO MANUFACTURING HEAD

A presentation is more likely to succeed with the manufacturing chief if it pivots around the overwhelming importance of digitisation and decentralisation. Say, for instance, that a pitch for procurement transformation is being made to the head of manufacturing affairs. With digitalisation in play, the manufacturing department can maintain a bird's eye view of activities across a widespread plant network while simultaneously ensuring that in-

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put goods are sourced at the most economical rates without compromising quality. A catalogue-based purchase platform will tabulate and digitise the list of reliable vendors, which will, over time, aid in filtering out suppliers whose performance and cost-effectiveness outmatch others. An integrated dashboard can continuously update the manufacturing department on the goods in the pipeline, effectively ensuring that no factory should suffer through a stock-out situation.

PITCHING TO CFO

If a pitch must be made to the CFO, the procurement transformation is more likely to come to fruition if it emphasises the anticipated cost reductions that will accompany the weeding out of teams engaged in non-value-generating activities. The presentation could also advocate for outsourcing processes that are cost and time accretive while simultaneously laying out a blueprint for the digitalisation of supply chains. Digitalisation, in effect, will lead to fewer macro-interventions and errors while boosting the working capital at the company's disposal.

PITCHING TO CEO

Lastly, if it is the CEO instituting a procurement chain transformation, one would do well to etch out clearly how these changes can spell immense benefits by dramatically improving customer experience. Procurement transformation as an exercise is inextricably tied to improving the customers' receptivity to the product. Irrespective of whether the firm runs on a B2B or a B2C model, for a procurement evolution to be successful, different departments involved in the value chain will have to align and work seamlessly to elevate a customer's convenience, comfort and ease. A procurement transformation prioritising customers and their responses will draw greater attention from the CEO.

WHY DOES YOUR COMPANY NEED PROCUREMENT TRANSFORMATION?

1. Evaluating Topline and Profitability Impact Of Procurement Transformation

Let us sample the commercial application and efficacy of procurement transformation in the food industry that improved touchless POs by 63% and a 90% ratcheting in PO compliance. This particular company, one of the largest in the world, had its smooth operations thwarted because of lags in purchase requisitions, consequently leading to higher customer disgruntlement and a sizable toll on revenue. The situation was remedied by employing a service processing model with assimilated standardised desktop procedures and a catalogue that helped the company streamline customer interaction. The

incorporated procurement transformation heralded a new phase for the company, which saw a dramatic drawdown in customer complaints and a spike in on-time supplier payments.

A procurement transformation can help script a superlative sales proposition for the customer, provided that the company is committed to implementing it in its full measure. At a preliminary stage, procurement transformation exercises can spell prodigious expenses for a large-scale company. Still, their cost benefits can easily outmatch the expenditures sustained in the long run. Actionable insights emerging from end-to-end value chain visibility can plug leakages and zero in on unreliable partners and vendors who cause cost overruns.

Within a few months of a procurement re-engineering, incremental additions to the top and bottom line become apparent. The top line becomes stronger primarily because of a tightly run procurement chain that is digitally optimised and powered by a consolidated roster of high-performing vendors. On the other hand, the bottom-line leaps from strength to strength as wastages, be they of resources or funds, are nipped in the bud.

2. Measuring Success At Each Milestone

Procurement transformation, at its core, is a monitored initiative embedded with parameters that deliver insights into its effectiveness and impact on the company's finances. For firms that have their KPIs in place, changes, especially those that strengthen work culture and profit margins, become visible quickly. Procurement officers have also reported high productivity as principles of scientific management steadily replace outmoded hap-hazard and impromptu management norms. However, one must be mindful of chalking out the KPIs one seeks to achieve before setting off on such an entrepreneurial journey.

3. Avoiding Common Roadblocks

It is a commonly tragic occurrence that a company that sets its eyes on a lofty goal of re-imagining its supply chain often focuses on the unique challenges while tripping over small and manageable obstacles. One of these roadblocks witnessed with somewhat alarming frequency is that of multiple plants operating as if they are silos unto themselves with little or delayed responsiveness to the central hub. This level of decentralisation, in one fell sweep, damages the company's operations and economics. Cost savings that could have been easily implemented thanks to an integrated digitised ecosystem are absent in an undigitised factory network. At other times, manufacturing units add unnecessary overheads by opting to manufacture goods that they could easily outsource, leading to some impressive reduction in operational expenses. However, the temptation of comfort zones is such that these processes continue for years, saddling value chains with time and cost drag. Only when a company's managerial leadership decides to shake off these unoptimised processes is a company better placed to engender a transformation.

4. Getting Quick Wins

Anyone vying for a procurement transformation must present a list of quick wins for the managerial leadership to see meaning in financing its procurement pipeline re-design. Thankfully, these quick wins aren't hard to score. It is easy to pull off some changes, such as outsourcing expense-inducing protocols, consolidating a vendor base, or digitally centralising factory operations in a short time window. The company's top echelons can appreciate the results. What's more, data insights can light up all the operationally opaque areas where the organisation has no choice but to rely on local vendors from informal sectors. Logistics and transportation activities often suffer from such blindness. With end-to-end digitisation in place, such concerns will become a thing of the past and pave the way to a more profitable future for the firm.

THE FINAL WORD

Disruptions are, ironically, the new order. In the new scenario, a procurement officer will have to forego the old matrix's reliability, stability and predictability and anticipate new seismic shocks to the procurement chain from all corners. These shocks could be systemic, as was the case with the pandemic or financial, as is the case with inflationary pressures or triggered by larger geopolitical tensions. The work of tightening the nuts and bolts of a procurement pipeline is seemingly unending and is a part of the business hygiene of a company. However, a procurement transformation goes beyond simplistic calibrations and calls for a more extensive ecosystem reboot by fixing alignments and remoulding the company's priorities to best serve its customers and finances.

REINVENTING INDIA: THE MACHINIST SUPER SHOPFLOOR AWARDS 2022

The Machinist Super Shopfloor Awards 2022 hosted its eighth edition on June 17, 2022, in Bangalore, India. The red-carpet event witnessed participation from the who's who of the industry and government. Excerpts of the event…

by Anvita Pillai


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As the manufacturing industry strides towards transforming India into a trillion-dollar economy, it is essential to recognise and reward the positive steps and developments throughout the sector. An award ceremony that has been synonymous with the manufacturing sector for the last eight years, recognising the positive efforts of the industry, has been The Machinist Super Shopfloor Awards.

The red-carpet event hosted on June 17, 2022, in Bangalore, India, witnessed participation not only from the head honchos of the industry but also from top government officials. With the years passing, the competition to win the coveted 'Machie' has only become stiffer. From the thousands of nominations received, the jury chaired by Dr Pawan Goenka, Chairperson, INSPACe – Dept of Space, Government of India, along with jury members Vikas Kadlag, Managing Director, Robertshaw India; S K Sinha, COO & Senior Vice President, Setco, Bireshwar Mitra, Former Executive Director, Sharda Motor Industries Ltd; Professor Madhu Ranjan, Emeritus Professor, College Of Engineering Pune; Hemant Watve, MD & CEO, Wilo Mather And Platt Pumps Pvt Ltd; Ramendra Kumar Sharma, Independent Director And Consultant; Rajeev Mittal, Chief Information Officer, Endurance Technologies; Abhijit Janugade, Head – Production and Maintenance, Draexlmaier Manufacturing India and Dr Dhananjay Kumar, Emeritus Professor, College Of Engineering Pune; through an extensive six-hour brainstorming and evaluation session, narrowed down 32 winners across eight categories.

LIGHTS & ACTION!

The Machinist Super Shopfloor Award 2022, studded with eminent people from the state government as well as the industry, started with the lamp lighting ceremony. The chief guests Dr Thaawarchand Gehlot, Governor of Karnataka; Dr Murugesh Nirani, Minister of Large and Medium Industries, Government of Karnataka; R Madhavan, CMD, Hindustan Aeronautics Ltd; TK Ramesh, Managing Director, Micromatic Machine Tools; and Yatendra Kumar, Business Head, MotulTech India; inaugurated the event.

Following, giving the welcome note, TK Ramesh, Managing Director, Micromatic Machine Tools, mentioned, "Manufacturing and machine tools along with agriculture are the mainstays that built the nation and the economy. It is an onus on all of us to look at sustainability along with quantity for Indian development and recognise the people on the shop floor for greater development."

MARCHING TOWARDS MAKE IN INDIA DREAM

Make in India has evolved from a simple campaign to get minds running on building in India to a necessity today. The vision to create a self-reliant India has broadened the purview and brought to the fore the capacity and skills India as a country possesses. Dr Thaawarchand Gehlot, Governor Of Karnataka, emphasised, "The 'Make in India' campaign is the need of India in the 21st century today, and it also allows us to showcase our potential to the world. I believe there are new possibilities in this area for 'Make in India'. We must be visionaries."

India has immense potential; it is now all about monetising it. With make in India, not only can we become independent but also a world leader. Gehlot concluded, "We want your industry to be strong to make India strong. We want your products to earn worldwide respect. Let's decide and move forward together."

ACKNOWLEDGING VISIONARIES OF MANUFACTURING

Mixing things up in 2022, the event began with the Editorial Choice Awards, recognising the efforts of amazing manufacturing professionals whose vision and leadership have set a benchmark for others.

Outstanding Contribution To Manufacturing Industry
Dr Murugesh Nirani,
Minister Of Large & Medium Industries, Government Of Karnataka

Business Leader Of The Year 2022
R Madhavan,
Chairman and Managing Director, HAL

Machinist CEO of The Year 2022
Satyakam Arya,
Managing Director & CEO, Daimler India Commercial Vehicles

The Machinist Next Generation Leader 2022
Ankit Mehta,
Co-Founder and CEO, Ideaforge

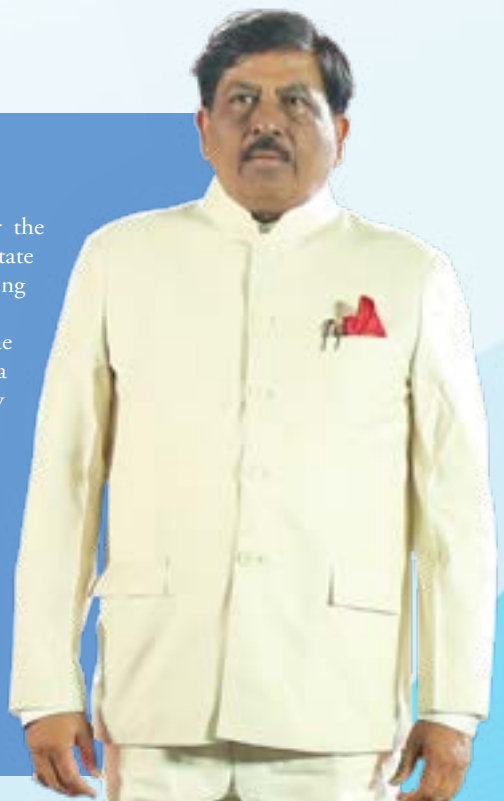
The Machinist Sustainable Manufacturing Company for 2022
Alstom

KARNATAKA FOR 4.0

Karnataka has been among the most ambitious cities in India for the longest period. Besides building the Silicon Valley of India, the state government has been putting valiant efforts into building the manufacturing circuit beyond Bengaluru.

The government is furthering its efforts to propel Karnataka as the global manufacturing hub. "The government aims to make Karnataka the number one state in the country by making it industry-friendly and investor-friendly. In furtherance of this, we have unveiled the new Industrial Policy 2020-25 released that provides further thrust to key areas such as – Industry 4.0, advanced manufacturing, and R&D - aimed at becoming an integral part of the global value chain," revealed Murugesh Nirani, Minister Of Large And Medium Industries, Government Of Karnataka.

"For Karnataka to emerge as a global manufacturing hub, providing easy access to land, labour, and finance is the key criteria. Our department of industries and commerce has taken several pro investors initiatives under the dynamic leadership of our Chief Minister, Basavaraja Bommai," added Nirani.



BECOMING TRULY AATMANIRBHAR

Covid-19 and the Eurasia war has posed several hurdles to the manufacturing sector in recent times, but it is all about the recovery now. Further, given the turbulent external circumstances, India has also realised its pattern of unhealthy dependency on imports. It has given the industry time to re-evaluate, focus and grow India's prowess globally via Aatmanirbhar Bharat and Make in India. "In the last couple of years, we have realised that depending on external sources is dicey, and at any point in time, one can also be banned due to one's relations with other countries. Since the onset of Aatmanirbhar Bharat and Make in India has boosted the support of indigenous activities to the hilt," said R Madhavan, CMD, Hindustan Aeronautics Ltd.

While we march on the mission to reduce the dependency on imports, focusing on building capacity within India is essential. Madhavan added, "To ensure a reduced dependency on imports, it is essential to develop technologies and a supply pace, which have their own IPs." Manufacturing needs to evolve from its status of "built to print" to create its intellectual products, which can be put on our systems as India plans to sell it globally.

MACHINING SUSTAINABLY

Machining, in general, has never been a sustainable process. With the changing times, the industry must keep up. "Machining is evolving from becoming a labour-intensive process to an automated process by the day. Technologies such as AI, AR/VR, etc., have come in to reduce human intervention as far as possible. Although there is a benefit of manufacturing cost coming down, we need to also shift our focus from processes such as machining, metal cutting, etc., to other areas like additive manufacturing, composite manufacturing, etc.," summarised Madhavan.

AWARDING REVOLUTION & INNOVATION

The celebrations didn't end with the editorial choice awards. Post the opening note, keynote and panel discussion, it was time to recognise companies for their extraordinary contribution across various segments. The awards were divided into two clear categories of large and SME.

The winners for the machinist super shopfloor awards across large are:

ENVIRONMENT, HEALTH AND SAFETY:
Winner: Bajaj Auto Limited, Chakan
Runner up: Royal Enfield (A Unit of Eicher Motors Ltd)

MANUFACTURING EXCELLENCE:
Winner: Aurobindo Pharma Limited
Runner up: GULF Oil Lubricants India Ltd

QUALITY:
Winner: Alstom Madhepura Electric Locomotive Pvt. Ltd
Runner up: Varroc Engineering Limited Plant-VI, Maval Pune

DIGITAL MANUFACTURING:
Winner: Hyundai Motor India Limited, Chennai
Runner up: Alstom Transport India Limited, Sricity

INNOVATION:
Winner: Tata Motors Ltd, CVBU Pune
Runner up: Shakti Pumps (India) Limited

HUMAN RESOURCE:
Winner: Alstom Transport India Limited, Sricity
Runner up: IAC International Automotive Private Limited, Chakan

CORPORATE SOCIAL RESPONSIBILITY:
Winner: Zydus Lifesciences Ltd
Runner up: Tata Motors Ltd, CVBU Pune

SUPPLY CHAIN MANAGEMENT:
Winner: Cummins Technologies India Private Limited, Dewas

EVOLVING FROM THE 3 RS OF SUSTAINABILITY

With environmental consciousness gaining prominence, the manufacturing sector has also been actively making efforts to become greener and help India become net-zero. During the panel discussion on Sustainability in Manufacturing, Oliver Loison, Managing Director, Alstom - India Cluster, commented, "I think there are several levers to sustainable manufacturing, and we are just at the beginning of the journey. The first pillar is to ensure that you have the eco-design to settle the manufacturing and design that allow companies to be sustainable,". Further, the industry needs to be mindful of the material used throughout out the process; the recyclability and reusability will play a key in helping plants go greener.

However, Satyakam Arya, Managing Director & CEO, Daimler India Commercial Vehicles, opined that to create a sustainable ecosystem, manufacturers need to move on from the three Rs – reduce, reuse and recycle – to developing a circular economy. He posits, "Besides emphasis on the three Rs there needs to be an increased focus on building a circular economy; this can help in reducing the manufacturing cost by almost four to five per cent," emphasised and continued, "Additionally, companies now also need to work on another important R, which is recover. There needs to be a lot of awareness, infrastructure, IT systems that need to be created."

Taking the conversation ahead, TK Ramesh, Managing Director, Ace Micromatic Group, cited, "Amidst all the new R values coming up, there is an important R that is essential for any other process to work out – reimagine. Ultimately, there is value and waste, and what we need to focus on is whatever that is a waste at a certain point is an input to the next point in time."

However, Dinesh Patidar, Chairman and Managing Director, Shakti Pumps, pointed out that in the journey to sustainability, India falls short on education, training, KRA, kaizen, etc. He suggested, "We need to be prepared to change our design. White-collared officials need to accept the information/ kaizen coming from shop floors and integrate it with the KRAs to enable sustainability throughout the process effectively."

Runner up: Hyundai Motor India Limited, Chennai

Following are the winners of the machinist super shopfloor awards 2022 under the SME segment:

ENVIRONMENT, HEALTH AND SAFETY:

Winner: Godrej Consumer Products Ltd, Meghalaya Coil.

Runner up: GKN Fokker Elmo India Pvt Ltd, Chakan

MANUFACTURING EXCELLENCE:

Winner: Supreme Treon Pvt Ltd, Sanand Plant

Runner up: Continental Automotive Brake Systems India Pvt. Ltd

QUALITY:

Winner: FM PBW Bearings Pvt. Ltd

DIGITAL MANUFACTURING:

Winner: Kranti Industries Limited

Runner up: Continental Automotive Components (India) Private Ltd

INNOVATION:

Winner: Omega Seiki Mobility

Runner up: Stanadyne India Pvt Ltd

HUMAN RESOURCE:

Winner: Supreme Nonwoven Industries Pvt Ltd, Bawal

Runner up: Continental Automotive Components (India) Private Ltd

SUPPLY CHAIN MANAGEMENT:

Winner: Supreme Treon Pvt Ltd, Sanand Plant

GEARING FOR MANUFACTURING SUPREMACY

With the growth of the manufacturing sector, rewarding innovation and evolution play a key role in motivating the industry's development. What better platform to recognise the industry's efforts than the Machinist Super Shopfloor Awards 2022?

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Chakan

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Meghalaya Coil

MANUFACTURING EXCELLENCE

Aurobindo Pharma Limited

Supreme Treon Pvt Ltd
Sanand Plant

QUALITY

Alstom Madhepura Electric Locomotive Pvt Ltd

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Cummins Technologies India Private Limited
Dewas

Supreme Treon Pvt Ltd
Sanand Plant

CORPORATE SOCIAL RESPONSIBILITY

Zydus Lifesciences Ltd

By Madan Mohan Mewari, Senior Vice President and Global Delivery &
Operations Head, (Manufacturing, and Communication, Media & Technology verticals), Birlasoft

INDUSTRY 4.0 ENABLING TOMMOROW'S SMART FACTORIES

An article on how manufacturing industries can work on building the factory of tomorrow using Industry 4.0

Madan Mohan Mewari

Industry 4.0 first saw adoption by a few enterprises in the early part of the decade, starting in 2011. General Electric (GE) and Siemens, both high-end engineering enterprises, were some of the early adopters of IoT within their manufacturing and engineering operations by developing smart sensors and connected solutions to track the efficiency of the equipment and machinery in their plants. Data from these sensors were analysed on in-house software and analytics platforms – these platforms were later connected across servers and the cloud. This was the start of the IoT journey for these firms. These firms then embedded their industrial equipment, such as electric generators for power generation companies, with smart sensors to monitor and improve uptime, predict failures/faults, and lower usage costs–KPIs customers sought to improve constantly. The data from these sensors were collected over the cloud and analysed on in-house IoT platforms. Both these enterprises initially utilised IoT solutions internally and then as end-to-end smart engineering solutions, covering sensors, devices, smart factories, connectivity, platforms, and analytics. At every step of the journey, these early adopters of IoT accelerated the utilisation of smart tools and platforms to move up the value chain from simple equipment and factory monitoring to end-to-end deep analytics of the manufacturing lifecycle – a necessity to remain competitive and to deliver the required KPIs to their customers.

INDUSTRY 4.0 – CORE TECHNOLOGIES

Industry 4.0 is characterised by smart factories or tomorrow's plants revolutionising manufacturing. Nine core technologies are transforming the smart factories in the new paradigm. These technologies are:

- Big Data and Analytics
- Autonomous Robots
- Simulation
- Horizontal and Vertical System Integration
- Industrial Internet of Things (IIoT)
- Cybersecurity
- The Cloud
- Additive Manufacturing
- Augmented Reality

AUTOMATION AND INDUSTRY 4.0

Automation is one of the emerging technologies increasingly utilised by the industrial sector to improve product quality and efficiency and reduce operating costs. Automation is the bridge between humans and machines – leading to the development of smart plants and factories. Smart plants are made up of hyper-connected production processes – these machines and processes communicate through Machine to Machine (M2M) technologies. The M2M technologies rely on automation platforms to collect and analyse different data related to inputs, manufacturing, operations, and production outputs.

Automation creates a connected manufacturing ecosystem that enables connectivity across machines in factories through wireless connectivity and sensors – the connectivity technologies enable monitoring

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- METALLOGRAPHIC ANALYSIS
- DEFECT ANALYSIS
- SURFACE METROLOGY - EXTERNAL AND INTERNAL
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and visualisation of the entire production process and drive assisted decision-making or semi-autonomous decisions.

Wireless connectivity across machines and remote applications and the increased usage of sensors is expected to be bolstered with the full rollout of 5G services for industrial purposes. This would enable greater automation, allowing for real-time communication between systems, and facilitate disparate systems to "move" closer (virtually) to the point of production and manufacturing by utilising Edge Computing.

IMPLEMENTATION OF INDUSTRY 4.0 – KEY TOOLS AND APPLICATIONS

While nine main pillars of Industry 4.0 exist, several software tools and applications are essential to the implementation and operations of Industry 4.0. These tools enable the entire smart manufacturing lifecycle from design and development to scheduling and decision-making. The essential software tools that enable the whole operation processes of smart manufacturing include:

- **Simulator Tools:** Simulator Tools include the applications that manufacturers and product designers utilise in the smart manufacturing ecosystem. Simulators are used in the product design in the R&D / Design stage and in the planning stage to map how production would be carried out based on the product specifications. The availability of a range of tools enables designers and manufacturers to develop hyper-personalised products for a wide range of consumers. Moreover, the ability to develop several prototypes and carry out numerous test simulations without building the actual product enables the manufacturers to seek customer feedback while developing the product specifications continuously.
- **APS Software:** The demands of manufacturing have a corresponding effect on the demands of operations and scheduling "smartly" in Industry 4.0. For this purpose, manufacturers utilise Advanced Planning and Scheduling software (APS) to streamline operations and production schedules. Advanced Planning and Scheduling (APS) offers digital solutions to manage production planning and shop floor scheduling. Using advanced algorithms to balance demand and capacity and generate achievable production schedules, Advanced Planning and Scheduling (APS) software results in shorter lead times to meet customer demands and easier, more rapid responses to unexpected production changes.

The two primary components of advanced planning and scheduling (APS) – strategic planning and detailed scheduling – help manufacturers by:

- Anticipating manufacturing resource needs
- Orchestrating efficient use of material people and machines
- Delivering valuable customer service and higher profitability

Advanced planning and scheduling (aps) can be utilised for any length of production scheduling across:

- Long-term strategic planning covering months and years
- Medium-term tactical planning with a horizon of a few weeks
- Detailed sequencing and scheduling

Advanced planning and scheduling (APS) software can be utilised as a standalone system to manage planning and scheduling and can also be integrated with enterprise resource planning (ERP), manufacturing execution system (MES), and other software solutions.

- **IoT Applications:** IoT applications enable manufacturers to utilise dedicated software to monitor production processes, perform

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predictive maintenance, and boost ROI / productivity. IoT applications utilise several technologies encompassing software, sensors, machinery, and connectivity. By bringing all these technologies on a single dashboard, IoT applications can monitor and manage manufacturing sub-processes. IoT applications can connect devices and applications across the board (including ERP and CRM), integrate data from several sensors and devices, utilise AR (augmented reality) simulation, analyse data, and monitor machinery and tools. Each process is remotely monitored by the IoT application, with data constantly streaming into the platform 24/7.

• **AIIoT (Artificial Intelligence in the Internet of Things):** AIIoT is redefining and reforming every industry process in the manufacturing sector. AI paves the way for intelligent task execution with real-time analysis, and by integrating with IoT, AIIoT enables machine monitoring, data collection, and storage to the cloud while delivering decision making and stimulating the machines/devices to respond. Overall, AIIoT enables interoperability of devices (chipsets), software (programs and operating systems), and platforms (IoT, ERP, and CRM) – this interoperability is enabled with the implementation of APIs for AI and IoT devices, software, and platforms.

OPTIMISING MANUFACTURING PERFORMANCE

Industry 4.0 has begun, and it signals the start of a new way of planning and operations of manufacturing processes. Adopting IoT software, data-driven analytics, and connectivity is crucial for manufacturers and product designers to stay competitive in the new, highly competitive landscape. Industry 4.0 can improve revenue growth and business operations and transform the supply chain, products, and customer expectations. The use of portable devices and sensors, robotics, and analytics enable real-time improvements in products, from creating tests and prototypes to integrating connectivity, seeking customer feedback, developing personalised products, and integrating several platforms for constantly monitoring the production lifecycle.

Customers are going beyond increasing revenue and optimising costs - customers are seeking an elevated level of experience and sustainability and looking to improve key KPIs that exist in the manufacturing process constantly – some of these KPIs include - asset availability, factory performance, and overall equipment effectiveness. Customers now seek to not only track data but also provide insights into performance and recommendations for improvements - these requirements are now being addressed through all the integrated technologies of smart factory initiatives.

By Sumit Garg, Co-founder & MD of Luxury Ride

SEMICONDUCTOR SHORTAGE: AN OPPORTUNITY TO BOOST PRE-OWNED LUXURY CAR INDUSTRY

The article elaborates on how the shortage of semiconductors is a perfect opening for the preowned car segment, especially the preowned luxury car segment, to shine.

Sumit Garg

It has been a while since the global semiconductor shortage hit the automobile industry. The crisis continues to stay strong two years after its onset in early 2020. The shortage has compounded the already existing perils of the volatile market. But on the other hand, the semiconductor shortage is the major factor in giving the desired impetus to the pre-owned luxury car market.

The demand for semiconductors was starkly felt during the transition of India from BS-IV to BS-VI norms. The move toward reducing the environmental emission required enhanced cars to meet the government guidelines. As a result, consumers moved towards more electronic-driven features with alacrity. Therefore, to comply with the new requirement, semiconductors were essential to support the car's performance and abide by emission guidelines. It was at the centre of new car manufacturing for its multiple advantages ranging from managing the electric current to driving the smooth functioning of assistive technology and sensors, powering the display system, and integrating mobile phones and Bluetooth connections. It was responsible for supporting all the high-performance components in the vehicle. Consequently, semiconductors witnessed a soaring demand in the market.

WHY THE SLUMP?

But the proliferating market saw a receding trend with the onset of the pandemic. Considering the restriction in mobility and disruption in the operations due to covid guidelines, the new cars registered a sluggish sale. As a result, the semiconductor orders plunged briskly, and the manufacturers either reduced their production or drastically stopped the entire manufacturing. Surprisingly, with the market opening, the entire industry bounced back quickly at a double pace. The

new cars recorded a skyrocketing booking of the orders. This sudden rise in demand turned out to be the major cause of the acute supply shortage of semiconductors. The entire automobile industry faced repercussions for the long waiting period for new cars. It ranged from three to four months and sometimes extended to six months to one year before the buyer possessed the vehicle.

Additionally, before covid, cars were available in abundance that exceeded the demand portrayed by the market. The cars were supported with heavy discounts to leverage the sale. But with the coming of covid, OEMs started manufacturing cars to maintain the balance of supply and demand. Therefore, there were no lucrative offers, and the cars were sold at their original value point. All the factors together proved to be a major discouragement for the buyers who were discontent with the new market situation and hence, readily found solace in the pre-owned car segment, which came with a wide gamut of benefits.

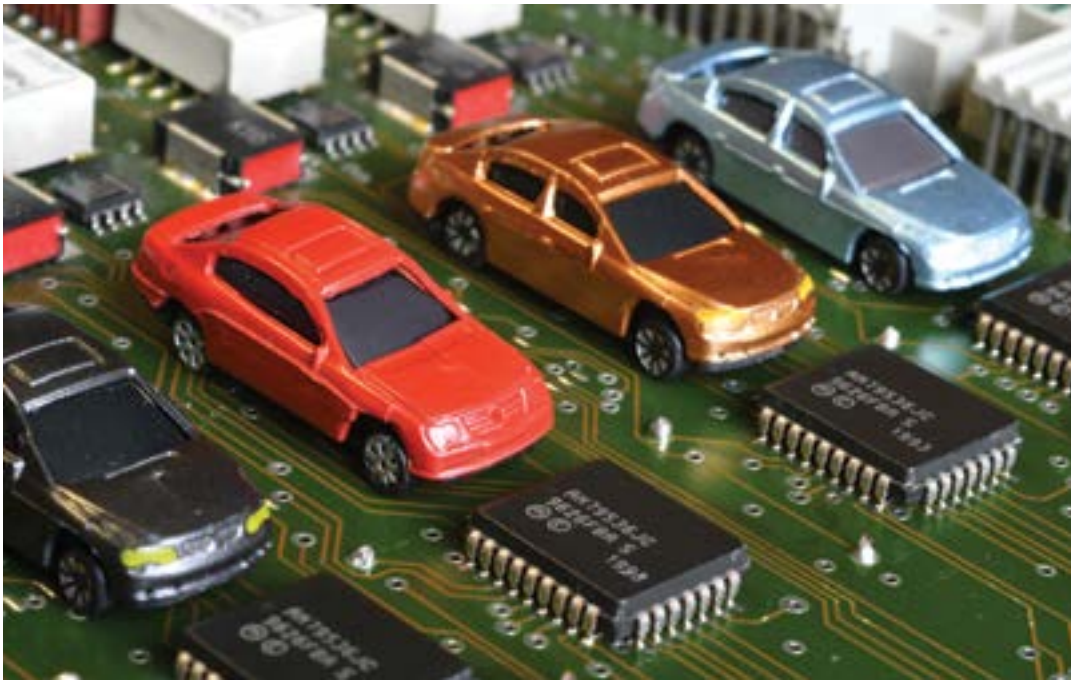
FILLING THE GAP

Looking at the gap in the market, India, which is dependent on other countries, namely Taiwan, China, Thailand, etc., for the import of semiconductors, is making huge strides under the 'Make In India' initiative to set up factories for mass semiconductor production. Nevertheless, the country will require time to lay a strong foundation for the manufacturing infrastructure. In the meantime, where the pre-owned cars have caught the population's attention, it is unlikely that their popularity will decrease soon and only amplify with time.

In addition to solving the long waiting period and inaccessible discounts problem, the pre-owned cars industry also offers a good resale value that benefits both the owners and the potential buyers. It is being pegged as the 'Sunrise Sector' recording a growth of 15 per cent for the year 2022.

WHY GO FOR PRE-OWNED

Since post-covid people were unanimously looking for personal mobility options to avoid any contraction of the disease, they were invariably considering the pre-owned options to be frugal with their hard-earned money considering the difficult times. With millennials forming the major bulk of the consumer population, they were always driven by the desire to own a luxury car. Hence, the market mix was sheer encouragement for them to fulfil their dream of purchasing a



luxury car. The pre-owned luxury car came at an affordable price falling in the same bracket as a new economical car but backed up with endless benefits in addition to the uncompromising performance. Unlike the new cars huddled with high depreciation rates, elevated taxes, and RTO/ registration fees, making the new car expensive, the pre-owned luxury cars come with the backup of advanced technology packed with high-end features, slow rate of depreciation, low insurance rate, extended warranty, inbuilt accessories, and many more benefits.

There was a time when people used to avoid purchasing a pre-owned car for its exorbitant price. Still, with the coming of the pre-owned services, people can now upgrade to a premium car, too, without compromising their financial stability. Moreover, to keep the continuity throughout covid, many organised players emerged to give new-age experiences and solutions by bringing about the confluence of physical and digital assets. They explored a whole new latitude of online services and focused on catering to the needs of both sellers and buyers, which expedited the acceptance of pre-owned cars.

By simply foraying into omnichannel presence, the players initiated the organisation of the highly scattered industry, instilling faith amongst the customers with their products and services. They offered comprehensive services like virtual tours, physical inspection of cars, doorstep test drives, and many more. They even went a step ahead and integrated end-to-end progressive solutions providing documentation authentication, financing options, and thorough vehicle inspection that gave customers a premium experience.

DRIVING THE EXPONENTIAL GROWTH

All the factors together drive the exponential growth of pre-owned luxury cars a year over year. In addition to the independent dealers, even car manufacturers like Maruti's True Value, Mahindra's First Choice, and even companies like Porsche are foraying into the pre-owned car market in India. Given the robust expansion, where pre-owned cars were popular only in metropolitan cities, the segment is now making inroads into Tier II and III cities. The major lifestyle changes with the liberty of augmented disposable income drive the aspiration to upgrade the car to the latest trend continuously. This has accounted for the short ownership period for which pre-owned cars are the only viable option.

The pre-owned luxury cars are enjoying the revelations of a diverse market mix, and with a unified effort, the industry can invariably contribute to the country's economy.

ADDRESSING THE CHANGING FACE OF MOBILITY

The Economic Times hosted the Global Automotive Summit & Awards 2022 on June 30, 2022, in Mumbai, India. A glimpse of the event...






Since the onset of the pandemic, a lot has changed in the automotive industry. As the industry strives to revive, there are plenty of challenges the industry faces that need to be addressed. The Economic Times Global Automotive Summit & Awards, hosted on the June 30, 2022, took a closer look at the future of mobility in India, the technology trends and advancements in the sector, the electrification model of India and more.

The conference addressed some of the hard-hitting questions about the 'sustainability factor' of e-mobility, the future of mainstream e-mobility, the future of ICE vehicles, domestic manufacturing, and much more, giving you a holistic, 360-degree view of each niche aspect of the automotive industry under the theme 'The New-age Drive to Mobility'.

The automotive industry, for the longest period, especially the last five years, has been focused on cutting its greenhouse gas emissions to as close as possible to zero. To speak on why the automotive industry is heading the movement toward net-zero and to address the opportunities and the barriers that the industry will encounter in its journey, the event kickstarted with an opening note from Andy Palmer, Executive Vice Chairman & CEO, Switch Mobility. "The march toward electric and net-zero is stopping for no one," he emphasised. "But we have to get it right. Thankfully, the automotive industry gives us rich and varied history that gives us a treasured trail of learning as we embark on this journey (towards net-zero)," he added.

The Economic Times Global Automotive Summit & Awards with its Media Partner, The Machinist, along with Knowledge Partner, Frost & Sullivan, also evaluated and shortlisted companies and members of the industry who have contributed greatly and are widely recognised for their attitude of constant innovation and inspirational leadership.

The winners of the Economic Times Global Automotive Awards 2022 were:

- Vehicle of the Year (4w) – Safety: Tata Punch
- Vehicle of the Year 2022 – Connectivity: MG Hector
- Made in India Innovation of the Year: Mahindra TREO
- Concept of the Year 2022: Tata Avinya
- Innovator of the Year: Narayan Subramaniam, CEO, Ultraviolette Automotive
- Entrepreneur of the Year: Dr Akshay Singhal, Founder & CEO, Log 9 Material
- Women Leader of the Year Award: Suman Mishra, CEO, Mahindra Electric Mobility Ltd

Since the onset of the pandemic, the automotive industry was certainly in need of an open platform for discussion to brainstorm on the challenges and the roadmap ahead, and the Economic Times Global Automotive Summit & Awards 2022, along with rewarding the best in the industry also enabled this much-needed platform for discussion.

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AT THE RIGHT ANGLE

In milling applications, 90° cutters are perhaps the most common tools. These versatile tools are used for milling square shoulders, slots, and face operations bound by shoulders, edges, pockets, and cavities. Face mills perform machining by ramping and turn-milling. These 90°cutters prevail in the product range of tool manufacturers that produce general-purpose mills, whether indexable, solid or brazed.

In selecting 90°milling cutters, several factors must be examined, such as the material to be machined, the removal of stock, required accuracy, surface finish, stability, and the characteristics of the machine tool in use. These factors influence the cutter type, geometry, tool configuration, and more. The same factors are also the key points for choosing a cutter design for a tool manufacturer intended for its production processes. For example, solid mills provide ultimate machining accuracy, while an indexable tool concept enables machining under heavy loads and provides additional cost-effectiveness per cutting edge. The cutting geometry of solid and brazed mills becomes complete only after grinding. In indexable mills, the shape of a sintered insert is the key contributing factor to achieving optimal tool geometry.

A quantum leap was achieved in the world of metalworking during the early 1990s with the Iscar Helimill– a family of 90° milling tools that introduced helical-shaped edged inserts. The intersection of the insert's top (rake) face and the helical insert side (relief) surface generated a highly effective edge. This milestone geometric design formed a constant positive rake, and a constant relief along the insert's cutting-edge length. The ground-breaking feature caused a significant reduction in power consumption and ensured a very smooth cut. Iscar's Helimill concept heralded a new design approach and benchmarked indexable milling by anchoring the geometry of an insert at the forefront of milling technology.

A polygon comprises the shape of inserts in 90° milling cutters. These inserts may be rectangular, square, parallelogram, rhombic, triangular or trigon (broken triangle). The shape of an insert determines the number of indexable cutting edges. There are additional important insert features which relate to the insert's shape. A square or triangular insert features greater width compared to a rectangular insert shape. Increasing the insert width facilitates a larger central hole and enables greater clamping screw sizes to improve the securing function of an insert. However, increasing the insert width limits the minimal diameter of a milling cutter and requires larger chip gullets, which reduce the strength of the cutter body. This is just one factor to consider when designing 90° milling cutters with indexable inserts. At the same time, there are other contributing elements such as the mounting method (radial, tangential), range of corner radii, a wiper flat, chip splitting functions, and more. It is imperative to consider the material being processed and the type of milling operation for which the cutter is designed.

A parallelogram shape provides an optimally harmonious combination of the cutting-edge length, varied corner radii, ramping-down capabilities, and additional parameters of the cutting geometry and inserts strength. This explains why the parallelogram shape remains common. A significant disadvantage of the shape is the number of cutting edges – limited by two in a traditional design configuration. A double-sided, reversible insert concept seems to be the simple way to increase the number of edges on an insert more effectively. There are additional attributes to think about when considering a double-sided insert configuration. Additional limitations affect the relief angle and increase the axial rake of a milling cutter after the inserts are assembled on the tool body.

With the many forms and shapes of cutters in the tool market, the creation of new geometries has become an obsolete task. Iscar's Neologiq campaign has created unique, innovative milling solutions to conquer new quests for fast and productive milling solutions.

Iscar's prolific R&D design engineers invented the new Neodo S890 milling cutters designed for rough, semi-finishing, face and square shoulder milling operations primarily for steel and cast iron. The 90° cutter design places cost-effectiveness and productivity at its forefront, intended for milling under unfavourable conditions. The tool utilises a strong-structured double-sided insert. When mounted on the cutter, the insert guarantees positive radial and negative axial tool rake angles, which promise smooth cutting and reduced power consumption for milling under diverse machining conditions and interrupted cuts. A dovetail profile of the insert pocket enables rigid clamping that substantially increases cutter stiffness. The insert has a built-in wiper flat to improve the surface finish. A new look on a square insert profile, in combination with the advantages of pressing technologies, has resulted in effective and economical solutions for face milling, particularly for machining close

to shoulders where work holding constraints exist.

The double-sided 90° Helido Trigon tool was derived from a trigon shape. The insert configuration provides six indexable cutting edges and ensures higher tooth density for increased feed rate and maximised productivity. The tools have a double-positive cutting geometry: positive axial and radial rake angles. These attributes contribute to lower power consumption and allow rough milling applications on machines with limited power. The versatile Helido Trigon tools are suitable for milling shoulders, slots, side plunging and ramping by use of helical interpolation. The main advantage of these tools is the combination of 90° profile accuracy, productivity, and cost efficiency.

Efficient milling of aluminium alloys and other non-ferrous materials (ISO N group of application) requires a sharp cutting edge and a polished rake face. The chip-splitting capability of a cutting edge is an additional tool to improve performance. The serrated edge geometry of the single-sided triangular Heli3mill inserts, which have proven themselves as real workhorses in 90° milling, are cost-effective tools.

Given case studies convincingly confirm the conclusion that the possibilities for improving 90° indexable milling cutters are not exhausted. A fresh right-angle on the cutter design will lead to an attractive solution, even when considering the redundancy in developing new insert geometries.

WALTER INTRODUCES LASER CONTOUR CHECK FOR NON-CONTACT MEASUREMENT

In addition to tactile measurement in the grinding and eroding machines, Walter now offers a new and innovative non-contact option: Laser Contour Check. The new blue laser, in combination with the intelligent measuring system for high-precision measurement of various tool parameters on cylindrical tools with diameters from 1-52 mm, avoids possible damage to cutting edges or measuring errors that can occur due to wear on the probe tip during tactile measurements.

Measurements are made directly in the analogue laser beam on the entire tool contour and not only at specific points as with the tactile or digital measuring method. Deviations can thus be compensated directly in the process. A short measuring time, including cleaning of approximately 16 seconds (depending on the tool type) for diameter measurement, ensures increased productivity.

Optimised programme sequences for cleaning and compensation can be programmed and adapted by the operator. The measuring system is integrated directly

into the machine's working area and moves into position when required. The blue laser beam offers improved accuracy compared to the conventional red laser, as blue lasers have a shorter wavelength, thus reducing diffraction effects and optimising the laser beam geometry.

WIKA LAUNCHES PSM-630 FOR AIR COMPRESSOR & WATER PUMPS

Wika India, a wholly owned subsidiary of WIKA Global, recently launched the PSM-630, an automatic, heavy-duty pressure switch for applications like air compressors and water pumps.

The model PSM-630 can also be used in industrial control, monitoring and alarm applications. The switch point is engineered so that it can be manually adjusted by the customer on-site and adjustable for automatic cut-off within the prescribed range. The entire electrical system can be controlled by the pressure switch to maintain the pressure of the storage unit.

The instrument can switch electrical loads up to AC 440 V, 16 A. The integrated relief valve (option) is used for depressurising the pressure chamber of the compression piston before starting the compressor. With the manual On/Off knob, the contact system can be locked in the open position, irrespective of the process pressure. This helps to maintain the safety of the machine and workplace.

WIKA, a specialist in precision component manufacturing associated with Pressure, Temperature, Level, Flow, & Force for critical industrial applications, has launched this Indigenous solution as a value-for-money proposition for Indian customers looking for world-class products.

Gaurav Bawa, Sr Vice President, WIKA India, said, "Apart from the unique safety features, PSM-630 works with both three phases and single-phase of electricity, and thus can be adopted in any environment. There is significant growth expected for the heavy-duty pressure switch market with the demand for precision equipment. WIKA's market survey has indicated that only 10 per cent of the pressure switch market is being catered to currently. The unique product aligned will market need will plug the gap," Bawa added.

PSM-630 has an integrated relief valve to ensure a smooth restart of the compressor. This adds to the safety measures provided by the manual knob on the top, which is easily accessible by the customers. Among the other safety measure, the switch cannot be easily tampered with as the process connection is made through forging or casting. The switch has a snap-action mechanism inbuilt into it—thus, it stops automatically once the pressure reaches the defined particulars, thus causing no side effects to the machine itself. Also, it is a single process connection that is threaded in four different ways to accommodate safety valve and other types of switches.

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