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industry
India

VOL 15 – Issue 03 | JANUARY 2024 (Monthly) | ₹ 100

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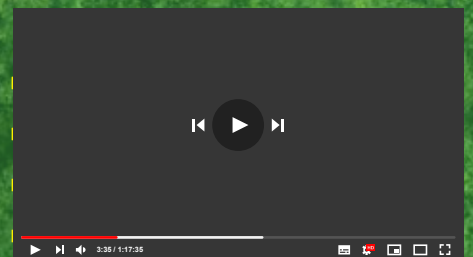


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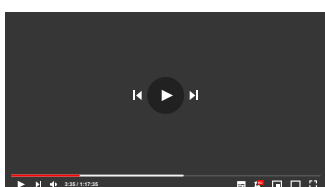
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“Redefining Industry Trajectory”

Neha Basudkar Ghate

Joint Editor, neha.basudkar@pi-india.in

New year, new horizons

As we usher in a new year, the manufacturing landscape is gearing up for a wave of developments and challenges that promise to redefine the industry's trajectory. In the past decade, the Indian automotive sector has been at the forefront of a remarkable evolution, driven by economic shifts, technological advancements and a changing regulatory environment.

The global push to address climate change, stemming from the alarming rise in greenhouse gas emissions, has led to stringent emission norms worldwide. The automotive sector responded with regulations like Euro standards and Bharat Stage standards. Now, the focus has shifted to decarbonisation, with governments and industry collectively working towards cleaner technologies and the adoption of low-carbon and zero-emission vehicles.


Our Cover Story this month explores the potential of Hydrogen Internal Combustion Engines (H2ICE) in achieving green ambitions for the automotive sector. Positioned as a bridging technology, H2ICE offers an immediate and viable powertrain option for medium- and heavy-duty vehicles, supporting cost competitiveness until fuel cell technology is commercialised and fostering hydrogen infrastructure development.

In tandem with the H2ICE spotlight, this edition delves into Metal Forming Technology in our Industry Focus, alongside Technology Focus articles on Supply Chain Management and Tool Making. The Special Feature accentuates Green Manufacturing, emphasizing the industry's commitment to sustainability.

As we navigate the challenges and opportunities of the coming year, the manufacturing sector in India stands at a crossroads, ready to embrace innovation and sustainable practices. Let this edition of our magazine serve as a guide for manufacturers looking to stay ahead in an ever-evolving landscape, where green ambitions and technological advancements converge for a brighter, more sustainable future.



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CONTENTS

MARKET

08 NEWS

10 "Factors such as climate change impacts drive innovation in clean energy"

Interview with Rohit Pandit, Managing Director
and Chairman, Shuzlan Energy

11 "Energy efficiency is at the forefront of every industry"

Interview with Anvar Jay Varadaraj,
Executive Director, Elgi Equipments

MANAGEMENT

12 "Our business is focusing on creating smart, sustainable solutions for customers"

Interview with Nitin Singh, Vice President and Head,
Internal Audit and Corporate Sustainability,
Havells India

COVER STORY

16 Hydrogen ICE fuels green ambitions in automotive sector

The cover story explains why Hydrogen Internal
Combustion Engine is the key zero carbon emission
technology solution for commercial vehicles in India

FOCUS

METAL FORMING

20 Metal Forming 4.0: Embracing digitalisation for enhanced production

Overall scenario presented by Metal Forming 4.0

MARKET

AUTO COMPONENTS MANUFACTURING

24 Practice and preach: How manufacturers can recycle

Importance of recycling in automotive manufacturing

IMTEX PREVIEW

28 IMTEX Forming 2024 to be held at BIEC from January 19 - 23

The upcoming IMTEX Forming edition is set to
showcase four dynamic exhibitions: Weldexpo, Moldex
India, Tooltech, and Fastnexus India.

TECHNOLOGY

TOOL MAKING

30 Efficient special tools for timely metalworking

The article discusses ideal tool selection based
on factors like business situation, manufacturing
programme, production type, and personal preferences



34

SUPPLY CHAIN MANAGEMENT

Data-driven logistics:
A boon for the
Indian MSMEs



20

METAL FORMING

Metal Forming 4.0:
Embracing digitalisation
for enhanced production



12

COVER STORY

Hydrogen ICE

fuels green ambitions in
automotive sector



18

TOOL MAKING

Efficient special tools for
timely metalworking



All image courtesy: shutterstock

SUPPLY CHAIN MANAGEMENT

34 Data-driven logistics: A boon for the Indian MSMEs

This feature showcases data-driven decisions transforming MSMEs, fostering economic growth

DATA ANALYTICS

36 Adhering to customer trends with data analytics

Through data analytics, manufacturing businesses adapt products to meet consumer demands efficiently, as outlined in this article

SPECIAL FEATURE

GREEN MANUFACTURING

40 Sustainable manufacturing: A win-win for both business and the environment

Unravel the diverse strategies defining eco-friendly manufacturing in this insightful article

SMART EV MANUFACTURING

44 Smart manufacturing in EVs Challenges and innovations

Here is a look into how smart manufacturing techniques accentuate the utility of EVs

NEW PRODUCTS

- 46 Smallest and frameless BLDC motor; Heater Controllers for NOx reduction; Push-in technology suitable for the field assembly of connectors; A new add-on for Additive Manufacturing
- 47 Screen printing machines for Autonomous Factory operations; New safety switch with a rotating actuator head; The 3-in-1 solution for fast thread machining; Super-resolution microscopy across all scales and applications

Columns

- 03 Editorial
- 04 Content
- 06 Industry Edge
- 48 Highlights: Next Issue
- 48 Company Index



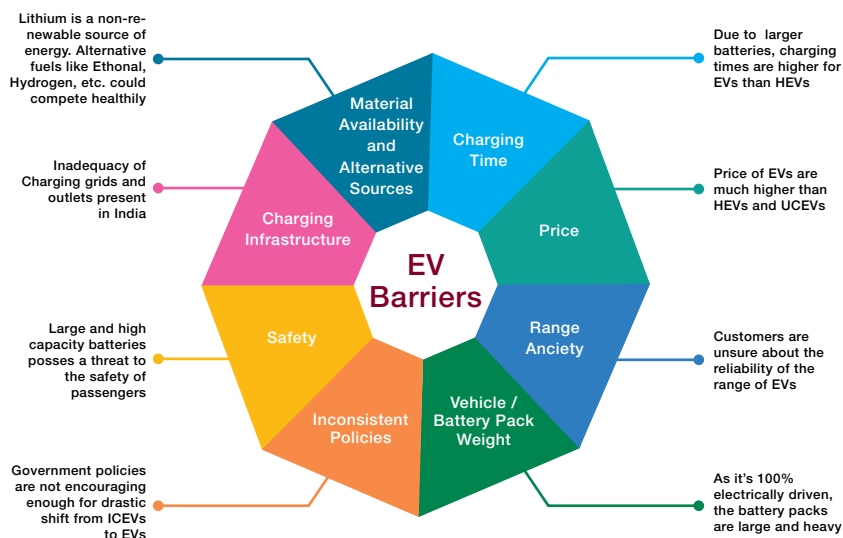
Arun Bhardwaj

Editor, EM and A&D India

Talk

“The complete adoption of EVs is a goal achievable for our country, provided we address the challenges faced on priority”

Challenges for EV adoption in India



While the Indian government has set ambitious targets to use EVs, here are some challenges that we must tackle:

- 1. High upfront cost:** Manufacturing electric cars in India is estimated to be 30% higher than conventional vehicles, primarily due to expensive battery technology.
- 2. Limited charging infrastructure:** As of 2023, India has approximately 5,254 public EV charging stations, with 90% concentrated in major cities like Delhi, Mumbai and Bengaluru.
- 3. Battery range:** Charging an EV using a standard AC charger can take several hours, while fast-charging stations can charge up to 80% of the battery in 30–60 min.
- 4. Limited models:** The lack of variety and choice in EV models in the Indian market disheartens potential buyers who may not find a suitable option within their desired price range.
- 5. Infrastructure investment:** Inadequate power grid infrastructure hinders the deployment of EV charging stations. Public-private partnerships are needed to facilitate the expansion of grid infrastructure in India.
- 6. Battery technology:** India is a significant supplier of battery cell imports from China and South Korea.
- 7. Awareness and education:** In a survey, around 40% of Indian consumers were unaware of EVs. It is essential that the masses are educated and informed, and the country is working towards this gradually.

By addressing these unique challenges and implementing innovative solutions, India can pave the way for a greener and more sustainable way of living.

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“Factors such as climate change impacts drive innovation in clean energy”

...says **Rohit Pandit**, Managing Director and Chairman, Shuzlan Energy. In an interview with **Sanjay Jadhav**, he delves into the conceptualising cutting-edge solutions to catalyse EV adoption by incorporating sustainable charging infrastructure. Excerpts...

What drove the conception of Shuzlan Energy?

Shuzlan Energy's conception was likely influenced by various factors, including the urgency of addressing climate change as stipulated in the Paris Agreement. The agreement underscores the global commitment to limit global warming to well below 2 degrees celsius compared to pre-industrial levels significantly driving innovation in clean energy. Shuzlan Energy might have emerged with a vision to align with the global effort of reducing carbon emissions and fostering sustainable transportation solutions through accessible and efficient Electric Vehicle (EV) charging infrastructure.

Could you expand on the solutions aiding EV adoption in the country, particularly the Charging Station Management software?

We provide cutting-edge solutions to catalyse EV adoption. Our Charging Management software is a testament to our commitment. With our software, we empower operators by enabling real-time monitoring of charging stations, facilitating seamless billing management and allowing remote access for unparalleled control. Integration with diverse payment systems enhances accessibility, making EV charging not just efficient but also user-friendly.

What are the key technological features and solutions that set you apart in the industry?

Our smart charging algorithms play a pivotal role in optimising energy usage and ensuring efficient and sustainable operations. Scalability is a cornerstone of our approach, allowing us to seamlessly accommodate the ever-growing demand for charging stations. We prioritise compatibility with various EV models, providing a versatile charging solution. Our commitment to security is evident through robust measures, safeguarding data and ensuring user trust. Furthermore, we prioritise user experience with intuitive interfaces, making the charging process seamless for both operators and EV owners.

In the long run, what goals is the company working towards in the e-mobility sector?

Embracing sustainable practices by integrating renewable energy sources into the charging infrastructure. The company might focus on incorporating solar or wind power into some or all of its charging stations to reduce its carbon footprint and promote eco-friendly charging. This could involve collaborations with EV manufacturers, energy companies or municipal corporations to expand infrastructure and drive EV adoption through joint initiatives. As a Charge Point Operator, Shuzlan Energy likely aims to be at the forefront of providing a comprehensive, reliable and sustainable charging infrastructure. Our long-term vision is centred around contributing significantly to the growth and adoption of EVs by creating an ecosystem that supports the evolving needs of EV users and aligns with the broader goals of a greener transportation landscape.



“Energy efficiency is at the forefront of every industry”

... says **Anvar Jay Varadaraj**, Executive Director, ELGi Equipments. In an interview with **Neha Basudkar Ghate**, he stresses on the increase in demand for compressors that consume less energy. Excerpts from the interview...

When it comes to the current Indian market, what have been the major market drivers for manufacturing air compressors?

The demand for our products tends to follow the manufacturing trends in the market. With a lot of infrastructure development and expansion, our portable air compressor range is witnessing a lot of demand in the country. Being in the compressed air business offers the advantage of accessing diverse markets and segments, as every industry requires an air compressors. On the other hand, energy efficiency is at the forefront of every industry. Hence, there has been an increase in demand for compressors that consume less energy. ELGi prioritizes fuel efficiency in diesel compressors and less electricity consumption in electric compressors. Our R&D team continuously enhances our product's energy efficiency, thereby reducing energy expenses for our customers.

What strategies is ELGi implementing to cater to the increasing demand in the Indian Air Compressor Market?

We are very bullish about the Indian market. However, being a dominant player with a double-digit market share, the ability to grow further becomes challenging compared to the US or Europe, where we have a smaller market share and could grow faster. In India, we look forward to increasing our presence in industrial segments where we are going deep to understand the opportunities better and then either introduce our products based on the needs or develop new products and offer them to the industry.

How has the integration of IoT technology influenced the growth of compressors in various industries?

IoT doesn't increase demand for our products. The data our devices procure is more important for us as manufacturers to track their running efficiency. We generate a lot of data as we run many machines and assembly lines. We capture data and analyze to predict defects, improve productivity, and quality of the machines. On the product quality side, IoT also provides data on how to improve preventative maintenance. Our goal is to offer a standard package to customers without additional charges.

Could you tell us about the sustainable part of ELGi's product portfolio?

Sustainability is central to our business. Our Environmental E objectives focus on moving towards resource-neutral operations and leading a technology-driven transformation via product stewardship. ELGi's environment-friendly, oil-free, and electric compressors are creating new standards as they deliver industry-leading performance backed by reduced energy consumption and maintenance costs. They also support our customers' efforts to achieve their carbon emission reduction goals. **To accomplish this, we are committed to:** Improving customer experience by manufacturing products that deliver best-in-class efficiency – making existing products 5% more energy efficient by 2030. Additionally Reduce climate impact through lower GWP refrigerant options - attain 80% of product range availability of HFO-based dryers by 2030.



“Walter is actively penetrating multiple industry segments that are relevant for India”



...asserts **Dmitry Andreev**, VP Global Sales, Walter AG, and **Brajesh Kumar**, Managing Director, Walter India. In an interview with Neha Basudkar Ghate, on the occasion of 20 years of Walter Tools in India, they describe the significance of Engineering Kompetenz and custom machining solutions as a core aspect of their market positioning. Excerpts from the interview...

Q Walter AG is known for Engineering Kompetenz and custom machining solutions. Could you provide us with an overview of the key pillars of your current business strategy and how they align with the company's long-term vision?

Dmitry Andreev: The message of Engineering Kompetenz holds immense significance for us, as it truly embodies Walter's motto and reflects our perception of our market positioning. When we talk about the most important pillars of the strategy, we rolled out our last and most valid global strategy back in 2019, which is in motion until 2025. Among the numerous pillars, I'd like to highlight a few that hold immense significance. Notably, Walter stands

Consequently, enhancing and fortifying our offerings in the realm of aluminium machining has become one of our strategic priorities. Walter's substantial influence within the automotive industry is also of great significance. As a part of our current strategy, we are actively penetrating some other industry segments, like aerospace, medical and mould and die, which are all relevant strategies for India. Another important thing is that we keep innovating and bringing new and innovative products every year to cater to the customer's varied needs.

out as over a century old, with strong European roots that connect us to our origins and extend across the global stage. Nevertheless, one of the most important parts of our strategy currently is to strengthen our presence outside of the European continent. Hence, we would like to be even more visible and present, resulting in more customers and bigger market shares in America and Asia. Moreover, this links directly to the importance of the Indian market. Furthermore, as the market is changing we see more and more customers, especially in the automotive sector, switching to aluminium machining, driven by the e-mobility sector. Furthermore, this motivation stems from the universal desire to decrease the weight of the automobile. Therefore, we see many lightweight materials making their way into the field, and although this isn't entirely novel, the momentum is increasing, especially for substances like aluminium.

Q Walter AG has a strong global presence and serves customers in over 80 countries. Could you highlight any recent merger or acquisition activities undertaken by the company to expand its footprint and enhance its product offerings?

Dmitry Andreev: Dmitry Andreev: As previously noted, our focus on aluminium as a crucial material has led us to play a more proactive role in its utilisation. This endeavour is exemplified by our recent acquisition of Frezite Metal Tooling (FMT), a Portuguese company with four decades of expertise in PCD (polycrystalline diamond) tools. This strategic move bolsters our position in the aluminium sector, enabling us to deliver the numerous benefits of these advanced tools to our customers. In essence, through the acquisition, we've gained access to 40 years of invaluable experience and production capacity in PCD, leveraging the engineering competence of our esteemed counterparts at FMT. At the moment, FMT has established its presence on the European and American continents through production units and reconditioning centres. Leveraging the capabilities of Walter, our aim is to introduce this brand to the Asian markets. We have also recently acquired relevant local players in the area of solid carbide tooling in the US Market. It's worth noting, though, that for the broader international impact and implications, especially within India, FMT holds the utmost significance.

Q With over 4,400 employees worldwide, how does Walter AG prioritise workforce management and ensure a motivated and skilled workforce?

Dmitry Andreev: We engage in various activities, and one of these activities defines this company's embodiment of Engineering Kompetenz. This principle originates from individuals, as Kompetenz is not carried by machines; rather, it resides within the minds and passions of people. Consequently, the significance of internal training programs holds immense weight. Regarding our sales training programs, there are two primary areas of focus. Firstly, competency training is paramount. To achieve this, we engage our globally distributed certified trainers, including those based in India. Given our nature as a customer-centric enterprise, we also emphasise sales training. Our unique approach is finely attuned to the demands of the metal-cutting market. Additionally, we constantly measure the pulse of the organisation. Quarterly

surveys encompass our entire global workforce, extending beyond India. These surveys encompass various aspects, such as employees' sense of belonging, comprehension of our strategy, perception of communication effectiveness, satisfaction with managerial feedback and more. We utilise the insights garnered from these surveys to inform our subsequent actions.

Q With the diverse range of precision tools and specialised machining solutions offered by Walter, how do you ensure that your business model remains agile and responsive to customer needs?

Dmitry Andreev: Indeed, the inception of this process lies within the product or solution offering itself. Our discussions have predominantly revolved around holistic solutions rather than individual products. The trajectory ahead involves further developing this range of products in alignment with the discernible requirements of our customers. Firstly, we try to get market inputs from the customers and what they are asking for. Then, we started building our product offering and have been always doing this around the customer needs. This helps us stay agile and react to the changing demands. Being a global company always presents challenges because a universal approach isn't universally applicable. As a result, we are inclined to adopt a global mindset while implementing actions on a local scale. That is why we have a very strong presence of local Walter Sales company here in India. While our inventions may hail from the headquarters, our colleagues in India are always closer to the Indian customers and know what the customers want. Hence, we grant ample autonomy to our sales subsidiaries, allowing them to tailor our local market strategies according to market conditions.

Q Over the years, there has been a significant demand for advanced cutting tools in the Indian market. What, according to you, are the major driving forces for the cutting tools industry?

Brajesh Kumar: As Our Vice President has previously touched upon the concept of Engineering Kompetenz, emphasising that Engineering Kompetenz encompasses more than just tools; it encompasses a harmonious blend of various elements. The Machining industry has seen rapid evolution during the past decade. The industry has a continuously evolving appetite for improvement

which calls for challenging applications, surfaces & materials to be machined. On top of that greater precision is needed to be achieved at an ever-increasing productivity rate with rock-solid process security. We at Walter concentrate on a holistic approach to the entire range of our clients' applications and on what they can achieve using our Specialized Process Optimization Solutions.

Technology leaders like Walter not only provide customers support in redefining the machining strategy & selecting the correct tools from our vast standard offerings but also customise tailor-made special tools which may boost productivity and lower the Cost per Component. Our driving force has been the fact that we are not the end user, but rather the support. We are the solution providers for customers. Our customers' trust in our technological advancements for the machining requirements and services drives us.

We are pioneers in the cutting tool industry, introducing digital tools that operate seamlessly without the need for manual intervention. Every business partner is given access to our warehouses and distribution centres. With the appropriate technology, our enterprises can facilitate the direct placement of orders and material sourcing, while also enabling accurate tracking of material location.

Q How can today's highly productive manufacturing solutions address productivity improvement and cost reduction challenges in the upcoming years?

Brajesh Kumar: The new generation machines are very well-equipped with digital solutions. When we examine a typical scenario, the proliferation of digital solutions becoming more prominent becomes evident. As a part of the metal-cutting industry or the tooling industry, we are not away from that. With our multiple digital offerings, we try to make our end users, customers and partners more competitive and productive.

Get more information on the Walter Apps: <http://www.walter-tools.com/en-gb/press/media-portal/apps/overview/Pages/default.aspx>

Hydrogen ICE

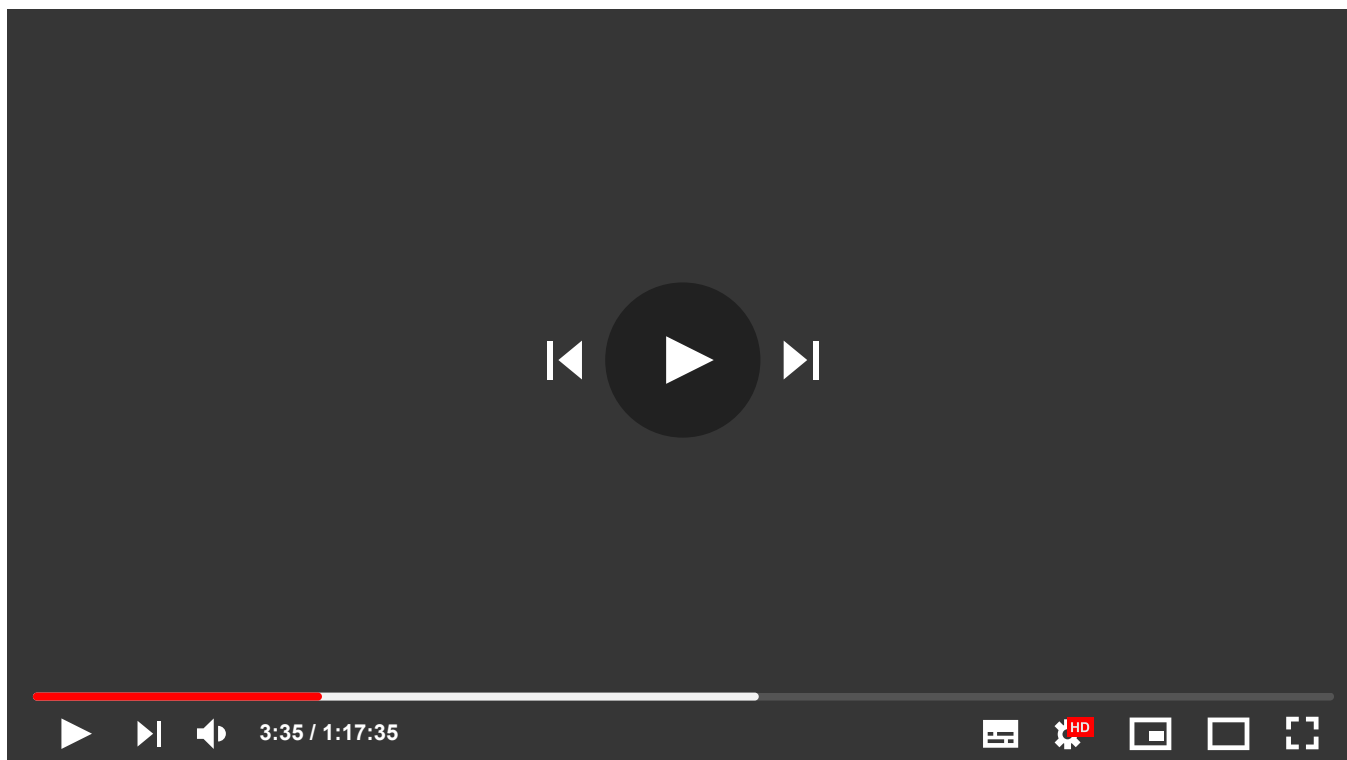
fuels green ambitions in
automotive sector



Navigating a zero-carbon future involves overcoming challenges in infrastructure, technology, and economics. The cover story advocates the Hydrogen Internal Combustion Engine as a pivotal zero-emission solution for Indian Commercial Vehicles (CV), fostering a greener tomorrow.



Nitin Jirafe,
Engine Business Leader,
Cummins India



Over the past decade, the Indian automotive industry has undergone a remarkable evolution, shaped by dynamic economic, technological and regulatory forces. The period witnessed a shift from traditional internal combustion engines to a burgeoning interest in electric and low carbon fuel technologies, driven by environmental concerns and advancements in technology.

Furthermore, the regulatory push on stringent vehicle emission norms from the Government of India not only compelled manufacturers to adopt cleaner technologies but also spurred innovations in fuel efficiency and emission control. In a nutshell, the evolution of the Indian automotive industry in the last decade has been characterised by a transition towards cleaner and smarter mobility solutions, reflecting a global trend towards sustainability and technological innovation.

Climate change is the existential crisis of our times

Climate change has emerged as a pivotal force driving the implementation of stringent emission norms worldwide. The alarming rise in greenhouse gas emissions, primarily from the combustion of fossil fuels, has intensified the need for proactive measures. Governments globally recognise the automotive sector's significant contribution to emissions, prompting the establishment of stringent regulations to curb pollutants like NOx, PM, and others. Emission norms,

such as Euro standards and Bharat Stage standards, have been pivotal tools in managing these pollutants so far.

However, over the last few years with the focus on climate change and GHG emissions, governments and Industry participants are now focusing on decarbonisation. Governments and Industry are now working towards cleaner technologies and fostering the development and adoption of low carbon and zero emission vehicle technologies, thus steering the automotive industry toward a more sustainable future.

CV industry's contribution to climate change

Needless to say, climate change has had profound effects on India, which is ranked among the top ten countries in the world most affected by climate change. The four major sectors that are the major contributors to the carbon footprint of the country and need to heavily focus on decarbonization are energy (electricity), mobility and transportation, steel, cement and infrastructure industry.

Transport sector is backbone for growth of any economy and with the same accounting for nearly 14% of total Greenhouse gas emissions it provides an opportunity to the road transport sector in participating and contributing towards the decarbonisation journey.

The need for decarbonisation and the pursuit of alternate fuels and technologies

The automotive industry has been working for decades to reduce the harmful pollutants including carbon footprint. There have been significant technological advancements in base Internal combustion engines as well as after-treatment technologies. The Oxides of Nitrogen (NOx) and Particulate Matter (PM) emissions have gone down by a staggering 90% for current BS6 vehicles launched in year 2020 as compared to BS3 vehicles allowed to sell till year 2017.

Apart from conventional fuels, many alternate fuels are either already being used or planned for future (like CNG, LNG, Ethanol Flex Fuel, Biofuels, Hydrogen etc.) apart from zero emission technologies of BEV and FCEV using electricity from grid and hydrogen.

For these zero emission technologies, it's important to ensure zero carbon emissions for entire well to wheel. This means that government needs to focus on decarbonisation of the electricity grid with renewable energy for supplying electricity to BEVs and encourage production of green hydrogen.



There is no single silver bullet

Cummins believes that transitioning to a zero-carbon future is not a light-switch event, given the challenges on infrastructure, technology maturity and unit economics. With over a century of experience as a global power leader and a six-decade presence in India, we understand, better than anyone else that to address the varied duty cycles, applications, and operating environments, there will not be single solution to reach zero emissions. Therefore, progressing and integrating various technologies today will

contribute towards a greener future tomorrow.

Destination Zero™ is Cummins' strategy to go further and faster to reduce its products' Greenhouse Gas (GHG) and air quality impacts and reach net-zero emissions by 2050. The group is pursuing a dual-path approach – acting today to reduce emissions from internal combustion engines while simultaneously investing in new, zero-emissions products. This strategy is part of the framework of Cummins' broader PLANET 2050 environmental sustainability strategy, which also includes a focus on improving the communities the company operates in and using natural resources in the most responsible way.

Multiple paths to decarbonisation

We understand that when it comes to lowering GHG, it's not a matter of which technology is better — but rather which technology is more suitable to a specific set of application and needs. We have to consider range, weight, downtime, performance requirements, customer economics, and related infrastructure to provide the best options for the market. Therefore, we as Cummins are working to develop and improve multiple technologies for myriad applications.

Our multiple paths to decarbonization include:

- Switch to the latest generation Diesel technology- Advanced Diesel (Diesel / Bio-Diesel)
- Immediate shift to Low – Carbon Technology - Natural Gas Internal Combustion Engine (CNG / LNG / Bio-CNG)
- Move to Zero carbon fuel (Innovation in Internal Combustion Engine (ICE) technology - Hydrogen Internal Combustion Engine
- Leap forward to Zero Emission Vehicles – Fuel Cell and Battery Electric and Electrifyer

Achieving zero carbon emission with Hydrogen Internal Combustion Engine

In road transportation sector, while Battery Electric Vehicles (BEVs) and hydrogen fuel cell vehicles are known to be zero emission technology vehicles, there is an emergence of Hydrogen Internal Combustion Engines (H2 ICE) as a viable, near zero carbon emission technology solution for commercial vehicles in India. At scale, it can help the sector rapidly decarbonise. In fact, vehicles powered by green hydrogen, which is hydrogen produced by using renewable energy have near zero well-to-wheel greenhouse gas emissions.

Battery Electric Vehicle (BEV) is increasingly finding its acceptance in the passenger cars, two / three wheelers, Small commercial vehicles, and City Bus applications in India. However, they are yet to be proven commercially viable for the Medium and Heavy-duty truck/tipper applications, due to reasons like penalty on payload, charging time required, total cost of ownership etc.

Bridging technology for India's commercial vehicle sector

Fuel cell (FCEV) uses hydrogen to produce onboard electricity to power the vehicles. Fuel cell powered bus deployment has started in India, though in limited numbers. While electrification (BEVs) and fuel cell (FCEV) technologies continue to mature and become affordable, Hydrogen internal combustion engine, built on the fuel agnostic platform is the promising bridging technology for India's commercial vehicle sector.

The fuel-agnostic architecture utilises a common base engine with cylinder heads and fuel systems specifically tailored to fuel ranging from diesel, natural gas, renewable natural gas, and hydrogen. The platform offers OEMs common engine architecture across multiple fuel types resulting to a high degree of parts commonality.

The key advantages of H2 ICE are as follows:

- Existing engine hardware can be modified to adapt H2 fuel / combustion system
- Existing vehicle drive lines can be used
- Availability of eco system (existing manufacturing set-up, vendor base, dealer & service network)
- Diesel like performance across power, torque and thermal efficiency
- Cost efficient and Total cost of ownership (TCO) comparable to existing Diesel / CNG variants
- Can use low purity hydrogen
- Quick refilling time compared to Battery charging for BEV's

Towards a better today and a greener tomorrow

If majority of our trucks switch to H2 ICE, it will automatically spur the establishment of a hydrogen infrastructure ecosystem. The infrastructure would include fuel transportation network, fueling stations, and repair shops – very similar to the support system that exists for diesel truck today. To a large extent, development of H2 ICE will also support the development of Fuel cell (and vice versa) as both technologies have many things in common. □

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**to be held at
BIEC from
January 19 – 23**

The upcoming IMTEX Forming edition is set to showcase four dynamic exhibitions: Weldexpo, Moldex India, Tooltech, and Fastnex India. This event presents a prime opportunity for manufacturing industries to leverage the thriving business landscape in the nation.



The Indian Machine Tool Manufacturers' Association (IMTMA) will organise the eighth edition of its flagship metal forming machine tool exhibition, IMTEX FORMING 2024 at the Bangalore International Exhibition Centre (BIEC) in Bengaluru from January 19 - 23, 2024.

Tooltech 2024 focusing on machine tool accessories, forming tools, die and mold, metrology, CAD/CAM, Digital Manufacturing featuring the latest innovations in additive manufacturing and Industry 4.0., and Weldexpo, an exhibition for welding, cutting, and joining in association with the Indian Institute of Welding will be held concurrently.

Moldex India and Fastenex India, organised by Messe Stuttgart, focusing on moulding, fasteners, and fixing technologies respectively, will be co-located alongside the exhibition.

This trade fair would feature around 500 exhibitors from 18 countries in an exhibition space of around 45,000 sq. mts. covering five exhibition halls.

Some exhibitors include Fronius India, TRUMPF, Arm Welders, Beckhoff Automation, Ecoclean Machines, S&T Engineers, Statfield Equipments and TURCK India Automation.

Exhibitors will present cutting-edge advancements in metal forming, including innovations in technology related to robotics, automation, welding, wire-forming, drawing, presses, die casting, hydroforming, sheet metal machinery, specialized application presses, die and mold technology, hydraulic and pneumatic systems, testing machines, and more, all showcased at the event.

Expressing his thoughts on the upcoming edition of IMTEX FORMING, Rajendra S. Rajamane, President, IMTMA, said, "IMTEX FORMING 2024 offers great opportunities for manufacturing industries to capitalize on the positive business environment in the country".

Rajamane added, "As most visitors to IMTEX FORMING would comprise key decision makers nurturing an intention to invest, exhibitors can have effective face-to-face business meetings".

Speaking about IMTEX FORMING 2024, Jibak Dasgupta, Director General & CEO, IMTMA, said, "The economic outlook for companies in the metal forming sector looks promising and IMTEX FORMING will play a catalytic role in realizing this promise. This edition of IMTEX FORMING is very comprehensive in terms of offerings of technologies with the inclusion of Weldexpo, Moldex India, and Fastnexus India. It will be a great opportunity for industries across sectors to visit the exhibition and explore the various products, and solutions visitors that are part of day-to-day manufacturing needs".

The last edition of IMTEX FORMING was held in June 2022 which witnessed a good response from the manufacturing community from across the globe.



TOOLTECH

- Beginning from the late 1990s, Tooltech has become synonymous with IMTEX showcasing innovations in machine tool accessories, metrology and CAD / CAM cutting tools and trends from the tooling industry.

DIGITAL MANUFACTURING

- Showcase your wide range of technologies in 3D printing and Industry 4.0 concepts besides robots, cobots and software at the Digital Manufacturing Pavilion and maximize the value of your products and processes by providing end-to-end visibility and control of production processes.

WELDEXPO

- Welding finds acceptance among a wide range of manufacturing applications: pressure vessels, aircraft, ships, medical devices and high-volume products like automotive parts, appliances, food packaging and microelectronics.
- Weldexpo will facilitate in exchange of new technologies, IIW and IMTMA can supplement the growth of each other through Weldexpo.

The exhibition featured 350 exhibitors from 19 countries and attracted a footfall of 25,656 visitors from 45 countries which included trade delegations and institutional buyers.

Visitors connected with Additive Manufacturing and Industry 4.0 in the concurrent Digital Manufacturing show as well as the indigenous technologies displayed in the AatmaNirbhar pavillion.

Trade delegates from 250 companies across India from sectors like aerospace, defence, railways, power, electronics, medical equipment, textiles, agriculture, turbines etc visited the show. Business orders worth around ₹ 500 crores and enquiries around ₹ 4600 crores were generated, as reported on the last day of the show. □

Efficient special tools for timely metalworking

Choosing the right cutting tool poses challenges—deciding between standard and special tools. The article highlights superior performance in cutting diverse engineering materials. In metalworking, standard tools are fundamental for inventory management..



Fig. 1 - A wide variety of exchangeable heads, shanks, adapters, extensions, and reducers feature MULTI-MASTER as a versatile modular system.

When deciding on the appropriate cutting tool for a particular application, it is difficult to determine whether a standard tool or a special tool is preferable. The ideal tool selection is contingent on various factors, such as the nature of the business situation, the manufacturing program, the production type, and sometimes personal preferences. Standard cutting tools, produced by a specific tool manufacturer, offer high versatility and are appropriate for machining a diverse range of parts that come in different shapes.

Furthermore, the tool exhibits excellent performance capabilities when cutting various engineering materials. To ensure seamless production processes, it is crucial to have the cutting tools delivered in a timely manner. This is why standard tools are the foundation of tool stock management on metalworking production floors.

Special Tool Limitations

A special cutting tool is designed for specific operations on a particular part, made of a specific material, and used on a machine that requires a specific work holding fixture. This custom-engineered tooling solution aims to provide the best possible performance and outcome. However, there is a downside to this solution as it limits the tool's versatility, making it less adaptable to different applications. As a result, special tools are primarily used for high-volume mass production, especially in the automotive industry.

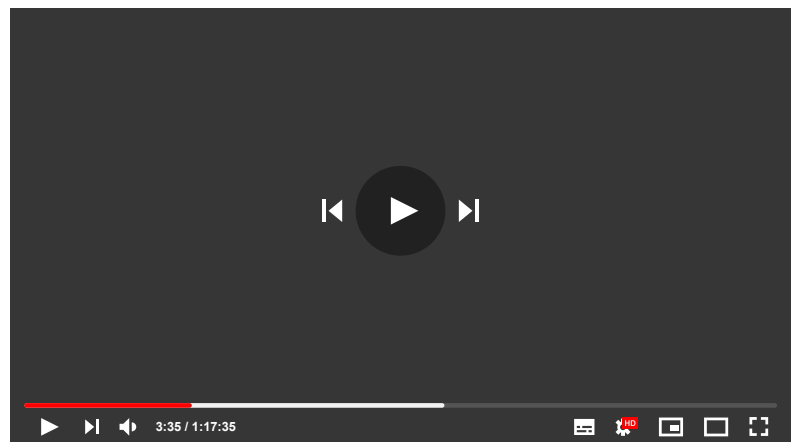
A special tool is not readily available and requires significant engineering effort, including concept design, coordination with the customer, detailed design, and production. The delivery time for special tools is significantly longer than that of standard tools. Metalworking shops often face a dilemma when choosing between standard or special tools, which can impact project timelines. The question remains: which tool will provide the best solution? Should shops rely on readily available standard tools or opt for a highly efficient special tool with a longer delivery time? Naturally, economic factors such as cost per unit and tool costs should be taken into consideration. All things being equal, in an ideal situation where production programs, processes, and inventory are planned, the answer is clear. Therefore, the maximum short lead time is an important factor when choosing a special tool.

Special tools vary in their design complexity. Some are simple modifications of standard tools, such as changes to the corner radius or tool length. These modifications fall under the category of 'semistandard' products, which can be manufactured relatively quickly. The design complexity of a special tool is determined by a pre-design study that assesses the customer's manufacturing limitations, accompanied by cost calculations and production time. The results of the study determine the limits and cost-effectiveness that correlate to the special tool's delivery time. However, there are additional ways to reduce the delivery time of special tools, such as using solid

tools with exchangeable heads, bodies of indexable cutters, or replaceable inserts. The tool manufacturer's delivery times and production abilities play a significant role in the final decision on how to proceed.

Custom-Engineered Special Tools

One alternative to engineered special tools is modular tooling, such as ISCAR's MULTI-MASTER (shown in Fig.1), which features rotating tools with exchangeable solid carbide heads. This tooling system includes a wide range of tool bodies (referred to as 'shanks' in the family nomenclature), adapters, extensions, and reducers that enable the configuration of the required tool for diverse machining operations.



Additive Manufacturing (AM) presents new opportunities for special tool solutions. This technology allows for the quick production of tools with complex profile designs. Although finish cutting and grinding operations are still necessary, the fast manufacturing of pre-shaped products that are very close to a final shape is fascinating (as shown in Fig. 2). Additionally, 3D printing can be used to fabricate carbide inserts without the need for a die-set, which significantly reduces production time and costs. This process is an excellent way to create insert prototypes during the development stages and produce low-batch special inserts. AM of carbide inserts and heads is gaining momentum and is highly capable of ensuring fast delivery of customized tools and their components.

Metalworking shops can quickly manufacture and customize a special tool if an appropriate off-the-shelf product is not available. However, they may not have the means to complete the full cycle of toolmaking. In such cases, tool manufacturers can provide semi-standard tools as standard items, which can be adapted by the customer to their final shape. These semi-finished products can include blank bodies, blank inserts, and blank heads. Some cutting tool manufacturers, such as ISCAR, offer this option and include blanks in their standard product range. □

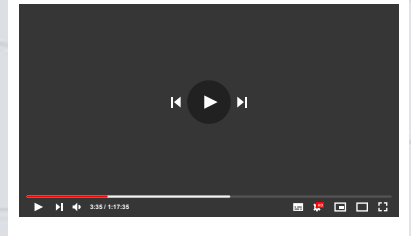
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