CHRONICLING PROCESS INDUSTRY INNOVATIONS SINCE 1966

VOL.56 | ISSUE 3 | MARCH 2021

CHEMICAL ENGINEERING WORLD

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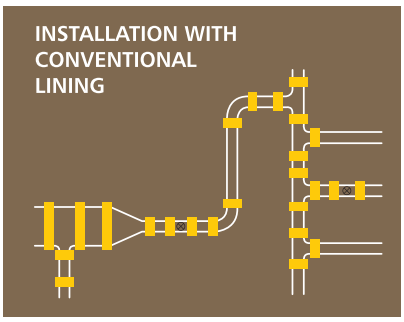

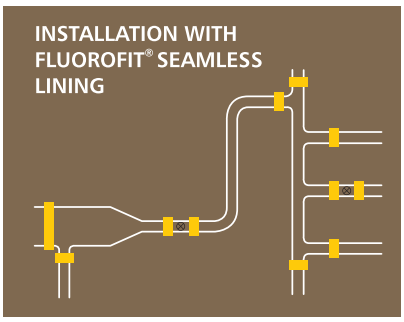

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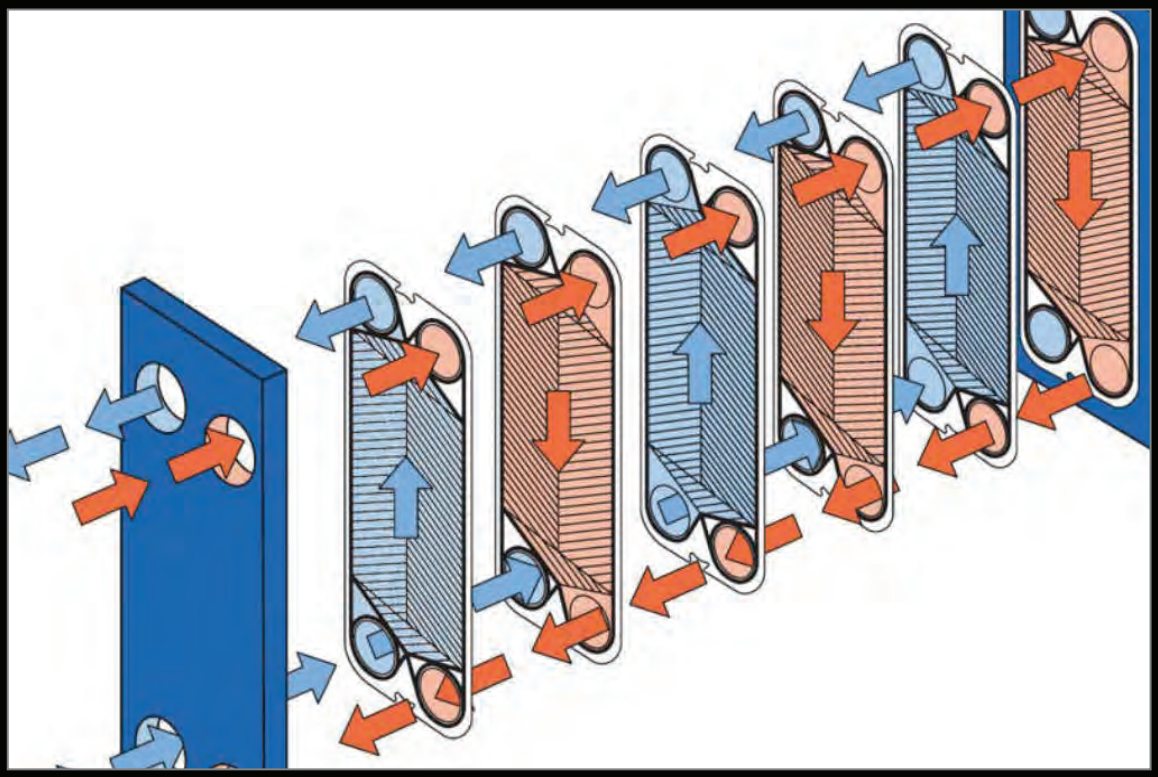

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FORM IV

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I Hemant K Shetty, hereby declare that the particulars given above are true to the best of my knowledge and belief.

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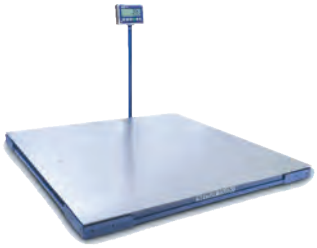

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Rs 8 lakh crore investment are in the pipeline in Indian chemical industry by 2025

D.V. Sadananda Gowda, Union Minister, MoC&F, Government of India

New Delhi, India: Union Minister of Chemicals & Fertilizers D.V. Sadananda Gowda stated that the Indian chemicals and petrochemicals industry is growing to new heights, and informed that an investment of Rs 8 lakh crore is anticipated in the sector by 2025. He added that the growth in the chemical and petrochemicals industry is also contributing to the Prime Minister's vision of Atmanirbhar Bharat. He informed that Government has launched 12 PLI scheme for different sectors which will directly or indirectly benefit the chemicals sector. He also stated that the Government is prioritising the sector and in the Budget 2021-21, the import duty on Naphtha has been reduced from 4.0% to 2.5%.
Yogendra Tripathi, Secretary, Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, said that India is emerging as one of the fastest-growing economies in the world. He highlighted the various factors such as development of industrial corridors, commitments in National Infrastructure Pipeline, competitive wages rates give India a competitive advantage.

Capt. Dibya Sankar Mishra, Minister of Industries, MSME, Energy & Home (MoS), Govt of Odisha, emphasized that Orissa is emerging as an investment destination and it has the ecosystem where the investor will be benefitted if the investments are made in Odisha. To facilitate the companies to setup and do business in the state, Odisha has undertaken several initiatives in terms of implementation of EoDB Framework."
Mekapati Goutam Reddy, Minister for Industries, Investment, Infrastructure, Commerce & IT, Govt of Andhra Pradesh said that Andhra Pradesh is the preferred destination for chemicals and petrochemicals industries. He also appreciated the Government of India for taking effective steps to promote the petrochemical industry during recently organised India Chem

Initiatives in oil and gas sector are catalysing socio-economic change

New Delhi, India: Union Minister of Petroleum and Natural Gas & Steel Dharmendra Pradhan said that Energy is the catalyst of socio-economic change. Speaking at the symposium on fuels and lubricants, he said that investment of billions of dollars in the Oil and gas sector will bring in more job opportunities, leading to trickledown effect to drive Socio-economic growth. The sector will play an important role in double digit growth trajectory of the Indian economy, he added.
The Union Minister said that India is the third largest consumer of fuel in the world

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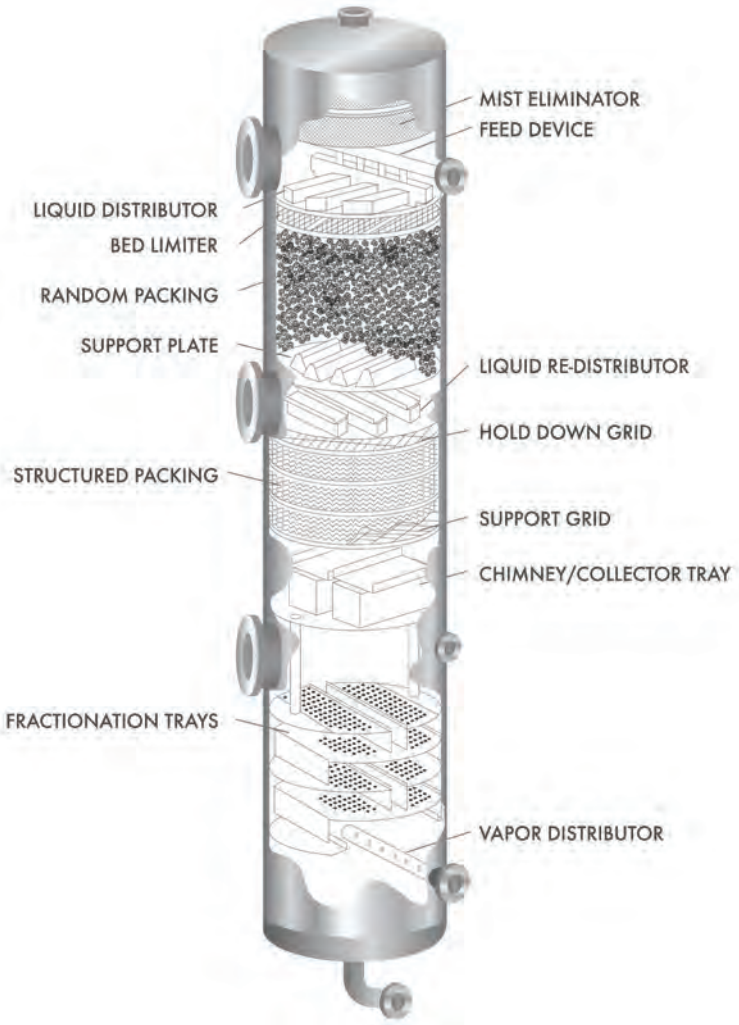
Union Minister at the inaugural of International Symposium on Fuels and Lubricants in New Delhi

but will soon reach the top as the per capita consumption in the country is on the rise. He said that the energy requirement for the future will be met through cleaner, greener and sustainable sources, and for this, continuous R&D efforts are called for. Talking about the policy reforms in this direction, he mentioned about the PMUY, Ethanol blending, Compressed Bio Gas, bio-diesel, Coal to Syn- gas, and promoting LNG as a priority transport fuel. On policy side, concrete investment plan, clarity about future targets and robust implementation strategy are bringing in a new paradigm. He said that our industry is ready to meet not only availability of energy but also quality energy.

Dharmendra Pradhan said that we are embracing new heights in the energy vertical of the economic development. "The world is talking about sustainability. We have laid down sustainable pathways in our strategy to make energy cleaner, greener, more sustainable. Shri Pradhan also released a logo on the occasion of golden jubilee of IndianOil's R&D centre and a souvenir to mark the occasion.

Secretary, Petroleum and Natural Gas Tarun Kapoor said on the occasion that IndianOil R&D is doing commendable job, and has launched several products commercially. He however called for enhancing the R&D and innovation efforts so that net emission from the fossil fuels are reduced. He also stressed on increasing the fuel efficiency which will lead to reduced consumption and import dependence. Chairman, IndianOil Shrikant Madhav Vaidya and Director, R&D IndianOil Dr SSV Ramakumar also spoke during the inauguration of International Symposium on Fuels and Lubricants on the theme of the symposium is "Emerging trends in Fuels and Lubricants – BS VI & Beyond".

Nurturing your plants…



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The Future in Industrial AI and the Self-Optimizing Plant

The consistent formula behind AspenTech's success over the past 39 years is applying innovative digital technology to addressing industry's challenges and value levers, with strong domain expertise and software engineering knowledge.

AspenTech has pioneered an approach to AI and machine learning we call Industrial AI. The approach combines the chemistry and physics based digital models which make current oil and chemical assets operate safely and optimally, which are known as first-principle models, with AI machine learning, and industry domain expertise. By combining these three elements, practical solutions can be created that break new ground in ability to model hard problems, in predictive insight into what will happen next, and in intuitive usability to make these advanced solutions accessible to everyday industry workers.

Innovations such as powerful process simulation, powerful multivariate process control and powerful production planning, are the indispensable systems we have delivered to industry over the past 39 years, and which 2300 companies worldwide use to create value. The R&D power behind these models has always involved strong collaboration between AspenTech, customer domain experts, and academia innovators. More than 2000 man-years of chemical engineering

Ron Beck, Marketing Strategy Director
Aspen Technology

The Self-Optimizing Plant is AspenTech's strategy for taking customers on a journey to the future intelligent plant, asset, and networks of plants.

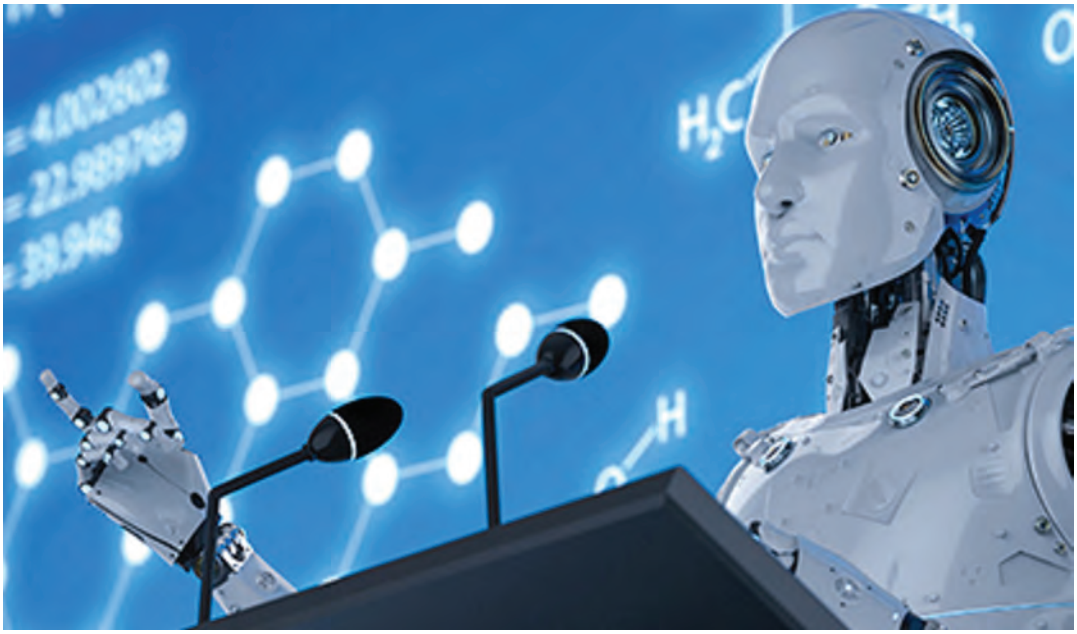
and domain expertise constitute the differentiated value of these systems.

Process simulation models, introduced by AspenTech beginning in 1981, created the foundation for the rapid growth and innovation in chemicals and oil and gas over 30 years. The ability to introduce new products and processes quickly. And to scale production to meet the demands of the rapidly growing southeast Asian middle class and economy. To support safety and energy conservation in increasingly complex operations. And they are today indispensable as digital twins running in assets globally.

The future is with Industrial AI

Now to help industry make the next leap, we have added some of the best AI and data science minds to our teams. The combination of chemical engineering and data science knowledge is creating exciting practical, Industrial AI results.

Over the past five years, we have introduced exciting Industrial AI technology.



Our vision for the Self-Optimizing Plant is a plant that is **self-learning**, self-adapting and self-sustaining and operates in an intelligent enterprise.

- **Aspen Mtell**

  Aspen Mtell improves asset uptime by predicting equipment degradation up to 60 days in advance.

- **Aspen Hybrid Models**

  Aspen Hybrid Models was introduced last year which combines our award-winning Aspen HYSYS modeling system with machine learning. Beyond simulation modeling, we are beginning to deploy these hybrid models into refinery and chemical planning. Similarly, we have just introduced new embedded AI solutions inside our Aspen PIMS-AO planning modeling system and our Aspen DMC3 advanced process control system.

  We continue to develop these areas, and also see a massive potential to apply these new innovations and more to sustainable oil and gas, chemical, mining and pharma industrial companies.

A journey with the Self-Optimizing Plant

- Self-Optimizing Plant

The Self-Optimizing Plant is AspenTech's strategy for taking customers on a journey to the future intelligent plant, asset, and networks of plants. Our vision for the Self-Optimizing Plant is a plant that is self-learning, self-adapting and self-sustaining and operates in an intelligent enterprise.

- Self-learning

By self-learning, we mean that the plant, as it operates, learns from the impact of each action it takes, learns from the data streams reporting on the process and equipment and learns from the digital twins providing operating insights. Therefore, it improves its ability to reach its potential and even

set the potential higher based on its learnings.

- **Self-adapting**

  By self-adapting, we mean that the plant will continually adjust to changes in the condition of the asset itself, as well as to external factors, to change the objectives of the operation continually.

- **Self-sustaining**

  By self-sustaining, we mean that the plant will intelligently monitor the health of its equipment, processes, and systems, based on data streams and insights from those data streams. It will then take corrective actions to ensure the integrity of the asset, and the health of the equipment, to avoid or minimize degradation and to avoid missing customer targets.

Sustainability in full view

Our target is to reach a capability for the asset to be self-sustaining. Some aspects of operations may become autonomous in the relatively short term. But broader autonomy is a longer-term goal. That choice of words is a conscious strategy decision on AspenTech's part. Typically, oil and chemical assets are too complex to be able to run completely autonomously, at least within the next five to ten years. Instead, we are driving toward enabling a self-sustaining plant with the help of a digitally empowered work force.

With respect to sustainability and environmental impacts, these capabilities will be absolutely crucial to navigate the complicated technical, operational, and business trade-offs required to make energy and chemical assets move towards zero carbon, reduced water usage and a reduced-waste circular economy.

Most companies in the chemical and energy fields are beginning to set ambitious sustainability targets, to ensure that they contribute to future sustainability and maintain access to capital. Achieving progress in areas such as carbon neutrality, a circular plastics economy and water conservation, are complex challenges. It is a complex optimization challenge that requires looking at a company's assets, its value chain, and its optionality. The self-optimizing plant will be critical to achieving these goals.

Industrial AI, data science, and analytics are very dynamic areas from a technology and solution viewpoint. As an organization in the energy, chemicals, mining and engineering areas, it is crucial that you select partners with the capability and strategy to "future-proof" the solutions you adopt. Namely, it is important to work with a technology supplier who has a clear strategy and vision, a technology architecture that can adapt rapidly to changes in the availability of the technology building blocks, but most importantly industry domain expertise. ■

Sealmatic India : At the Forefront of Mechanical Seal Industry in Global Arena

Umar AK Balwa
Managing Director, Sealmatic India

How do you see the current Mechanical seal market evolving in India? What are the major factors driving its growth?

Over the last five decades, mechanical seal market has been dominated by international players. The technology for mechanical seal employs high precision designing and production, which was not available in the pre liberalization period. Capabilities of Indian industry have improved dramatically and paved way for induction of state-of-the-art technology in all the industrial fields viz. oil & gas, refinery, power, petrochemical, chemical, pharmaceutical, fertilizers, pulp & paper, shipping, aerospace etc. which has created huge demand for high precision mechanical seals in India.

Mechanical seals are designed to prevent leakage of exotic and hazardous media into the environment. With stricter regulatory norms, it is now mandatory for

the industrial plants to use mechanical seals for rotary equipment which will continue to create market for the state of art mechanical seals. Further, the GDP growth of India will continue to be one of the key drivers for growth of mechanical seals industry. Way back in the early 1980s, the size of the mechanical seal market was merely Rs 15 crores and today the same has grown exponentially at Rs 1500 crores.

What are the major expectations of clients from the suppliers of mechanical seals and how do you meet their expectations?

Reliability, application know how and quick after sales & service in my view are major expectations of customers. Technically speaking, this mechanical seal industry is highly competitive. Know how to design is of paramount importance for the mechanical seal manufacturers as the clients demand proven track record for customer applications. Moreover there is no standard formula to manufacture these seals as these have to be customized for each individual application. In fact we are the only Indian company in this space to have made significant amount of investments in R&D, Designing, Quality control & Production with a team of 26 engineers specialized to design customized solutions for our customers globally. Sealmatic India Pvt. Ltd. is the only Indian company which has the distinction of API Q1, ATEX & EU FDA certification for mechanical seals. Besides this, we are the only Indian manufacturer which employs ANSYS for hardcore design and development of mechanical seals. From our experience in this field of over 32 years, our customers get the benefit in terms of enormous data that we bring to the table in terms of application know how, trouble shooting and failure analysis, the key to success in this highly competitive business.

How is your Sealmatic India Pvt. Ltd. positioned in this segment?

We enjoy excellent position in this market both in terms of global and domestic exposure. Our range of mechanical seals are exported to over 45 countries and we are well accepted when compared to the big boys of the industry. Domestically, we are second to none in our offerings, we provide a comprehensive package to our customers in India right from the selection of mechanical seals to the installation and training of the personnel at the end user premises. We are the preferred vendor for various projects in India in the core industrial sectors, due to our knowledge and application-based solutions that we provide for critical equipment.

What are the major factors that set you apart from other players in this segment?

Mechanical seal industry is highly competitive, it requires huge amount of time, money and energy to reach a certain level. When we started out in 2011 after ending our joint venture of 20 years with

Feodor Burgamnn of Germany in 2007, we consciously made efforts to set up our plant to match international standards and specifications not only in terms of employing hardware and software, but also implementing very high international standards and a highly trained team. We are proud to state that we have more than 100 visits from international customers to our premises and all of them have said simply one thing – "state of the art international facility".

Also if we compare ourselves with other domestic players, though we would not like to do so, but to answer the question in all earnest, we have marched miles ahead of the domestic competition, we have got all the certifications in place which no other domestic manufacturer has which I have already shared. We have invested in state of the art test rigs that meets API 682 standards and investment in these test rigs is huge, sometimes surpassing the cost of a small mechanical seal company. We have built capabilities of ANSYS, which nobody does in India in our field, have tools such as MSD (Mechanical Seal Dictionary), SSG (Seal Selection Guide), AKH (Application Know How) and many more which have catapulted Sealmatic in the bigger league of the International players. We are perceived and respected globally as a high-quality mechanical seal company.

How has the company been proving itself with its heavy-duty mechanical seal with innovative and tailor-made sealing solutions? Tell us with respect to your various product offerings.

As mentioned earlier, the business of mechanical seals entails application know how, which comes through various years one serves in this technically competitive industry. We have devoted over 32 years in this high-octane business, which requires out of the box thinking in providing solutions for very difficult and complex sealing applications. Our specialty lies in designing and providing heavy duty mechanical seals for pumps, compressors, agitators and other rotary equipments. Applications where the pressure rating exceed 100 kg/cm2, temperatures in excess of 350 degree Celsius, high level slurry content, media with high viscosity and so on. Over the years we have designed and developed niche products to meet such demanding applications, which are not only difficult to design and produce, but equally challenging to install a suitable mechanical seal in the rotary equipment with such applications. This has been achieved from the rich data bank that we have assimilated in the last 32 years, which allows us to match such demanding applications to the work that we have done in the past, plus we employ best of the raw materials, which are imported from Germany, USA and the UK, we do not compromise on the metallurgy. Our heavy duty mechanical seals find applications in oil & gas, offshore platforms, pipe line booster pumps, slurry pumps, high

pressure agitators in chemical plants, high temperature rotary equipments in a refinery and many more such varied applications.

Tell us about the journey over the last 3 decades.

Our journey in this business started in 1989, started as a small enterprise with 200 sq mt of premises and a handful of 8 employees. Today we are housed in one of the most modern manufacturing facilities in India and can be ranked as a global player. In the course of our journey, we experienced ample share of disasters, failures and disappointments. Back in 1989, we were proud to introduce ourselves as an indigenous company that could solve any mechanical seal related problem, and the customers obliged us by bringing all their problems to us. Most of them were chronic cases which could not be solved by the competitors. In the process we burned our fingers and of course a lot of money went down the drain. Consequently, we learnt the lesson and finally got our act together. In due course, we became one of the most successful mechanical seal companies in India.

Over the years Sealmatic has become synonymous to mechanical seals with deliveries to more than 45 countries. The modern plant of Sealmatic has grown exponentially since the 220 square meters it was at its nascent stage. Above all, every colleague is proud to be a part of this journey and the company. Anything more we add here about a company such as Sealmatic, which is growing every day will be premature. Sealmatic is the sum total of the efforts of all the people associated with it and a vision that the Sealmatic team shares. It's proven to us that a dream that is pursued with dedication earns the right to be called a vision.

What is the future roadmap for Sealmatic India? How is the company gearing up for the same?

The future of Sealmatic and the Indian industry at large is bright and it is our rightful place to be in the forefront of the mechanical seal industry in the global arena. We already have deliveries to more than 45 countries, we want to be physically present with our sales and service centres in every continent. We want to be the preferred choice when it comes to mechanical seals with various customers and we want to make India proud with our little contribution in the process of making India truly a global power house. We are continuously investing into highly trained manpower, best of the software and hardware and are imbibing latest technology available to improve our designs and processes, in short, we are investing in the future. ■

For more details:
Website: https://sealmaticindia.com/
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Union Petroleum Minister bats for IndianOil's Haldia Refinery expansion; writes to fellow Union ministers

New Delhi, India: Minister of Petroleum and Natural Gas and Steel Dharmendra Pradhan has written to Union Minister of Chemicals and Fertilizers D V Sadanand Gowda and Union Minister of State for Ports, Shipping & Waterways (I/c) & Chemicals & Fertilizers Mansukh Mandaviya seeking their personal intervention in leasing out 175 acres of land for undertaking expansion work for IndianOil's Haldia refinery. In his letter, Dharmendra Pradhan stressed the continued endeavour to be self-reliant in petroleum products and wrote that infrastructure development in the oil and gas sector is driven to expand its facilities to meet the domestic demands of quality and quantity of fuels and specialties. He wrote about the Haldia Refinery's increased crude processing capacity from 2.5MMTPA initially to 8MMTPA and the capacity to produce the best quality of fuels, lubricants and specialty products.

He further wrote that in recent times when the refinery was required to construct new units for the Bharat Stage VI standards, this could only be partially accomplished by dismantling existing storage tanks, and for construction of some critical units, additional land is required. Adjacent 175 acres of land in possession of Hindustan Fertilizers Corporation Limited on lease from Kolkata Port Trust / Syama Prasad Mookerjee Port Trust. IndianOil has been in constant touch with SMP-HDC authorities and HFCL to acquire this land parcel. He solicited the support of both Ministers to enable IndianOil to establish its critical units of the refinery for the benefit of people and boost the Purvodaya vision.

Dr. Ganesh Natarajan to Chair Honeywell Automation India Ltd.

Dr. Ganesh Natarajan, Independent Director (Non-Executive) & Chairman, Board of Directors, Honeywell Automation India Limited

Pune, India: Honeywell Automation India Limited announced Dr. Ganesh Natarajan's appointment as Independent Director (Non-Executive) and Chairman of its Board of Directors, effective March 8, 2021. As Chairman of Board of Directors, Dr. Natarajan will offer guidance to HAIL's management team on the company's overall strategy, business, and financial matters. He will

provide direction and Board support for strong corporate governance. Dr. Natarajan succeeds Suresh Senapaty, who completed his term of five years this year.

Commenting on his appointment, Dr. Ganesh Natarajan said, "I have always been keenly interested in the role of digital technologies in re-engineering processes for the corporate and social sectors. I am excited to be part of Honeywell, a software-industrial leader that has been driving India's move towards Industry 4.0."

L&T's Skill Trainers Academy inaugurated by Union Minister of Skill Development & Entrepreneurship

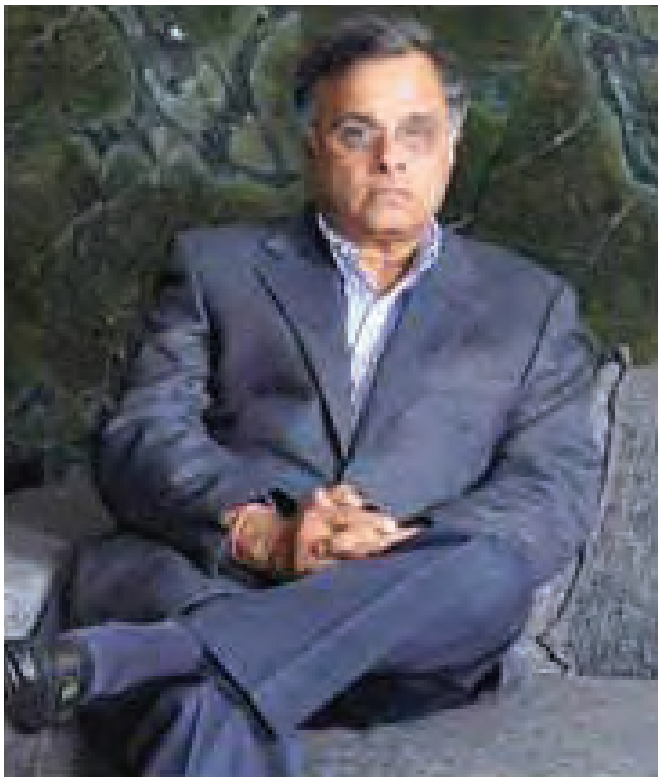
Mumbai, India: L&T's Skill Trainers Academy (STA) was inaugurated by the Union Minister of Skill Development & Entrepreneurship, Mahendra Nath Pandey at Madh Island. The event was held in the presence of A.M. Naik, Group Chairman, L&T and Chairman National Skill Development Corporation (NSDC), who spearheaded this initiative to address the skill gap in India. Manish Kumar -MD & CEO, NSDC and Atul Tiwari-Addnl. Secretary -Ministry of Skill Development & Entrepreneurship were also present to grace the occasion, along with Board Members of L&T and NSDC and Sector Skill Council CEOs.

The academy aims to impart high impact training to trainers engaged in the skilling ecosystem in the country. It was inspired by the strong belief of A M Naik that having high caliber trainers is the key to the success of skill training in India. The academy comprises of experienced faculty with rich domain experience and a passion for training. Set up in an existing facility of L&T, the academy with a capacity to train 1,500 trainers per year. It is equipped with state-of-the-art classrooms, workshops and hostel facilities. The program comprises a ten days classroom training followed by a 15 week "On the Job" (OJT) training. The curriculum is developed by Singapore Polytechnic as part of MoU with NSDC. While it focusses on platform skills or pedagogy the sessions also cover domain skills along with soft and life skills to provide a "holistic" development. At the end of the 10-day program candidates go through an assessment process and those who qualify get a certificate valid for 2 years. Those who qualify after the "OJT" gets a certificate with lifelong validity.

Commenting on the occasion A.M. Naik, Group Chairman, L&T and Chairman NSDC said "The academy is a step forward in achieving our goal of developing skilled workforce that can not only meet the skill requirements of India but also cater to the global demand." The academy kick-started its initial program on January 15, 2021 and has already successfully trained 150 trainers until now. Commenting on the occasion, Dr. Mahendra Nath Pandey, Honorable Minister of Skill Development and Entrepreneurship said, "The 'Skill Trainers Academy' is a milestone in the direction of promoting skill development in the country. I thank Shri. A.M Naik for this important initiative."

NSDC is a public-private-partnership, working under the aegis of the Ministry of Skill Development & Entrepreneurship. It

supports short-term skill training through a wide network of training providers and district nodal skill canters called Pradhan Mantri Kaushal Kendra (PMKK). L&T's Skill Training Academy is aimed at creating a holistic environment for the trainers and providing them a space to grow and learn while developing into valuable assets of the industry. L&T is preparing the youth to facilitate the delivery of their mega projects at its training centers across the country. The skilled learning garnered from the training is considered essential while designing the "Training of Trainers Program." For decades, L&T has been involved in giving underprivileged the opportunity to learn skills that will enable them to find employment and raise their standard of living.



U.S. Bhartia, Chairman, India Glycols Limited

Clariant & India Glycols tap into green renewables megatrend by forming joint venture

Conrad Keijzer , CEO, Clariant

Muttenz, Switzerland: Clariant, a focused, sustainable and innovative specialty chemical company and India Glycols Limited (IGL), a leading company in the manufacturing of green technology-based chemicals, today announced a strategic partnership to establish a 51-49% joint venture in renewable ethylene oxide (EO) derivatives. By combining production and distribution capacity, the joint venture is expected to become a leading supplier of renewable materials to the rapidly growing consumer care market in India and neighboring countries, while providing Clariant the ability to leverage the EO derivatives globally across the home care, personal care and industrial applications segments of its Industrial and Consumer Specialties business. The partnership is subject to customary regulatory approvals. "This opportunity to partner with India Glycols is an important step in Clariant's journey to strengthen our core portfolio, while adding value with sustainability. It enhances the capacity of our Industrial and Consumer Specialties business in India and beyond, whereas the access to renewable Ethylene Oxide broadens our global offering to custom-

ers and this makes Clariant a leader in "green" Ethylene Oxide Derivatives", said Conrad Keijzer, CEO of Clariant.
"The partnership is in line with IGL's strategy to promote value added products through sustainable green chemistry in the domestic market while expanding footprints in global markets. IGL being the largest manufacturer of green EO in the world, which is based on a unique and green production process using bio-ethanol, would continue to leverage its strength in further developing complex and sustainable chemistry to create value for its shareholders", commented U.S. Bhartia, Chairman of India Glycols Limited.

The joint venture will market Clariant's entire range of Industrial and Consumer Specialties products in the previously mentioned countries, while all other global markets shall be served by Clariant. To support production, India Glycols has agreed to a long-term supply agreement for ethylene oxide made from bio-ethanol as well as further utilities. At its inception, the joint venture will have approximately 200 employees.

Henkel delivers overall robust performance in fiscal 2020 despite substantial impact from COVID-19 pandemic

Mumbai, India: Henkel recorded sales of 19.3 billion euros, slightly below the prior-year level in organic terms and maintained a profitable business with an adjusted EBIT margin of 13.4 percent. Henkel also generated a very strong free cash flow in excess of 2.3 billion euros, almost at the record level of the prior year. "Despite the sharp decline

Carsten Knobel, CEO, Henkel

of the global economy as a result of the COVID-19 pandemic in 2020, we delivered an overall robust performance across all business units. For the full year, our results were at the upper end of our guidance. We achieved this thanks to our balanced portfolio, successful innovations, and financial strength as well as the outstanding commitment of our employees around the world. I would like to thank all of them for their excellent contributions in this truly challenging year," said Carsten Knobel, CEO, Henkel.

For the full year, the Adhesive Technologies business unit reported sales below the prior-year level, reflecting a significant decline in demand from key industries. However, thanks to the breadth of its portfolio and successful innovative solutions the business has proven its robustness in a global economic downturn. The organic sales development in Beauty Care was below prior-year level, strongly impacted by the Hair Salon business due to enforced closures, while the Retail business recorded good growth. This was driven by the successful development of top brands as well as new product launches addressing key consumer trends.

The Laundry & Home Care business unit achieved very strong organic sales growth, fueled by both, the surge in demand for hygiene-related products and by successful innovations, also addressing the increased demand for more sustainable products. After a strong negative impact on sales due to the pandemic and related shutdowns in the second quarter for Adhesive Technologies and Beauty Care, all three business units reported in the second half of 2020 good organic growth compared to the prior year. The development of the consumer goods businesses, Beauty Care and Laundry & Home Care, was also supported by increased investments in brands, innovations and digitalization.

"As we enter 2021, we still face a high level of uncertainty how the pandemic will continue to evolve, how quickly the vaccination efforts will progress and how this will impact the widespread restrictions in many countries. We expect that the industrial demand as well as consumer segments which are relevant for our company, in particular the Hair Salon business, will recover. At the same time, we believe consumer demand will return to normal levels in those categories which saw higher demand due to the pandemic. In addition, we assume that current restrictions in many key markets will be lifted in the course of the first quarter and that there will be no widespread shutdowns of retail and industrial businesses as well as production facilities in the remainder of the year," said Carsten Knobel. Based on these assumptions, Henkel expects to generate sales and earnings growth in fiscal 2021. The company anticipates organic sales growth of 2.0 to 5.0 percent and adjusted return on sales (EBIT margin) in the range of 13.5 to 14.5 percent. For adjusted earnings per preferred share (EPS) at constant exchange rates, Henkel expects an increase in the range of 5.0 to 15.0 percent.

Evonik and InnovationLab bring new battery technology to the market

Germany, Essen: Evonik presents at the virtual exhibition LOPEC a new material technology for printable batteries. Together with the company InnovationLab, the specialty chemicals group proves the integration of TAeTTOOz® technology in printed electronics to open up new applications. TAeTTOOz® was develop based on so-called redox polymers from Creavis, the strategic innovation unit from Evonik.

With TAeTTOOz® Evonik presents an innovative technology for the efficient production of rechargeable battery cells. The new materials can be processed with screen printing into very thin and flexible batteries. In this way, designers gain a high degree of design freedom. They make it possible to store electrical energy without having to use metals. The batteries manufactured with TAeTTOOz® technology do not require liquid electrolytes and are therefore leak-proof. Compared to regular batteries, organic polymer batteries have a number of advantages. They can be produced with regular printing methods. This allows a high degree of design freedom. Additionally, the battery materials do not contain metals or metal compounds.

„We are very pleased to be working with

InnovationLab", says Dr. Michael Korell, responsible at Evonik for the development of TAeTTOOz®. "With the TAeTTOOz® technology, we want to enable new applications. Especially with the increasing interconnection of everyday life objects - in the 'Internet of Things' - the development of a metal-free and printable energy storage solution opens up future areas of application". In the health sector, sensors to monitor vital function can be worn much more comfortably when using printed batteries. In the field of logistics, sensors powered with printed batteries can also monitor packaging, like in the supply chain of sensitive goods, including vaccines or food.

FMC Corporation named Digital and Technology-Enabled Company at India's Chemicals and Petrochemicals Awards 2021

Pramod Thota, President, FMC India

New Delhi, India: FMC Corporation was conferred the Digital and Technology-Enabled Company award by The Federation of Indian Chambers of Commerce & Industry (FICCI) last evening at its Chemicals and Petrochemicals Awards 2021 ceremony held at the Hotel Taj Palace, New Delhi, India. "It is an honour to be recognized by the industry," said Pramod Thota, President, FMC India. "The pandemic has affected our country's agricultural industry in a profound way. The FMC team was tenacious in its commitment to support farmers in India through it all. Using digital technology, we reached more than 2 million farmers to provide the know-how and solutions they needed to continue growing their crops without disruption."

Today, agriculture's most pressing challenges are being addressed through advances in artificial intelligence (AI), genomics, robotics, precision agriculture, biopesticides, synthetic biology and other innovations. As progress in these disciplines converge, they will radically alter how crop inputs are developed, sold and applied. FMC invests heavily in these emerging technologies to advance agricultural innovation all over the world. Raju Kapoor, Director of Public & Industry Affairs, received the award on behalf of FMC, from Mansukh Mandaviya, Honourable Minister of State (Independent Charge), Ministry of Ports, Shipping and Waterways & Minister of State, Ministry of Chemicals & Fertilizers, in the presence of Yogendra Tripathi, Secretary, Department of Chemicals & Petrochemicals, Ministry of Chemicals and Fertilizers, Government of India.

Haldor Topsoe and Aquamarine enter into a Memorandum of Understanding with the purpose of building a green ammonia facility based on SOEC electrolysis

Lyngby, Denmark: Aquamarine is developing a large-scale green ammonia facility to be constructed in multiple stages. In the first stage of the project, the proposed facility will use Topsoe's proprietary solid oxide electrolyzer cells (SOEC) to produce green hydrogen from 100 megawatt of renewable electricity. The hydrogen will be further processed into 300 ton/day of green ammonia, also using Topsoe technology. The produced ammonia can be used as a green marine fuel or as fertilizer. "We look forward to our partnership with Aquamarine on our SOEC and ammonia technology. Driven by our vision to be recognized as the global leader in carbon reduction emission technologies by 2024, we are excited by our low-carbon solutions and attractiveness for our customers. This project is innovative in both its use of cutting-edge technology and its scale and will lead the way," says Amy Hebert, Chief Commercial Officer, Topsoe.

Topsoe is already engaged in several projects to produce green hydrogen, green ammonia, eMethanol, and green fuels. An example is the Helios project in NEOM, Saudi Arabia, announced in July 2020, which includes the world's largest ammonia loop (1.2 million tons per year) delivered by Topsoe. With the SOEC technology and decades of experience as a world-leading technology provider within ammonia, methanol, gasoline, jet-fuel, diesel, and hydrogen, Topsoe is one of the very few companies that can deliver insights, technology and catalysts along the entire value chain for next-generation fuels and chemicals.

Aquamarine will develop the project and seek relevant permits for the project, which will be located in northern Germany close to existing offshore wind farms, where the product can be sold to the marine shipping industry. "We are delighted to be working with Haldor Topsoe toward the commercial application on its cutting edge SOEC technology to bring

The ammonia produced at the facility can be used as green marine fuel. (Pic: Haldor Topsoe)

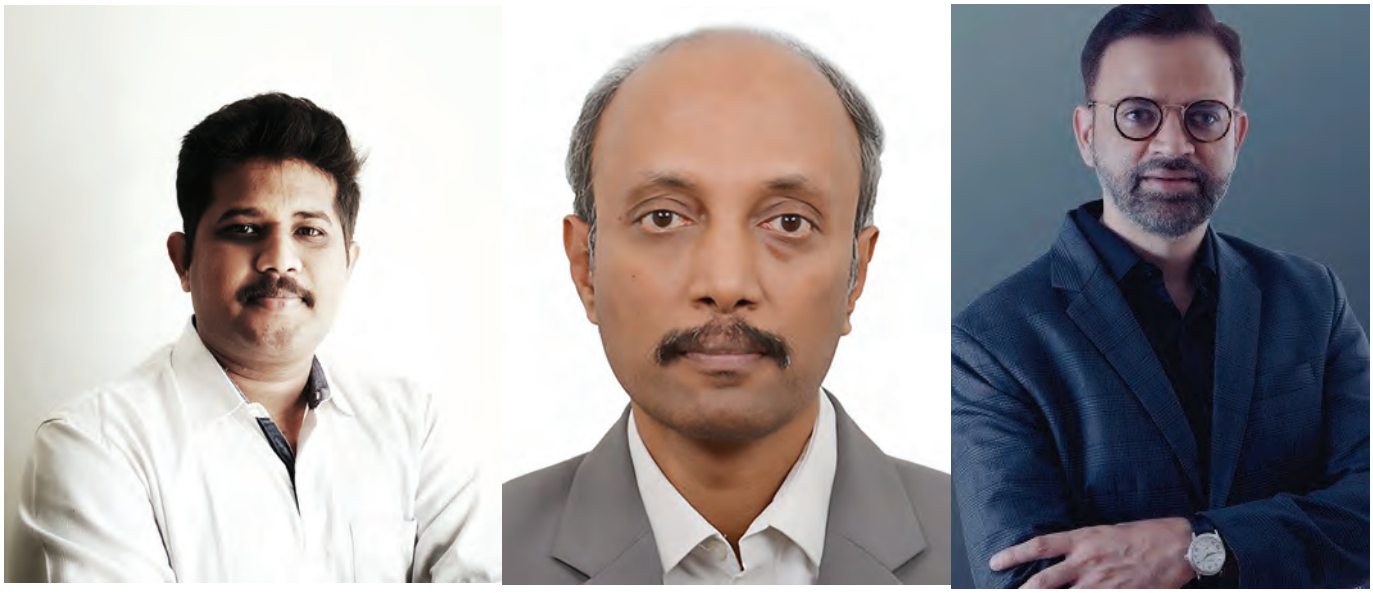
green products to market as part of the global move toward decarbonization. We expect to be soon announcing other partners who will be joining the effort, as we move forward to build HydrGEN into a global green hydrogen products leader," says Joel H. Moser, Founder and CEO at Aquamarine.

The facility's electrolysis unit will have a 100 megawatt capacity & product will be green hydrogen to be fully converted to green ammonia – 300 ton per day. The technology will be Topsoe's proprietary high-temperature electrolysis SOEC technology offering up to 30% larger green hydrogen output compared to standard technology such as PEM and alkaline electrolysis. Subject to a final investment decision, the facility is expected to be commissioned in 2024.

AVEVA Strengthens India Operations and Expands Channel Network

Bengaluru, India: AVEVA, a global leader in engineering and industrial software, today announced that it has signed partnership agreements with Titan Engineering & Automation Limited (TEAL) and Utthunga Technologies Pvt. Ltd., to effectively deliver the company's flagship Monitoring and Control portfolio to customers in India. The Bengaluru-based partners will play a key role in building awareness of the AVEVA portfolio in the manufacturing space. The addition of both systems integrators will fortify AVEVA's expansive channel network further and grow its presence across India.

Commenting on the new channel partnerships, Mohammed Abis Zaidi, Head of Channel, India, AVEVA, said, "AVEVA is a market leader in the engineering and industrial software space across the globe and has assisted a large number of customers in their end-to-end digital transformation journeys. Our proven solutions and products in the manufacturing vertical offer enterprises a competitive edge and help them to effortlessly scale their businesses. A major portion of our manufacturing business is driven by the channel. We are excited to announce our



(L to R): Nagaraj GP, Venkatesan, MA Zaidi

latest value-added channel partnerships with TEAL and Utthunga Technologies. Partnering with AVEVA offers channel partners infinite opportunities to enhance their profitability and become trusted advisors for their customers. We look forward to expanding and strengthening our India channel ecosystem further." As per the terms of the agreement, the new AVEVA systems integrators will activate their highly skilled teams to sell and bundle AVEVA's Monitoring and Control Solutions with value-added supplements to boost the company's presence and brand value across the country. Venkatesan, Head of Automation Business at TEAL, said, "AVEVA's extensive suite of solutions in the manufacturing space complements our existing offerings seamlessly. As a channel partner for AVEVA's business, we can empower Indian enterprises to leverage the power of AVEVA Manufacturing portfolio to fast-track their digital transformation efforts. Our proficient engineers and dedicated team will help our customers to explore all avenues of opportunities with AVEVA Manufacturing solutions. We look forward to developing this partnership and growing it to new heights." Nagaraj GP, Industry 4.0 Solution Expert at Utthunga Technologies, said, "We are thrilled to partner with a global leader like AVEVA, allowing our growing customer base to capitalize on its innovative and pioneering solutions suite. We are in the process of ensuring our adept workforce is specially trained on AVEVA Manufacturing solutions to be able to expertly recommend the right solutions and bundles to help our customers achieve business outcomes effortlessly. We expect to contribute significantly to growing the AVEVA operations across India." Both the systems integrators are committed to delivering superior quality services, technology, business solutions and consultations to its client partners spread across India, enabling them to compete in today's competitive and dynamic business environment. AVEVA is looking to grow its operations further through dedicated channel partnerships to ensure customers all across the country can take advantage of its extensive portfolio.

IndianOil & Phinergy, Israel forms JV to boost India's e-mobility aspirations

New Delhi, India: In the presence of the Union Minister of Petroleum and Natural

Gas & Steel Dharmendra Pradhan, and the Minister of Energy of Israel, Dr. Yuval Steinitz, Indian Oil Corporation Limited entered into a collaboration with Phinergy, an Israeli start-up company specializing in hybrid lithium-ion and aluminium-air/zinc-air battery systems, to form IOC Phinergy Private Limited. The joint venture will manufacture Aluminum-Air systems in India to boost India's flagship programme - "Make in India" and recycle used Aluminum to strengthen India's energy security. The new Indo-Israeli JV also intends to develop fuel cells and indigenous hydrogen storage solutions for promoting green mobility. In a significant boost to India's pursuit of e-mobility, two of the leading Automotive manufactures in India- Maruti Suzuki and Ashok Leyland signed a Letter of Intent (LOI) with the newly incorporated JV IOC Phinergy Limited. Tarun Kapoor, Secretary, MOP&NG; Sanjeev Kumar Singla Ambassador of India to Israel; Dr. Ron Malka, Ambassador of Israel to India ; S M Vaidya, Chairman IndianOil , Aviv Tzidon, Chairman Phinergy; Kenichi Ayukawa, MD, Maruti Suzuki India Ltd. and Dr. N Saravanan, CTO Ashok Leyland were among those present in the virtual ceremony.

Danfoss introduces Climate Solutions segment; announces merger of its heating & cooling verticals

Chennai, India: In an effort to further strengthen customer focus and be fully ready to capture future growth opportunities, Danfoss is now implementing a new group structure by merging its Heating and Cooling segments. The new segment called Danfoss

Kim Fausing, President & CEO, Danfoss

Climate Solutions will focus on developing integrated energy efficient solutions to engineer a better and sustainable future. The merger is backed by the company's strong growth in 2020, despite Covid-19 challenges, with a bullish approach and high investment towards the green agenda & digital transformation. Danfoss Climate Solutions India Sales organisation was recently unveiled by the company. Anuraaga Chandra, who previously led Danfoss Cooling Sales will now be Head India Sales for Danfoss Climate Solutions and shall report to Ravichandran Purushothaman, President – Danfoss India. This restructuring also reflects the company's move for more regional empowerment & facilitating its regional leadership to be closer to customers and thereby, enhancing its customer-centric approach towards 'India4India' innovation and engineering.

India's transformation across the global mega-trends of electrification, digitalisation, urbanisation, climate change and food supply are growing stronger by the day. In view of this, Danfoss stays committed to deepening its industry relevance and furthering the scope for innovation and sustainability

for its customers and partners. "Danfoss emphasises consistent investment in future growth, thereby enhancing our future readiness. Our focus is to build and develop global leading businesses and market positions to accelerate growth and remain a trusted pillar of support for our customers." says Kim Fausing, President & CEO, Danfoss.

The merger of Danfoss Heating and Cooling businesses into Danfoss Climate Solutions will unlock a huge potential for Danfoss to leverage the combined scale, resources and technology of both businesses to become a global player with an unmatched value proposition across industries and a green agenda that will re-energise the economy. There are strong strategic rationales for combining the two segments, as 40% of all energy consumption in cities is utilized for cooling and heating. With increasing urbanization and global focus on green transition, Danfoss Climate Solutions offers a huge potential for providing integrated energy-efficient solutions needed to deliver on the targets in the "Paris agreement" and the nation's sustainability goals. "The introduction of the Danfoss Climate Solutions segment in India will reinforce our thought leadership in the market and create new avenues to highlight the role of the Indian industry in achieving global climate targets. Our view is to support India's transition to a decarbonized economy with world-class technology that is innovated, manufactured and marketed in India", said Ravichandran Purushothaman, President, Danfoss India.

With this merger, Danfoss aims to introduce a wider range of products/solutions, centralised marketing, and regional tech support for its customers to enable them to move faster towards the adoption of the green agenda. The company also plans to enhance the company's footprint across the geographies of world countries and identify opportunities for cross-selling among its customers.

MOL Group starts innovative biofuel production at Danube Refinery

MOL Group Downstream Facility
(Pic Courtesy: MOL Group)

Budapest, Hungary: Following several years of research and development MOL has stepped up the value chain and has become a biofuel producer, through the realization of an investment in the Danube Refinery. Bio feedstock will be co-processed together with fossil materials increasing the renewable share of fuels and reducing up to 200,000 tons /year CO2 emission without negatively affecting fuel quality. "MOL Group has been a biofuel user by purchasing more than 500.000 tons of biofuels (bioethanol and biodiesel) for blending. With this investment, we have started to produce sustainable diesel for the first time within MOL Group and we became biofuel producers. The benefits are numerous, as we produce more sustainable fuel, we will also help the circular economy by recycling waste. In line with our recently updated

strategy, "SHAPE TOMORROW" we are planning to produce 100.000+ tons of biofuel by 2030" – said Gabriel Szabó, Executive Vice President of MOL Group Downstream.

During co-processing at the Danube Refinery, bio-feedstock is processed together with the fossil material in the production of diesel fuel. Vegetable oils, used cooking oils and animal fats can also be used for this purpose. As a result, the produced gasoil is partly renewable, without any quality changes compared to diesel produced entirely from crude-oil. The main advantage of this innovative method is that the resultant biodiesel can be still blended with a maximum 7 percent of bio-feedstock based fuel, in-line with diesel standards, allowing the bio-share of the gasoil to be higher.

One of the main goals of the European Union, and MOL Group, is to achieve net-zero CO2 emissions by 2050. The renewable share obligations of transportation fuel are continuously increasing, accordingly the biocomponent content expectations have also increased across MOL Group's fuel markets, which have so far been met mainly by blending bioethanol and biodiesel.

MOL started co-processing as an R&D project in 2012 based on the research results of Pannon University. Types and quality requirements of processable raw materials were determined and the investment was launched in 2018. This included the necessary infrastructure development for storing and processing the new bio-materials. The trial operation of the new process started in March 2020 and has been operating regularly since May.

The bio-component produced using this process has significantly higher CO2 saving potential than other type of biofuels produced from the same feedstock. This project means that up to 200,000 tons of annual CO2 emission will be cut, equivalent to a city of 200.000 inhabitants entirely switching to solar energy for heating. The target is to further expand the type of waste that can be used as feedstocks in the processing to achieve even better CO2 savings from the product. One of the cornerstones of the MOL Group 2030+ Strategy is to play a key role in shaping the low-carbon circular economy with investments in new businesses such as waste integration and utilization, recycling, carbon capture, utilization and storage (CCUS), advanced biofuels and potentially hydrogen-related opportunities.

In the next five years, MOL will spend USD 1bn on new, low-carbon and sustainable projects to become a key player in CEE in the circular economy and to get closer to its net-zero CO2 emitter goal by 2050. MOL aims to transform its Downstream segment into a highly efficient, sustainable, chemicals-focused leading industry player.

Cole Parmer is now Antylia Scientific

Illinois, USA: Antylia Scientific, a global leader in peristaltic and single use bioprocessing solutions, and a diverse portfolio of life sciences and diagnostic products for the pharma, biopharma, healthcare, and environmental markets, has been launched. Formerly Cole-Parmer Instrument Company, Antylia Scientific (An-

til-e-a) will continue to build on the platform of unique products and expert customer support by expanding the company's organic product research and development capabilities and acquiring complementary products and companies.

"The evolution as a provider of mission critical products to the customers in their quest to discover and manufacture new therapeutics, vaccines, and diagnostic tests has led to creating Antylia Scientific," said Bernd Brust, Chairman & CEO, Antylia Scientific. Antylia Scientific is creating two operating divisions, bioprocessing and life sciences. Bioprocessing portfolio includes the industry leading Masterflex® I/P®, L/S®, B/T®, Ismatec® and Reglo range of peristaltic pumps, the MasterflexLive® connected products, pump and transfer tubing, flow meters and single-use components and assemblies. Masterflex addresses the entire fluid path from research to production with a solution set developed for the specific needs of the bioprocessing, pharma and food and beverage customers.

"Masterflex has become the industry standard. We are the customer's first choice in peristaltic pumps that support their need for providing consistent, repeatable, reliable and pure end products in cGMP environments across the globe," added Brian Barnett, SVP, Bioprocessing.

The life sciences portfolio includes well-recognised brands such as the environmental sampling and testing innovator, Environmental Express®; real-time monitoring and cold storage expertise at Traceable®; the standards and external diagnostic control specialists, SPEX® and ZeptoMetrix®; and lab essentials and consumables brand Cole-Parmer®.

"Innovation is in the DNA. Bringing together this portfolio of exceptional businesses, products and talent allows us to continue to deliver trailblazing products that improve the quality, accuracy, efficiency and repeatability of the customers' critical processes," said Jon Salkin, President, Antylia Scientific. "Antylia Scientific will serve as a catalyst for further organic investment and acquisitions in the burgeoning life sciences and environmental markets." "With great respect for the company's venerable history," added Brust, "we are confident that Antylia Scientific is now well positioned to serve the customers in their quests to accelerate scientific discovery and improve the quality of life."

Grundfos delivers strong financial performance in 2020

After having been significantly impacted by COVID-19 during the first half of 2020, Grundfos returned to stronger sales traction in the second half of 2020 with sales only 1.0% below 2019. Return on sales reached 9.9% and in a challenging year, Grundfos maintained a high customer satisfaction score and continued to deliver on its sustainability ambitions. Return on sales (EBIT/Net

turnover) reached 9.9% for the full year corresponding to Earnings before Interest and Tax (EBIT) of 2,606m DKK. Profitability was impacted by restructuring costs and other non-performance items. Adjusted for these non-performance items Grundfos' return on sales reached 11.1%, which is the second highest in the company's history. Full year net turnover ended at 26.3bn DKK, corresponding to a decline in sales versus 2019 of 4.4% when measured in local currencies. A cash flow from operating activities of 3.5bn DKK and an equity ratio of 68.9% secures financial strength.

This is a result to be proud of, says Poul Due Jensen, CEO and Group President, Grundfos, "The COVID-19 pandemic made 2020 a challenging year for everyone and our main priority has been ensuring a safe working environment and to continue to serve our customers in the best possible way. We are therefore very satisfied with our result. Our financial strength allows us to invest further in our strategic ambitions and in innovation to fulfill our purpose of solving the world´s water and climate challenges and improve quality of life for people."

Grundfos also continued to deliver on its sustainability ambitions by once again reducing the company's own water withdrawal by 51% and CO2 emissions by 36 % compared to the 2008 baseline. The annual employee motivation survey, conducted in September, also showed an increase in employee motivation to a record high level. "Grundfos is its people, and I am proud to see that we

despite a global pandemic, deliver very strong financial results, an increase in our employees' motivation and our customers' satisfaction score. We also continued to deliver positive climate impact by significantly reducing our own energy consumption and enabling our customers to reduce their energy use as well. Furthermore, we have successfully gone live with our new customer-centric organization. Grundfos is in really good shape and ready for the future," adds Poul Due Jensen.

In the year 2020, the company had net turnover of 26.3 bn DKK, Sales growth (in local currencies) versus last year of -4.4% and Return on sales of 9.9%

Total Oil India Pvt. Ltd (TOIPL) launches innovative LPG cutting gas to improve safety

Alexis Thelemaque, CMD, TOIPL

Bangalore, India: Total Oil India Private Limited (TOIPL), a subsidiary of Total, launched LPG Cutting Gas in Bangalore today.

The new product, developed by TOIPL's LPG division, highlights the brand's commitment to innovation and customer safety. Total's LPG Cutting Gas is developed specially for the metal cutting industry including scrappers, fabricators and metalworking industries. Today, acetylene is commonly used in the metal cutting application. However, this has a high flammability range and is difficult to handle. Total's Cutting Gas is an additized LPG that offers safer and superior performance for metal cutting and other high-temperature intensive applications. In its first phase of distribution, Total's Cutting Gas will be marketed to the metal cutting industries in Karnataka and Tamil Nadu. The product will be produced in Total's LPG facilities in Bangalore, Namakkal and Maduranthakam.

Alexis Thelemaque, Chairman & Managing Director- TOIPL said, "Total's Cutting Gas shall give a boost to the use of LPG in metal cutting segment, as we aim to provide customers with safer operability, cost savings, and better cutting performance over acetylene and regular LPG. We believe the superior surface finish with high cutting speed makes cutting gas an excellent choice for applications such as metal cutting, straightening, hardening and others." With soot-free emissions and low-glare flame at lower operating pressures, this technically advanced product has low oxygen consumption and heat throughout, and is thus a more environment-friendly option for the end-users.

Thermax signs technology agreement with Steinmüller Babcock Environment for Waste to Energy boilers

Pune, India: Thermax Babcock & Wilcox Energy Solutions Private Limited (TBWES), a wholly owned subsidiary of Thermax recently signed a know how transfer and license agreement with Steinmüller Babcock Environment GmbH (SBE), Germany for Waste to Energy technology. The agreement was signed by Pravin Karve, CEO, TBWES and Thomas Feilenreiter, Managing Director, SBE.

As a part of the agreement, TBWES will design, engineer, manufacture and sell Municipal Solid Waste (MSW) fired waste to energy solutions incorporating SBE's well established grate and boiler technology. "Thermax has always brought proven global technologies to India and this collaboration is one more step in that direction. We are proud to be closely associated with a global leader having the most advanced and reliable technology. This partnership will provide us with a technology edge and help us deliver on our brand promise of 'Conserving Resources, Preserving the Future'. It will accelerate our involvement in the waste to energy application, much needed for solving the dual challenge of urbanisation and deteriorating environment." said Pravin.

"SBE technology is backed by more than 150 years of experience, and we have designed and supplied some of the largest and most efficient grate and boiler systems for waste to energy plants in the world. We are pleased to associate with Thermax in bringing our advanced technology to the industry through this agreement and look forward to a strong relationship," said Thomas.

Bentley Systems Enters into ~ USD 1.05 Billion Agreement to Acquire Seequent

Exton, PA, USA: Bentley Systems, Incorporated (Nasdaq: BSY), the infrastructure engineering software company, today announced that it has entered into a definitive agreement with investors led by Accel-KKR to acquire Seequent—a leader in software for geological and geophysical modeling, geotechnical stability, and cloud services for geodata management, visibility, and collaboration—for USD 900 million in cash, subject to adjustment, plus 3,141,361 BSY Class B shares. The acquisition of Seequent is expected to initially add approximately 10% to each of Bentley Systems' key financial metrics (ARR, annual revenue, and EBITDA) and is expected to be measurably accretive to Bentley's organic growth rate. Most significantly, the combination will deepen the potential of infrastructure digital twins to help understand and mitigate environmental risks, advancing resilience and sustainability.

The acquisition is subject to customary closing conditions and regulatory approvals, including New Zealand Overseas Investment Act consent as well as clearance under the Hart-Scott-Rodino Antitrust Improvements Act. Upon closing, Seequent will operate

as a stand-alone Bentley subsidiary, with Seequent's current Chief Operating Officer Graham Grant, succeeding its retiring CEO Shaun Maloney, reporting to Bentley's Chief Product Officer Nicholas Cumins.

Seequent, founded and headquartered in Christchurch, New Zealand, has more than 430 colleagues in 16 office locations, serving geologists, hydrogeologists, geophysicists, geotechnical engineers, and civil engineers in over 100 countries, and the world's top mining companies. Its established presence in mineral-intensive geographies such as South America and southern Africa is expected to accelerate Bentley's overall opportunities in these regions with significant infrastructure requirements. In turn, Bentley's established presence in China, and its mainstay reach across civil engineering sectors, is expected to accelerate Seequent's expansion in new markets. The integration of Bentley's and Seequent's solutions, for deeper infrastructure digital twins, can contribute a multiplied "ESG handprint" to improve the world's environment while improving the world's economies. While Seequent's products aren't appreciably used in oil and gas exploration or production—which is served by its own dedicated industry of specialized geophysical software—imperatives for energy transition present new opportunities, even beyond the expansion of mining to produce the materials needed for widespread electrification. Seequent is a leader in 3D modeling for geothermal energy sources, and its software and cloud services provide the important geosciences context for water resources simulations and environmental engineering.

PC-based control simplifies integration of S7 controllers

Pune, India: The openness of PC-based control and the resulting array of connectivity options with other systems number among the fundamental advantages of TwinCAT automation software from Beckhoff. A new add-on now also enables easy and efficient communication with Siemens S7 controllers. TwinCAT 3 offers numerous options for connecting TCP/IP-based thirdparty systems to the main control program: OPC UA, MQTT, HTTPS and Modbus are only a few prominent examples of an entire range of communication protocols. The TwinCAT S7 Communication (TF6620) function now expands this broad spectrum to include the S7 communication protocol.

This product implementation enables reading and writing of variables from an S7 controller. The PLC application program carries this out directly – either via dynamically parameterizable PLC function blocks or via easily configurable I/O mapping. No additional hardware is required and the local TCP/IP network serves as the transport medium. ■

Practical Aspects of Process Safety Management in the Research Laboratories & Pilot Plants

Research and development (R&D) laboratories and pilot plants have unique hazards from the hazardous chemicals, number of non-routine operations, modifications of equipment, modification of process flows, lack of information, and inability to anticipate the consequences. Unlike large commercial process plants, probability of mass incidence is much less in the R & D, but nevertheless loss of life and loss of assets are not ruled out.

US OSHA laboratory standards and hazard communication standards can improve the safety performance of the laboratories and pilot plants if those are understood and implemented with easily understood procedures and check lists. The most critical aspect of the R & D process safety management (PSM) approach is recognizing the hazard and putting the right mitigation in place. When asked about the PSM standards, most lab owners' response would be "we know the standards but those may not be applicable to the R & D kind of work environment. R & D organizations are quite often satisfied with just a workplace safety approach, process safety is not understood and hence not felt necessary to implement. Incidents are although recorded but often not investigated to find the real root cause. PSM came on the forefront after the number of major disasters in chemical industries. Baker's investigation report on the BP Texas City incident stressed upon the importance of PSM in the chemical industries. Since then, the PSM has been an essential part of managing safety in the industry. Most industries started

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adopting PSM interface in technology selection, engineering, commissioning, and operation & maintenance of the plant. Manufacturing plants perform most of the operations which are routine and are supported with well documented procedures. Hence the systems and procedures once adopted needs compliance and improvements from the learning from the incidence. However, when it comes to implementing PSM in the research labs and the pilot plants, most of the activities which are done are quite often being done for the first time. There are a number of unknowns and hence the risk involved is often not understood. Not anticipating the risk is one of the major reasons for accidents taking place in the laboratory and the pilot plants. Most laboratories don't think beyond the workplace safety such as personal protective equipment, housekeeping, generic operating procedures for day-to-day activities, storage & handling of chemicals etc.

There is a need to develop and implement a robust safety management program with a careful blend of work-place safety and process safety supported by competence and the culture. Program must address the practical aspects of implementation and sustenance. The essential features of such program shall be as below:

1. Management commitment- safety Objectives and targets
2. Responsibility and Accountability with the people working in the laboratory.
3. Competent safety support team- internal or external
4. Risk Assessment
5. Adoption of appropriate safety standards/PSM elements
6. Culture of "I own my safety".

1) Management Commitment

The simplest way to assess the management commitment is:

- How many visible man-hours senior leaders are spending in safety related programs and activities?
- Do the senior leaders begin their meeting with talk on safety?
- How frequently do they visit the laboratory and talk to the people on the shop floor?
- Is the safety performance and few leading indicators part of the annual KRA?
- Is there a safety policy signed by the head of the institution and displayed all over?
- Most importantly is there an annual budget prepared and sanctioned for safety?

2) Responsibility and Accountability with the people working in the laboratory

Quite often during my audits when the researchers are asked who is responsible for your safety, I get the answer, "we have a safety officer". Unless the safety is a line function and each one working in the laboratory is responsible, and the head of the laboratory is accountable for safety performance, there will never be a culture of safety and the facility will remain vulnerable for accidents. There are few good ways to bring the responsibility and accountability to the line people as below:

- Identify the safety program for workplace safety and process safety for each laboratory.
- Form a committee for each of the programs.
- Appoint a leader and a facilitator for each committee.
- Set objectives for each committee- such as writing a procedure, doing self-audits, sharing the near misses, and learning from the accidents.
- Committee should meet once a month to discuss the objectives and improvement programs.
- Committee shall be responsible for all the laboratories of the facility for the safety program which the committee has decided to take up. This will ensure cross laboratory involvement and fair assessment of the safety facility and program implementation.

3) Competent Safety Support Team- Internal or External

Competency is one of the requirements for design and implementation of robust safety programs. While careful selection of consultants is the key, approach can be as below:

- Assess the internal competence of the leaders and the laboratory staff. This can be done by referring to the safety standards available in the public domain.
- Perform the gap assessment to know the key support areas.
- Identify the teams for each of the gaps.
- Select a consultant who will do the hand holding of the team to acquire the required knowledge and skills by themselves.
- Do not select a consultant who will deliver the training and hand over the procedures for the laboratory to implement.

4) Risk Assessment

There are three major hazards in any chemical laboratory-

- **Chemical Hazards:** All laboratory chemicals must be considered as potentially hazardous as these chemicals can be flammable, corrosive, toxic, and highly reactive. Risk must be assessed for storage, transport, spillage, and disposal of these chemicals. Quite often chemical bottles are stored in a number of rows in a single compartment of a rack and when the laboratory chemist needs a bottle in the last row, he/she is most likely to lift the last row bottle over the other rows, which is a serious unsafe act. A detailed procedure is hence required for ensuring safety of chemicals from procurement to storage to movement to lab to use to disposal. Procedure must quantify the risks and provide mitigations to minimize the probability and mitigations to minimize the consequences of the incidence.
- **Physical hazards:** extreme reactor conditions, radiation, heat stress, noise, dust, or vapour exposure etc. are the physical hazards. Procedures must be developed with expert advice to measure the severity of hazard, allowable exposure limit, appropriate PPEs to be used, and appropriate detection systems.

  In one such incident, a chemist in the lab completed analysis of Hydrofluoric acid samples by using necessary PPEs. After removing the PPEs, he realized that he had missed to put the cap on the HF sample bottle. He just lifted the cap without hand gloves and put it up on the bottle and the drop of HF acid from the cap was enough to cause him severe pain which required immediate medical attention. This incidence shows how serious can the physical hazards be if the risks are not properly assessed and hard & soft mitigations are not provided.
- **Hazardous technique:** Processes & equipment, exothermic reactions, runaway reactions, operation under vacuum, mixing of incompatible chemicals for the experiment, potentiality hazardous derivatives, high speed rotary equipment, handling of glassware, etc. can lead to serious incidences. Process hazard analysis with competent persons for each of the new or first-time experiments is must to evaluate the expected hazards and plan adequate precautions. Proper barricades are required for the rotary equipment with the display of hazards.

5) Adoption of appropriate safety standards/PSM elements

US OSHA laboratory standards and hazard communication standards are commonly used. Laboratories can also

adopt the country specific standards if available. NABL accreditation also helps achieve well-structured safety management. Selection of PSM elements and customization for laboratory and pilot plant kind of operation is very important to effectively implement these standards. If these elements are not customized to make those "fit for purpose" then either those are never implemented in true spirit or researchers end up spending too much time in compliance at the cost of creative thinking which is essential for the successful and rapid research.

Here are some thoughts on critical PSM elements and approach to implement those in the research and academic institutions:

- **Process Safety Information**

Material Safety Data Sheet- Procurement department must ensure that no chemical is procured without a detailed MSDS available for it. MSDS is often not easily available for ready reference and also not understood by many who are working in the lab. It is recommended to convert large MSDS into a simple risk assessment sheet. Researchers also should be trained to develop MSDS for the new chemical or product which they are developing in the lab. Information about lab equipments- Fume hood minimum pressure, pressure in the lab, fresh to recirculated air ratio, integrated operating window for all equipments, colour coding and operating pressure of gas pipelines, gas cylinder pressure, fire & gas detection system, trips & interlocks, firefighting equipments etc. information should be readily available and understood by all the staff members. Check sheet should be developed for checking the integrity of all the equipment and systems. Preventive maintenance schedules should also be developed and preferably digitized to get notifications and also to maintain the history of all equipment.

- **Process Hazard Analysis**

Most chemists are never trained for doing the process hazard analysis. Structured training with participation in a couple of PHA is important to create a PHA trained team. Risks should be adequately assessed and ranked by using a risk assessment matrix. All the process and administrative controls to minimize the probability and minimize the impact of consequences should be listed. It is recommended to convert as many administrative controls as possible to process controls to minimize the human error. Most practical approach for PHA is first to list down all the activities done in the lab, all the equipment used, all the chemicals stored and used, all the routine experiments done, and then use the RA matrix by the PHA trained group to assess the risks and risks rating.

▪ Management of Change (MOC) and PSSR

Change is the inherent characteristic of the research environment. Researchers often believe that trying out new things is part of their routine and their creativity should not be killed by bureaucratic approval processes. The most critical part of MOC evaluation is assessment of the risk and adequate mitigation with process or administrative controls. With the involvement of researchers such risk assessment can be done in very little time by the PHA trained person. Approval processes can be well defined based upon the risk rating. If all the previous MOCs are well documented, those can be referred before the risk assessment, this will further speed up the process.

Pre-start-up safety review should be made part of the MOC process. Team assessing the risk should visit the site of experiment and carry out the review with the standard checklist. Check list should include construction and design of equipment, PHA recommendations from MOC process implemented, availability of process information, standard operating procedure and standard operating conditions with upper and lower limits, alarms and trips tested and are in line, firefighting equipments healthy and available, all instruments are duly calibrated, and most importantly all the people involved in the experiments are trained and validated.

▪ Incident Investigation

Incidence investigation and learning from incidence, learning from other's mistakes, and learning from own mistakes are a significant and important aspect of safety culture of the organization. There are several tools for root cause analysis, every facility should have a good number of people who are trained to do the RCA. In every incident investigation team, there must be a minimum of one RCA trained member. Investigation must get extended to find out where the management has failed. Unsafe acts and near misses also should be investigated. There must be a business process to record the incidence, form the team for investigation, approval of root cause & recommendations and action tracking system to ensure learning from incidents is implemented.

In one of the research labs in a minor incident, a chemist got a splash of sulphuric acid on the face and hands while diluting the acid. This is an incidence; can it be closed just by writing "it was a mistake on part of the chemist, he should have known how to dilute the acid" Quite often incidence investigation is like this. Right way to investigate is to ask following questions:

- What is the potential incidence?
- Is the risk assessment of the job done?

- Is there a procedure available?
- Is the procedure adequate and approved?
- Is the person working trained and validated?
- Has it happened before?
- Can it happen again?

If the answer is Yes to each of the above questions, then the incident can't take place and if the answer is No then each question will lead to more questions to find out what the management failure is.

There are 14 PSM elements which are applicable to the laboratory and pilot plant. I have discussed the most critical of those in this article. Elements like mechanical integrity, training, audit, contractor safety management, emergency planning and response, operational discipline shall be covered as partially while writing the procedures for each of these elements. There are always overlaps between the elements of PSM but those should be allowed as in safety "Overlaps are allowed, gaps are not permitted".

6) Culture of 'I own my safety'

Systems, procedures, good process & administrative controls, competent resources, codes & standards etc. are must to achieve the desired HSE results. However, if the culture of the organization is conducive, incidents will continue to take place. Building a strong safety culture need involvement of as many people as possible in the safety programs, safety committees, incident investigations etc. Senior leaders of the company showing their commitment by spending their time which would be visible to all.

Safety should be treated as one of the core values of the organization. Vision, strategy, goals, policies, structure, procedures are the visible organization culture, but what is not visible is beliefs, perceptions, traditions, assumptions, norms, stories, unwritten rules, and feelings. The challenge for building a strong culture is to find out what is not visible and make efforts to transform the negative sentiments of invisible culture. You are not required to remove the shoes before entering the temple, no warning board is required, no policing is required, everyone just does it. This is the kind of culture we need in all our organizations whether research institutions or manufacturing plants with respect to safety. ■

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Key Trends in Digital Transformation in Manufacturing in 2021

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"The biggest part of our digital transformation is changing the way we think." - Simeon Preston, CEO, Bupa.

And indeed, our thinking on Digital Transformation has changed in a year eclipsed by the COVID-19 pandemic. It is now seen as a necessity rather than a futuristic opportunity. For sure, the overabundance of hype on digital will continue, and it can be difficult to separate the wheat from the chaff when it comes to deciding what's worth investing in today versus what's still under development. If anything, the stakes have risen for companies placing bets on transformational ideas to deliver immediate impact. And although I am not a betting man, here are my bets on Digital Transformation Trends in Manufacturing in 2021.

Trend 1: The Digital Imperative

"We have seen more digital transformation in 2 months than in the last 2 years" Satya Nadella, CEO, Microsoft

The world has changed significantly in the last one year. Till 2019, Manufacturing companies were focussed on 3 areas of digital transformation (a) Front end

innovation to lift top line growth, (b) Cost Reduction by improving productivity, and (c) A few brave companies experimented changing their business model. However, in 2020 this has expanded exponentially, and Digitalization initiatives have spread to all areas of a company as our personal and professional lives experienced a massive twist. It started with Employee Safety Tracking (at Reliance we launched a digital app to track daily health status of employees within days of the pandemic) and enabling uninterrupted Remote Working (WFH). Once safe working environment was ensured, it swiftly moved to ensuring manufacturing plants were kept COVID free with worker Social Distancing Solutions and ensuring Real-time Tracking of Shipments from suppliers to ensure no stock out situations. And today, automation initiatives in every area viz. Remote guidance for plant operations, Remote Inspection, Digital twins, etc are being seriously explored.

It's a brutal recognition that adopting Digital technologies is existential and that the 2020 pandemic was just a trailer of a movie that hasn't played out yet.

- **Merger of Office and Shop floor**

  Imagine Tony Stark building a new version of the Ironman suit - Stealth Armor MK III. He designs the suit and JARVIS, his AI assistant, runs simulations and gives feedback on the efficacy of the designs. He then builds a prototype version and sends it on a test flight. JARVIS monitors all the parameters of the prototype in real time and sends them to the lab in Fortnite. Tony remotely asks the prototype to perform a difficult maneuver which doesn't go as smoothly as planned and Jarvis notes the impact on different components and estimates damage to them".

This is exactly what CEOs of manufacturing companies are dreaming of today. Bridging the divide between IT and OT and bundling Manufacturing Asset, Process Control and Data from IIoT's to create the building blocks of a Smart Factory. Increasing maturity in 3 technology areas promise to propel this idea in 2021 (a) Digital Twin (b) Autonomous Mobile Robots (AMR)/ Collaborative Robots (COBOTS) (c) Touchless Service Model.

Trend 2: Digital Twin of Manufacturing Assets and complete Manufacturing Plants

Global research firm, Gartner, predicts that by 2021, 50% of large industrial companies will use a Digital Twin to monitor and control their assets and processes. A Digital Twin is a digital representation of a real-world product, machine, process, or system, that allows companies to better understand, analyze and optimize their processes through real-time simulation.

Unlike engineering simulations, a Digital Twin runs an online simulation, based on data received from Industrial Internet of Things (IIoT) devices connected to an asset or process equipment. As an IIoT device sends data almost in real time, a Digital Twin is able to collect this data continuously, maintaining its operation within control parameters throughout the lifespan of the product or system and to predict potential issues so that preemptive process or maintenance measures can be taken. This technology holds great promise for optimizing the operating performance and reducing maintenance of industrial systems. A crucial enabler to deployment of Digital Twins will be the rollout of Mobile 5G technologies which are poised to make a debut in later part of 2021.

Trend 3: Autonomous Mobile Robots (AMR's) and Collaborative Robots (COBOTS) on Shop floor

According to the Robotic Industries Association, robotics shipments in 2020 were up 41% over 2018 and that this growth is expected to continue for the next few years. One of the primary drivers of this growth trend is demand for Autonomous Mobile Robots (Autonomous Fixed Robots are omnipresent in modern factories over last decade). In the last few years, we have seen evolution of AMRs in warehouses managing simpler pre-programmed tasks of material movement to more sophisticated tasks of picking different sized packages. Large scale material handling has also seen automation using autonomous vehicles especially by mining companies which often operate in environments unsafe for humans. In 2021 and beyond, we expect to see AMRs on the Shop floor especially as COBOTS as companies look to ways of reducing human dependency in all aspects of manufacturing. The pandemic has created an imperative for COBOTS brushing aside concerns about possible negative impact on the workforce. This promises to create an environment where robots and people working together, collaboratively, in factories can get more work done, faster and more safely. This will reinvent the Shop floor.

Trend 4: Touchless Service Model

"I exist in two places, here and where you are" Margaret Atwood.

Who knew that this mushy quote, better suited to Valentine's day setting could also be the futuristic vision of Remote Working!

Restrictions during COVID-19 were a major obstacle to the field service personnel of OEM companies, preventing them from going to client sites to install equipment or administer repairs. Fortunately, assisted remote field service technology and improving data bandwidths have made it possible for asset maintenance experts to provide remote technical guidance via AR/VR enabled devices worn by technicians

at the asset site. Real-time expert guidance with step-by-step visual guided instruction and annotation on asset will help achieve quick resolution of issues and improved quality of services. In the past, customers were reluctant to explore touchless service options and instead preferred the convenience of having OEM technicians come onsite to complete repairs. Now, due to COVID-19, more customers are open to this idea, enabling manufacturers to evaluate new processes and procedures with the long-term goal of making them permanent features. This technology advance is expanding beyond maintenance and troubleshooting services to other areas such as remote inspection, commissioning support and even Plant restart services.

Trend 5: Cloud Applications (PAAS, SAAS)

"Two ways. Gradually, then suddenly." is how Mike described how he went bankrupt in Ernest Hemingway's novel The Sun Also Rises.

And this is the script of Cloud Adoption by Manufacturing enterprises. In the past, manufacturing companies had huge concerns about using Cloud technology. The Cloud was evolving quickly, with hundreds of new providers entering the space, and IT leaders were worried about lack of control of operations, IT breakdowns, poor cybersecurity, and hacks. The change started gradually and as per Gartner, by 2020, over 68% of all companies had already adopted Infrastructure as a Service (IaaS) which is a two-fold increase over 2018. The positive results from IAAS adoption and COVID-19 has potentially triggered a change in the way manufacturers engage with and utilize their ERP systems. Increasingly, they are evaluating adding a layer of agile applications on top of their existing ERP systems, rather than try to make ERP do it all and leveraging the benefits of agility, speed and nimbleness of adding new functionality continuously in Cloud based applications. Further, today's cloud-based Manufacturing Execution Systems (MES), Quality Management Systems (QMS), have both the depth to tailor to individual machines and industries especially in Discrete Manufacturing companies. Process manufacturing companies are experiencing the maturity in Asset Optimization applications providing Predictive Maintenance, Asset Reliability Solutions and Multi-Factory Optimization solutions.

In the coming year, I expect this script to play out in adoption and deployment of Cloud Platform and Software as a service (PAAS, SAAS) as it did or IAAS.

Trend 6: Digital Supply Chain

"All great changes are preceded by Chaos" Deepak Chopra

The challenge with Digitalization of Supply chains in India has never been lack of technology but the lack of

standardization of data exchange formats and the imperative for adoption by all stakeholders. However, this changed as the government implemented GST and a series of digital initiatives linked with GST. This regulatory push has created standard, digital formats for e-Way bills, e-Invoicing for large corporates; unique identification for vehicles with FasTags (the new Aadhar for commercial vehicles) and their integration with E way bill; Seamless integration between Bill of Exchange & Bill of Lading and potential GPS vehicle tracking system with implementation of new standard AIS-140. These changes along with the proposed 'Unified Logistics Interface Platform' will lay foundations for standardized digital data exchange and lead to rapid digitization of Supply chains. The time is ripe for innovative companies to link the enterprise supply chain across their suppliers, sub suppliers, customers and end consumers. Leveraging Blockchain with its decentralized, distributed ledger could also add an extra dimension to this linear Supply chain and would facilitate inclusion of supply chain partners like financial institutions (banks and insurance companies) and make the Digital Chain holistic.

Trend 7: More courage in implementing AI, ML solutions on Shop floor

"When scientists began seeking a vaccine for the SARS-CoV-2 coronavirus in early 2020, they were careful not to promise quick success. The fastest any vaccine had previously been developed, from viral sampling to approval, was four years, for mumps in the 1960s. And yet, the 1st fully approved COVID vaccine was developed in 11 months"

The story of COVID vaccine development is not one of miracles but of human grit, courage to dream the impossible, super focused funding and years of research that preceded it. This has changed the paradigm for innovation. In the pandemic, this wasn't the only innovation that was being created on warp speed. Several manufacturing companies including Reliance built and deployed their own social distancing solution and mask recognition solutions within weeks! In the backdrop of this success, manufacturers will likely be more courageous to implement AI/ML solutions in their shop floors in areas of asset health monitoring and predictive maintenance services, visual inspection systems and optimization of manufacturing processes. ■

Indian Packaging Industry: Reeling under Unprecedented Raw Material Cost

Globally, with the advent of COVID pandemic, demand for manufacturing sector plummeted drastically, chemicals being no different faced the dearth in demand. Industry experts believed the recovery will be slow and sluggish, therefore many industry majors in the chemical sector went for a planned shutdown in mid-2020 while some faced force majeure. However, now when economies are recovering, market is witnessing an unprecedented increase in demand. With sudden surge in demand this has led to major imbalance in the demand supply scenario. Due to this demand and supply gap, price for raw materials cost has increased multiple folds. Besides this, the situation is being compounded by a current global shortage of containers which has led to a sharp rise in transport costs thus further restricting supplies.

This complex mix of higher demand, capacity and supply problems together with restricted availability of transport resources is increasing uncertainty in the market and driving up feedstock prices exponentially.

Raw Material /Petrochemical Price Increase

Petrochemical raw materials and its derivatives, which include UV resins, Polyurethane resins, Solvents, acrylic resins, Adipic Acid, Glycols, Ethyl Acetate, PPG, MDI/TDI, Phthalic Anhydrid have recently experienced extreme price increase.

Epoxy resin prices have witnessed

sharp increase since the latter part of 2020. Similar to petrochemical products, prices around the globe have witnessed exponential increase for pigment raw materials, including titanium dioxide (TiO2).

Similar challenges are affecting the market for polyester resins with factory closures in Singapore and Sweden as well an explosion at a factory in China adding to the difficulties further. This in turn has resulted in suppliers diverting product to their local markets, further pushing up prices.

The raw material scenario is reaching a peak and in fact news is getting worse by the day.

- Adipic Acid, Phthalic Anhydride and Isophthalic Acid are on a constant upswing
- All glycols have escalated, DEG, MEG
- Price of PPG has increased three folds
- Ethyl Acetate has increase by 45-50% and is culminating on a daily basis
- MDI prices has doubled along with scarcity of material

All this has severely impacted the price for printing inks, coatings and laminating adhesives used in various packaging and printing applications. At large, the price for primary feedstock has increase as mentioned below.

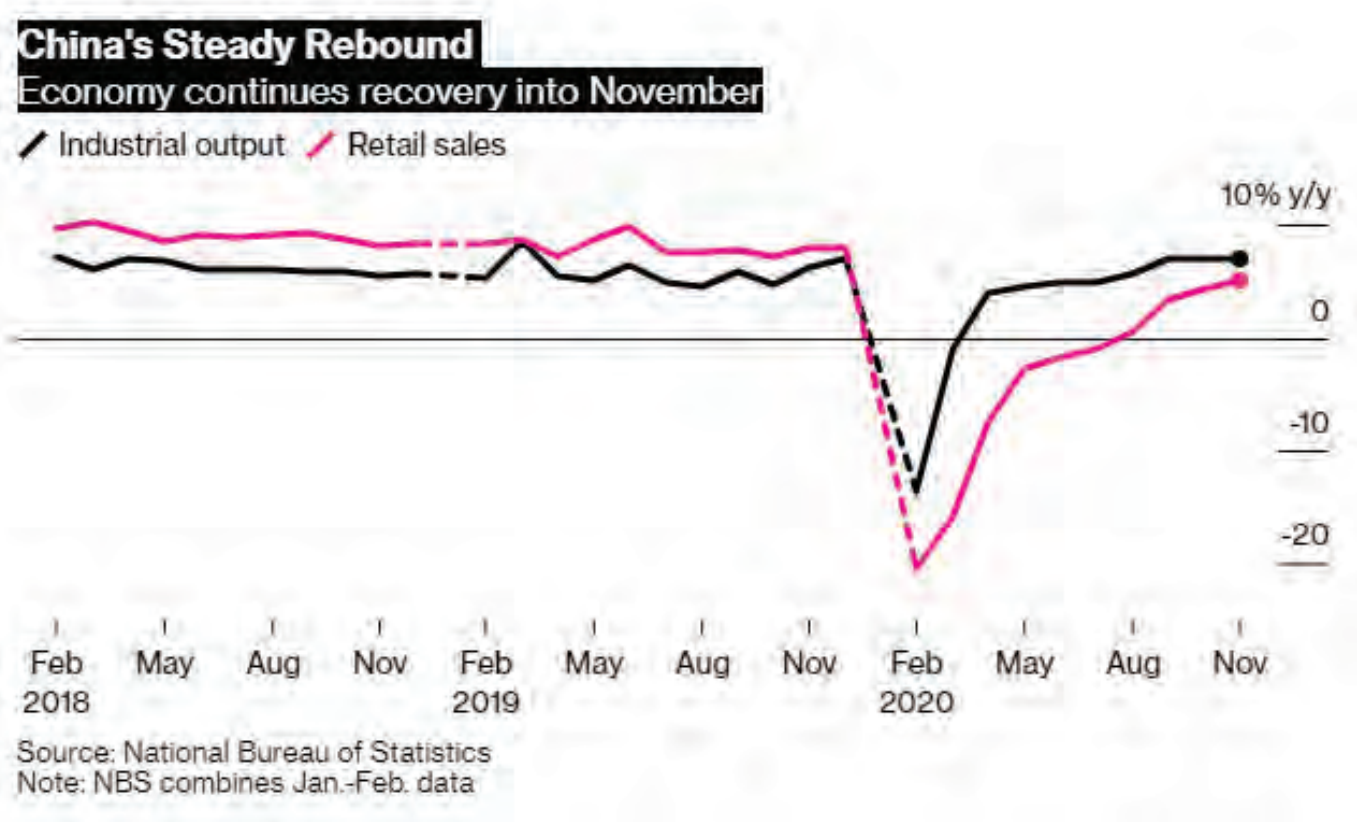
PRODUCTS	Price Increase since Dec 2020
ADIPIC ACID	71%
BUTYL ACRYLATE	112%
MDI	104%
TIO2	28%
ETHYL ACETATE	44%
ETHYL ACRYLATE	43%
TOLUENE	52%
PPG	169%
METHOXY PROPANOL (PM)	159%
PIA	67%
PA	69%
TDI	20%
TEMPTA	58%
MIBK	84%
BUTYL CELLOSOLVE	79%

Economic Recovery in China

Strong demand from certain markets is driving up prices while an unexpectedly rapid V shaped recovery in China is also fuelling demand for these essential raw materials.

Changing Freight Rates

It's not unusual for the ocean freight rates to be changing, and it happens on a regular basis. What is not that usual, however, is the reason behind the changes this time. At India's two largest ports, JNPT and Mundra, carriers have introduced new



general rates. We're seeing this increase because of the equipment shortages and the reduction of vessel capacity in the Indian subcontinent. This is leading to an increase in ocean freight rates that started at the beginning of Jan'21.

Looking away from India, these ports aren't the only ones, where the ocean freight rates have gone up. Containers from Jebel Ali, the United Arab Emirates, and the ports of Qingdao, Shanghai, and Nansha, China, with a destination to different parts of the world have also seen an increase in freight.

With the Covid-19 pandemic, the market in container shipping has been turned on its head.

Force Majeure Notices Are Stacking Up

Companies have clearly been cutting capital budgets, in response to the slowing global economy. That's the only conclusion to be drawn from last 4 month review of force majeures. Force majeure have been climbing steadily for months. Thus it is worth keeping a careful eye on force majeures, as they provide early indication of problems ahead.

To worsen the scenario further, in late Februrary US Gulf coast had been hit by rare severe winter storm and ultralow temperature impacting the production and operation of MDI and TDI plants located in Texas, Louisiana, Mississipi, Alabama

and Florida. Covestro announced that the supply of MDI, TDI units in North America encountered force majeure, production of all units in Texas including 330,000 tons of MDI and 220,000 tons of TDI will be impacted.

Another key raw material Acrylic acid is in shortage globally due to on-going shutdown of LG-Korea (no update on production till March), force majeure of Sasol-South Africa & fire accident of China's Zhejiang Satellite Petrochemical. LyondellBasell, INEOS declare force majeure. IQ declares force majeure on butanols, butyl acetate

Conclusion

Key drivers for the increases include high demand across all industries, greater domestic supply requirements and broad demand pressures and higher costs. While the actual costs vary widely from region to region, higher than average per ton costs have been aggravated by significantly higher freight costs.

Consequences due to feedstock and freight cost increase

- Inordinate delay in the shipment execution from different overseas suppliers due to vessel space/ container shortage. Current ocean freights are more than 4 times as compared to Jan.
- These unprecedented dynamics have resulted in significant inflationary pressure which requires to raise prices to offset these costs
- Some of the raw material suppliers are now resorting to monthly price. Inks , Adhesives and Coatings also plan to implement the same, instead of quarterly pricing
- At this stage, this extreme situation looks set to continue till June / July 2021 at the earliest. Although it could be extended. ■

Author

Rajesh Srivastava
Vice President Sales & Marketing – Chemicals Business, UFlex Ltd.

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Advances in Engineering

Worley
energy | chemicals | resources

Video Link: https://youtu.be/xfg_XBMmjow

Neelesh Borkar, Senior Director Operations, Worley

Project jigsaw puzzle has process units at the core and supporting facilities utilities at the periphery. One piece missing out of the place the puzzle remains unsolved and the customer's investment is at risk. Engineering Procurement & Construction are the prime pathways leading to solution of the puzzle. Engineering constitutes 10% of the project's cost but its ability to influence the project is to the level of 90% which clearly indicates the importance of engineering in total project delivery. Incomplete scope definition , inadequate front end loading and poorly completed engineering deliverables causes cost & schedule overruns apart from multiplier effect on project lifecycle contractors, operators & maintenance folks.

Worley has moved from conventional document centric approach to data centric approach. This has enabled the company create alignment innovation & flexibility in delivery, remove redundancy , reduce operational costs and deliver projects more efficiently to meet the needs of customers. Neelesh Borkar, Senior Director Operations, Worley shared his experience on 'Advances in Engineering.'

Paradigm shift in Sourcing & Logistic Management

accenture

Video Link: https://youtu.be/8lhr02OazrQ

Manish Chandra, Managing Director, Accenture

In terms of how sourcing & procurement has evolved is now more relevant than ever. For the 1st few years the focus was more on how do you manage the budget, slowly the focus shifted to cost transformation , how does one drive incremental savings & values over the budget. Now the focus has shifted to drive digital transformation across the organization specifically in procurement since that is where most if the costs reside. If one looks at the digitalization, you will not only achieve benchmark performance and do better that your peers but you will also achieve quartile zero performance which is achieving the art of possible in terms of operational efficiency, strategic value & more importantly user experience. In his address during EPC World.

IE 2021 , Manish Chandra, explained how Digital procurement has become a critical area of focus for most of the organizations.

New Generation High Performance Coatings & Way Forward

Video Link: https://youtu.be/XXOOAsqwOgQ

Bharat Chokshi
CMD, Grand Polycoats Co. Pvt. Ltd

Bharat Chokshi talked about green coating and sustainability and closely addressed the major concern of environment and green technology. Mr Bharat spoke about Green chemistry from Fashion to Functionality.

New Generation High Performance Coatings & Way Forward

CMP CHUGOKU

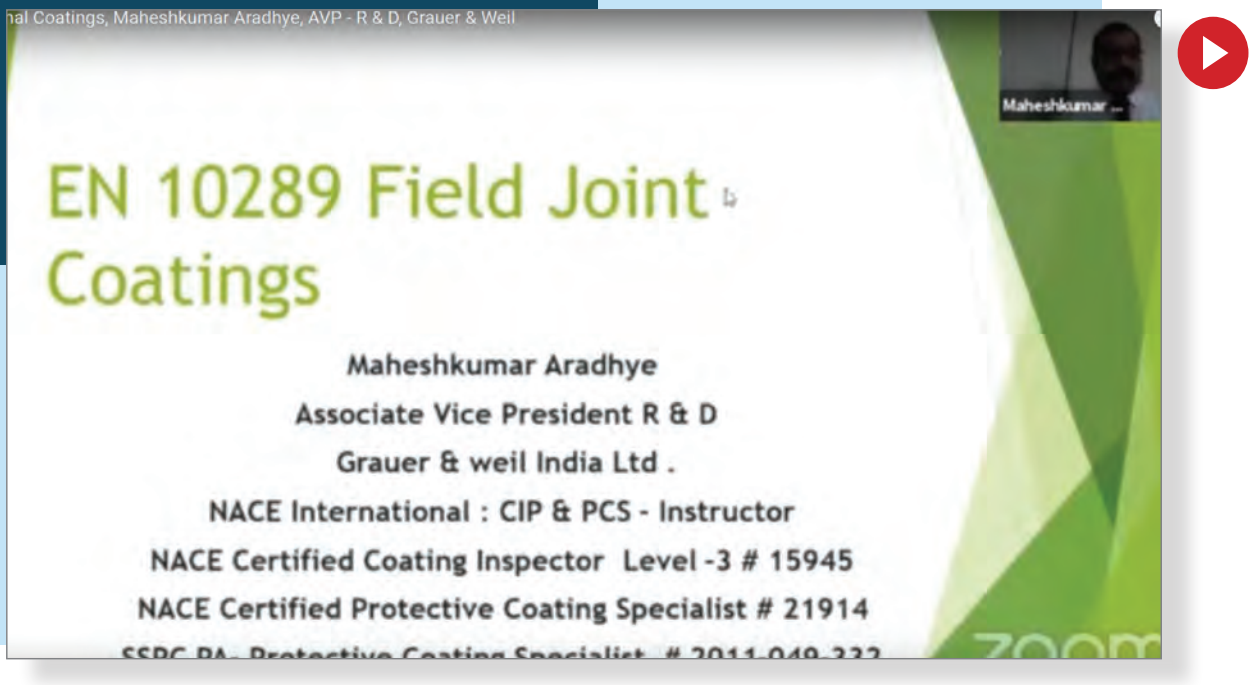
Video Link: https://youtu.be/y3amTAhvWC8

Shekhar Joshi,
Managing Director, Chugoku Paints (India) Pvt Ltd

Shekhar Joshi talked about Long service life paint system for steel bridges. Speaking about the company's close collaboration with Japan, other major aspects of topics like fluororesin Finish , Track Record for fluororesin, data for fluororesin, JRA C-5 paint system, Expected service life of C-5 and C-5 for Nhat Tan bridge was discussed.

New Generation High Performance Coatings & Way Forward

Video Link: https://youtu.be/AVl1HAillug



Maheshkumar Aradhye
Associate Vice President - R & D, Grauer & Weil (India) Limited

Maheshkumar Aradhye, talked about field joint coatings and other major tools and technology. ISO EN 10289, its scope, coating thickness and hardness, critical test parameters, was explained in depth. Pentazone 1000 BSEN 10289Brushing @ 1500 Microns, Holiday Detection @ 15 KV, Pentazone 1000 BSEN 10289 were also some key highlights. How to handle Pentazone 1000, its technology, the moisture displacement, handing substrate and must have power tools like Base Resin, Curing agents were discussed.

New Generation High Performance Coatings & Way Forward

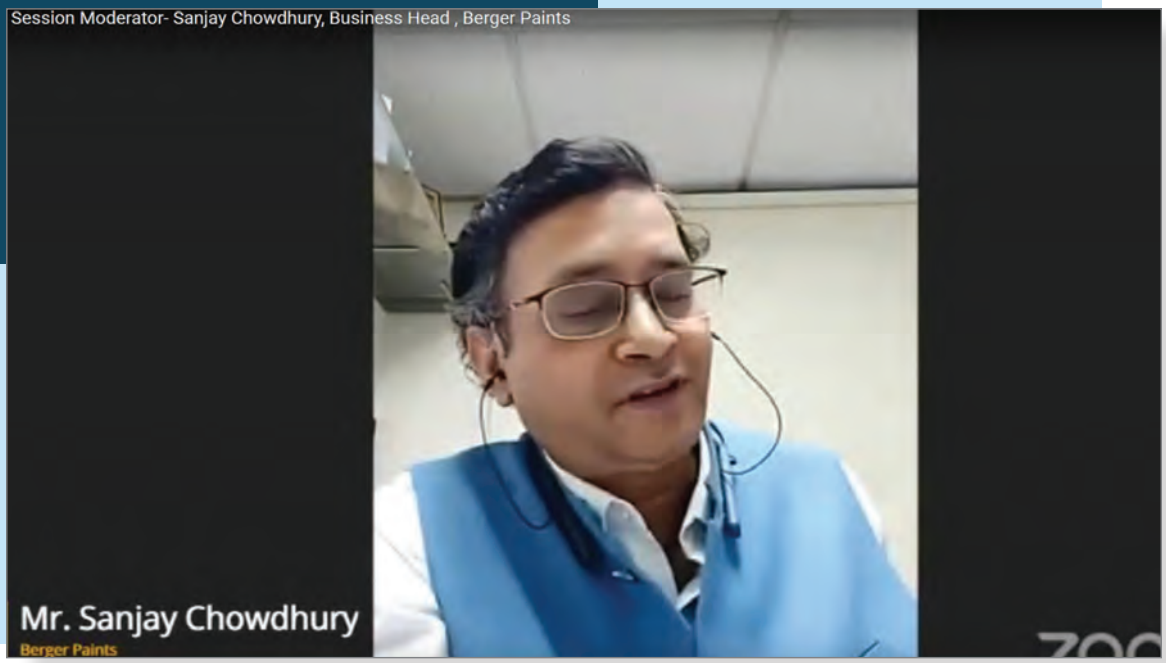
Video Link: https://youtu.be/hIe5v2HSru8

S Ravichandran
Senior Manager, Protective Coatings (T&D), Berger Paints

S Ravichandran, talked about insulated piping, equipment and vessels in chemical plants and oil refinery. CUI coatings challenge, NACE SP0198, test methods for products, ideal CUI coating, basic corrosion control techniques and application requirements were also discussed.

New Generation High Performance Coatings & Way Forward

Video Link: https://youtu.be/PmdFKwvf79U



Sanjay Chowdhury
Business Head, Berger Paints

Sanjay Chowdhury talked about how the industry is coming in terms with adjusting into the market volatility. He addressed the complexity and important aspects of relaying on innovation techniques to cope up with new ways of making profits.

New Generation High Performance Coatings & Way Forward

KANSAI NEROLAC PAINTS LIMITED

Video Link: https://youtu.be/FnT9EgLnGb8

Xavier Pereira
Chief Manager, Technical Product Development, Kansai Nerolac

Xavier Pereira spoke about new generation high performance coatings and way forward and History of KNPL. Innovative performance coating solutions or highly corrosive atmosphere, protective coatings sector, maintenance and general solutions were discussed during the session.

Fill the Gap: APM 4.0 Bridges the Technology and Generation Divide

By Kim Custeau, Vice President, APM Business AVEVA

The workforce has always adapted to ongoing generational shifts, and today's employee landscape is no exception, particularly in the engineering and industrial sectors. With many baby boomers still in the workplace but potentially thinking about career exits and retirement plans, businesses must think not only about succession plans surrounding people, but also how technology can help bridge the knowledge gap.

New research revealed that 77% of finance directors are concerned about the skills gap and the negative impact from the widespread retirement of baby boomers over the next five years. Beyond this, there are also concerns beyond the new demands and expectations from the younger Generation Y and Z workforce, especially surrounding technology. It's essential that we align people, process and technology.

Kim Custeau, Vice President, APM Business AVEVA

Inspire people to shape the future

If machines could talk, they'd tell us that now is the time to unlock and capitalize on the knowledge of the retiring workforce so that Millennials and Generation Z can reap the rewards of their hard earned

experience. In industrial operations in particular, it's time to consider how to blend the institutional knowledge that the retiring generation carries to benefit the younger generation that has additional skill sets in digital technology.

The next generation of industrial workers expect an easy, modern, scalable solution to conduct their work processes – high-speed internet access, mobile devices, touch screens and virtual reality. This combination of an evolving workforce and proliferation of technologies such as predictive maintenance, cloud, big data and mobility is bringing asset performance management 4.0 (APM) to the forefront of business.

Collaborate and Create

APM 4.0 is bridging the technology and generation gap, enabling people to communicate and collaborate beyond traditional boundaries. As your business evolves, APM 4.0 enables continual digital transformation designed to accommodate the knowledge and expertise of your workforce.

BP is a great example of the power of collaboration. The company wanted to simplify and standardize its oil and gas downstream supply chain management creating an intuitive environment that enables refinery analysts to identify economic opportunities and share best practices. . There was a lack of transparency and duplication of efforts across the supply chain, which was largely down to using outdated technologies that required rare specialized skills, often limited to a small number of specialists.

By adopting APM 4.0, BP was able to enhance data management and transparency to improve decision-making and knowledge share across global feedstock planning and refinery operations teams, spanning countries and generations.

- 1.1.1.1. Ascend Performance Materials is another great example of a company that gained real business value from APM, and how workflow enabled organizational collaboration amongst all teams, from junior to senior level team members.
- 1.1.1.2. Ascend's goal was to transform from a '1950s' era plant, into a modern manufacturing facility able to leverage the hidden insights in industrial data in order to help prevent plant shutdowns.
- 1.1.1.3. Prior to implementing APM 4.0, Ascend was collecting data manually on pieces of paper that stayed on a clipboard until the clipboard was full. It was a challenge to track down who implemented work, and what they posted in the system. Using APM 4.0, Ascend was able to eliminate the manual input of data and visualize the overall manufacturing process across all teams, improving communication

and knowledge share, and saving over $2 million in potential plant closures.

APM 4.0 to Revolutionize Industry and Enhance the Human Experience

APM 4.0 also unlocks the potential of your assets, opening new opportunities to bring together cyber and physical systems, the Internet of Things and cloud computing to create smart factories, facilities or plants. As organizations invest in their people and technology to bridge any generational divides, they should be looking at APM 4.0 as a critical component of that strategy in order to help business to quickly adapt to market changes and capitalize on economic opportunities.

APM 4.0 is an evolutionary step that brings together many components we see now and that have the potential to make an impact in the future. At its core, APM 4.0 includes prescriptive analytics and machine learning, smart connected assets and services, IIoT platforms, industry best practices and digital twin as a mashup. It empowers companies to adopt predictive and prescriptive maintenance strategies, giving them the ability to look ahead, prescribe the most economically advantageous course of action that prevent costly failures and reduce unplanned downtime.

We believe industry advancement should enhance the human experience, and not only revolutionize industries, but also empower the people behind them. Our comprehensive Asset Performance Management software portfolio is designed to overcome today's industrial challenges by leveraging industrial big data. With improved analysis, you'll eliminate inefficiencies, bridge the generational divide of your people, optimize operations, and improve profitability.

About AVEVA

AVEVA Group plc provides innovative industrial software to transform complex industries such as Oil & Gas, Construction, Engineering, Marine, and Utilities. AVEVA's software solutions and platform enable the design and management of complex industrial assets like power plants, chemical plants, water treatment facilities and food and beverage manufacturers – deploying IIoT, Big Data and Artificial Intelligence to digitally transform industries. ■

For more details contact

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Website: www.aveva.com

Stop Postponing Tank Calibration

This New Method Makes it Easier than Ever

METTLER TOLEDO

Gone are the days of time-consuming and expensive calibration methods with unsatisfying accuracy and traceability results. The new, innovative RapidCalTM method offers economical and fast calibration without using huge amounts of test weights and liquids. This allows you to avoid extended downtime and save costs!

How does RapidCal tank scale calibration work?

Instead of using test weights or material substitution, a downward force is applied with hydraulic equipment. The loading of the tank scale during RapidCal mimics that of normal operation, taking into account piping influences.

Minimum time investment

RapidCal can be performed at any time with a minimum amount of preparation. The calibration is done quickly, thanks to equipment portability. Moreover, the whole calibration process is significantly faster than calibration with test weights. This lowers the effective downtime of your production facilities dramatically over the course of a year to a few hours per calibration. High

cost savings are realized by reduced downtime.

Higher accuracy and assured traceability

With RapidCal, it is possible to reach up to 0.1 percent accuracy by using the force applied to hydraulic cylinders. The reference load cells used are traceable to test-weight standards and provide accuracy and traceability comparable to calibration with physical weights.

Saves thousands of dollars

Traditional forms of tank calibration can be very expensive, from test weights which increase in price depending on scale capacity to material substitution calibration which requires a huge amount of purified water. RapidCal helps to maintain traceability at lower costs, increase the efficiency of the calibration cycle, and improve the ecological footprint of your operation.

Avoid contamination of tank contents

The tedious emptying and cleaning of tanks during substitution calibration is avoided by applying this new method. For production facilities, the risk of tank contamination is eliminated and disposal costs of contaminated water avoided.

Up to 32 ton full capacity

RapidCal is the best method up to 32 tons, where using test weights is time-consuming and cumbersome. Regular recalibration can easily be scheduled to comply with quality systems. Furthermore, for weights in excess of 32 tons, a material substitution calibration is possible using the calibration technology offered by our service team.

About METTLER TOLEDO

METTLER TOLEDO is a leading global supplier of precision instruments and services. The company has strong leadership positions in a wide variety of market sectors and holds global number-one market positions in many of them. Specifically, METTLER TOLEDO is the largest provider of weighing and analytical instruments for use in laboratory and in-line measurement in demanding production processes of industrial and food retailing applications. ■

For more information

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No Downtime Whatsoever

High Reliability from TDL O2 Analyzer

A closed extractive measurement system and paramagnetic analyzer can be used to monitor O2 levels inside equipment along production lines. Keeping moisture in the gas sample at a very low level avoids negative effects on analyzer response time and performance.

Oxygen sensor accuracy and speed of response are paramount when there is a risk of explosion in production vessels. For a leading producer of performance additives, METTLER TOLEDO's GPro® 500 is providing high performance with almost zero maintenance.

Safety is overriding

Phosphorus pentasulfide is an inorganic compound used in the production of lubricants, pesticides and flotation agents. It is extremely flammable; therefore, an inert atmosphere must be maintained during its production.

Italian company needs fast, accurate O2 measurement

Italy's Italmatch is a leading supplier of performance additives for the lubricant, plastics, water and oil industries. They required an improved oxygen analyzer and sampling system to reduce measurement time and increase accuracy for phosphorus pentasulfide production in its plant in Spoleto.

Advanced technology provides measurement confidence

A tunable diode laser (TDL) gas analyzer uses laser light, tuned to a specific

frequency, to rapidly detect the quantity of a target element in a gas stream. METTLER TOLEDO's growing GPro 500 series of analyzers offers TDLs with a wide range of process adaptions. This gives the series exceptional flexibility in respect to application suitability and installation possibilities. Other than annual verification and periodic cleaning of the analyzer's optics, GPro 500 sensors require no maintenance; therefore, they can be relied on to provide continuous, reliable measurements throughout production processes. The GPro 500 can be installed in situ when process conditions allow, or connected to an extraction system if the gas stream has a very high particle load and moisture content, as is the case at Italmatch.

Six months without maintenance

A demonstration of the GPro 500 at Italmatch's Spoleto facility convinced the instrumentation team that the analyzer's ease of use, speed of response, and low maintenance would meet all their needs. In addition, they appreciated the two alarm thresholds on the connected M400 transmitter that would signal when a lower and higher O2 level in the production equipment had been breached; something that was not possible with their paramagnetic analyzer.

A GPro 500 with an extractive cell adaption was duly installed to a new extraction system. Since its commissioning, the Spoleto plant has been very impressed with the GPro 500's measurement accuracy, rapid measurement and problem-free operation. The site manager said, "I'm delighted with the analyzer. It was surprisingly easy to install and since turning it on six months ago we've had no downtime from it whatsoever. I wish we'd known about it years ago." At Italmatch, confidence in the accuracy of production vessel O2 levels has been well and truly restored.

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L&T Construction Divisions Awarded Contracts for Water Treatment & Cement Plant

(Pic courtesy: lntecc.com)

Mumbai, India: The construction arm of L&T has secured orders from its prestigious client for two businesses. The Water & Effluent Treatment Business of L&T Construction has secured EPC orders from the Rural Water Supply and Sanitation Department, Odisha to execute individual Rural Water Supply Projects in the Kendrapada & Khorda Districts of Odisha. The scope of work includes design & construction of Intake structures, 4 Water Treatment Plants of a cumulative capacity of 105 MLD, supplying and laying transmission and distribution pipelines, overhead service reservoirs, a booster pumping station, house service connections and associated electromechanical & instrumentation works including measuring the input & output of the quantity and quality of water at each level. The projects will provide drinking water to 12.28 Lakh people across 780 villages in Kendrapada & Khorda Districts of Odisha.

The business is already executing several other rural water supply projects for the same client.

The business has also secured a repeat order from the Water Resources Department of Odisha to construct an intake structure and pressure main along the right bank of Bargarh Main Canal of the Gangadhar Mehar Lift Irrigation Project in Bijepur, Odisha on EPC-TurnKey basis.

The scope includes design & construction of an intake structure, pump house, pressure main of length 34 Km and associated electromechanical & instrumentation works.

The factories arm of Buildings & Factories Business has secured an order from a leading Cement Manufacturer in India to construct a 10000 TPD Integrated Cement Plant in Pali, Rajasthan. The scope involves Civil, Mechanical and Equipment Installation works.

IOCL & IDCO sign MoU for Paradeep Plastic Park

Minister for Petroleum and Natural Gas & Steel and Chief Minister of Odisha jointly witness the signing

New Delhi, India: Indian Oil Corporation Limited (IOCL) and Odisha Industrial Infrastructure Development Corporation (IDCO) have signed Memorandum of Understanding (MOU) to develop Paradip Plastic Park. The MoU was signed on a hybrid mode, in the presence of Minister of Petroleum & Natural Gas and Steel Shri Dharmendra Pradhan, Shri Naveen Patnaik, Chief Minister of Odisha and other dignitaries. Addressing on the occasion, Dharmendra Pradhan said, "Keeping the enterprise and employment generation potential of the plastic sector in mind, Government of India has initiated the cluster development of the Industry through its Plastic Park scheme. Currently, six such parks have been approved by the Government of India, with Paradip Plastic Park being one of them." Dharmendra Pradhan further added that Odisha would become the nerve centre of industrialisation through rapid development in petrochemical, chemical, polymer, textile and fibre sectors.

The Union Minister also highlighted the importance of a skilled workforce in this downstream Industry for which the Institute of Chemical Technology, Mumbai and IndianOil have joined hands to set up a world-class Centre of Excellence in Chemical Engineering and Technology at Bhubaneswar. The Minister also said that "Today's event is a significant milestone in the direction of Honourable Prime Minister Narendra Modi's vision of mission Purvodaya for growth of Eastern India." Speaking on the occasion, Naveen Patnaik, Chief Minister, Odisha, said, "I congratulate Union Minister, IndianOil and IDCO for coming together towards the development of Paradip Plastic Park, which is going to be a real game-changer

for the downstream plastic industry. This will boost the petrochemicals and plastic infrastructure as well as auxiliary industries & MSMEs in Odisha as well as Eastern India.

As part of the MoU signing, to attract investments in downstream polymer industries at Paradip Plastic Park, IndianOil announced a Special Strategic Incentives scheme. An incentive of Rs 2000/MT on Polypropylene granules from Paradip Refinery shall be offered to the manufacturing units located in the Paradip Plastic Park till 31.3.2030. It is estimated that around 26 units will come up at the plastic Park with an estimated investment of 500 Crores and is likely to generate direct and indirect employment of 6,000. Dibya Shankar Mishra, MoS (I/c), Energy, Industries, Micro, Small & Medium Enterprises, Govt. of Odisha, Sanjay Kumar Singh, Chairman, IDCO and Shrikant Madhav Vaidya, Chairman, IndianOil were also present on the occasion.

Praj wins breakthrough order to set up Compressed Biogas plant from HPCL

Pune, March: Praj Industries bags the prestigious breakthrough order from Hindustan Petroleum Corporation Limited (HPCL) for setting up Compressed Biogas

Dr. Pramod Chaudhari, Founder & Executive Chairman, Praj Industries Limited

(CBG) project at Badaun in Uttar Pradesh. Praj is offering its State of the art, worlds' first of its kind RenGasTM technology developed using proprietary microbe to produce CBG from rice straw. The project has capacity to process 35000 MT of rice straw as feedstock to generate 5250 MT of CBG annually. In addition, the project will also generate 23,000 MT high quality solid bio- manure and 350,000 MT of liquid bio-manure for ferti-irrigation. This project has a potential to save up to 15000 MT of CO2 emissions per year. The project will

be completed and commissioned within 12 months timeframe.

The Best-in-Class RenGasTM technology, to process agri-residues for the production of CBG is developed at Praj-Matrix, Department of Scientific and Industrial research (DSIR) certified the R&D centre. Praj has incorporated unique dual plug flow digestor design, in collaboration with DVO Inc of USA. This patented design technology has several advantages including higher efficiency, lower energy consumption and near zero maintenance. RenGasTM technology yields are considerably higher compared to conventional biogas processes. This project will contribute to the Ministry of Petroleum and Natural Gas (MoPNG), GOI's Sustainable Alternative towards Affordable Transportation (SATAT) initiative with an objective to promote CBG as an alternative, green transport fuel. The project will generate significant employment opportunities in surrounding farming and rural community. Agricultural waste in the form of rice straw procured as feedstock for the CBG project will provide additional income revenue stream to farmers, facilitating GOI's flagship program of Doubling Farmers Income.

Speaking on this development, Shishir Joshipura CEO & MD of Praj said, "We are delighted to partner HPCL for the CBG project at Badaun UP which will deploy RenGasTM technology an integral part of our Bio-MobilityTM platform. This project is a definitive solution to meet the challenge of air pollution related to stubble burning while simultaneously enable sustainable decarbonisation.This project will facilitate India's pursuit of energy security, and also, a definitive step towards Atmanirbhar Bharat. We are already executing for HPCL advanced biofuels project at Bhatinda Panjab, based on our enfinity 2G technology that uses rice straw as feedstock to produce ethanol. We look forward to continue strengthening of our association with HPCL in future." ■

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EPC 2022 Engineering Procurement Construction | Refining & Petro CHEMICALS 2022 | LAB ANALYTIX World Expo 2022 | Industry AUTOMATION & Control 2022 | PVF Pumps, Valves & Fittings WORLD EXPO 2022 | WaterEX WORLD EXPO 2022 | Paint & Surface Coating | BOILER World Expo 2022

Scope for CHEMTECH + Biopharma World Expo 2022

- Refining & Petrochemical products
- Biotechnologies
- Chemical & Pharma Processing Equipment
- EPC Services
- Automation Technologies
- Environment Solutions
- Water & Wastewater Treatment Technologies
- Pumps & Valves
- Pipes & Fittings
- Packaging Solutions
- Material Handling Systems
- Analytical & Laboratory Technologies
- Consulting Services
- Equipment Fabricators

Scope for Specialty Chemicals World Expo 2022

- Agrochemicals Intermediates
- Adhesives & Sealants
- Agrochemicals & Crop Protection
- Bulk Drugs & Intermediates
- Enzymes
- Colorants, Dyes & Pigments
- Cosmetics & Personal Care Ingredients
- Hygiene & Cleaning Chemicals
- Laboratory Chemicals
- Surfactants
- Water Treatment Chemicals
- Catalysts
- Electronic Chemicals
- Flavours & Fragrances
- Contract Manufacturers

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