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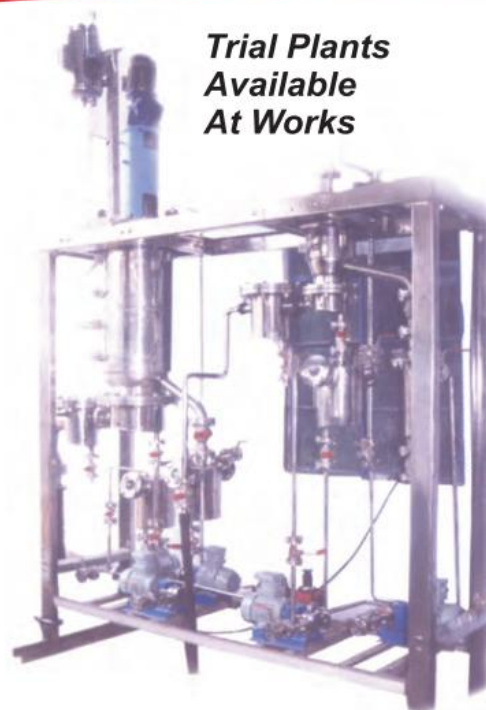
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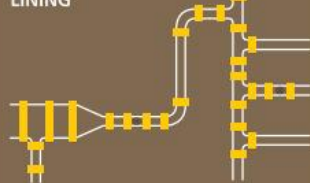
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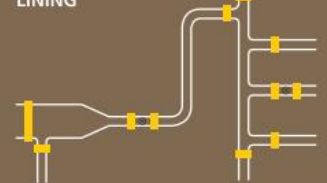
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- Bio Sludge Disposal System
- Anaerobic Treatment Plants
- Advanced Oxidation Plant
- Wet Air Oxidation Plants
- MBR & MBBR ETP Plants
- UF & RO Plants



Air Pollution Control Plants

- Venturi Scrubbers & Packed Towers
- Exhaust System Vent Scrubbers
- Ammonia & Solvent Recovery Plants
- Odour Control System & Bio Scrubbers
- Organic Fumes Adsorption Plant
- Catalytic NOx Control System
- ACID Fume Scrubbing Systems



Chemical Waste Incinerators

- Solid & Liquid Waste Incinerators
- Organic Fumes & Waste Gas Incinerators
- Rotary Kiln Incinerators
- Drum Pyrolysis
- Bio Sludge Disposal System
- Flue Gas Treatment for Incinerator
- Air Pollution Control for Incinerator

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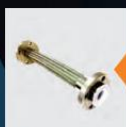


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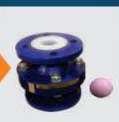


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PP/PVDF/FEP/PFA
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Sight Flow Indicators



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Bellows & Hoses | Special Lined Products | Fittings



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Chemical Market to Witness Steady Growth in Industrial Water Treatment

California, USA: As per a recent report published by specialists, the scope of global industrial water treatment chemicals market is projected to grow at a CAGR of 4.2 percent to touch USD 18.3 billion by the completion of 2025. With increasing scarcity of fresh and fit-to-drink water – majorly in Asia Pacific, Middle East, and Africa – is a major factorial for the necessity of wastewater treatment, which in turn boosts up the demand for industrial water treatment chemicals. The frequently utilized chemicals for water treatment are iron, chlorine dioxide, muriatic acid, sodium bicarbonate, aluminium, chlorine, and algicides. Flocculants, coagulants, filter cleaners, and clarifiers too form an important share of water treatment method for contaminated seawater, rivers, and wastewater discharges towards making the source harmless for humanoid drinking.

Growing industrialized accomplishments, speedy urbanization, and rising financial growth are the notable factorials of incessantly growing demand for water. Purification, treatment of wastewater effluent, cooling treatment, and boiler treatment are four elementary procedures in this regard.

In the USA, the demand for freshwater upsurge is predominantly caused by altering weather, alterations in energy generation, amassed usage of land, and increasing humanoid populace. The freshwater is majorly utilized for irrigation, livestock, aquaculture, cooling of electric power plant, and other industrialized as well as metropolitan usages.

Africa, Asia Pacific, and Central & South America experience low per head availability of freshwater for human ingestion; and one of the major causes for this is unpredictable rain fall. These areas are the developing markets for biocides which are utilized in the industrial wastewater management to keep up the environment clean and to deliver the drinkable supply to the populaces. Growing industrial productivity in power generation sector and decreasing water footmark through recycling are expected to motivate the global industrial water treatment chemicals industry.

Source: Cision PR Newswire

Global Chemical Logistics Market is on Upward Trail

New York, USA: Global chemical logistics market is expected to see a significant upward movement during 2020 – 2024. The market is expected to touch USD 24.73 billion, with a CAGR of

14 percent during the forecasted period. This growth is the cascading impact of the holistic growth of chemical industry. In addition to this, the increased demand for modernized green warehouses in chemical industry has also been factored in for this growth. The global chemical production saw a growth increment of approximately 2.7 percent in 2019 compared to 2018. The fall in crude oil prices from USD 64.90 per barrel in 2018 to USD 57.05 per barrel in 2019 has also given a prominent forward push as a bulk number of chemicals are being derived from crude oil.



Image courtesy: <https://www.technavio.com/>

The increased demand for naptha does also contribute well in this growth trail, as it is an important and major feedstock for petrochemical industry.

Source: Business Wire

LANXESS Honored by CDP for Climate Protection

Cologne, Germany: Specialty chemicals company LANXESS has been recognized by the international climate protection initiative CDP as a global leader in climate protection. The company received the highest rating in the most recent evaluation and is now listed as one of 179 companies worldwide in the "Climate Change A List". LANXESS is among the top two percent out of 8,400 companies evaluated by CDP. This is the third inclusion in the "Climate Change A List" for the company, which has been disclosing data relevant to climate protection as part of the program since 2012.

"We see the inclusion in the CDP's list of best performers as both confirmation and incentive for our commitment to climate protection. As an international chemical company, we take our special responsibility seriously. This is also reflected in our ambitious goal of becoming climate neutral by 2040," said Hubert Fink, member of the Board of Management of LANXESS AG.

The rating "A" is given to companies that stand out in terms of transparency and completeness of reporting as well as actual climate protection performance. Specifically, this includes that companies already report in line with the requirements of the "Task Force on Climate-related Financial Disclosure" (TCFD). A key element is the presentation of risks and opportunities as well as the business strategy with regard to climate change. The requirements of the TCFD will only be implemented in European legislation for financial reporting in the coming years.

Climate neutral by 2040

In the last few months, LANXESS has focused its business activities even more strongly on sustainability, with climate protection and energy efficiency being key topics.

The specialty chemicals company announced in November 2019 that it will become climate neutral by 2040 and reduce its greenhouse gas emissions from the current level of around 3.2 million metric tons of CO₂. In December, LANXESS linked the interest rate terms of its main revolving credit facility to the successful reduction of its greenhouse gas emissions, among other things. Since January 1, 2020, LANXESS has also been a member of the World Business Council for Sustainable Development (WBCSD). The organization is committed to accelerating the change towards a more sustainable world.

CDP: Largest data collection of environmentally relevant data

The independent non-profit organization CDP has set itself the goal of creating worldwide transparency on greenhouse gas emissions and the management of water resources and forests. In 2019, more than 8,400 companies as well as 920 cities and countries submitted their data to the initiative. This makes the CDP data platform one of the world's most comprehensive sources of environmentally relevant information.

The ratings also serve institutional investors as a guide for Socially Responsible Investing (SRI). The project is currently supported by more than 525 investors worldwide managing assets totaling around USD 96 trillion.



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ECHA Smooths the Path for Saltigo's Active Ingredient

Leverkusen, Germany: The Biocidal Products Committee of the European Chemicals Agency (ECHA) has published its opinion regarding the approval of the active ingredient Icaridin: the insect repellent that Saltigo GmbH markets under the trade name Saltidin should be approved for use in insect repellents (product type 19) without any age limit.

Approval of the active ingredient Saltidin (Icaridin) had already been requested under the previously applicable Biocidal Products Directive (Directive 98/8/EC). "The respective national approval requirements in the individual EU member countries applied to Saltidin (Icaridin) prior to the approval decision, i.e. the inclusion on the list of approved active substances," explains Andreas Klein, Head of Marketing and Sales at Saltigo. The European Union (EU) aimed to standardize approvals for active ingredients such as repellents with the Biocidal Products Regulation (BPR, Regulation (EU) No 528/2012).

Dirk Sandri, Head of Sales at Saltigo, adds that "the EU has made safety requirements for repellent active ingredients much stricter in recent years. This makes it all the more encouraging that Icaridin is the first insect repellent active ingredient to garner a positive opinion for approval under these tighter conditions. It is therefore clear that our Saltidin fulfills the stricter requirements. In the future, these will also apply to other repellent active ingredients that will have to be reevaluated as of 2022."

Globally established active ingredient offers effective protection. In formulations Saltidin reliably repels insects. This protects the user against bites from mosquitoes, biting houseflies and ticks for several hours. These are not only unpleasant or even painful, but can also go hand in hand with the transmission of dangerous diseases such as Zika virus and Lyme disease. In chemical terms, Saltidin is 1-(1-methylpropoxycarbonyl)-2-(2-hydroxyethyl)piperidine. The active ingredient with the non-proprietary name Icaridin has a neutral odor and does not irritate, sensitize or stick to the skin. Another advantage of the active ingredient is its compatibility with numerous materials. For instance, Saltidin does not affect plastics or textiles.

Icaridin, which Saltigo markets under the name Saltidin, is ideal for a very wide range of insect repellent formulations that are applied in a variety of ways and is used by numerous manufacturers of such products worldwide.

The first products to use this active ingredient arrived on the German market in 1998. The mosquito repellent active ingredient Icaridin was then launched in South and Central America and Africa in 2007. Its very successful Asian market launch began in May 2012. Insect repellent formulations based on Saltidin have now been approved in more than 40 countries, including the U.S.

The official approval requirements for insect repellent formulations vary from country to country. In most countries, an insect repellent formulation has to be approved before it can be brought to market. In some countries, it is also necessary to register the active ingredient.

"Saltigo offers support to companies that aim to market insect repellent formulations containing Saltidin in Europe," says Sandri. "We offer the same level of assistance to customers outside Europe

and we are working on new approvals for our tried-and-tested active ingredient Saltidin".

IoT Market in Chemical Industry Takes a Positive Stride in 2020

As per recent Quince Market Insight on global IoT market, chemical industry is expected to witness a positive growth trail due to increasing interest for a modern system of computing devices designed with an aim to connect various interrelated devices and applications to deliver quantifiable benefits within business processes. The report stated, "IoT in Chemical Industry Market to accrue lucrative gains worth USD 80 billion by 2025". Today's chemical world has experienced a shift in their operations owing to such digital transformations. A shift towards green and renewable products, in context of present competitive market environment coupled with changing customer preferences, has enabled the chemical companies to adopt innovative technological solutions. Analytics are being used extensively these days across the industries to gain insights on their stored data. Efficient management of voluminous data these days has become super easy with the integration of analytics and IIoT which facilitates seamless transfer of real-time data between machines and networks. The IoT market is being greatly influenced by the growing demand for analyzing and monitoring information. Besides this, the emergence of new players, growing regulatory issues, and increasing adoption of green & renewable products have driven the use of advance technologies in the chemical industry.

Source: OpenPR

HollyFrontier Opts for Topsoe's HydroFlex™ Solution to Reduce Cost-of-Compliance with Renewable Fuel Blending Requirements

Copenhagen, Denmark: Under the agreement with Artesia Renewable Diesel Company LLC, a subsidiary of HollyFrontier, Topsoe will license and supply basic engineering, proprietary equipment, catalysts, and technical services. The project is based on HydroFlex™, a world-leading, industry-proven Topsoe technology that produces renewable fuels, such as gasoline, diesel and sustainable aviation fuel, from all renewable feedstocks. The contract was awarded after an in-depth feasibility study, involving competing technologies.

Every year, the United States Environmental Protection Agency (EPA) sets an annual quota for how much biofuel must be blended into gasoline and diesel sold in the US market. RIN (Renewable Identification Number) credits represent a volume of biofuel blended into fossil fuel and are used to ensure compliance with the quota. RIN credits can be traded, so companies that do not produce renewable fuels can buy RIN credits to meet their individual quota of renewable fuel.

"We are very proud that a market leader such as HollyFrontier has chosen HydroFlex™ for their strategic expansion into renewable fuels. HydroFlex™ is the preferred choice for refiners leading the industry transition into producing renewable fuels," says Henrik Rasmussen, Vice President of Haldor Topsoe.

HydroFlex™ can be deployed in both grassroots units and revamps for co-processing or stand-alone applications.



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Grauer and Weil (India) Ltd Displayed Impressive Products at Auto Expo 2020



Mumbai, India: Grauer and Weil (India) Ltd participated in Auto Expo 2020 Components scheduled from February 6 to 9 at Pragati Maidan in New Delhi. This was the 15th edition of the event themed 'Technovation-Discover Innovations for Future'.

Grauer and Weil (India) Ltd displayed a host of stellar products related to Surface Finishing and automotive industry during the expo. The focus of the company was to meet up and network with the various auto ancillary part manufacturers who were present at the event. Being a leading manufacturer and supplier of metal finishing chemical in India, Grauer and Weil has the expertise to supply and support the needs of such manufacturers who will in turn supply to OEMs.

Another important highlight of participating in the expo was to showcase an ace product from the company's repertoire. The Geomet coating – a product from the NOF metal Coating range -- is a water-based zinc aluminium flake coating. It is an environmental-friendly product that is widely used in the auto and auto ancillary industry. Through the expo, Grauer and Weil aimed to inform the industry about the advantages of the NOF water-based, environmental-friendly technology. Geomet is free from hexavalent chromium and is a water-based technology widely used for protection against corrosion for fasteners, brake discs and many other items. Geomet base coat is available in different colours like silver and in different top coats like black, blue, green etc to provide desired COF value.

At this year's Auto Expo 2020, over 1,500 companies exhibited their products and solutions with 400 international exhibitors from 20 countries which included dedicated pavilions of 7 countries. The event displayed latest technology and innovations in the spheres of BS-VI, and emissions, safety, e-mobility, startups among others.

Grauer and Weil has come up with several innovations in recent times in coatings, especially for the auto industry. Usually, many auto parts like shock absorbers require thick chrome coatings in their manufacturing processes. Traditionally, these are done using hex chrome electrolytes. Grauer and Weil has developed a feasible thick chrome plating technology using trivalent chrome electrolyte.

Other products from the company include corrosion resistant trivalent chrome passivates replacing hex chrome-based passivation for Zinc, Zinc alloys and Aluminium substrate, ROHS compliant electro less nickel plating, corrosion resistant cyanides and toxic elements free zinc and its alloy plating process, phosphate free pre-treatment process before painting which ensures desired adhesion requirements

and NPEO-free biodegradable cleaning technology. Another product is the Zn Ni alloy plating which is for mild steel sheet to offer better corrosion resistance at much lower thickness to replace galvanization and galvaneal coatings. This is useful for fuel tank manufacturers.

Grauer & Weil (India) Ltd are pioneers and market leaders in the field of Electroplating Chemicals and Engineering Plants in the Metal Finishing Industry. With a rich legacy of almost

six decades, the company is a formidable force that offers a diverse product blend including anodising, phosphating, pre-treatment and topcoats, engineering plants, effluent treatment and waste recovery systems, industrial lubricants, high performance protective paints and coatings for the automotive and marine industry. It is now a One Stop Solution Provider for protection of all types of substrates across various industrial segments.

Speaking about the expo, Mr. Krishna Bhandari, Vice President-Grauer & Weil (India) Limited, said "The Auto Expo is an impressive platform where various stakeholders from the auto and auto ancillary industry meet to exchange knowledge and create networking opportunities. The best advantage of proper coatings is reduced maintenance and hence this topic requires major awareness which is why such platforms are extremely effective. We are happy with the response our stall received and we could also meet many other experts from the industry to share opinions and knowledge."

Fluor Has Been Awarded by an EPC Contract for World-scale ADN Project in China

Irving, Texas: Fluor Corporation has recently announced its bagging of a contract to provide engineering, procurement and construction for a new 400 kilo-ton-per-annum adiponitrile (ADN) plant in Shanghai, China. The new ADN plant is a part of INVISTA's ongoing work at the Shanghai Chemical Industry Park where the company recently completed a 215 kilo-ton-per-annum hexamethylenediamine (HMD) plant and a 150 kilo-ton-per-annum nylon 6,6 polymer plant. Fluor booked the undisclosed contract value in the fourth quarter of 2019.

"Fluor has been providing engineering, procurement and construction solutions to clients in China for more than 40 years," said Mark Fields, group president of Fluor's Energy & Chemicals business. "With this award, our proud legacy in China continues and we look forward to supporting INVISTA's efforts to expeditiously increase production of ADN with their company's most-advanced technology to meet growing demand within China and globally."

When complete, INVISTA's new ADN plant will integrate with its existing HMD and polymer facilities to directly supply domestic customers with the key building blocks to produce nylon 6,6 and other high-value products in China. These products are used in the production of a variety of goods, including those in the automotive, industrial, apparel and consumer electronics industries.

"We're pleased to be working with Fluor to advance our ADN project in China," said Bill Greenfield, president, INVISTA Intermediates. "We're excited about this project and are committed to maintaining an accelerated timeline—with completion planned in 2022."

Detailed engineering on the project is well underway, procurement has begun, and construction is anticipated to begin this year. Mechanical completion of the new ADN plant is planned for the first quarter of 2022.

A background image showing laboratory glassware. In the foreground, three Erlenmeyer flasks are prominent, containing green, red, and blue liquids respectively. Behind them, several graduated cylinders are visible, some containing blue liquid. The entire scene is set against a light blue background with a white grid pattern.

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Evonik Develops World's First Free-Flowing Bioresorbable Powder for the 3D Printing of Implantable Medical Devices

Essen, Germany: Evonik, a global biomaterials leader, today announced the development of the world's first bioresorbable polymer in powder form suitable for the high-resolution printing of implantable medical devices on Selective Laser Sintering (SLS) equipment.

RESOMER® PrintPowder is a free-flowing powder with tight specifications and an optimized particle size distribution for efficient processability. Evonik's advanced powder preparation capabilities can facilitate the supply of ISO 13485-certified formulations for development and commercial use. A range of customization options are available upon request.

Mechanical properties and degradation characteristics of devices utilizing RESOMER® PrintPowder can be precisely engineered to meet key application requirements such as strength, durability and the prevention of stress shielding. Craniomaxillofacial (CMF) plates, spinal fusion cages, scaffolds for soft tissue repair and dental mesh are among the implantable products that can leverage the powder-based polymers to improve patient healing and device performance across orthopaedic, dental and soft tissue application areas. In addition to the supply of RESOMER® PrintPowder, Evonik can also support customers in the 3D printing of feasibility samples on its own SLS equipment, as well as providing other associated testing, analysis, characterization and regulatory services.

"The free-flowing processability of RESOMER® PrintPowder will, for the first time, allow medical device companies to utilize SLS 3D printing technologies to create complex bioresorbable implants with precisely tailored mechanical properties," said Dr. Jean-Luc Herbeaux, SVP and General Manager of the Health Care business line. "With the launch of RESOMER® PrintPowder, Evonik becomes the first commercial GMP supplier of bioresorbable polymers with a complete portfolio of powders, filaments and granules suitable for use with all core 3D printing technologies."

The Health Care business line, which is part of the Nutrition & Care segment of Evonik, serves more than 1,000 pharmaceutical, nutraceutical and medical device customers worldwide. Its portfolio of RESOMER® bioresorbable polymers, Endexo® surface modification technologies and application technologies services is a core element of the Health & Care growth engine, which helps drive Evonik's profitable and balanced growth.

Jenabatteries and BASF Cooperate in the Development of Innovative Power Storage Technology

Ludwigshafen, Germany; Jena, Germany: JenaBatteries GmbH and BASF are cooperating in the production of an electrolyte for a battery technology that is particularly suitable for stationary storage of electricity from renewable energy sources and for stabilizing conventional transmission grids. JenaBatteries, which has developed this technology based on a so-called redox flow battery (RFB) with organic materials, thus has the world's first commercially available technology of this kind. Two liquid organic electrolytes separated by a membrane and stored in separate tanks store the current. BASF will supply one of the two electrolytes as part of the collaboration. This battery material is based on an amine, a chemical intermediate that the company can produce on an industrial scale. JenaBatteries plans to market the first RFB in 2020.

RFBs store electrical energy in chemical compounds. The two reaction partners are present in dissolved form and circulate in two separate circuits. The ion exchange between the two energy-storing electrolytes takes place through a membrane in the galvanic cell. Here the chemical reduction or oxidation of the dissolved substances takes place. Electrical energy is absorbed during charging and released during discharging. The size of the connected and scalable tanks is the determining factor for the capacity of the RFB. They are therefore suitable for use as large-format, stationary energy storage units with a capacity of 100 kilowatts and above and a capacity of 400 kilowatt hours and above. With a high degree of flexibility, RFBs enable particularly high outputs of several hundred megawatts and capacities in the range of gigawatt hours. These properties are particularly useful for renewable energy sources that generate electricity independent of demand. Surplus electricity can be stored and delivered on demand. RFB do not contain any flammable or explosive substances. Compared to other batteries, RFBs last about ten times longer because they can be charged over 10,000 times.

Dr. Olaf Conrad, Managing Director of JenaBatteries, said: "We are pleased to have won BASF as an experienced partner for one of the two electrolytes in our batteries. The globally active company has the know-how, the necessary resources and last but not least a special understanding of JenaBatteries' technology. The industrial production of the electrolyte on a large scale at BASF enables us to provide our customers with electricity storage technology that is cost-effective compared with our competitors. Dr. Oliver Cullmann, Vice President, head of the Special Amines Europe unit in BASF's Intermediates division: "JenaBatteries is a start-up that supports the use of renewable energies with its solutions and therefore fits perfectly with our sustainability strategy. For BASF, the cooperation offers a new, attractive and future-oriented field of application for our amine chemistry."

LANXESS Completed Acquisition of Brazilian Biocide Manufacturer IPEL

Cologne, Germany; São Paulo, Brazil: Specialty chemicals company LANXESS has recently completed the acquisition of Itibanyl Produtos Especiais Ltda. (IPEL). The competent anti-trust authorities approved the transaction beginning of January.

IPEL with headquarters in Jarinu, São Paulo, is one of Brazil's leading biocide manufacturers and generated sales in the lower double-digit million euro range in 2018. With the acquisition, LANXESS is strengthening its position as one of the world's leading manufacturers of antimicrobial active ingredients and formulations. In addition to around 100 employees and the production facility, LANXESS has taken over the Brazilian company's laboratory facilities. IPEL generates the majority of its sales with biocides and specialty chemicals for the paint and coating industry. The product portfolio also includes preservatives and fungicides for process control in water treatment as well as active ingredients for disinfection and cleaning agents.

LANXESS is a leading specialty chemicals company with sales of EUR 7.2 billion in 2018. The company currently has about 15,500 employees in 33 countries and is represented at 57 production sites worldwide. The core business of LANXESS is the development, manufacturing and marketing of chemical intermediates, additives, specialty chemicals and plastics. LANXESS is listed in the leading sustainability indices Dow Jones Sustainability Index (DJSI World and Europe) and FTSE4Good.

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Danfoss Targets CO₂ Neutrality Latest by 2030

Hessen, Germany: Danfoss is now embarking on an ambitious journey to become CO₂ neutral in all of the company's global operations at the latest by 2030. Danfoss has for decades been a global provider of technology and solutions helping to save energy and reduce CO₂ emissions all over the world.



The Danfoss Group has within recent years lowered its global energy intensity considerably. Now, additional activities are initiated to further reduce energy consumption and transition the remaining energy demand at all Danfoss operations towards renewable energy. Furthermore, Danfoss commits to change its company car fleet to become all electric latest by 2030. These initiatives are all steps towards being CO₂ neutral in all of the company's global operations at the latest by 2030. We will continuously update our plans to stay aligned with science.

To further emphasize Danfoss' commitment to combat global heating Danfoss is joining the UN Global Compact's campaign on "Business Ambition for 1.5 C - Our Only Future" and commits to setting science-based targets. Hereby Danfoss joins the global movement of leading companies aligning their businesses with the most ambitious aim of the Paris Agreement, to limit global temperature rise to 1.5 C above pre-industrial levels.

"Focusing on energy efficiency, sector coupling and electrification are the key steps to a sustainable future. This is the very core of our business and the solutions we provide to our customers. Decarbonizing our business, for example by using surplus energy from our process heat in production and datacenters, are natural steps. Driving electrification and integrate renewable energy is how we take climate action and reach our targets. We are well under way and we will continue to move forward to showcase that green growth is indeed possible," says Kim Fausing, President & CEO of the Danfoss Group.

Danfoss is now working on detailed plans on how to reach the targets including how to balance potential CO₂ impact, commercial terms and long-term factory footprint considerations. The overall approach is "energy efficiency first" that also supports a high share of renewables. Less green energy needed means that less investments are needed for grid extension, energy storage, back-up capacities and energy imports. Finally, electrification, powered by renewables, is an enabling tool that will allow Danfoss to decarbonize the business.

"Sustainability is good business for our customers, for the planet and people. As a leading business, we prove that it is possible to deliver on ambitious climate targets – both by decarbonizing our own business and by providing the solutions needed to decouple economic growth from energy consumption, reducing the energy needed in the first place," says Kim Fausing, Danfoss CEO.

In 2016, Danfoss joined the EP100 initiative that targets to double the company's energy productivity before 2030 from 2007 levels, and today Danfoss has already improved its energy productivity by 80%. Now, additional activities are initiated to further reduce the consumption of energy and ensure that all Danfoss operation transition towards

renewable energy. In December 2019, Danfoss signed up for both the RE100 and EV100 initiatives. Furthermore, Danfoss wants to transform its own company car fleet to be electric when infrastructure becomes available and latest by 2030.

In 2019, Danfoss was the first global technology company to join all three business action initiatives under The Climate Group, and this commitment will further ensure a systematic follow-up on the company's climate targets on energy productivity, renewable electricity and electric vehicles.

Helen Clarkson, CEO, The Climate Group, said: "Global companies have an important role to play in accelerating the energy transition. By joining EP100 and putting smart energy use at the heart of its business strategy, Danfoss is already leading by example. We are excited that Danfoss is now also joining EV100 and RE100, making them one of the hopefully many more companies to make all three commitments, demonstrating that smarter energy and transport go hand in hand".

IFAT Delhi to Showcase Opportunities to Assess Global Environmental Contributions across the Globe

Delhi, India: IFAT Delhi 2020 trade fair, hosted by Messe Muenchen India, recently has taken place at the India Habitat Center, Lodhi Road, New Delhi. The Trade fair was inaugurated by Shri. Prakash Javadekar, Minister of Environment, Forest and Climate Change; Shri. Raj Kumar Singh, Minister Ministry of New and Renewable Energy;

For the first time IFAT Delhi 2020- North India's Trade Fair for Water, Sewage, Solid Waste and Recycling will take place alongside World Sustainable Development Summit 2020 organized by The Energy and Resource Institute (TERI) and will aim to establish a strong & comprehensive platform for the environmental sector in the north of India. IFAT Delhi will provide the ideal platform for WSDS 2020 to bring together policymakers, government agencies, local administration and industry consumers to interact, network and seek solutions for the current environmental challenges. WSDS is the annual flagship event of TERI which has brought together 47 heads of state and government, 13 Nobel laureates, ministers from 64 countries, 1700 business leaders, 1900+ speakers and over 13,000 delegates from across the world

IFAT Delhi is a leading trade fair for Water, Sewage, Solid Waste and Recycling. Due to its high population density and its expansive economic policy, India has immense potential for environmental technologies and waste management. Scarce water resources, rapid industrialization, extensive agriculture and enormous waste volumes pose a great challenge to the country.

IFAT Delhi 2020 hosted over 45 exhibitors from 10 countries. Among them are market leaders like Endress+Hauser (India) Pvt. Ltd., HP Composites LLP, WEIMA Maschinenbau GmbH, WEIMA Maschinenbau GmbH, Sarvo Technologies Limited, Micro Transmission Systems, SIDSA Environmental Pvt. Ltd, HP Composites LLP and many more

Mr. Bhupinder Singh, CEO of Messe München India, commented, "With growing environmental crisis, it is crucial to take definitive measures on a larger scale. With IFAT Delhi, we bring the latest innovations in the sector to India's capital city. Our association with TERI for WSDW is a conclusive step towards environmental progression through sustainable measures, and a lucrative opportunity to engage with upcoming green technologies showcased at the trade fair."



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Grundfos and Augury's Strategic Partnership to Advance Water's Digital Future

Bjerringbro, Denmark: Grundfos a world-leading pump and water technology company, and Augury, a fast-growing data analytics company and leading Digital Machine Health solution provider, are taking a major step toward digitizing water and utility infrastructure worldwide by signing a long-term strategic partnership. Together, they will develop smart diagnostics solutions and services for Grundfos' customers. The two companies have already been working together successfully over the past two years to test new products and service offerings across several markets and industries. Now, they are committing to the next step, offering a range of services and new business models enabled by connected equipment.

"By adding an AI-driven intelligence layer on top of existing assets, we can automatically collect mechanical and operational data, providing actionable machine health insights and diagnostics to our customers and service organisation," says Tommy Due Høy, Group VP, Global Service & Solutions, Grundfos. He believes the partnership puts down a marker for future solutions.

"When we stand ten, fifteen years from now, this could end up being one of those defining moments where we took a real step forward," he adds.

Augury works with the world's largest manufacturers and industrial companies to transform their operations by providing real-time diagnostics regarding the health and performance of their machines. The combination of Augury's AI-based solutions with Grundfos' deep applications expertise has the potential to change water delivery and services as we know them.

"Water is at the core of how we live, work, and thrive - yet it often goes unnoticed," says Saar Yoskovitz, Co-Founder and CEO of Augury. "Through this partnership Grundfos and Augury will work to make water a safer, more available and more useful resource for businesses, individuals and even nations worldwide."

"We have spent the last eight years working with manufacturers and utilities to ensure that people around the world can always rely on the machines that matter and have seen first-hand the impact it brings. I am thrilled to be partnering with Grundfos to bring this impact to a wider market."

"Our applications knowledge has consistently been the key differentiator for us to provide best-in-class pumping solutions to the world. As we prepare our portfolio for the future, it is key that we leverage this knowledge base to build more intelligence, IoT, remote monitoring and advanced diagnostics into our offerings to ensure differentiation, which is one of the highest priorities for Grundfos," said Anupam Bhargava, Group Vice President, Industry at Grundfos.

thyssenkrupp Entered into a Contract with Nayara Energy for Their Petrochemical Units in Vadinar, Gujarat

Mumbai, India: Thyssenkrupp Industrial Solutions (India), a leading partner for engineering, construction, and service of industrial plants and systems in India and abroad, has inked a contract with Nayara Energy, an integrated downstream company, through a global tendering process. In terms of the contract, thyssenkrupp will provide project management consultancy services for Nayara Energy's upcoming petrochemical units in Vadinar, Gujarat, India.

Nayara Energy currently operates the second-largest private sector refinery in India with a capacity of 20 MMTA at Vadinar, Gujarat. The company endeavours to diversify its energy basket with a foray into

petrochemicals, and a vision for making Devbhumi Dwarka district in Gujarat a petrochemical hub in India.

Commenting on the partnership, Mr. P. D. Samudra, CEO & MD thyssenkrupp Industrial Solutions (India) Pvt. Ltd. said, "We are delighted to collaborate with Nayara Energy for the second time, after 2000. We are honoured to be entrusted with implementing their upcoming Petrochemical units. The project validates our expertise in the refining and downstream sector. With this partnership, thyssenkrupp will support Nayara Energy with project management consultancy services and help them in achieving their project plans."

Commenting on this development, Mr. B Anand, CEO, Nayara Energy said, "Nayara Energy's endeavours in the petrochemical sector are aligned towards our larger aspiration to play a vital role in India's development story. Through this association, thyssenkrupp will help us steer this expansion project keeping in mind two aspects extremely close to us - excellence and agility." The project will mark Nayara's foray into the Petrochemical sector by building a world-scale capacity Polypropylene Unit and Methyl Tertiary-Butyl Ether (MTBE) Unit. It also involves revamp of the existing FCC unit and building of a Propylene Recovery Unit and associated off-sites & utility facilities.

thyssenkrupp is currently engaged in implementing projects for a number of refining and petrochemical complexes in India and abroad, on PMC and EPCM basis. In addition to the petrochemical business, the company has a global presence in other chemical process and allied industries.

thyssenkrupp Inked Contract with SHV Energy for LPG Terminal Expansion Project at Tuticorin

Mumbai, India: SHV Energy Private Limited has selected thyssenkrupp Industrial Solutions (India) to render Consultancy Services on Engineering, Procurement, Construction Management (EPCM) basis for their Tuticorin Terminal Expansion Project at Tamilnadu, India.

The LPG Import Terminal expansion project will be set up alongside the energy major's existing LPG Terminal. The project will also include installation of the new unloading arms at jetty and a 4 km cross-country pipelines for the transfer of the propane and butane to the cryogenic storage tanks from the jetty. In addition to the storage capacity enhancement and the additional facilities, the project will also increase the LPG terminal throughput threefold. The project will be implemented in two phases. In the first stage, thyssenkrupp Industrial Solutions (India) will render Basic Engineering validation and Cost Estimation Services. In the second phase, Detailed Engineering, Procurement Management and Construction Management Services will be rendered. The project is expected to be completed by May, 2022.

Commenting on the contract, Mr PD Samudra, CEO & MD, thyssenkrupp Industrial Solutions (India) said: 'We are indeed honoured to be entrusted with this prestigious project of SHV Energy and pleased to be able to assist them in their project plans. Our experience in cryogenic storages dates back to the seventies, and we look forward to leveraging our experience in this field for this important project. thyssenkrupp is well known in India for engineering and execution of plants for Storages, Fertilisers, Petrochemicals and Polymers, Refinery Units, Caustic Soda-Chlorine and Metallurgical plants.'

The project serves to vindicate thyssenkrupp's remarkable record in the cryogenic storage sector. To date the engineering major, which enjoys a plus 50% domestic market share, has implemented in excess of 100 major Storage facilities for a variety of liquefied gases, including Ammonia, LPG, Ethylene and Propylene, many of which have been implemented on EPC-LSTK basis.

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UFlex Gears up to Reduce Delhi-NCR Plastic Waste

Noida, India: Out of the 8.3 billion metric tons of plastic that has been produced in the world, a recent study states that a whopping 6.3 billion metric tons has become plastic waste either lying in the landfill or swimming in the ocean. A meagre 9% of this plastic waste gets recycled. Reports indicate that by 2050, there will be 12 billion metric tons of plastic on this planet, if there isn't an eco-system built to recycle plastic waste.

UFlex, a pioneer in Multilayer Plastic Manufacturing and Waste recycling, is scaling up its recycling strength to help build a circular economy, by the way of setting up two lines that will wash and recycle post-consumer waste and subsequently give a second life to plastics. This pilot plant in its Noida facility commenced its operations and is aimed to mitigate the piling plastic dumps in Delhi-NCR by recycling collected post-consumer waste PET Bottles and Multi-layer Plastic packaging into chips and granules, put into further use to make products with economic value. In line with its global sustainability campaign 'Project Plastic Fix', UFlex will steer its efforts towards keeping plastic in the economy and out of the environment, converting waste into wealth.

On the launch of this facility, Mr. Jeevaraj Pillai, Jt. President-Packaging & New Product Development, UFlex said, "The problem of discarded plastic is escalating and alarming. India alone generates 26,000 tons of plastic waste every day. Need of the hour is to enable a system where plastic is collected, properly cleaned and then recycled. Our Noida plant is one such initiative that we have made in this direction to solve the plastic waste crisis around us and Delhi-NCR is set to benefit from it. With recycling plants as this coming up at various locations, UFlex will have a capacity to recycle more than 3000 MT of plastic waste a month and we aim to build the largest infrastructure for recycling of plastic waste."

Throwing light on the company's focus towards environment protection, Mr. Dinesh Jain, President – Legal and Corporate Affairs at UFlex said, "We believe in co-existence of sustainability and business, and it is incumbent on us to take care of our environment with ethical and safe practices such that the utility of our product persists without any harm to the environment. We have ensured that these two lines follow a zero-emission practice to convert MLP and PET bottles waste into recoverable."

Below are more details on washing-recycling lines in Noida plant:

- 1) PET Bottle Line (PCR Line) – The Post Consumer Recyclate (PCR line) at UFlex is set up with the objective to recycle PET bottles, used and discarded by consumers, to form chips. The PET bottles will go through the process of crushing and washing and will finally get dried up before it reaches the extruder to form chips. Since the PET bottles are transparent and virgin in nature, chips derived as a result of recycling process will further be upcycled to manufacture a range of PCR grade BOPET film from UFlex called Asclepius. The Asclepius film can be used and reused for multiple applications like packaging and label material, creating a loop economy. The PCR line will recycle used PET bottles collected by NGOs and Waste

Collection Agencies from Delhi NCR area. The line has the capacity to recycle upto 600 tonnes of PET Bottle waste a month.

- 2) The MLP Film Line (PCPR Line) – The Post-Consumer Plastic Recyclate (PCPR) line at UFlex Noida plant will wash and recycle post-consumer MLP waste and convert them into granules. The PCPR line will also pass the waste through the same process of crushing and washing before forming granules. The granules derived can be used to form more than 10,000 industrial and household products like flower pots, outdoor furniture, bucket, dustbins, paver tiles, road dividers etc.

The post-consumer MLP waste collected from Delhi-NCR will be sourced from NGOs, Producer Responsibility Organizations (PRO) as well as Producers & Brand Owners directly. The PCPR line has a capacity to wash and recycle upto 500 tonnes of MLP waste in a month.

Evonik & LIKAT Achieved Breakthrough in Carbonylation Chemistry

Essen Campus, Germany: A research team with leading participation of Evonik has achieved a breakthrough in the field of carbonylation chemistry. Carbonylation is one of the most important types of reaction in the chemical industry. It involves the catalyzed introduction of a CO group (carbonyl group) into organic compounds. For more than 60 years, science and industry had been looking for a way to implement the now successful reaction step.

A team was led by Prof. Dr. Matthias Beller, Director of the Leibniz Institute for Catalysis, Rostock, and Prof. Dr. Robert Franke, Evonik Performance Materials GmbH. The scientists have succeeded in double carbonylating the starting material 1,3-butadiene directly to produce adipates (salts of adipic acid). Adipates can currently only be produced by a complex multi-stage, energy- and cost-intensive synthesis. This involves not only the use of many chemicals, but also releases climate-relevant nitrogen oxides (NOx), which are among the main greenhouse gases.

The potential benefits from this innovation are great: adipates are produced annually on a large scale in the millions of tonnes and serve as starting materials for the manufacture of numerous products such as plasticizers, perfumes, lubricants, solvents, various active pharmaceutical ingredients and above all nylon.

With their new process, the participating project partners are laying the foundation for a more environmentally friendly and cost-effective large-scale method of synthesis.

The key to the breakthrough Development of a new palladium catalyst based on a specific phosphine ligand (HeMaRaPhos). This ligand binds to palladium, resulting in a highly selective, efficient and long-lived catalyst that can result in 95% yields of adipic acid derivatives under industrially feasible conditions. Due to the special importance of this innovation, the renowned journal "Science" published the results of the project.

Information courtesy: Evonik (<https://corporate.evonik.com/e>)

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Indian Chemical Industry in 2019

Indian chemical industry is a prominent contributor to Indian Economy. This article explains the industry performance in 2019 in a comprehensive manner.

State of the Economy – 2019

The global economy experienced strong headwinds as some key global economies registered subdued growth, while certain others continued to grapple with slowdowns. Another set of countries was perilously close to recession. The heightened trade tussles between the US and China, coupled with the resulting uncertainty continued to have a far-reaching impact on global trade and industrial activity throughout 2019. Moreover, the impasse over the UK's exit from the EU and the dramatic turn of events for a large part of the year continued to exacerbate the ever-heightened global uncertainty. Besides, rising tensions between the US and Iran coupled with tightening sanctions on Venezuela continued to exert downward pressure on the global economy, trade, and energy dynamics. This resulted in a less than expected GDP growth of 2.9 percent in 2019, of the global economy.

Unlike some of its counterparts, conventionally the Indian economy has so far experienced a consumption-driven growth story. The liquidity crunch in non-banking financial companies, a weak job market, weakness in domestic demand, and tumbling auto sales coupled with the global slowdown contagion had a drastic impact on the country's industrial activity in particular and on the overall economy in general. Sectors such as automotive, construction/real estate, and FMCG were hit the hardest. India's GDP growth slowed down to 4.5 percent (a six-year low) in the quarter ending September 2019. Furthermore, the IMF (International

Monetary Fund) slashed India's economic growth forecast for FY2019 to 4.8 percent, down 1.3 percent from its earlier projection of 6.1 percent. In the wake of a worsening economic situation, the government introduced a series of policy changes and stimulating packages such as export promotion incentives, and rollback of tax surcharges on foreign portfolio investments, amongst others. In September 2019, the government announced a reduction in corporate tax rates for domestic companies to provide the necessary impetus to investments.

Impact on the Chemicals Industry

The rapid escalation in trade tussles, rising uncertainties, and weakening industrial output had a far-reaching impact on chemical output and sales especially in North America and Europe. The latter registered a decline of nearly 1.4 percent in overall chemical sales in 2019. On the other hand, according to the American Chemistry Council (ACC), chemical output in the US registered a growth of a mere 0.6 percent (estimated) in 2019 whereas both imports, as well as exports, were estimated to decline by around 3.9 percent and 2.5 percent, respectively.

The Indian chemical industry, being characterized by a diversified set of

businesses engaging in commercial production of nearly 80000 chemical products, has been among the beacons of growth both within the country's industrial sector as well as in the global chemical space (esp. specialty chemicals) over the recent past. Also, unlike some key chemicals producing countries, the bulk growth in the Indian chemicals industry is driven by growth of the knowledge-based specialty chemicals business.

The size of the Indian chemicals industry for 2019 was estimated at around USD 170 billion. Subdued macro-economic factors coupled with weak industrial activity, and weaker demand from key export markets, have adversely impacted the overall chemicals output, sales, as well as exports. The Indian automotive industry continued to be marred by liquidity crunch, tightening of the regulations entailing higher compliance cost and price escalations, and ever-weakening demand. Passenger vehicle output in the country registered nearly 13.5 percent year-on-year decline during the period of April-December, 2019. Such a precipitous decline in vehicle output has, in turn, had a significant knock-on effect on the demand for chemicals especially plastics & polymers, coatings as well as base chemicals, among others.

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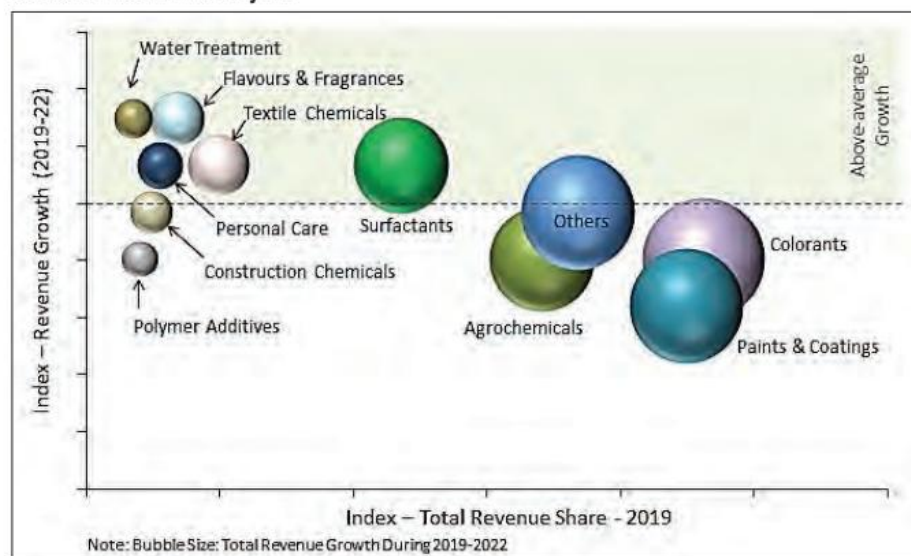
Tightening Regulations in China and Its Impact on the Indian Chemical Industry

In the wake of growing HSE (Health, Safety, and Environment) concerns coupled with hazards and incidents associated with chemical facilities in China resulted in several chemical facilities facing temporary suspension of operations to facilitate safety assessment exercises. Numerous small, and mid-sized facilities have faced temporary or permanent closures owing to a lack of adherence to existing safety standards. Further, in September 2019, the Chinese Ministry of ecology and environment (MEE) notified the World Trade Organization of an updated draft of the country's chemicals regulatory framework. This framework is expected to help better assess and control the environmental impact associated with the use of chemicals as well as serve as a means to ensure environmental and public health safety. Thus, in an industry characterized by low capacity utilization, significant fragmentation, eroding margins and declining prices, the move toward tightening entry-barriers, capacity rationalization, and consolidation, mark the country's efforts to ensure higher capacity utilization and improved efficiency across segments. Moreover, unlike the past, China's chemical industry growth is expected to stem not only from the dominating commodity supply and bulk chemicals, but by strengthening its share in specialty and high-value-added chemicals. To name a few - electronics chemicals, new mobility-related chemicals, battery materials are amongst others.

While the short term impact of industry restructuring in China involved chemical companies across the globe witnessing significant shortfall in the adequate

supply of key raw materials from China as well as decline in country's exports, on the brighter side, such a move is expected to create growth avenues for chemical industry especially in neighboring Asian countries including India. Some key market segments that are likely to witness a shift in demand especially towards India include dyes and dyestuff, plastics additives, low-to-mid-range coatings, and surfactants among others.

Exhibit 1: Specialty Chemicals – Relative Growth Analysis



Source: Frost & Sullivan

Challenges and Prospects – Indian Chemical Industry

Continued weakness in crude oil prices throughout 2019 resulted in corresponding low price points for crude derivatives such as benzene, thus driving production costs for specialty chemical industry downwards. However, weaker demand from export as well as the domestic markets, along with the shortage in supply of key raw materials, resulted the below expectations in revenue growth. Companies directed strong efforts toward margin improvement by reducing the working

capital and investing in the development of specialty products. Easing global uncertainties and improving growth outlook over the mid-term is expected to engender strong growth in the Indian specialty chemicals industry.

While Indian chemical sales account for a share of around 3 percent to 3.4 percent in the overall global chemical sales value, the country's share in global chemicals related capital spending

is even lower (pegged at a paltry 2.4 percent). Significant investment toward technology upgrades and development of specialty, higher-value-added chemicals are necessary to sustain robust growth in the ever-competitive global chemical industry.

Ever-increasing demand, especially for basic chemicals such as acetic acid and methanol, continues to rely heavily on imports especially from China. Nearly 45 percent of the country's chemical requirement is fulfilled by. The net imports of chemicals in India in aggregate for FY 2019 were pegged at around USD 16.93 billion.

The Indian chemical industry permits 100 percent FDI under the automatic route. However, as of August 2019, FDI in the

The Indian government's resolve to raise the contribution of the manufacturing sector toward GDP from around 16 percent to 25 percent by 2025 necessitates strong investments toward import substitution of major chemicals.

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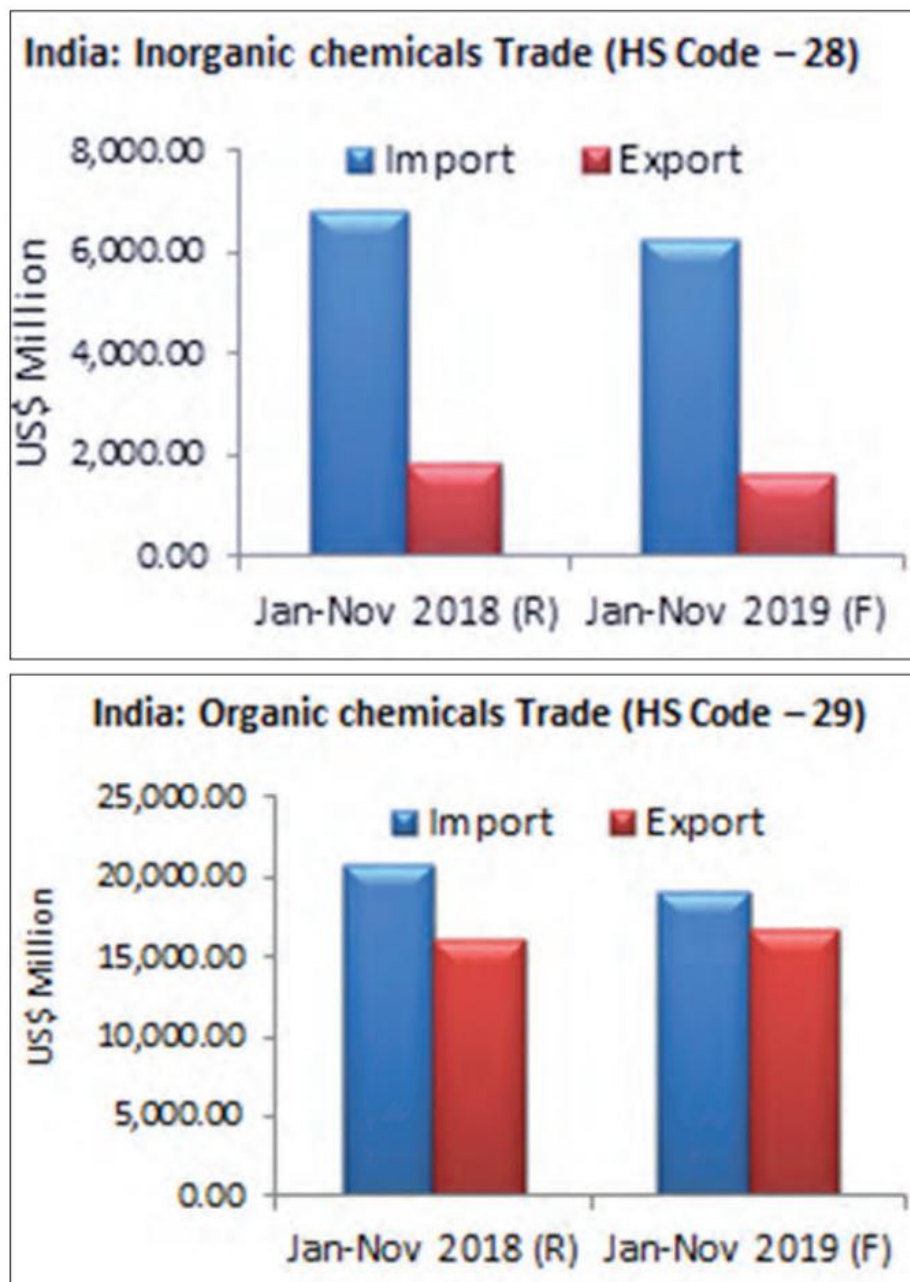
chemical industry composed a mere 9 percent of the total FDI in the country, while countries such as Singapore, Thailand, and Vietnam have been witnessing increasing investments. The Indian government's resolve to raise the contribution of the manufacturing sector toward GDP from around 16 percent to 25 percent by 2025 necessitates strong investments toward import substitution of major chemicals.

Sustainability and Industry Evolution

The global chemicals industry is on the cusp of rapid convergence coupled with the increasing interplay between environment and business disruption. Moving forward, chemical companies will be instrumental in closing the loop: producing materials that enable more recyclable designs of the end-product and working with end-users to create new applications for used materials. A

new industry will spring up to enable this, with the backing of industry leaders' experience both in chemicals and in waste management. Technology to close the loop will come from established automation companies. Major chemical companies in India are increasingly acknowledging the importance of and investing in sustainability in both operations and governance. However, internalizing concepts of sustainability across every aspect right from product design, through recycling and reuse necessitates concerted efforts from across the value chain and the policymakers.

Exhibit 2: Organic and Inorganic Chemicals Trade in India



Source: Ministry of Commerce and Industry

Outlook 2025

A strong set of targeted policies including the Make-in-India initiative, development of dedicated PCPIRs (Petroleum, Chemicals and Petrochemicals Investment Regions), improved taxation policies and ease of doing business, stronger IPRs, robust infrastructure spending initiatives and investments, coupled with growing export opportunities are expected to create avenues for chemical industry growth in general and in specialty chemicals business in particular. The Indian chemicals industry is expected to register robust double-digit growth over the next five years to register nearly 1.5-2.0x growth by 2025. ■

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Ensuring Environmental Sustainability

In the wake of pollution, global warming, and other environmental issues, environmental sustainability is the need of the hour. Lead industry players have realized its importance in order to make necessary changes aiming to process optimization and cost effectiveness. In this article, the author narrates a few key initiatives taken by Technip India Limited.

As a responsible corporate citizen, Technip India strongly believes that Industry – being an important and resourceful part of the society – has an important role to play in helping the Government to achieve inclusive growth with an emphasis on ensuring environmental sustainability. In line with this belief, Technip India Ltd partners with non-profit and social enterprises for various environmental initiatives across India. Here are the key environmental initiatives which have been undertaken in the vicinity of our operational locations in India:

- **Biogas Initiative:** 100 biogas plants were installed in Dahej, Gujarat leading to sequestration of 250 MTs of CO₂ annually.
- **Plastic PET Bottles Recycling Initiative:** 2500 kgs of plastic were being recycled annually in Mumbai and Dahej, Gujarat through waste recycling initiative including installation of Plastic PET bottles vending machines.
- **Smokeless Cooking Stoves:** 150 smokeless cooking stoves were distributed to women in Dahej, thereby improving the quality of air in their households.
- **Solar Power Panels:** Installed 105 Kilowatts of solar power grids in needy schools in Gujarat, Mumbai, and Chennai thereby providing them eco-friendly energy alternative.

As a global signatory to UN Global Compact, our environmental initiatives are not only aligned with the UN Sustainable Development Goals (Goal 3: Good Health and Well-Being, Goal 5: Gender Equality, Goal 7: Affordable and Clean Energy and Goal 13: Climate Action), but also contribute to the overall goal of 'Swachh Bharat' (Clean India) campaign of our Government to make India clean and green through effective utilization of renewable energy and recycling of plastic waste thereby minimizing carbon footprint.



CASE STUDY: BIOGAS Initiative

Prologue

Objective: To provide access to clean and affordable source of energy to the less fortunate communities.

Target Location: This project was implemented under the aegis of Corporate Social Responsibility initiative of Technip India in 5 villages located in the vicinity of its modular manufacturing yard in Dahej, Gujarat.

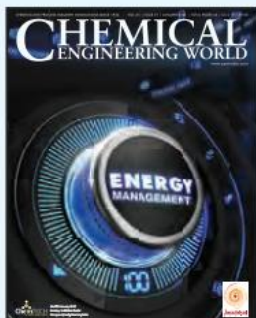
Basis the undertaken need assessment, 100 biogas plants were installed resulting in sequestration of 250 MT of CO₂ emissions on annual basis.

How does it work?

Biogas plant works on the concept of anaerobic digestion, a proven mechanism,

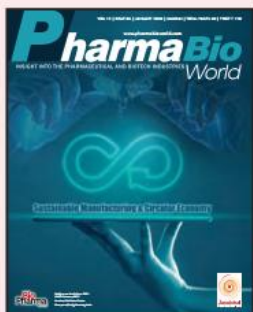
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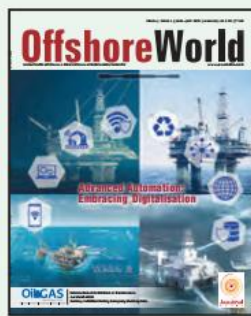
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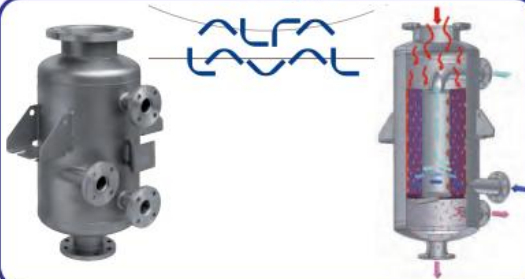


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in which biomass (specifically cow dung in this case) is allowed to get digested in the absence of oxygen by microbes. The nutrients are eaten by the microbes which generate biogas. This Flexi Biogas plant is an easy to fit plant requiring minimal civil construction and comes with all accessories. In addition, this requires negligible maintenance but to be on safer side, a social enterprise has been empaneled to ensure the maintenance and safety of the installed bio-gas plants.

Cow dung slurry along with leftover feedstock including organic waste is put into the inlet tank. The slurry passes into the biogas digesters, where anaerobic digestion occurs followed by methanogenesis. This leads to formation of biogas which then could be used as fuel for cooking.

Benefits

Benefits of this project are manifold and are primarily aligned to organization's key sustainability pillars, viz Supporting Communities, Respecting Environment, and Advancing Gender Diversity.

► Supporting Communities:

- Enabling a better and healthier lifestyle for the less fortunate communities by providing them access to less cost intensive cooking fuel proposition.

► Respecting Environment:

- Access to Clean Energy: Identified needy village households now have

access to clean energy thereby reducing dependence on burning of wood.

- Sequestration of CO₂ Emissions: Basis conservative production of 25 kgs of cow dung for 15 days in a month, 100 biogas plants will help in sequestering 250 MTs of CO₂ emissions annually.

► Advancing Gender Diversity:

- Women Empowerment: Women of the target households who typically engage in collection of firewood/ making cow dung cakes would be relieved of the drudgery involved. This will lead to improved quality of life for women. 100 women were benefitted out of this project.

Apart from the above-mentioned benefits, here are few more advantages which could be attributed to the biogas project:



- **Production of organic manure:** The digested slurry from biogas plants, a rich source of manure, shall benefit farmers in supplementing chemical fertilizers or may be replacing the same leading to organic produce at no extra cost.

- **Improved health and hygiene:** Decrease in incidences of diseases or infections caused through reducing waste stagnation in villages; and improving indoor air quality that is otherwise affected by burning of dung cakes and firewood.

Industry – being an important and resourceful part of the society – has an important role to play in helping the Government to achieve inclusive growth with an emphasis on ensuring environmental sustainability.

Monitoring and Evaluation

Technip India* has brought in digitalization of monitoring and evaluation with the help of a technology platform to keep a tab on the efficiency of project implementation against the predefined deliverables. As a part of this, biogas plants are geo tagged and are accessible through web based platform.

Testimonials from Beneficiaries

With help of Technip India, biogas plant was installed at my home. It simplified my daily routine as earlier I use to throw the cowdung at village pits but now it provides me cooking gas and I don't need to gather firewood, so no worries for cooking in monsoon too- **Parmar Kapilaben, Samnatpor village, Dahej, Gujarat**

Never thought cow dung could be utilized for cooking purpose through biogas. Now I can spend more time at fields and give more time to my kids at home which earlier was utilized only for gathering firewood. Thanks to Technip India- **Parmar Bhartiben, Akhod village, Dahej, Gujarat**



This initiative has been appreciated by leading industrialists and philanthropists including Ms. Rajashree Birla, Chairperson, Aditya Birla Group CSR; and Mr. Sanjiv Mehta, President, Unilever, South Asia, & Chairman & Managing Director, Hindustan Unilever Limited

Technip India* believes that overarching social and environmental issues of our society could not be resolved overnight but with integration of such initiatives as sustainable way of doing business will yield result oriented outcomes. Our commitment towards community well-being and UN Sustainable Development Goals has been recognized by the Ministry of Corporate Affairs with National CSR Award 2019, conferred

As a global signatory to UN Global Compact, our environmental initiatives are not only aligned with the UN Sustainable Development Goals (Goal 3: Good Health and Well-Being, Goal 5: Gender Equality; Goal 7: Affordable and Clean Energy; and Goal 13: Climate Action), but also contribute to the overall goal of 'Swachh Bharat' (Clean India) campaign of our Government to make India clean and green through effective utilization of renewable energy and recycling of plastic waste thereby minimizing the carbon footprint.

Appreciation from Industrialists and Philanthropists



by Honorable, President of India. Our integrated approach reiterates our belief in the fact that sustainability is at the center of everything we do. ■

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Green Growth is the Future of Manufacturing

Environmental sustainability these days is the key focus and to be in sync, the future manufacturing is all green. This article narrates the approaches that companies have been adopting these days towards their sustainable eco-friendly manufacturing and operation.

As a developing nation, India has been making huge strides towards the development of the manufacturing sector, realizing its potential to contribute toward country's economic growth and to create employment opportunities. In India, manufacturing has been emerging as one of the high growth sectors due to increasing number of educated population & skilled labor. There is potential for the sector to account for 25 – 30 per cent of the country's GDP and to create up to 90 million domestic jobs by 2025. While growth of manufacturing is necessary for the economic development, it is also essential to look into the challenges that emerge with it. With growing number of industries, country's continually rising environmental concerns need to be mitigated. The Government has also been supporting the growth of manufacturing industry by conducting various initiatives, and at the same time, with a special emphasis on pushing the manufactures to develop sustainable framework.

India's manufacturing sector is in a continual state of transformation and in the era of sustainable development, manufacturers have been embracing the new paradigm of green growth to create environmentally conscious industrial operations for the future. In all these years, businesses have adopted a quantity-oriented and fossil-fuel-driven growth model which has largely contributed toward their economic endeavors, however not addressing adequately the ecological considerations,

thus being compelled to develop a sustainable growth framework.

Companies have observed that only economic pursuit is no longer sufficient in this age of sustainable development, as it has become essential for them to attain the business objectives while meeting the needs of environmental safety. Businesses are going through a phase of evolution which is considered as significant as industrial revolution where the emphasis is more on 'Green manufacturing processes'. Companies are increasingly convinced that it's in their interest to take care of the environment and invest in green practices. Hence, they are purposefully adopting sustainable business processes.

In green manufacturing, production processes are aimed to reduce pollution; products are made from sustainable materials, and waste is reduced through re-manufacturing, reuse, and recycling. Besides its benefits to the environment, it also contributes to the production cost reduction of the business, thus enabling them to potentially increase the revenue.

Following are some of the methods that companies have been adopting to incorporate sustainable processes in their business operations :

Method 1 – Conducting an energy audit

Conducting an audit to incorporate productive and energy efficient practices in manufacturing can dramatically reduce the production cost in a shorter time span and create a positive impact on the environment. Companies these days have been conducting energy audits to discover new insights about energy utilization in the production to understand where improvement can be done to save energy and to achieve production efficiency. With a focus on achieving sustainable development, companies have proactively been improving their energy utilization by making every possible change. From utilizing programmable thermostats that reduce energy waste to replacing incandescent bulbs with LED fixture and star ratings of electrical gadgets etc., companies have been taking every step ensuring the optimal energy-resource usage to increase energy efficiency.

Method 2 – Incorporating sustainable manufacturing processes

In order to tackle the unfavorable climate change, companies have been finding new ways to incorporate sustainable manufacturing processes in their business operations. Companies now aim to manufacture products that are ecologically sound and to use production method which causes lesser negative environmental impact while ensuring the

In India, manufacturing has been emerging as one of the high growth sectors due to increasing number of educated population & skilled labor. There is potential for the sector to account for 25-30 per cent of the country's GDP and to create up to 90 million domestic jobs by 2025.

optimum usage of natural resources. Across the globe, manufacturers from various sectors are in search of innovative alternatives of fossil fuel to reduce the carbon emission. World's leading companies have started incorporating state of the art technologies like renewable fuel based Co-generation plant and renewable sources like solar thermal systems to make their manufacturing plants fully energy sufficient and equipped with self-sustaining facilities.

Many Organizations have also been implementing alternatives for power generation in order to increase their production and to reduce the energy usage. These alternatives significantly slow down the climate change, which otherwise impacted by manufacturing processes.

Also, various industries have been building environmentally conscious strategies to dispose the solid, special, or hazardous wastes generated during the manufacturing processes. With a vision of maximizing the operational material value and minimizing the overall environmental footprint, organizations these days started banking on zero waste initiatives aimed towards reducing and recycling of production residuals to achieve environmental compliance.

In FMCG sector, producers and manufacturers of the consumer goods are into the development and implementation of solutions that optimize raw materials at their fullest potential to avoid wastage. Such organizations reach their zero waste goals by developing a safe, economical, and compliant program that facilitates proper disposal or recycling of the product residue.

With growing number of industries, country's continually rising environmental concerns need to be mitigated. At the same time, the Government has also been pushing the manufactures to develop sustainable framework. And towards this, manufacturers have been embracing the new paradigm of green growth.

To turn the vision of sustainable future into reality, global chemical companies have also been adopting an eco-friendly approach. By incorporating processes like wastewater treatment and zero liquid discharge, many companies have raised the bar of sustainable development in the chemical industry. The wastewater treatment process is utilized to recycle the wastewater discharges from the production processes with the help of technologies like reverse osmosis that purifies water up to a point where it is completely recyclable. Also, zero liquid discharge process further ensures that virtually no liquid is discharged from the site. The initiative to treat the wastewater and achieving zero water discharge not only prevents the contamination of conventional water sources, but also facilitates the water footprint minimization.

Method 3 – Producing and selling eco-friendly products

Taking a step further into green manufacturing, many companies deliver the products which boast of excellent green credentials. Previously, products consisted of non-biodegradable and toxic chemicals. For example, washing detergents contained dispersing and complex agents which used to persist in the environment for a long time; and sometimes used to leach into groundwater causing damage to the natural habitat. But now, chemical companies have taken initiatives to develop eco-friendly agents which can be used in washing powders or detergents making them biodegradable and much safer for the environment. Companies have started taking environmental responsibility more seriously as they have now purposefully been manufacturing products which are ecologically safe.

Conclusion

While green manufacturing fundamentally facilitates environment-friendly operations, it can be troublesome for companies as it costs them a significant amount of money. In the transition phase, companies are needed to locate funding sources to finance the transformation, which many companies find difficult. Additionally, to ensure the smooth functioning of newly installed technologies, businesses have to invest in educating the employees on how-to-work in the new green manufacturing environment. Surviving through the transition is a tough phase for businesses but it is a worthwhile business pursuit as it will benefit the organization and decide the long term survival. The future of manufacturing is all green. As these green business opportunities continue to push the sustainable manufacturing agenda up, there is a need for the industry to collectively become more outward-looking and forward-thinking, so that the manufacturing plant of the future is one that envisions a low-carbon, resource-efficient, economy first manufacturing. ■

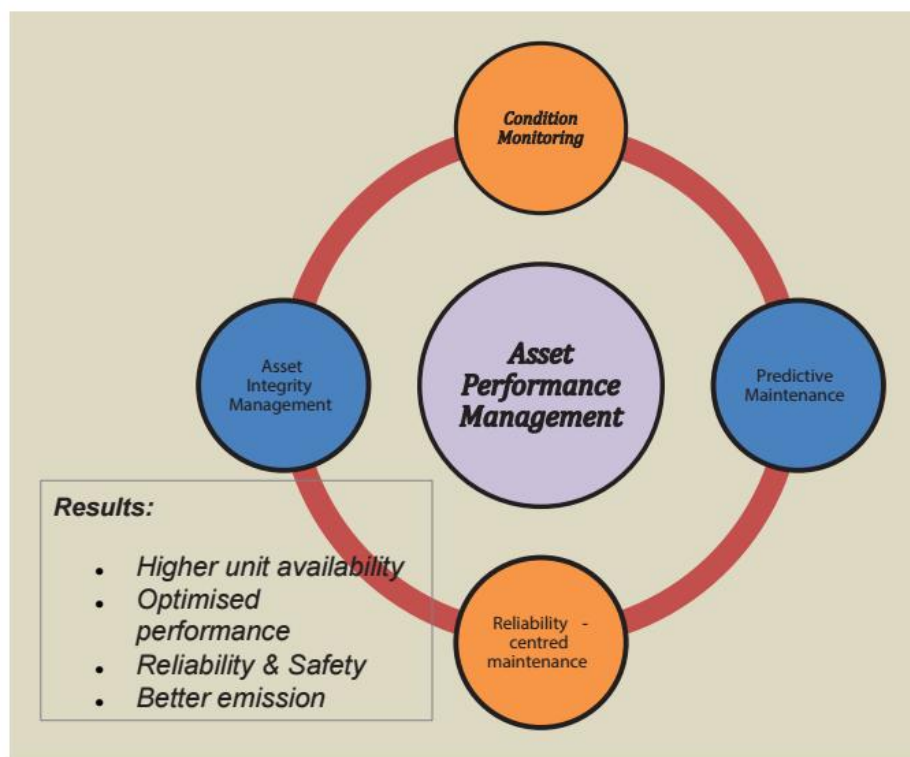
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Industry 4.0 Driven Project Execution Approach and Environmental Sustainability

These days environmental issues are of pivotal concern for industries, and more so for chemical industries. In order to reduce the carbon footprint and develop sustainable goals, adoption and implementation of asset performance management program are on the vogue to achieve functional and energy efficiency. The article throws light on how industry 4.0 impacts the project execution process and facilitates to achieve environmental sustainability.



An organization's effort towards reducing carbon footprint primarily sets up the tone for achieving sustainable development. Organizational approach is therefore towards sustainable maintenance of existing assets. A new concept of Asset Performance Management has been evolved. Through proper implementation of Asset Performance Management (APM) program, organizations strive towards achieving maximum functional efficiency and energy efficiency with a focus towards sustainability.

Organizations should have a comprehensive grasp over present operational model and must evaluate various possibilities of system upliftment to reduce unplanned downtimes, and HSE (Health, Safety, and Environment)

risks to maintain the uninterrupted operation at an optimized cost.

Outlines of Industry 4.0

Industry 4.0 accentuates the entire business process through digitization, digitalization, and digital transformation. It ensures synergy in capturing, storing, and retrieving structured information (Big Data), giving customized solution with embedded crosslinking to ensure safety & environmental goals along with best techno-commercially feasible solution. This 'Digital Landscape' thus redefines the entire business model by adding value to the existing traditional methods of operation.

Mission Industrie (Industry) 4.0

- Agile approach to catch up to new business opportunity. Organizations need to cut down the inertia for faster response.
- Using technology to transfer from unknown domain to true replication & appropriately providing engineered solution.

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- Customization of work process in each assignment.
- Creating Digital Landscape by capturing, transferring, providing engineering solution, and archiving in digital platform.

Amalgamation of Asset Performance Management (APM) & Industry 4.0

In context of integration of Industrial Internet of Things (IIoT), Industry 4.0 concept driven tools & technologies (such as big data management, complex systems modeling, cloud storage, and computing & advanced analytics) with traditional APM program aid the users to figure out opportune strategic plans, to prognosticate, and to optimize the maintenance. Many of the organizations go through the transition from digitization mode to digital transformation platform to reap the additional values from legacy assets and to identify new business opportunities. Boosting of existing technologies and assets with new types of digital technology fosters higher return on investments. New age technology aids in ensuring environmental regulatory compliance by capturing data from secluded assets that lack connectivity such as real time monitoring of plant emissions and complete automated control. The entire effort towards successful APM program narrows down to energy efficient systems and inculcates a norm of "lower carbon footprint".

APM program does not hover over a tear-and-replacement philosophy. A typical framework of APM includes condition monitoring, predictive maintenance, asset integrity management, reliability-centred operation, thus resulting in maintenance with higher unit availability and a drive towards better emission standard.

Significance of Asset Integrity Management (AIM) program

Apart from APM of equipment and process, the other challenge is to ensure

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the safety of the operational assets by AIM. When the asset in question pertains to building structures, asset integrity management (particularly, corrosion management) turns out to be the key component.

Across the myriad industries such as oil & gas, mining & minerals, power generation, many of the age-old building structures have already surpassed its service life. With a dearth of greenfield investments worldwide and stringent environmental regulations restricting acquirement of new land for industrial use, forensic engineering followed by rehabilitation of existing installations is the viable option now-a-days. Thereby, plant owners are bringing in Asset Integrity Management (AIM) regime to ensure effective and efficient service life of age-old dilapidated assets and protecting the interest of personnel and equipment with which it interacts.

Standardized Way of Working (WOW) for customized solutions

Each asset is unique in terms of the degree and nature of damage as well as the requirement of capacity enhancement. Hence, "customized solution" is the "need of the hour". An AIM regime cannot exist in isolation. For successful implementation of the regime,

it is essential for all the stakeholders to have a common understanding of AIM regime essentials, but the most difficult challenge is to bring all to a common understanding and evolve a way forward. Therefore, a standardized approach to customized solution is to be incubated catering to specific asset requirements.

At the onset, a strict structural inspection regime is to be undertaken for the assets in question. Accordingly, priority index is to be set based on present condition of the asset and its strategic importance with regards to overall functionality of the plant. Incomplete archival of as-built drawings, design calculation, space constraint, non-approachability, and limited shutdown period are few of the challenges of brownfield engineering. Industry 4.0 prescribes use of technology to capture unknown to known platform. Thereby, non-intrusive means such as drone, 3D laser scan, underground mapping in addition to extensive manual inspection, geotechnical investigation, and topographical survey are being used to capture existing condition. With the advent of Industry 4.0, BIM platform is being used extensively to consolidate captured site data and transform the same into an intelligent working model representing the existing condition.

Organizations should have a comprehensive grasp over present operational model and must evaluate various possibilities of system upliftment to reduce unplanned downtimes, and HSE (Health, Safety, and Environment) risks to maintain the uninterrupted operation at optimized costs.



Figure 1A & B – Web of column corroded away & concrete augmentation

Engineered remedial measures / features are then incorporated in the existing base model to produce the engineered model and consequent extraction of construction drawings. Life expectancy of rehabilitated structure especially steel structures is difficult to ascertain with certainty in adverse environmental condition more aggravated by process driven hazards. Thereby, post rehabilitation, the structures should again be brought under the purview of periodic maintenance regime.

Reorientation of few basic brown field engineering concepts leading to substantial reduction of carbon footprint and safety hazards

Stage wise deconstruction schemes of risk prone assets may often lead to alteration in superstructure load data at base plate level and load flow path. Adequacy review of existing substructure becomes a difficult task in absence of as-built substructure drawings. Invasive exploration by excavation, augmentation of existing foundation system under prevailing condition may not be feasible with a view to stringent safety norms.

Thereby, approach should always be to keep the load-flow path unaltered at respective stages.

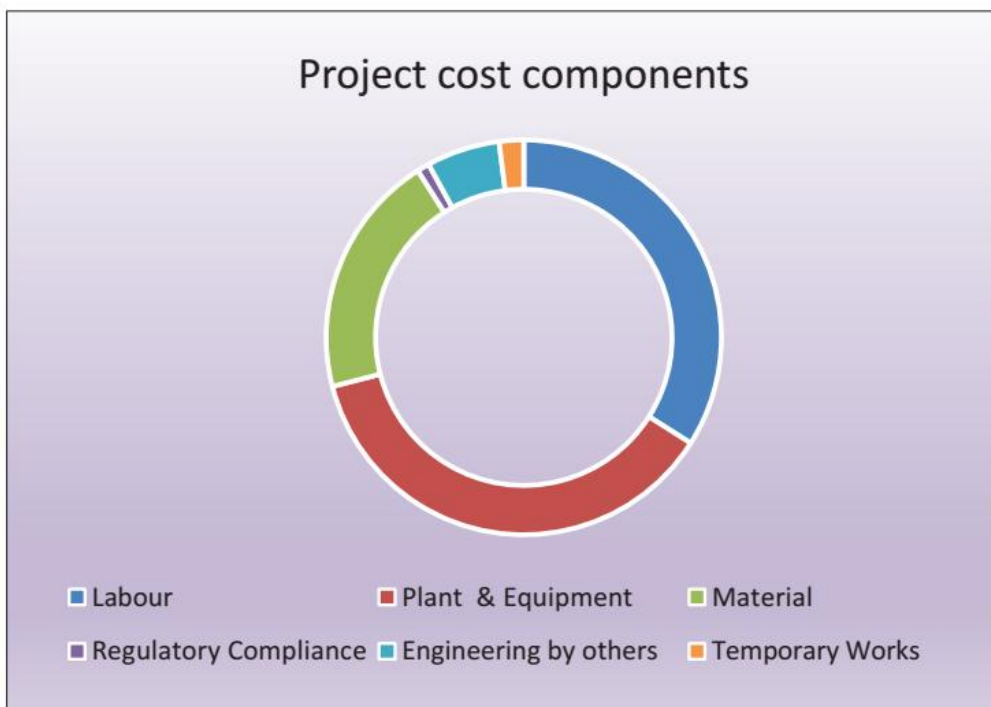
In heavily distressed steel structural buildings requiring rehabilitation under operational condition, augmentation of distressed load bearing members with concrete jacket may prove to be better approach compared to conventional replacement over plating philosophy. Therefore, deployment of larger steel member handling equipment & hazard associated with cutting and replacement

of loaded members, extensive temporary prop structures can be avoided.

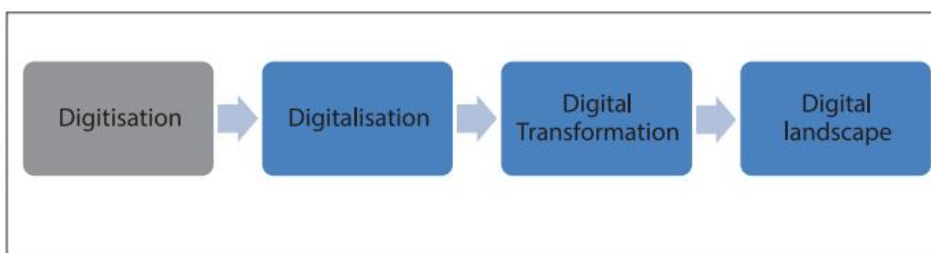
In offshore assignments, where labour and equipment hiring charges are the leading cost components compared to material cost, approach towards finalizing of retrofitting scheme should always aim at reduction of labour and equipment hiring components. Thereby, substantial reduction of energy consumption can be minimized.

Process of Digital Transformation

Old assets are being digitally transformed to intelligently engineered



working model for creating value throughout production life cycle, thereby creating digital landscape. BIM designers are gradually integrating engineering model to migrate towards operational model.



AIM Lifecycle

Sequence of **New age Brownfield Project execution & Operation maintenance** throughout entire lifecycle

Inspection

Prioritisation of asset

Application of technology & traditional investigations



Drone



3D laser scan



Underground mapping

Traditional surveys-geotechnical, dimensional, & topographical investigations

- Creation of existing virtual model
- Comprehending problem statement
- Formulation of engineering solution
- Engineered virtual model ready for future modification
- Regular maintenance regime

Restructuring and analysis of recovered pixel-level information over cloud, rapid retrieval, and sharing among all stakeholders facilitate mobile workforce enablement, and reduce resource

commute, thereby leading to a reduction in carbon footprint.

Future of Asset Performance Management

Asset Performance Management shall evolve through an effective alliance, alignment of personal and corporate values, and knowledge transfer to millennial workers in an aging industry. The Asset Performance Management regime will play a pivotal role in the advent of Industry 5.0 bearing the essence of closer cooperation of man and collaborative robot, structured prevention of waste and wasting including industrial

upcycling. Engineering tools including BIM (Building Information Modelling) platforms are being migrated towards addressing Operation & Maintenance aspects. ■

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New age technology aids in ensuring environmental regulatory compliance by capturing data from secluded assets that lack connectivity such as real time monitoring of plant emissions and complete automated control. The entire effort towards successful Asset Performance Management program narrows down to energy efficient systems and inculcates a norm of “lower carbon footprint”.

Process Equipment Efficiency and Environmental Footprint Management

Over the years, when the oil-and-gas industry has come under the scrutiny for causing negative environmental impact, attaining process efficiency has also come in the limelight. Along with necessitating the time- and cost-economy feat, the need of the hour for the industry is to achieve sustainability. The author, here in this article, speaks about the responsible production with recycle-replace-reuse approach to strike the right balance.

Process efficiencies not only entail achieving time- or cost-economy, but also need to be sustainable and generate a positive effect on the environment. This has gained due prominence against the backdrop of developing sustainable goals. A lot is being done, but a lot more to achieve with the prevailing scope.

Oil is much more than only being humankind's most significant energy source. It provides employment and runs the economy of many countries in the world. Petroleum products serve as the feedstock for several consumer goods, thus playing an increasingly relevant role in people's lives. Oil-and-gas generates significant revenue in taxes and duties to Governments, globally. Thus, the sector clearly has an overarching influence over the world's economy.

However, over the years, the oil-and-gas industry has come under scrutiny for its environmental impact. Pollution is the most adverse impact caused by the activities that oil-and-gas industry carries on. From exploratory activities to production, and from refining to transportation, all stages of oil-and-gas production end up with wastewater, gas emissions, and solid waste.

Producing responsibly to strike the right balance

As a responsible supplier, the process equipment industry can ensure to adopt

techniques that can positively impact our carbon footprint, while manufacturing the static process equipment for the oil-and-gas sector. By simply improving the existing processes, we can balance both the economic and environmental aspect of production activities.

Since the last decade or so, the awareness has been increasing about the fact that cost effectiveness need not dictate the process efficiency implementation. Apart from deriving economies, improvements should also promote conservation of ecology and natural resources.

The industry has already been implementing the initiatives such as switching to cleaner fuel with less sulphur content, and maximising the use of renewable energy. However, there is scope for more. The simple and time-tested 3R principle of Recycle-Replace-Reuse can form the base for various initiatives for effective environmental footprint management.

Recycle

For years, careless disposal of process waste has been a significant cause of environmental degradation. Earlier, the organisations used to consign non-

hazardous waste to landfill. However, they are now investing in recycling methods of solid wastes. When it is recycled, non-hazardous waste reduces the pressure on land resources, and thereby consequently reducing the damage to human health and the environment.

Hazardous waste, at the very first place, needs treatment to reduce the toxicity. There are various thermal, physical, chemical, and biological treatment technologies that have been developed for this purpose. Once treated, the waste can be disposed safely through incineration, oxidation, or underground injection wells.

Untreated water, discharged during different processes, is unfit for human consumption in any form; and when released into nature, it can easily cause widespread ecological damage. Hence, it can be better utilised by sending it back into the system. For instance, water used during hydro-testing of equipment, for pickling & passivation of equipment, and for many other purposes can be recycled back into the system. There are many other ways in which the used water can be recycled back into the system.

Over the years, the oil-and-gas industry has come under scrutiny for its environmental impact. Pollution is the most adverse impact caused by the activities that oil-and-gas industry carries on. From exploratory activities to production, and from refining to transportation, all stages of oil-and-gas production end up with wastewater, gas emissions, and solid waste.

Replace

Energy is a key component of the manufacturing process. In addition to using conventional grid power, manufacturing facilities can install captive solar power plants, wherever feasible, to offset some of their power requirements. Using renewable energy will help to reduce the consumption of conventional electricity, which, in turn, decreases the

materials used earlier. For instance, by installing a filtration unit in the machine shop, used hydraulic oil can be reclaimed, thereby reducing the need for disposal. Similarly, the oil used for cutting operations can also be reclaimed and reused. Less waste means less pressure on the environment. Needless to add, it also leads to lower the consumption and hence, to lessen the replacement costs.

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need for fossil fuels. The same situation applies to the usage of traditional fuel. Piped natural gas can be used to fire furnaces for heat treatment instead of diesel, which is the traditional fuel.

Similarly, switching to multi-point burners will reduce the time and fuel consumed by the heat equipment, thus positively impacting both – the energy conservation and the productivity. Asbestos-based gasket sheets can also be replaced with non-asbestos based ones, thereby reducing hazardous waste.

Thyristor-based machines are generally used for industrial welding. These machines consume a lot of energy. Switching to inverter-based welding machines can lead to drastic energy savings.

Efficiencies can also be derived by adopting digitalisation instead of manual processes. It is a general practice to circulate manufacturing drawings across the shop floor, for the use of various departments. Manual intervention can be reduced by shifting to a digital drawing display, which in turn mitigates worker fatigue and reduces the human-error possibility.

Reuse

Another important method of reducing the carbon footprint is to re-introduce

Conclusion:

In line with the examples cited above, the process-equipment industry has been consistently and continually increasing its efforts to manage its environmental footprint. However, it is imperative for the industry to re-calibrate its strategies for further improvement of its quality towards augmentation of environmental aspects, occupational health-and-safety, and energy management systems. This is not only to ensure the process efficiency, but also to align itself towards the development of sustainable goals. ■

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Real Entrepreneurship Drag is to Own One's Own Destiny: Emergence of Bulk MRO Industrial Supply Pvt Ltd

By Jayati Mukherjee

When we talk about today's front-runners of Indian Entrepreneurship league, the two very prominent young leads are being surfaced out. They are – Gaurang Shah and Devang Shah, owner of Bulk MRO Industrial Supply Pvt Ltd, a B2B space based startup and a one-stop-shop for all Industrial products. This Cofounder-and-Director-duo stands out for their openness to new ideas, risk taking aptitude, and outlook towards people's capability development. They are always right to be in readiness. Being the visionaries, their practices resemble with large corporates. In appreciation of this young-duo's talent, BulkMRO bagged ChemTECH Excellence Award 2019 in the category of 'Outstanding Achievement by Start-up'. The article narrates their entrepreneurial journey, which has a notable stretch in Oil & Gas sector along with other verticals.



Outstanding Achievement by Start up: Devang Shah and Gaurang Shah, Directors, Bulk MRO Industrial Supply Pvt Ltd

BulkMRO Industrial Supply operates at a B2B space as a one-stop-shop for all industrial products. Leading Silicon Valley investors viz Y-Combinator, Bain Capital and FJ Labs have funded this start-up, which has been reflecting its exemplary 500 percent per annum growth potential. With this, the start-up is poised to be the Alibaba for Indian market based enterprises.

Early Days: Both the brothers were born and brought up in Mumbai. Their bon voyage started after successful completion

of their school days at the age of around 15-16 years, when they head out for their education at USA. They completed their graduation with dual degrees –Finance from the Wharton Business School, and Electrical Engineering from the Moore School of Engineering at University of Pennsylvania. This revered education equipped both the brothers with a very good global exposure. Subsequently, Devang pursued a career on Wall Street Trading Credit Derivatives at Deutsche Bank and Citigroup; and Gaurang

worked as a consultant at McKinsey & Co's New York office. He also rendered his expertise at Bain Capital. The brother-duo returned India in 2007. Those were the days when retail and telecom boom had set in, mobile revolution started happening, and transition from blackberry to android was about to phase in. In short, India was on the track of progression compared to what it was ten years ago. And Shah Brothers did not make any delay to grab the opportunity.

Why Entrepreneurship?

“For us the real entrepreneurship drag was: how do we actually own our own destiny”, said Gaurang Shah and Devang Shah

In Gaurang and Devang's own words, “the real drag of entrepreneurship was: how do we actually own our own destiny”. With this belief, they had decided to keep concentrating on factorials that translate into high impact business in the country. Country's steady-growing economy, which in turn had generated ample opportunities to explore, and the availability of quality human resource for workforce development have brought the scope for them.

First Venture

Digital Signage Network (DSN) was Shah Brothers' first initiative. It is a media-tech company funded by Sequoia Capital. In India, at the initial days, DSN was one of its kind advertising network. However, at the global landscape, similar signages were in existence, more so in US and New York. With a presence in over 1500 locations, the venture has captured a large share of Indian market covering areas like malls, cafes, restaurants, food courts, and large & small format retail outlets. Initially this endeavor was planned as a summer project; however, with a good surprise, it took a positive lift. Atria Mall at South Mumbai was the starting point. Going forward, as the momentum kicked in, the venture started scaling up by winning one after another projects viz DLF, Café Coffee Day, McDonalds, Railways, etc.

Emergence of BulkMRO

As in Amazon a consumer can buy five different things of five different category and all are delivered to that consumer majorly in one shot, BulkMRO is doing the same thing for Corporates in B2B space by becoming a consolidation hub where convenience comes as one box.

BulkMRO was conceptualized and emerged with the intent of starting a very scalable, platform driven, and high impact business. The Cofounder-duo identified long-tail

of suppliers as the biggest procurement challenge for large companies. Long-tail of suppliers generally deciphers more inwards, more invoices, dealing with too many people, and more administrative activities. On top of it, if the transactions are manual, it further leads to increasing errors and inefficiencies, thus finally causing cost overrun.

To eradicate this difficulty, BulkMRO came up as the consolidation hub where convenience comes as one-box. It started consolidating the entire end-to-end procurement process by stringing together all the sub-processes viz automatic indenting, automatic order generation, automatic order placement, as well as delivery on-schedule. As in Amazon a customer can buy five different items in five different categories and all can be delivered majorly in one-shot, BulkMRO does play the similar role for corporates at B2B space. Usually large MNCs and corporate houses, who are dealing with brown-field or green-field expansion or of similar category, prefer their plate to be offloaded from regular small and standardized procurement activities. In its place, they intend to prioritize and focus on crucial revenue-generating part of procurement. As an instance, a client into 1000 crore steel plant business prefers to focus more on big items. And to streamline that, they would prefer to outsource the procurement activities for small value standardized items – as for eg, laboratory equipment of around two crores. This would help them to save their man-hours as well as unnecessary hassles and liabilities, which could have resulted had their own workforce been deployed.

Competitive Edge

WoW Factors of BulkMRO that Generate almost 90 percent Repeat Rate:

- Enterprise focused and large corporate focused approach
- Online presence
- End-to-end digitized procedure
- Innovative technology back-up
- Strong sourcing
- Customer centricity
- Sales Team Extension Functionality for their Vendors / Suppliers
- Procurement Team Extension Functionality for their Customers

Being a horizontal specialist, BulkMRO provides solution for their customers across the length and breadth of their requirement – in short, in getting pin-to-plain on a single platform. They have integrated right suppliers, products, logistics, warehousing (including transition from suppliers' warehouse to customers' warehouse), and storage thus generating savings and efficiency in entire supply chain.

In India, even today, the procurement process majorly follows a low-tech way through excel files, manual order placement, and with no real-time tracking. The start-up identified this short-fall and built up on that with fully digital, technology-enabled, and transparent end-to-end procedure ranging from indenting to delivery. Their full-fledged online presence put their customers at ease and convenience for sourcing the requirement. Thanks to their advanced technology adoption, their customers can track and trace the orders they place. Customers are free from legal worries due to its reliability, adherence to compliance, and following of taxation rules. This value addition has enabled them to win over 200 corporate customers so far.

Competitive Positioning

The startup has identified a USD 300 bn market space in India; and realized that even a 1 percent dent in it can make them a multi-thousand crore company.

Director-duo mentioned, “We majorly cater to Oil & Gas, Power, Manufacturing, and Pharma sector with a focus on large- and mid-sized companies as well as on PSUs. In Oil & Gas industry, we have kept our eyes fixed on offshore. We are also gauging the expansion possibility in city gas distribution, refinery, and pipeline work. Lots of new projects are coming up in upstream, midstream, downstream, and gas-sector – mainly in LPGs and LNGs, which we have been considering as opportunity for us to scale up”. They added, “Almost USD 100 bn expansion is expected in India over next 5 years”.

As far as clientele is concerned, the start-up has acquired both global and national clients. Global clients buy in their concept without much inhibition as those clients are already acquainted with similar emergence. However, national clients are needed a shift in their mindset from what they have been doing and experiencing since ages. Nonetheless, it's worth mentioning that buying in BulkMRO's proposition is not an easy task, even for large corporates.

"Onboarding us leads to off-loading of thousand other vendors whom those corporates have been bonded with since years. Here comes the role of our commitment towards long-term presence and sustainability", Gaurang added. "We are now happy to mention that more & more clients have started appreciating our concept and the value addition, which have been contributing very positively and incrementally to our in-bound business development."

As far as market competition is concerned, the Director-duo considers existing small-scale solo suppliers too as their competitors, along with aggregators. They foresee enough room for their growth as well as for each player without affecting the others. And the contributing factor is the existence of sufficiently incremental market growth and demand.

Devang added, "even the giants like Amazon and Flipkart take up a small fragment of the market. Online retail has captured 59 – 60 percent of the US retail market. Amazon (both online and offline) has so far captured about 10 percent count. And in Indian context, this count is around 5 percent. If top companies like Big Bazar, Pantaloons, D-Mart, Reliance Retail, Amazon, Flipkart are consolidated together, still they constitute a small fragment of the entire market. Now this is the scenario for B2C market space. In B2B market space, in Indian context, so far there is no organized aggregator. A few can be named viz 3M, Honeywell,

etc; but they are not aggregators. They sell their own products. Therefore, it can be said that we have been pioneering for Indian aggregators at B2B space".

Global Presence

The start-up has established their presence in seven markets. Other than India, they have put their feet on the streets of Middle-East, South-Asia (Srilanka & Bangladesh), Kazakhstan, Commonwealth of Independent States (CIS), Russia, and South-East Asia. The Director-duo feels that these markets are poised for such kind of disruption. Europe and US have already been explored. And for coming days, their focus is on Nigeria, Africa, and South-Africa. However, they are yet to build-up their visibility in South America.

Vendor and Customer Engagement

So far the start-up has on-boarded more than 3000 vendors. Shah Brothers gladly mentioned, "We consider this aspect as our trump-card. We act as a sales team extension for our vendors by bringing orders for them. The vendors don't have to put their feet on street to deal with multiple customers individually. Our platform is enabling them to connect with more than 200 companies, and to alleviate all the logistical, compliance, and payment related hassles. From customers' stand point, we are their procurement team extension. So for both vendors as well as customers, associating with us is a win-win proposition."

Big Player vs Small Player Integration

For critical items and components, the start-up prefers to tie up with bigger players to avoid perforation in safety and compliance.

Gaurang said, "it is acceptable if the margin goes little bit up and down for the sake of maintaining safety and compliance."

The Director-duo is very protective of their customers' convenience and faith on them as a reliable supplier and

authentic & real deal provider with on-schedule delivery. And this they want to maintain with consistency. However, for not-so-critical and standardized items, they have kept their options open for small players. This provides them the scope for cost-optimization, the benefite of which they pass on to their customers.

Logistics Integration

The start-up has adopted a strategy of integrating third party logistics providers and developed a very good ecosystem with them, instead of recreating the existing wheel. They have collaborated with dozens of logistics service providers having expertise to their own respective domains catering to logistics, warehousing, pick-n-packs, and actual movement of the material.

Workforce Development

BulkMRO has grabbed a troop of promising young workforce. Their journey started at Jan'2015 with three people, followed by an expansion of up to almost 160 people as on date. The venture has on-boarded some partisans from the aggregators of West, having specific domain experience to this kind of industrial products & tools; and the team building is being done through them by using their best practices. As a part of their people development policy, training is also being accentuated on.

Future Thoughts

Shah Brothers strongly intend to practice humble strategy. Along with new acquisition, they intend to keep executing better with existing clients –

- in terms of products are being supplied to them
- in terms of customer centricity

Their goal is to become indispensable & default options to their clients. ■

Vacuum Mixer Homogenizer

The Ross turbo emulsifier consists of a counter-rotating turbine and a high speed rotor/stator. The rotor stator head is positioned in the bottom centre of the mix vessel to enable its use with very small volumes of material. During the mixing operation the outer turbine rotates clockwise and moves materials off the vessel wall and upwards. The inner blades rotate counter clockwise and move material downward and into the high speed homogenizing head. The turbo emulsifier is manufactured in many sizes from 10 through 4,000 litre capacity. Each machine is built for pressure and full vacuum operation, entirely in polished SS surfaces. The turbo emulsifier is used extensively in the pharma and cosmetic industries for the mixing of viscous materials. This processor is ideal for homogenizing, emulsifying, dispersion and particle size reduction. Typical applications include: antacids, biopolymers, collagen solutions, dental composites, gelatine compounds, gels and transdermal patches.

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Dispensers



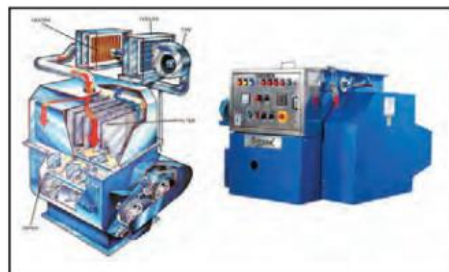
Transfer set for flammable liquids (petrol, kerosene and diesel fuel) features high efficiency pump with nozzle holder, easy to install on the barrel through the quick coupling; dispensing unit equipped with telescopic suction tube for direct connection into the tank allows easy and clear use of the dispenser; cast iron body, anti-noise filter and flanged component pump. Meter and filters

can be installed or replaced without the use of sealant, making connection quick and safe. Bypass setup with pressure relief valve, thermal protection, non-return valve (NRV) built, and suction unit with integrated fine filter.

For details contact:
Toshniwal Hyvac Pvt Ltd
267 Kilpauk Garden Road
Chennai 600 010
Tel: 044-26448558, 26448983
Fax: 91-044-26441820
E-mail: sales@toshniwal.net

or Circle Readers' Service Card 02

Fluidized Zone Dryer



The Toshniwal drying systems is especially suitable for powder products, granulates and filter cakes. A typical example of a product that can be dried effectively in a Toshniwal drying system is powder. For many chemical applications, the moisture in powder is desired; optimized for the final product. Due to the reliable and repeatable process, it is an easy task for the operator to produce the exact end-quality for each batch.

The system is based on the fluidized zone twin shaft mixing technology. The product is dried by mixing energy and powder in the best possible way. Hot air is blown into the dryer and mechanical fluidisation of the product ensures that all particles are surrounded by air

through a filter, out of the system. The temperature of the product must be kept under a certain value. By monitoring product temperature, together with in going air temperature, appropriate process control is guaranteed.

Advantages of the fluidized zone twin shaft drying of powder are: high thermal efficiency, less energy consumption compared to other types of drying systems; can operate close to the product's max temperature, increasing drying chamber; and universal machine where multiple processes are possible in one process chamber. The integrated mixing technology always ensures a homogeneous batch.

Product is charged into the dryer. Hot air is blown into the system, where it is mixed with the product. The moist exhaust air leaves the system through a filter. Customized control system, automatic operation possible. It finds application in foundry chemicals, agro chemicals, metal stearates, leather chemicals, paper chemicals and textile chemicals.

For details contact:
Toshniwal
267 Kilpauk Garden Road
Chennai 600 010
Tel: 044-26445626, 26448983
E-mail: sales@toshniwal.net

or Circle Readers' Service Card 03

Ozone in Swimming Pool



Ozone is the only powerful oxidising agent for swimming pool. The natural and biodegradable ozone completely reduces the consumption of chlorine. Ozone provides clean, odourless and healthier pool, which do not cause red eye or skin irritation. Ozone provides

3,000 times more effective results in disinfection compared to chlorine. Ozone in water kills bacteria, moulds, fungus, spores and viruses. Ozone reduces pool odour and destroys oil and other contaminations to improve the water quality of swimming pool. Ozone leaves no chemical taste or smell, will not cause eye or skin irritation and will not discolour or damage hair or clothing.

For details contact:
Faraday Ozone Products Pvt Ltd
106/4-A Revenue Nagar, Saravanampatty
Coimbatore, Tamil Nadu 641 035
E-mail: sales@faradayozone.com

or Circle Readers' Service Card 04

Filtration Unit



Double filter, triple control filtering unit provides double filtering for oil and diesel fuel and absorbs any water and impurities.

The unit features a supply and suction pipe with integrated bottom valve.

Features sturdy wheeled structure, large diameter wheels, flow rate 56 l/min and filtering capacity (first stage 30 μ with water absorption and second stage 5 μ for impurities). Flow rate is up to 56 l/min, two step filtration, and continuous AC operation 230-V and duty cycle 30 min DC version.

For details contact:
Toshniwal Hyvac Pvt Ltd
267 Kilpauk Garden Road
Chennai 600 010
Tel: 044-26445626 26448983
E-mail: sales@toshniwal.net

or Circle Readers' Service Card 06

Ring Vacuum Pumps



Toshniwal leader in vacuum engineering of over 60 years, now provides further solution to your vacuum needs in manufacturing of liquid ring vacuum pumps that offer optimum performance and reliability.

They offer minimal water consumption and an innovative impeller design that assure

extremely quiet operation and extends its life even under harsh condition the most advanced manufacturing process with the objective to reduce manufacturing and delivery time.

Hydrotwin, PLC-controlled roots + LRPV package for high vacuum application with total liquid recirculation capacity to 3,900-m³/hr and max vacuum 2-mbar. Hydrosys, centralized package vacuum units with total or partial water recirculation capacity to 3,500-m³/hr and max vacuum 33-mbar.

It finds application in distillation, drying, material transfer, power and steel, food processing, paper, general vacuum and textile.

For details contact:
Toshniwal Instruments (Madras) Pvt Ltd
267 Kilpauk Garden Road
Chennai 600 010
Tel: 044-26445626, 26448983
E-mail: sales@toshniwal.net

or Circle Readers' Service Card 05

Air-cooled Heat Exchanger

Pre-heaters, heat recovery units and similar air-to-air heat exchangers are designed and manufactured as per client's requirements.

Hot air and gases exiting processes in industries are used as heating medium to pre-heat process air by passing over finned air-to-air heat exchangers. Exhaust gas from fuel combination in generators, boilers, etc, is also used as heating medium. Their design incorporates wire-wound finned tubes or spiral finned tubes as dictated by the process conditions. The finned tubes have tabulators of suitable type to make the heat exchanger compact and economical.

Air-cooled after-coolers and inter-coolers can be custom-designed and manufactured to suit compressors.

Base tubes of carbon steels, copper and copper alloys, SS-304 and SS-316 and other SS grades finned with galvanized mild steel, copper and SS fins are used in fabrication of air heating exchangers. The body material used so far is carbon steel and SS.

For details contact:
Reliable Thermocraft
S No: 81/82, Plot No: 18
MIDC, Ambad
Nashik, Maharashtra 422 010
Tel: 0253-6628665
E-mail: works@reliablecrafts.com

or Circle Readers' Service Card 07

Portable Sampling Pump



Versatility and portability are what the new Masterflex L/S portable sampling pump brings to operators who need to carry around a pump. The new portable pump features the latest Easy-Load pump head for faster tubing changes and flow stability. The variable-speed drive has a top speed of 400 rpm, allowing the operator to adjust the flow rate to the needs of the application. It can run up to four hours on the self-contained 12 V DC rechargeable battery, or indefinitely from any AC or 12 V DC power supply. Users can charge the internal battery from an AC power supply or a DC voltage source of lower voltaic potential than the battery itself.

The pump is encased in high-visibility yellow housing for easy recognition and recovery in the field. It is ideal for rugged or remote pumping applications such as ponds and lake sampling in the forestry or the agriculture industries for applications like feed runoff sampling. It is also suitable for use in environmental testing labs and where a portable sampling pump is required.

For details contact:
 Cole-Parmer India
 403, A-Wing, Delphi
 Hiranandani Business Park, Powai
 Mumbai 400 076
 Tel: 022-61394410, 61394444
 Fax: 91-022-61394422

or Circle Readers' Service Card 08

Single Quadrupole Mass Spectrometry Technology



Chromatographers looking for bold confidence in their samples can now benefit from a single quadrupole mass spectrometer designed for ease-of-use while offering application flexibility and reliable results for challenging mass confirmation analyses.

Driven by industry demand for a robust, easy to implement system, Thermo Fisher Scientific designed the Thermo Scientific ISQ EM single quadrupole mass spectrometer for high performance and productivity standards in laboratories. With a mass range of 10-2,000 m/z, the system offers the power to detect and quantify small and large molecules, and supports analytical needs across an extensive range of applications – from drug development to manufacturing support and quality control. The system's high-performing heated electrospray ionization (HESI) and dual HESI/atmospheric pressure chemical ionization (APCI) probes facilitate the measurement of polar and non-polar analytes, enabling application flexibility.

The ISQ EM is integrated with HPLC systems and fully controlled by Thermo Scientific Chromeleon Chromatography Data System (CDS), which offers tools to guide users through LC-MS method development and select appropriate source conditions. Thermo Scientific Chromeleon XPS Open Access software also supports the ISQ EM with walk-up workflows for simple daily operation. Additionally, full integration with native control in Chromeleon CDS enables users to benefit from the entire productivity suite, from method creation through final reporting. A built-in reference standard also automates instrument calibration for a user-friendly experience.

The introduction of the ISQ EM further expands the product portfolio introduced in 2017 with the launch of the Thermo Scientific ISQ EC single quadrupole mass spectrometer. The ISQ EC was designed to integrate with both ion chromatography and liquid chromatography systems and deliver low-molecular-weight performance for the detection and quantification of ions with limits of detection in the single-digit-parts-per-billion range.

For details contact:
 Thermo Fisher Scientific India Pvt Ltd
 102, 104, Delphi C-Wing
 Hiranandani Business Park
 Powai, Mumbai 400 076
 Tel: 022-67429494
 Fax: 91-022-67429495
 E-mail: sagar.chavan@thermofisher.com

or Circle Readers' Service Card 09

Water Pumps



Toshio Technology offers water pump in submersible depth of 5-m; liquid temperature up to +40°C; grain size inlet 2-mm; two pole induction motor;

single/three-phase 50/60 Hz; insulation Class B/Class F; IP68 protection; single phase with capacitor and thermal overload protection.

It finds application in clean water without abrasive particles, mainly used for well pumping, river pumping, flowing collation and rain water, pumping water out from cellars, garages, basement, water supply and drainage in breeding industry.

For details contact:

Toshio Technology Pvt Ltd
Unit 1, 601/D, Wifi Park, Road No: 1
Above Satkar Grand, Opp: Aplan Co
Wagle Indl Estate, MIDC, Thane
Maharashtra 400 604
E-mail: service@toshiopumps.com / sales@toshiopumps.com

or Circle Readers' Service Card 10

Industrial Communication



Advantech's Industrial Communication products provide reliable wired and wireless communication (3G, GPRS and WLAN) for mission critical applications.

These products include: Industrial Ethernet Switches, Industrial Wireless AP/Client, Media Converters, Serial Device Servers, Cellular IP Gateways, and Modbus Gateways. They are also capable of securely transmitting critical and sensitive information, remotely monitoring and controlling networked devices and emphasizing high communication capabilities for industrial applications.

For details contact:

Advantech Industrial Computing India Pvt Ltd
79/2 City Centre, 5th Floor
Outer Ring Road, Ballari
Opp: Hebbal Bus Stop
Subramani Nagar, Hebbal
Bengaluru, Karnataka 560 024

or Circle Readers' Service Card 11

Stator Rotor



Tremendous amount of shear is required to produce stable emulsion and fine dispersion. Hence, all the impeller blades are designed at high tip speed and high shear rate.

For low and medium viscosity fluid premixing and de-agglomeration of particles to very fine and stable dispersion is a well-known use.

For high viscosity fluids co-axial or multi-shaft agitators are recommended with stator rotor or pump may be used for flow through inline homogenizer.

These machines are used for producing stable emulsions and fine dispersion in micron range. Ultra high shear mixers can be used for sub-micron range dispersion and emulsification (depending on the nature of the product). Trial on our pilot scale batch homogeniser or inline homogeniser is recommended for predicting the actual performance on the plant scale.

Standard machines can be used for most of the applications. However, a tailor-made custom design may be recommended to meet customer special needs.

Rotor moves inside a stator at very high peripheral velocity, which produces intense hydraulic shear, which is required for emulsification and very fine and stable dispersion. Fluids are drawn at centre of the high speed rotor where it experiences very high mechanical and hydraulic shear due to centrifugal force and small clearance between the stator and rotor.

It finds application in de-agglomeration, dispersion, particle size reduction, droplet size reduction, emulsifying, homogenising, dissolving, hydrating powder, liquid mixing, etc.

For details contact:

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B-37 Maruti Indl Estate
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Ahmedabad, Gujarat 382 445
E-mail: ashok@fedainc.com / reena@fedainc.com

or Circle Readers' Service Card 12

High-pressure Pump



KaiPUMP is a vertical multi-stage pump which is driven by a standard motor. It can be used to convey a variety of mediums from tap water to industrial liquid at diverse temperatures and with different flow rates and pressure. Where there

is a requirement of liquid to be transported at a high pressure KaiPUMP can be utilised by using multiple impellers or stages in the body of the pump. As the flow progresses through multiple stages of KaiPUMP, pressure is built within the pump that enables it to move contents to a longer distance. It can be used for negative displacement as well as for positive displacement application. It has many applications in industries like industrial boosting, industrial conveying, water treatment and irrigation.

It finds application in reverse osmosis, boiler feed, fire fighting system, industrial water supply, pressure boosting, etc.

For details contact:
Arvind Envisol Ltd
Arvind Mill Premises
Naroda Road, Ahmedabad
Gujarat 380 025
E-mail: support.kaigo@arvind.in

or Circle Readers' Service Card 13

Process Engineering Solutions



Ablaze has concept and history of developing and supplying process systems to chemical industry and helps to improve environment by offering exhaust gas absorption and waste water treatments. Reclamation of chemicals/solvents from waste air or liquid streams often plays an important part in becoming economically viable process. All around the actual synthesis material

flows accumulate in the chemical and pharma industry, which must be cleaned under environmental aspects or still contain resources. Requirements of the environmental protection laws also must be adhered to as well as the cost saving preparation and recycling of resources.

Ablaze offers basic and detailed engineering services to commissioning different project levels up to turnkey delivery using different MoC such as borosilicate glass, PTFE, FEP-PFA-lined components, Tantalum to arrive at cost-effective and environment-friendly solutions.

For details contact:
Ablaze Glass Works Pvt Ltd
E-52 Sardar Estate, Ajwa Road
Vadodara, Gujarat 390 019
E-mail: srshah@ablazeglassworks.com

or Circle Readers' Service Card 15

Distillation or Boiling Route



The plant produces dry HCl gas by the process of distillation of 30 per cent hydrochloric acid solution as a continuous process.

The feed 30 per cent HCl acid is pre-heated by the outgoing hot bottom product in the heat exchanger and fed to the azeotropic distillation column by the pump in controlled rate.

The heat energy is supplied by steam to the termosiphon reboiler at bottom of the column.

The bottom product from the plant is constant boiling approx 21 per cent acid solution, which is cooled by the cold 30 per cent acid feed solution prior to discharge.

The top product HCl gas is dried in the drying unit using sulphuric acid/suitable dehydrating agent. The product HCl gas is anhydrous.

All the wetted parts of the system are fabricated from corrosion-resistant materials (glass and graphite).

For details contact:
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E-52 Sardar Estate, Ajwa Road
Vadodara, Gujarat 390 019
E-mail: srshah@ablazeglassworks.com

or Circle Readers' Service Card 14

Filter Papers & Pads



National Card Board Mill offers wide range of filter papers and pads on highly sophisticated production plant. The entire process of manufacturing is untouched by hand from the pulping stage to the finished product. This is a high precision completely automatic plant which ensures a

uniformly produced filter media for excellent purity and frees from external contaminants qualities vital for sensitive industries like drugs, pharma, food, beverages, chemicals, cosmetics, etc.

The raw materials are continuously monitored for quality control. Constant laboratory tests are conducted to check filtration efficiency, pad porosity, absorbency, filtration speed and bursting factor. The fibres of their filter paper and pads are also subjected to a special porous chemically inert wet-strength impregnation process to impart high mechanical strength while filtering aqueous. The company manufactures cellulose filter papers and pads up to 50 inch dia activated carbon filter pad.

For details contact:
National Card Board Mill
Plot No: 140-2/B2, GIDC Estate
Ankleshwar, District Baruch, Gujarat 393 002
Tel: 02646-252569, 222569
E-mail: ncbmfilter@gmail.com

or Circle Readers' Service Card 16

Bio-based Plastic Packaging



Sanner BioBase is the first effervescent tablet packaging that consists of more than 90 per cent bio-based material. The biopolymers used consist of various renewable raw materials such as corn, sugarcane or cellulose, which are converted into green ethanol. A major advantage of bio-based plastic packaging is its essential independence from fossil raw material deposits and its reduced CO₂ footprint. Bio-based plastic packaging has the same properties as conventional packaging solutions. They can also be processed on existing filling lines. From a

chemical point of view, Sanner BioBase is almost identical to PE and PP from fossil raw materials. The initial tablet tube will have a dia of 27-mm and can be combined with the appropriate desiccant closure.

The TabTec CR tablet container protects children from accidentally taking painkillers, anti-depressants or medical cannabis. The patented Press & Flip closure prevents opening by children's hands. However, it is easy to handle for adults and especially for seniors by pressing and simultaneously folding up the closure. The desiccant integrated into the bottom of the container and the appropriate colour selection protects the contents from moisture and light at all times. The integrated pouring assistance ensures hygienic and easy dosing of the drugs.

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D-69115 Heidelberg, Germany
Tel: +49 6221 18779-27
Fax: +49 6221 18779-11
E-mail: sanner@commhaconsulting.com

or Circle Readers' Service Card 17

Peristaltic Pumps



Masterflex Ismatec Reglo Digital peristaltic pumps are ideal for the laboratory, with flow-driven technology that supports precision dispensing; functional versatility giving freedom in applications, and a space-saving compact footprint to conserve valuable benchtop space. In comparison to its predecessor, the new Reglo pumps have a wider overall flow range with the option of dosing between 0.00009- and 368-mL/min. The models pack in advanced features designed to deliver fluids accurately, including anti-drip technology to help conserve valuable samples, speed ramping to better accommodate fluids with varying viscosities, and touch-screen interfacing that supports powerful programmable performance - all while taking up very little space (178-mm (H) x 152-mm (L) x 165-mm (W)). The cartridge design synonymous with Ismatec Reglo pumps has been retained, with a choice of two or four channels, both of which fit three-stop tubing. The cartridge configurations offer a choice of 6, 8 and 12 rollers, allowing you to choose the

optimal balance of flow rate and pulsation. For the first time in the Reglo family of pumps, the popular Miniflex pump heads have been integrated into the available options, giving you a choice of one- or two-channel configurations, both of which use continuous L/S tubing. Furthermore, these new Reglo pumps feature a 50-W BLDC motor instead of the 75-W PMDC motor used in older models. It is ideal for feed, transfer, perfusion, volume dispensing and time dispensing.

These new Reglo pumps offer an easy-to-navigate and intuitive 5" capacitive touchscreen display so it can be used with disposable gloves. The Android platform on which the interface is designed helps the menu structure feel instantly familiar to most users. In addition, these are the first highly accurate micro-flow (<100-mL/min) models to receive MasterflexLive capability and 21 CFR Part 11 and EU Annex 11 compliancy. This secure, cloud-based platform allows you to control and monitor your pump via a PC, tablet or smartphone (iOS and Android). You can ensure that valuable sample loss is minimized, and your safety is optimized, due to the ability to control all pump parameters, including speed, flow rate, dispense volume, and more in real-time and remotely. Push notifications provide alerts for operating conditions and error messages. By subscribing to MasterflexLive premium, gain access to 21 CFR Part 11 and EU Annex 11 data compliance with the ability to robustly manage data, maintain digital records and control access to data.

For details contact:
Cole-Parmer India
403, A-Wing, Delphi, Hiranandani Business Park
Powai, Mumbai 400 076
Tel: 022-61394444, 61394410, Fax: 91-022-61394422
E-mail: response@coleparmer.in

or Circle Readers' Service Card 18

Power Measurement



With the new SCT current converters, Beckhoff completes the power measurement chain that now ranges from measuring the physical value to transmitting the captured data to the cloud. The portfolio of current transformers covers all applications for currents ranging from 1-A to 5,000-A with a choice of ring-type and split-core devices as well as 3-phase current transformer sets.

With its SCT current transformers, Beckhoff makes it possible to implement reliable power sensor technology directly in the field as an integrated component of the PC-based control technology. Users can select from two device types, each available in various designs and performance categories that are highly scalable and therefore suitable for a great variety of applications. The SCT portfolio is extremely broad, ranging from low-cost 3-phase CT sets for building technology and standard industrial transformers for machines through to solutions for inspection and test stands with extra-high accuracy requirements.

The choice of product category depends on the type of use. While ring-type transformers are predestined for cost-effective and accurate data acquisition in new installations, the easy-to-install split-core CTs provide the ideal solution for trouble-free retrofit solutions. With either solution, the integrated power measurement chain from the sensor to the cloud simplifies energy management and opens the door to improving the availability of machines and systems. Continuous, system-integrated power measurement allows users to perform extensive inline analyses, for example, to detect deviations early in time and take quick corrective action in order to minimize downtime.

For details contact:
BECKHOFF Automation Pvt Ltd
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E-mail: a.phatak@beckhoff.com

or Circle Readers' Service Card 19

Energy-saving Motors



The energy-efficient latest generation permanent magnet synchronous motor has considerably lower losses than the current IE4 Series. The unventilated smooth motor achieves its high-efficiency that, at times, is significantly above Efficiency Class IE5 via a wide torque range – and is optimally suitable for the operation in the partial load range. The compact IE5+ motor offers a high power density with less installation space and will be initially launched in a size for power ranges from 0.25 to 1.1-kW with a continuous torque from 1.6 to 4.8-Nm and speeds from 0 to 2,100-min⁻¹. The motor can be directly mounted according to NEMA or IEC.

The motor concept will be gradually extended with more sizes and powers. It is ideal for use in hygiene-sensitive and harsh environments because it is easy to clean, corrosion-resistant and wash-down capable. nsd tupH surface treatment and IP69K Protection Class are optionally available, as well as an integrated mechanical brake. An integrated encoder is part of the standard equipment. The new IE5+ motor can be combined with NORD gear units and drive electronics as a modular system and will be available from the second quarter of 2020. The nsd tupH surface treatment offered by NORD is an outstanding corrosion protection for gear units, smooth surfaced motors, frequency inverters and motor starters in wash-down optimised cast aluminium housings. The drives are easy to clean and largely resistant to acids and alkalis. It is even possible to use high-pressure cleaners or apply aggressive media. The fanless smooth surfaced motors prevent the spreading of germs and run very quietly.

For details contact:
NORD DRIVESYSTEMS Pvt Ltd
282/2 & 283/2, Plot No: 15
Village: Mann, Tal: Mulshi
Adj Hinjewadi MIDC Phase II
Pune, Maharashtra 411 057
Tel: 020-39801217, Fax: 91-020-39801416
E-mail: monika.mishra@nord.com / pl.muthusekhar@nord.com

or Circle Readers' Service Card 20

Fieldbus-Independent I/O for Hazardous Areas



The WAGO-I/O System 750 modules are designed for use in areas which are not potentially explosive as well as explosive. The direct application of Fieldbus technology in potentially explosive areas is typically resource-intensive. When used in hazardous areas of Zone 2/22, the WAGO-I/O System 750 offers a safe, easy and economical connection to the sensors and actuators of Zones 0/20 and 1/21. The blue Ex i I/O modules, developed for this purpose, form an intrinsically safe section that can be integrated into a standard Fieldbus node, offering all the advantages of a state-of-the-art Fieldbus technology.

The WAGO-I/O System 750 is approved for use in mining environments; explosive gas environments; explosive dust environments; and onshore/offshore environments (eg, gas tankers, oil/gas pipelines).

For details contact:
WAGO Kontakttechnik GmbH & Co KG
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or Circle Readers' Service Card 21

Industrial IoT Gateway



To stay at the leading edge of Industry 4.0, Advantech's UNO Series is more than just an embedded automation computer. With their advanced

communication capabilities they easily connect to the cloud as intelligent IoT Gateways in smart factories. The cloud-enabled embedded IoT Gateway, coming with iDoor technology, not only provides scalable computing power for field site control but also fully supports different PLCs running divergent protocols by integrating with IoT Software WebAccess/HMI for remote management.

With seamless connection, aggregation, data filtering and transmission to the cloud, the micro-size and different mounting way of embedded IIoT gateway also fit in any control cabinets or equipment without space limitations.

For details contact:
Advantech Industrial Computing India Pvt Ltd
79/2 City Centre, 5th Floor
Outer Ring Road, Ballari
Opp: Hebbal Bus Stop
Subramani Nagar, Hebbal
Bengaluru, Karnataka 560 024

or Circle Readers' Service Card 22

Pressure Switches



The new PLUS Series offers the versions NC (normally closed) or NO (normally open) with integrated connectors like DEUTSCH 2P or 3P, AMP Superseal, Packard MetriPack 280, AMP Junior Timer, M12 x 1 and others. The electric contact will easily be reached by just putting together the integrated connectors with the counter plug. Thereby these product series are designed according to the protection degrees IP67 (or IP6K9K) depending on the used connector. These approved standard pressure switches have been further developed and include now additionally security functions.

Moreover, SUCO offers the versions which include diagnostic functions (fail-safe) with short-circuit and cable break detection according to NAMUR. Such versions are of a special interest for safety systems as for example brake systems, hydrostatic steering systems or fire-fighting systems. The

PLUS Series pressure switches are also available in a version with varistor that allows limiting the flyback voltage efficiently. Thereby the generated overvoltage protection extends the contact lifecycle. Furthermore, an active reduction of EMI emissions will be reached by switching of the pressure switches.

Temperature-controlled switching, which can be interesting for the filter monitoring, will be the next development step. Due to this function it is easy to avoid the incorrect switch status at low temperatures and hence high viscosity of the medium.

For details contact:
Bedaflow Systems Pvt Ltd
W-7, Sector-11
Noida, Uttar Pradesh 201 301
Tel: 0120-43299 - 90
Fax: 91-0120-43299 - 20
E-mail: info@bedaflow.com

or Circle Readers' Service Card 23

NATIONAL**Waste Management Expo****Dates:** 12-13 March 2020**Venue:** BIEC Bengaluru International Exhibition Centre, Bengaluru**Event:** Waste Management Expo (WME) will facilitate this initiative by bringing together of experts, end users, technology providers, government bodies, stakeholders, waste recyclers, dealers, retailers and local authorities under one roof.

For details contact:

ICITE-Intl Chemical Industry Tech Expo India

E-mail: event@worldofchemicals.com**SCRAPEX 2020****Dates:** 02-04 April 2020**Venue:** Bombay Exhibition Centre, Mumbai**Event:** SCRAPEX 2020 – The Recyclers World, Nation's Prime Resources & Recyclers Expo will be the first of its kind to showcase raw materials, scrap, recycling material, product and components machine manufacturers. As we know India is a major buyer of raw materials, inputs and services of the above mentioned materials. SCRAPEX 2020 is an exclusive platform that helps in bringing together the foremost and competent industrial players to showcase their products and services. It will be an International Exhibition on metals, plastic, paper, rubber, glass, tubes, pipes, wires, wood, water, electronics processing and allied industries. This Exhibition will be based on raw materials used in industries, recycling scrap, commodity products, machine, chemicals, etc. It is the first exhibition in India which focuses on recycling of scrap materials.

For details contact:

JH Media Ventures

G/2 Diamond Swati CHS Ltd

Juhu Lane, Andheri (W), Mumbai 400 058

Tel: 022-26255701

Chemspec India**Dates:** 16-17 April 2020**Venue:** Bombay Exhibition Centre, Goregaon, Mumbai**Event:** The Fine and Specialty Chemicals Exhibition features exhibits of organic and fine chemicals, active pharma ingredients, drug intermediates, dyes and pigments, agrochemicals, contract and toll manufacturing, coatings, cosmetic chemicals or ingredients, pigments and solvents, surfactants, laboratory chemicals and a host of specialty chemicals.

For details contact:

Chemical Weekly

602, Godrej Coliseum, B-Wing, 6th Flr

B/h Everard Nagar

Off Eastern Express Highway

K J Somaiya Hospital Road

Sion (E), Mumbai 400 t022

Tel: 022-24044477

Fax: 91-022-24044450

E-mail: corporate@chemicalweekly.com**INTERNATIONAL****Energy from Waste Conference****Dates:** 04-05 March 2020**Venue:** America Square Conference Centre, London, UK**Event:** The Energy from Waste Conference, the event is the premier conference in the UK and Europe driving new technology discussion, operational efficiency, best practice and compliance in the global energy from waste sector. Designed to support your professional learning and global network development, this programme is packed with policy updates, expert advice and market opportunities from a lineup of renowned international speakers on Energy Waste Management. It drives the new technology discussion, operational efficiency and best practices.

For details contact:

Mark Allen Group

St Jude's Church

Dulwich Road

London SE24 0PB

U.K.

Corrosion Conference & Expo**Dates:** 15-19 March 2020**Venue:** George R Brown Convention Center, Houston, USA**Event:** Corrosion Conference & Expo showcase your newest products in front of customers, prospects, partners, and influencers; generate leads efficiently and effectively; build relationships with key players and decision-makers; bolster the global influence and reach of your company's product or service; and expand your reach and tap into new markets meeting new potential buyers and suppliers.

For details contact:

Nace International - The Corrosion Society
Houston, U.S.A.

Tel: +1 281-228-6411

E-mail: tiffany.krevics@nace.org**Analytica****Dates:** 31 March-03 April 2020**Venue:** Exhibition Munich, Munich, Germany**Event:** Analytica provides the attendees with the opportunity to explore the areas of laboratory technology, analytic and biotechnology.

For details contact:

Messe Munchen India Pvt Ltd

INIZIO 507 & 508, Cardinal Gracias Road

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New Contracts/Expansions/Revamps

The following list is a brief insight into the latest new projects by various companies in India.

CHEMICALS

Tata Chemicals, the world's second largest soda ash manufacturer, has received green nod for expansion of its soda ash plant in Gujarat at an estimated cost of ₹ 1,042.07-crore. The proposal is for expansion of its soda ash plant located in Devbhumi Dwarka district from 10.91 to 113.16-lakh TPA and enhance captive power plant capacity from 84 to 125-MW.

The proposal was first vetted by a central government constituted green panel and based on its recommendations the Union Environment Ministry has given the environment clearance (EC) for the expansion of soda ash plant in Gujarat, subject to compliance of certain conditions and prior clearance from the wildlife angle, including clearance from the standing committee of the national board for wildlife.

As per the proposal, the expansion will be carried out within the existing plant premises of 231 hectare (including cement plant). The cost of the project is pegged at ₹ 1,042.07-crore and will be completed in two years.

Soda ash is the common name given for the technical grade anhydrous sodium carbonate (Na_2CO_3) finds application mainly in the production of detergents, glass, chemicals, sodium silicate, water treatment and pulp/paper.

India has the advantage of abundance of raw materials, ie, limestone and salt and growing domestic demand that favours the establishment of soda ash plants.

Insecticides (India) Ltd has announced a ₹ 200-crore expansion plan to increase its capacity in the next three years. In the first two years, it would spend about ₹ 100-crore, followed by an investment of ₹ 100-crore in 2020.

The firm is planning to set up an Export Oriented Unit (EOU) in Gujarat with an eye on increasing export component of the business. Exports contributed about ₹ 35-crore in the total turnover of ₹ 1,109-crore in 2017-18. The firm has a share of about 5 per cent in the ₹ 18,000-crore crop protection market in the country.

MINING

Jindal Steel and Power Ltd (JSPL) recently said its 1.80-MTPA coal gasification-based DRI (direct reduced iron) plant at Angul District in Odisha has resumed operation. The plant was not operational for long due to the scarcity of coal. Now Coal India Ltd (CIL) and its arm Mahanadi Coalfields Ltd have started selling coal in adequate quantity, therefore gasification and DRI operations have resumed targeting an additional production run-rate of 1.50-million tonnes per year of steel in FY20-21 through CGP (coal gasification process) and DRI route.

Direct reduced iron, also called sponge iron, is produced from the direct reduction of iron ore (in the form of lumps, pellets or fines) to iron by reducing gas or elemental carbon produced from natural gas or coal. Many ores are suitable for direct reduction. The plant was set up by JSPL to ensure the availability of chemical and thermal energy required to produce DRI at an affordable price to reduce environmental impact of coal in the long run.

The coal gasification process converts high-ash grade coal into synthesis gas or Syngas. The syngas has replaced the costlier natural gas being used by other DRI manufacturers across the globe. The syngas is used as a reductant in converting iron ore/iron pellets into DRI/sponge iron.

The syngas produced from coal gasification contains methane, carbon monoxide, hydrogen and other such useful gases, in a particular ratio,

which are required to produce DRI from iron ore/pellets. This gasification process has a lesser impact on the environment as compared to the coal combustion process.

Thriveni Earthmovers Pvt Ltd (Thriveni) operates the NTPCs flagship Pakri Barwadih Coal Mining Project (PBCMP) in Jharkhand has awarded Zyfra – a joint project between Finnish-Russian digital solutions provider, the contract to implement its Intelligent Mine solution.

Zyfra's Intelligent Mine solution includes a mine fleet management system, automated drilling and blasting control system, payload and fuel level monitoring system, which allow allocating mining equipment, creating a schedule and assigning routes to mobile equipment according to the production objectives in real-time. Payload and fuel level monitoring system allow optimizing average payload of haul trucks and eliminating under and over loading.

Artificial intelligence has generated lot of interest among India's scientific community. India has made it to the top 10 countries with the largest number of publications on the artificial intelligence scientific projects and commercial rollouts conducted by research organizations and companies.

Artificial intelligence techniques help to solve such problems as optimal equipment control, raw materials consumption and quality checking. The relatively new area of computer vision is gaining popularity in industrial robotics and autonomous systems (cars, unmanned aerial vehicles, ships) fields.

Typically, machine learning techniques have been used in discrete manufacturing (44 per cent), in the process industry (22 per cent) and in the electric power industry (11 per cent). A further 23 per cent of projects belong to the industries where AI applications are at early stages of development.

Universal Autofoundry Ltd (539314/UNIAUTO) has opened a new unit (UNIT-II) with installed capacity of 1,800-MT per month to manufacture CI/ Ductile Iron Castings at B-51, SKS Industrial Area, Reengus, Dist: Sikar, Rajasthan. The company has made an investment of ₹ 40-crores (approx) raised from banks to set up this new unit.

Universal Autofoundry Ltd is a world class manufacturer and exporter of Grey Cast Iron and Ductile Iron, which has now made expansion by setting up a new manufacturing unit in the name of UNIT-II with installed capacity of 1,800-MT per month, which is just double as compared to the existing capacity of the Company.

Singareni Collieries Co Ltd (SCCL) has received a boost for its plans of increasing the coal production to 70-million tonnes in 2019-20 by getting the green nod for Kistaram open cast mine recently after suffering some setbacks in getting environmental clearance for its proposed new mines and expansion of existing ones earlier this year. The coal company has achieved a production of 64.4-million tonnes in 2018-19 and getting the environmental clearance for Kistaram open cast mine, with a capacity of 2-million tonnes per annum (MTPA), in Sathupalli Mandal of Khammam district is expected to go a long way in its plans to jack up the production by nearly 6-million tonnes. The green nod to the proposal has come three years after public hearing conducted on it. According to SCCL officials, a committee of experts in the Ministry of Environment and Forests (MoEF) that has gone through the proposal has recommended clearance to the mine earlier and stipulating several conditions to keep impact of the mining activity under check on air, water and local people. Environmental

conditions in and around Sathupalli Town were also appraised separately by the panel before giving its nod.

MOIL said production at its Parsoda manganese mine is expected to begin soon. The mine will be operated by open cast mining method. MOIL has been granted mining lease of Parsoda manganese mine near village Parsoda, 46-km from Nagpur in the year 2016. The lease extends for 50 year period, ie, from April 22, 2016 to April 21, 2066 and the project cost is estimated to be ₹ 19.54-crore. MOIL, under the Ministry of Steel, operates around 10 mines, including six in Maharashtra and four in Madhya Pradesh. Balaghat mine is its largest, which produces top quality manganese ore.

Hindustan Copper Ltd (HCL), on 2nd February, 2019, held a groundbreaking ceremony at Ghatsila Unit of HCL for construction of concentrator plant at Rakha, initiating Chapri-Sidheswar mine, a new mine development and Rakha mine re-opening projects. CMD informed that considering the opportunity to further increase the resource base of copper mineral in the State has finalized plan to undertake depth exploration up to 1,000-meter from surface in its existing lease area in next two years. HCL, in its Unit located at Ghatsila planned to implement total five mine expansion projects to increase the mine capacity from current 4.0 to 72.0-lakh tonne. Successful implementation of the project will also reduce country's dependence on imported copper concentrate.

NTPC Ltd hopes its captive coal production will reach 100-million tonne as soon as its five coal blocks commence operations, aided by faster regulatory clearances and the part-privatization model of Mine Development and Operator (MDO). The success of the plan would determine fuel security of the operations of India's largest power producer.

CIL, ONGC to produce coal-bed methane from 10 new mines: support SAIL in one more. The Coal Ministry has identified 11 mines to produce coal bed methane (CBM). Initially, ONGC will harness the gas and then CIL will extract coal from them. In addition to the mines with CIL, the two (ONGC and CIL) will also help develop SAIL's Parbatpur coal block (Jharkhand). Here too, ONGC will first harness the CBM. SAIL had surrendered the Sitanala and Parbatpur coal mines. SAIL had engaged MECON to prepare a techno commercial viability report, which declared the project unviable.

JSW Energy, part of the Sajjan Jindal-led JSW Group, is believed to be in the race for buying out the thermal power assets of Monnet Power and Jindal India Thermal Power Ltd (JITPL) in Odisha. Monnet Power's 1,050-MW coal-based power plant near Angul was in advanced stage of commissioning. Monnet Power's parent company, Monnet Ispat & Energy had won the Mandakini coal block in Odisha in competitive bidding, it surrendered the block later on grounds of economic unviability. Besides Monnet Power, JSW Energy is also eyeing takeover of BC Jindal controlled JITPL's 1,200-MW coal-based plant at Derang near Angul. The first unit (600-MW) of the 1,200-MW plant had begun commercial operations and started power supplies to the Odisha grid. This project has been completed at a cost of ₹ 7,537-crore which includes a debt component of ₹ 5,900-crore. JITPL has power purchase agreements (PPAs) with Odisha's Gridco Ltd, Kerala State Electricity Board and Tata Power Trading Corp. Apart from JSW Energy, JITPL also had competing offers from Adani Power and Singapore's SembCorp. The valuation of the prospective deal is not known.

NLC India (formerly Neyveli Lignite Corp) which is in the hunt for buying out power assets is understood to have shown interest in the 700-MW Odisha plant of Hyderabad-based Ind-Barath Power Infra Ltd (IBPIL). The power plant located at Sahajbahal, near Jharsuguda, has commenced commercial operations. In August last year, NLC India had floated an EoI from companies owning coal and lignite-based power projects, for a possible acquisition. NLC India's installed thermal power capacity is 3,240-MW. It runs a 10-MW solar power unit and wind power assets with a capacity totalling 37.5-MW.

Western Coalfields has received the environment clearance for its ₹ 263-crore expansion project in Nagpur district, Maharashtra. The proposal is to enhance the production capacity of the Gokul open cast mine to 1.875-million tonnes per annum (MTPA) from the existing 1-MTPA. The mine, located in 767.17-hectare, has a mineable reserve of 14.50-million tonnes. The clearance to the project is subject to certain conditions. The company has been asked to get 'Consent to Operate' certificate from the State Pollution Control Board for the existing production capacity of 1-MTPA and also the 'Consent to Establish' for the proposed capacity of 1.875-MTPA prior to enhancing the production capacity.

OIL & GAS

The Kochi-Salem Pipeline Pvt Ltd (KSPPL), the LPG pipeline project implemented by a 50:50 joint venture between BPCL and IOCL, will finally be commissioned up to Palakkad in April 2020.

The overall length of the pipeline has also been reduced to 206-km till Palakkad from 428-km, which was initially up to Salem. Failure in getting clearance from the Tamil Nadu government forced the company to terminate the pipeline at Palakkad, as of now.

The ₹ 1,000-crore worth project is being implemented in three phases.

The first phase from BPCL's Kochi Refinery to IOCL's bottling plant at Udyamperoor was completed about 4-5 months back. The first phase has a capacity of 12,000-15,000 tonnes a month.

The second phase of the project is from Kochi to Palakkad. The third phase (Kochi Refinery to Puthuvypeen) pipeline works lag behind with only about 30 per cent completion.

With works at Puthuvypeen resuming again recently, the 44-km pipeline works from BPCL Kochi to Puthuvypeen is back in full swing.

In the BPCL to Udayamperoor phase alone, a total of 800 LPG tanker lorries will stay away from the roads per month while in the Kochi-Palakkad stretch, over 2,200 LPG trucks will be off the roads once the project becomes operational in May-June.

Indian Oil Corporation (IOC) has proposed a Solapur-Hyderabad petroleum product pipeline is likely to be implemented as a strategic link by the national oil company at an estimated cost of a little over ₹ 1,006 crore.

The pipeline will serve as a crucial connection between the Koyali and Paradip refineries of IOC.

The combined capacity of the two refineries is 28.7-million tonnes. Post an augmentation of the Koyali refinery that IOC is planning, the total capacity will be nearly 32-MT. In other words, the Solapur-Hyderabad Link Pipeline (SHLP) will facilitate movement of petroleum products between the east and west coast. This, it will do by becoming a key link between two cross country facilities – Koyali-Ahmednagar-Solapur Pipeline; and Paradip-Hyderabad Pipeline – that will be 2,335-km long.

Reconnaissance survey for the pipeline from Solapur to Hyderabad has been completed. The length will be about 376-km and traverse through Gulbarga District of Karnataka. IOC has a marketing depot in Gulbarga, at a location about 130-km from Solapur. In 2018-19, the depot received petroleum products of about 360-TMT from various sources through rail and as per a study, estimated to touch about 604-TMT by 2029-30.

The proposal, in view of alignment of the depot along the proposed route of SHLP, is to connect Gulbarga depot too with the pipeline, according to official documents. While Solapur has a marketing depot, Hyderabad end of the pipeline will be connected to Malkapur, where a terminal is to be developed under the Paradip-Hyderabad Pipeline project.

An important task SHPL will undertake is maintaining supplies, in case of a planned maintenance of one of the refineries or in case of exigencies, to Maharashtra, Andhra Pradesh and Telangana. The three States together accounted for 20 per cent of petroleum products consumption in the country during 2018-19. Now, IOC sources products from other oil marketing companies in these States and rest by product movement from own sources through coastal, rail and road mode.

Thus, the pipeline will reduce dependence on other refineries and movements, and also be cost economical over time.

Considering the significance of the facility, senior officials of IOCs Pipeline and Marketing Divisions in November had decided the pipeline should be taken up on strategic basis. A detailed feasibility report has been prepared. IOC has initiated the process of appointment of financial institution/agency for financial appraisal of SHLP.

Brahmaputra Cracker and Polymer Ltd (BCPL) Lepetkata in Dibrugarh, foundation stone for HPG 2nd Stage Plant was laid by The Union Minister for Chemicals and Fertilizers.

A press release from BCPL said, "The proposal for setting up a Butene-1 and second Stage Hydrogenation of Pyrolysis Gasoline (HPG) plant at Lepetkata at a cost of ₹ 386-crore, has been approved by Government of India."

"In the first phase, BCPL shall set-up an HPG 2nd Stage plant at a cost of ₹ 125.99-crore. This project having the capacity of 52,000-TPA will produce a value-added product which can be blended with motor spirit," the release said.

The release further said that BCPL was commissioned on January 2, 2016 at a cost of ₹ 9,965-crore and was dedicated to the Nation by the Prime Minister, on February 5, 2016. The plant was stabilized within 8 months of commissioning and achieved full capacity operation during 2018-19.

In the current financial year also, the plant is operating at above 100 per cent capacity. Company has made remarkable progress in the last fiscal, achieving its maiden profit and is witnessing a consistent increase in its market share of Polymer, the release said.

Essar Exploration & Production Ltd (EEPL) and **ENI**, the Italian oil major, have discovered the presence of gas and condensates in the Ken Bau prospect at Block 114, Song Hong Basin, Offshore Vietnam.

ENI Vietnam is the operator of the block with 50 per cent participating interest while EEPL holds the remaining 50 per cent.

Confirming the discovery, ENI in a statement said, "Its exploration well located at Block 114, Song Hong Basin, Offshore Vietnam, has proven the presence of gas and condensate in the Ken Bau prospect. The well result indicates a significant potential of the hydrocarbon accumulation."

The exploration well Ken Bau 1X has been drilled at a depth of 95-m below water level, and reaches a total depth of 3,606-m, encountering several intervals of gas and condensate sandstone interbedded with Miocene age shale, with an estimated net reservoir thickness in excess of 100-m.

Ken Bau 1X well was plugged and abandoned ahead of the original plan due to certain technical issues, prior to reaching deeper levels that could hold significant additional resources.

"ENI is already planning to start a drilling campaign early next year to fully assess the substantial upside of the discovery," said the statement adding that Ken Bau 1X results represent a significant breakthrough for evaluating the exploration potential in the Song Hong Basin.

Mauritius-based EEPL has so far invested over \$1.1-billion in the exploration and production business in Vietnam, Nigeria and India.

Company's unconventional Hydrocarbon acreages in India are through wholly-owned subsidiary Essar Oil and Gas Exploration and Production Ltd (EOGEPL)

EOGEPL's Raniganj CBM asset in West Bengal is the first CBM asset in India to cross the threshold of 1-million cubic metres per day of gas production.

Tokyo Gas and Centrica LNG Co will be co-purchasing 2.6-million tonnes per annum (MTPA) of natural gas from ONGC Videsh-partnered Rovuma Offshore Area 1 project in Mozambique.

The agreement with the Tokyo Gas and Centrica LNG Co will be effective from the date production begins to the early 2040s. This takes the long-term sale tie-ups from the project to more than 9.5-MTPA, OVL said in a statement.

The development plan for the project was approved in February 2018.

Under the existing agreements, CNOOC Gas and Power Singapore Trading & Marketing have a commitment to procure 1.5-MTPA over 13 years. Shell International Trading Middle East has an agreement to procure 2-MTPA over 13 years.

Bharat Gas Resources, a wholly-owned subsidiary of Bharat Petroleum Corporation will get 1-MTPA of gas over 15 years. State-owned oil and gas company of Indonesia, Pertamina has an agreement for 1-MTPA of gas over 20 years.

The Mozambique Rovuma Offshore Area 1 project will be developed initially as an onshore LNG plant consisting of two LNG trains with total nameplate capacity of 12.88-MTPA to support the development of the Golfinho-Atum field located entirely within Offshore Area 1.

ONGC Videsh presently holds 16 per cent net interest in the Mozambique Rovuma Area-1 Offshore Project out of which 10 per cent Participating Interest (PI) is held directly by ONGC Videsh and another 6 per cent is held through its 60 per cent shareholding in Beas Rovuma Energy Mozambique Ltd (BREML). The remaining 40 per cent shares in BREML are held by Oil India Ltd.

Anadarko Petroleum Corporation is the operator of this project with 26.5 per cent PI. The other partners are: Mitsui (20 per cent), ENH (15 per cent), BPRL (10 per cent) and PTTEP (8.5 per cent).

ONGC will pump in ₹ 6,000-crore in drilling 200 wells over the next seven years in Assam in order to increase the output from the State.

The investment will take place in Sivasagar and Charaideo districts of Upper Assam, besides planning to hire over 300 persons in the State.

The wells are proposed to be drilled during the next seven years starting from the previous financial year.

Cairn Oil and Gas, which is part of the Vedanta Group, has drawn up plans to spend over \$ 1.1-billion in coming 18 months to improve the crude oil production from the Mangla, Bhagyam and Aishwarya fields in Barmer.

The announcement comes at the heels of Cairn Oil and Gas completing a decade of operations at the Mangla Processing Terminal in Barmer recently. "With implementation of Alkaline Surfactant Polymer (ASP) enhanced oil recovery, we aim to increase the recovery factor from 36 per cent to over 50 per cent. This means that we will be able to extract more than half the crude oil present in the fields," said Ajay Kumar Dixit, Chief Executive Officer at Cairn Oil and Gas.

The current production from the Mangla, Bhagyam and Aishwarya fields is to the tune of 135,000-140,000 barrels of oil equivalent per day (kboepd).

Cairn Oil and Gas currently produces a fourth of India's total domestic oil production and targets an immediate production of 300-kboepd by 2020-2021. The target by financial year 2021-22 is to have a production of 500-kboepd.

Hindustan Petroleum Corpn Ltd (HPCL) has informed that there are no roadblocks in setting up the 9-MMTPA refinery-cum-petrochemical complex at an approved cost of ₹ 43,129-crore at Pachpadra in Barmer district of Rajasthan.

In addition to motor spirit and diesel, the refinery envisages production of major products like Ethylene and Propylene derivatives. These derivatives are used as feedstock in various ancillary industries, viz, packaging, textile, petrochemical industry, etc.

Haldia Petrochemicals (HPL), plans to deploy an innovative technology for its project that seeks to convert crude oil into chemicals and petrochemicals directly. As opposed to the customary production of refined petroleum products, HPL's plant will concentrate on higher output of petrochemicals. "They will be setting up the refinery to produce chemicals and petrochemicals. The direct conversion of crude to petrochemicals will be the first of its kind in the country unlike other refineries, which are producing petroleum products. Such technologies are used widely in China," said an official privy to the development. HPL, is setting up an integrated refinery with aromatic complex for production of paraxylene and purified terephthalic acid (PTA) units in the first phase. The production capacity of paraxylene unit will be 1.6-million tonne per annum (MTPA) and PTA will have 2.5-MTPA capacity. The first phase of the HPL project approved is expected to be operationalised within five years of allotment of land. HPL has committed an investment of ₹ 28,700-crore (\$4.05-billion) in the first phase on its Odisha project. Recently, the High Level Clearance Authority (HLCA) in Odisha headed by Chief Minister gave its nod to the proposal, which HPL submitted on March 1, 2019. Official sources have touted HPL's proposal as the country's single-largest domestic investment in the last 12 months.

Vedanta Ltd has received environment clearance for the expansion of its oil and gas operation in Rajasthan that would entail an investment of ₹ 12,000-crore. The proposal is to expand onshore oil and gas production from the existing 3,00,000-BOPD (barrels oil per day) to 4,00,000-BOPD and 165-MMSCFD (million standard cubic feet per day) to 750-MMSCFD from the 'RJ-ON-90/1' block located in Barmer and Jalore districts, Rajasthan. The environment clearance (EC) is, however, subject to compliance to certain conditions. The estimated project cost is ₹ 12,000-crore. The company aims to implement the project in a phased manner during seven years. The project involves oil augmentation to produce up to 4,00,000-BOPD and 250-MMSCFD of associated gas from the oil field and natural gas augmentation to produce up to 500-MMSCFD.

Total area of the oil and gas block is 3,111-sq km. Out of it, the project presently covers an area of 1,501.7-hectare in Barmer and Jalore districts. Additional 150 hectare of land in Barmer district will be used for the proposed expansion. The 'RJ-ON-90/1 block' comprises of Vedanta Ltd and state-run ONGC for hydrocarbon exploration, development and production activities in the block, while Cairn Oil and Gas division (part of Vedanta Group) is the operator of the block.

BPCL-Kochi Refinery is going ahead with its second petrochemical project to produce polyols at an investment of ₹ 11,300-crore. An import substitute, polyols are used in the production of polyurethanes used in diverse products such as automotive seats, mattresses and shoe soles.

The project is expected to go on stream by 2022. BPCL is in talks with various global firms to finalise the technology for six different products. There is a huge

demand for polyols and it is growing at 10 per cent per annum providing good scope for MSMEs to set up units in the complex. The first petrochemical project of BPCL-KR constructed at a cost of ₹ 5,500-crore is all set to commence operations. It will produce acrylic acid, acrylates and oxo-alcohol that are used in the manufacture of paints, super absorbent polymers, detergents, adhesives, sealants and solvents. The technology has been sourced from Mitsubishi, Air Liquide Global and Johnson Matthey Davy. The two projects will facilitate ₹ 13,000-crore forex savings per annum for the country. With the completion of the second petrochemical project, BPCL-KR is expecting around 16 per cent increase in its turnover in three years. BPCL-KR is slated to complete its fuel upgradation project to comply with BS-VI norms this year. The project cost is around ₹ 3,300-crore.

Vedanta Ltd announced an oil discovery in its Krishna Godavari basin block in the Bay of Bengal. The block previously had a gas discovery in the very first well drilled.

Vedanta holds 100 per cent participating interest in the block. "Multiple reservoir zones were encountered in the well H2 within the Mesozoic sequence between the depths of 3,310 to 4,026-metres with hydrocarbon indications during drilling and downhole logging," it said. The zone from 3,403 to 3,431-metres was tested through conventional well testing (Drill Stem Test) and flowed oil to the surface. "Further appraisal will be required to establish the size and commerciality of the oil discovery. The first exploration well A3-2 drilled in the block was a gas discovery. Cairn India, the company Vedanta bought and merged with itself, had in June 2010 won the KG-OSN-2009/3 block in the 8th round of New Exploration Licensing Policy (NELP). It had committed to drill six exploratory wells on the block. These were expandable to 10. The KG basin is a proven basin where there have been many hydrocarbon discoveries. The company acquired around 1,000-sq km of 3D seismic data based on which it drilled two wells. KG-OSN-2009/3 offshore block in the Bay of Bengal was originally spread over in an area of about 1,988-sq km which was later reduced to 1,298-sq km due to exclusion of area within firing range. It is located in the shallow waters of the Indian Ocean along the East coast of India, approximately 1.5 km from the Indian coastline.

Chennai Petroleum Corpn Ltd (CPCL), the Indian Oil Corpn's (IOC's) group company is planning to set up a greenfield refinery at Nagapattinam in Tamil Nadu, at a cost of ₹ 27,460-crore. The products, including motor spirit (MS) and high speed diesel (HSD), which will be produced from the refinery will help meet the latest BS-VI specification in the southern States. The new refinery will be part of the Government of India's plan to set up a petroleum, chemicals and petrochemicals investment region (PCPIR) in this region. The boards of CPCL and IOC have accorded in-principle approval for the 9-million metric tonne per annum (MMTPA) refinery at CBR at an estimated investment of ₹ 27,460-crore, plus or minus 30 per cent. The investment includes ₹ 2,800-crore for setting up a polypropylene unit of around 500 thousand metric tonne (TMT) per annum capacity. Detailed feasibility report (DFR) preparation is underway. The refinery is expected to be operational by 2023-24. The products from the refinery will meet the latest BS-VI specifications. It will produce valuable products, including liquefied petroleum gas, petrol, diesel, aviation turbine fuel, polypropylene, etc, besides petrochemical feed stocks. The petrochemical complex will also feed stocks to downstream industries, including pharma, paint and lacquer, printing inks, adhesives, coatings, chemicals, automobile lubricants, and PVC, among others. CPCL operates two refineries with a total capacity of 11.5-MMTPA (10.5-MMTPA at Chennai and 1-MMTPA near Nagapattinam) in Tamil Nadu. The company's crude throughput increased to 10,789-TMT in 2017-18, from 10,256-TMT in 2016-17. Its profit after tax stood at ₹ 913-crore in 2017-18, as compared to ₹ 1,030-crore in 2016-17.



CPP Expects a Growth @ 20% per Year for Coming 5 Years

Vijay Rajpurohit
Managing Director
Chemical Process Piping Pvt Ltd

In an exclusive interaction with **Chemical Engineering World**, Vijay Rajpurohit spoke about CPP's business footprint, industry they are catering to, revenue, value creation, product portfolio, water desalination business, role of technology-innovation-and-digitalization, and future business expansion plan.

Please acquaint our readers with CPP's business footprints, both in domestic as well as in international market.

We serve the Chemical, Power, Desalination, and Oil & Gas industries in India. As a part of our global presence, we have reached out to South East Asia, Middle East, Australia, Europe, and South America. For chemical industry in particular, we serve to chlor alkali membrane cell plants, soda ash plants, & non-ferrous metallurgical plants such as copper and zinc.

As CPP caters to quite a few industries along with chemical processing industry, what's the proportion of serving – revenue-wise as well as value-creation-wise?

Our market share for FRP piping in the chlor alkali membrane cell plants is over 90 percent in India. Similarly, for the Soda ash plants we have an over 80 percent market share. We have supplied FRP piping to over 25 desalination plants globally, and the amount of desalinated water that flows through our pipes adds to over 2 billion lts per day. The Chemical industry contributes 40 percent of our revenues while the rest of the markets bring in remaining 60 percent in aggregate.

If we consider CPP's product portfolio, how does it bring in a competitive edge over its contemporaries? What's your USP?

CPP's large manufacturing capacity for FRP/ GRE piping, combined with consistent quality, is our strength. We are the only 'pure play' FRP/ GRE piping company in India with a focus on chemical, power, desalination, and oil & gas industries. All our competitors are with general FRP workshops with varied products, which do not allow them to concentrate on a single product. CPP, on the other hand, carved out a niche by concentrating only on FRP/ GRE

piping. And this focus on a single product enables us to bring in improvement in design and capacity building.

Today's businesses as well as consumers – both are highly concerned about cost optimization and energy efficiency. How does CPP add value here?

CPP has been in the forefront of technology innovation that has led to quality enhancement as well as bringing in production efficiency. We constantly look at the ways to shorten manufacturing cycles thus leading to cost optimization. We have invested in state-of-the-art machines which help us in this effort. Additionally, our design team constantly works on new laminates to achieve higher strengths and better chemical resistance.

Technology, innovation, and digitalization are today's axiom, as well as boon. How has CPP adapted to these? What practices do they follow in these three areas?

As mentioned, CPP holds the lead place in terms of technology and innovation in the field of FRP/ GRE piping in India. We constantly incorporate cutting edge technology in our manufacturing processes, which enable us to produce high strength and high corrosion resistant FRP/ GRE piping. The entire CPP operations are fully integrated with technology and innovation, thus enabling each stake holder to efficiently manage their work.

CPP has done a remarkable job in water desalination business. Over 2 billion liters of desalinated water flows through CPP's GRP Piping. Please tell us how does it add value to industry – consumer ecosystem?

CPP's getting into desalination business came in context of its demerger from the parent organization Chemical Process

Equipment Pvt Ltd (CPE). After the demerger, the mandate was to focus on new emerging markets; and hence CPP got into the desalination business in and around 2005, which was on rapid growth trail. We qualified with the global biggest & best EPC companies and Technology providers in the field of Desalination. CPP supplied and installed FRP piping to the 1st Desalination plant of Singapore, which was inaugurated by the Prime Minister of Singapore Mr. Lee Hsien Loong. We followed up this with supplying to the 2nd and 3rd Desalination plants in Singapore. CPP also supplied FRP piping to the Melbourne, Perth, Chennai, and Barka desalination plants besides others located in UAE, Chile, and India. Most of the plants are of national importance in the individual countries and have made a major difference in the lives of the respective countrymen. The combined capacity of all the plants is more than 2 billion lts per day. We have proven that Make-In-India is a credible term even before the concept was envisaged.

What's the future business expansion plan of CPP? Would the company concentrate on the industries it presently caters to? Or, will it make some new entry?

We intend to grow in the global Oil & Gas market. That is our focus area and we are working on it. Besides this, we intend to grow in chemical & desalination industries across the geographies where we haven't still made a mark. We foresee a growth of over 20 percent per year for the next 5 years. ■

We have supplied FRP piping to over 25 desalination plants globally, and the amount of desalinated water that flows through our pipes adds to over 2 billion litres per day.

Moderator: Jayati Mukherjee



Simon India Focuses on Solar Energy Sector with an Eye on Sustainability

Rakesh Verma

CEO and Whole Time Director
Simon India Limited

On the face of environmental hazards, solar energy comes as a promising and favourable substitute. On this note, Simon India limited has made a strategic move to the solar sector as a sustainable alternative of conventional energy sources. Here, with an exclusive interaction with **Chemical Engineering World**, Rakesh Verma provides detailed insights of their foray into for solar sector.

What prompted Simon India to foray into the solar business which has not been one of the core focus areas for Adventz group in the last few decades?

Simon India Limited (SIL) operates predominantly in Oil & Gas, Chemicals & Fertilizers, and Cement & WHR businesses. These are our core business areas and we will continue to pursue with these businesses, as opportunities are available here to scale up owing to the project size and the expertise we hold.

Solar energy, being one of the main sources of non-conventional energy, is the cynosure of all eyes. Solar space is a less capital intensive business. Huge demand is awaiting solar energy installations in the near future. And with this, the overall dependence on conventional captive power source would decrease significantly.

Having said this, the entire world including our government has been focussing on renewable energy and reduction in overdependence on conventional energy sources. Depletion of conventional resources, and other related issues viz global warming etc have been making everyone aware of the impending perils. Solar energy, being one of the main sources of non-conventional energy, is thus the cynosure of all eyes. We considered of getting into the solar space as it is a less capital intensive business and huge demand is awaiting solar energy installations in the near future. This would come as an addition to our core business.

Besides this, we wish to be fully aligned with our government's vision and mission of Clean and Green energy and Har Ghar Bijili. We have executed captive power plants for a few of our clients but they have all been with conventional sources. We will now be executing renewable captive power plants for our clients focusing on sustainability factor.

What are your forthcoming projects in this sector?

We have signed an exclusive MoU with a reputed solar manufacturer M/s. Enkay

Solar to tap the vast solar potential – not only for India, but also for abroad. Projects, ranging from 1.5 MW to 100 MW of power generation, are being targeted. And now in context of this, we have been evaluating a few tenders for India and abroad.

We plan to bid for a number of solar projects both in public and in private sector. Public Sector Units (PSUs) such as NTPC, NHPC, SECI, and OIL intend to put up a number of captive solar power

plants in near future. We will try to tap these markets and also the private tenders coming in. Since our group is predominantly into fertilizer sectors and has good connect with all major fertilizer manufacturers across the country, and since fertilizer sector is a pollution causing one, we have a large base of fertilizer clients as our prospective customers who would be eager to cut on its carbon footprints.

We are open to both CAPEX and RESCO/OPEX mode of project execution. However, since our core area of work is EPC, we would be more keen on CAPEX mode of execution. We would evaluate RESCO/OPEX mode critically and take up the same selectively.

Please walk us through Simon India's endeavour on synergistic partnership and the path ahead.

As we have mentioned before, Simon India Ltd (SIL) has been pursuing business in Oil & Gas, Chemicals &

Fertilizers, Cement and WHR sector; and has its core strength in engineering, procurement, project planning and management, and construction of projects up to Rs. 500 Crores. Thus we have the necessary bandwidth, expertise, and the knowhow for executing projects which are considered mid-sized in the sector we operate in, but large-sized for solar sector. We have been doing business for more than two decades and have built a strong client base. They are now very keen to go for solar power installation in their respective plants. Further, being a part of Adventz Group, we boast of a strong manufacturing background at group level and would look to leverage our relationships in this asset driven manufacturing sector.

Our partners are solar panel / lithium ion battery manufacturers having established manufacturing facility in Greater Noida with a capacity of 50 MW. They have also executed small scale solar projects up to 1.5 MW on their own in the last 4 years, but don't have the necessary bandwidth and background to take up big sized solar projects. We intend to complement and leverage each other's competencies through this association. While our partners would bring in solar background expertise, we would pitch in with our experience of executing large scale projects and industry connects. This will be a synergetic win-win situation for both the partners, going ahead.

We also plan to amalgamate our core projects with solar projects. For example, most of the projects that we execute have administrative buildings and related civil infrastructures. Going forward, we intend to educate our clients for bundling their upcoming projects

The global solar energy market was valued at USD 52.5 billion in 2018 and is projected to reach USD 223.3 billion by 2026, growing at a CAGR of 20.5 percent from 2019 to 2026. India is the third largest emitter of green-house-gases.

with solar installations. With this, the overall dependence on conventional captive power source would decrease significantly, with a significantly minimal CAPEX investment.

How do you see this segment to grow in the years to come?

The global solar energy market was valued at USD 52.5 billion in 2018 and is projected to reach USD 223.3 billion by 2026, growing at a CAGR of 20.5 percent from 2019 to 2026. India is the world's third largest emitter of greenhouse gases after China and the United States, and will likely to continue to be a significant emitter for the next two decades. According to government data, by 2030, nearly 50 percent of India's power generation will depend on coal, despite exponential growth in renewable energy.

Ensuring energy security and keeping emissions low – primarily by reducing the dependence on hydrocarbons – are two key priorities for India. In 2018, our Government came up with a plan to add 100 GW of solar power by 2022 in the overall plan to add 175 GW of power through renewable sources, the other sources being – wind (60 MW), bio power (10 MW), and small hydro power (5 GW). The total investment required to achieve this target has been estimated at USD 150 – 200 billion.

Thus solar sector is poised to grow not only in India, but worldwide. Along with being a renewable source of energy, it also helps in reducing carbon footprint on the earth. With the emergence of battery storage technologies in this segment,

we will be able to supply nonstop power 24*7. MNRE's new policy of Round-the-Clock (called RTC policy) and Kusum Yojana have also been giving great push to the segment.

What are the opportunities & how do you plan to address the challenges in the foreseeable future?

As stated in my above replies, there is a huge potential for solar power both in India and worldwide. However, as a country, we have made limited progress towards achieving 175 GW renewable energy capacity by 2022 since the first announcement of the target in July 2018. As of second quarter of last year, India had installed a total of 33.7 GW of solar capacity, with 66.3 GW left to be installed in just about three years. Thus there is a huge opportunity for growth in this sector.

On the flip side, the macro-economic challenges such as significant pressure on tariffs, high domestic interest rate (as compared to the US and Europe), a depreciating rupee and uncertain regulatory policies have marred significant investment in this sector.

In spite of the above challenges, I am very bullish on the sector and expect a significant fillip from the government to achieve its target of 2022. SIL has a strong database of industrial clients with red category pollution industry. We will start pitching for solar power with them and will also suggest new clients to include a provision for solar power while setting up any industrial unit. Simon's EPC background will be an

asset to these solar plants without any tethering problem. We have partnered with a manufacturing company which produces solar panel and lithium ion battery. The company understands the nuances of this business very well and are quite experienced in the said field. They are listed MNRE and CEL channel partners.

Please give us an insight on the revenue generation for the company & share in the pie

Though we are entering into the solar business, our core area and focus will still remain on oil/gas, chemical and fertilizer sector. This is primarily driven from the fact that these sectors are large giving us the opportunity to scale up and also a strong push to our topline. Solar business, to start with, will remain as a subsidiary business on our outer radar. We intend to keep it as a cherry on the cake for the next 2-3 years, and develop our own competency and knowhow during this period. Once we have a few mid-sized solar projects to our credentials, we would go aggressive and scale up this business. I am sure this business will also take a major portion of our revenue pie in the next 5 to 10 years. For the moment, we expect this business to contribute 10-15 percent to our revenue share. ■

Moderator: Mittravinda Ranjan

Simon India has signed an exclusive MoU with a reputed solar manufacturer to tap the vast solar potential – not only for India, but also for abroad. Projects, ranging from 1.5 MW to 100 MW of power generation, are being targeted. Through synergistic partnerships, we intend to complement and leverage each other's competencies. To make a synergetic win-win situation – while our partners bring in solar domain expertise, we pitch in with our experience & expertise in large scaled project execution and industry connects.

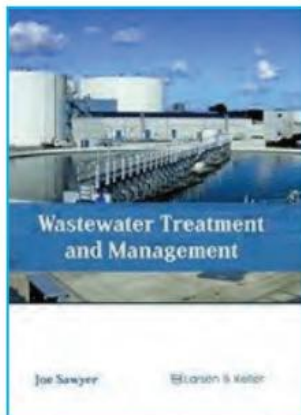
Wastewater Treatment and Management

Editor: Joe Sawyer

Price: \$94.11

No of pages: 257 pages (Hardcover)

Publisher: Larsen and Keller Education



About the book: Wastewater management refers to the process of converting polluted, damaged, stale, unsuitable water into reusable water. The processes and techniques used in this field are filtration, polishing, sedimentation, biochemical oxidation, phase separation, redox, etc. The topics covered in this extensive text deal with the core aspects

of wastewater management. It provides detailed analysis of the different concepts and techniques used under this field. The textbook, with its detailed analyses and data, will prove immensely beneficial to professionals and students involved in this area at various levels.

Membrane Technology in Separation Science

Authors: Mihir K Purkait and Randeep Singh

Price: \$113.45

No of pages: 242 pages (Hardcover)

Publisher: CRC Press (1st Edition)



About the book: The book explains fundamental and advanced topics related to the field of membrane science including extensive coverage of material selection, preparation, characterization and applications of various membranes. Explores both preparation and wide range of applications for all possible membranes, contains an exclusive chapter on functionalized membranes and

incorporation of stimuli responsive membranes in each type and includes exercise problems after each chapter. It also discusses new membrane operations as membrane reactors and membrane contactors.

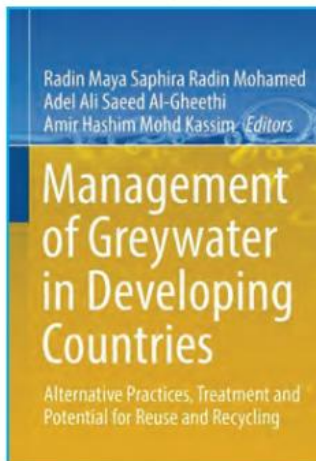
Management of Greywater in Developing Countries

Editors: Radin Mohamed, Radin Maya Saphira, Adel Ali Saeed Al-Gheethi, Mohd Kassim and Amir Hashim

Price: \$130.45

No of pages: 263 pages (Hardcover)

Publisher: Springer (1st Edition)



About the book: This book reviews the consequences of improper disposal of greywater into the environment and the most appropriate treatment technologies for developing countries, focusing on the potential to reuse greywater as a production medium for biomass and bio-products. It also describes the quantities and qualitative characteristics, as well as the common practice of discharging greywater in

developing countries and highlights the associated health risks. Further, it compares the management of greywater in developed and developing countries, and explores the advantages and disadvantages of various treatment technologies, discussing the reuse of greywater for irrigation purposes in arid and sub-arid countries, especially in the Middle-East. The book shows the benefits of greywater and introduces low-cost technologies based on the available local facilities can be used to discharge, reuse and recycle it.

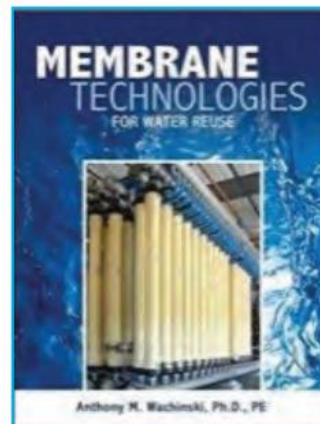
Membrane Processes for Water Reuse

Author: Anthony M Wachinski

Price: \$107.00

No of pages: 464 pages (Hardcover)

Publisher: McGraw-Hill Education (1st Edition)



About the book: Written by a water and wastewater industry expert with more than 35 years of experience, this book describes how membrane technology can be used alone, coupled with aerobic or anaerobic processes, or as integrated membrane systems to process treated municipal effluent or industrial wastewater

for discharge, recycle or reuse.

After reviewing chemistry fundamentals and basic principles, the book covers microfiltration, ultrafiltration, nanofiltration, reverse osmosis and membrane coupled bioprocesses. The design, sizing, and selection of membrane technologies for water recycling and reuse applications is discussed in detail. Wastewater reuse case studies and example problems illustrate the concepts presented in this practical, authoritative guide.

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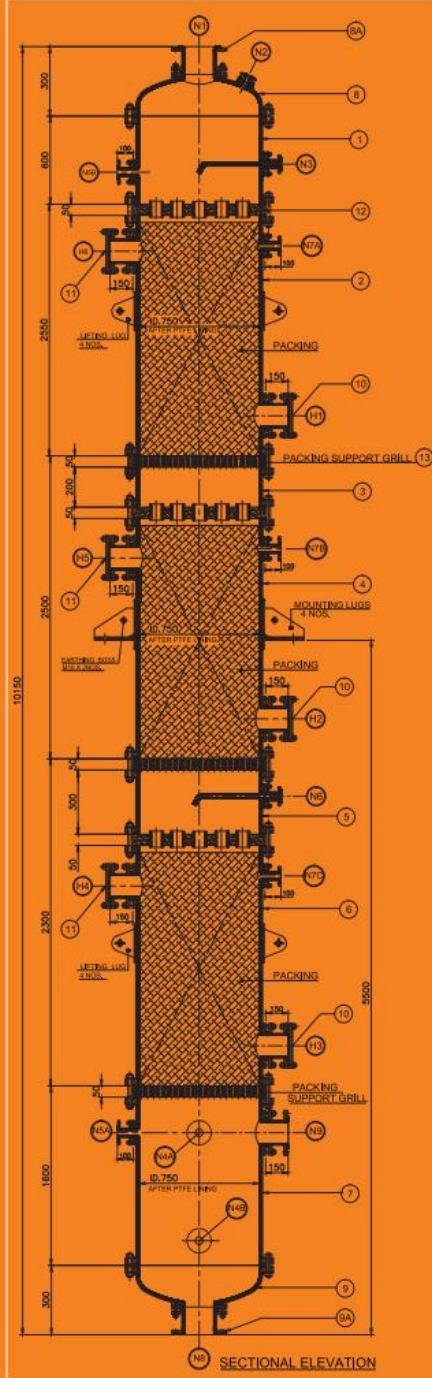
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