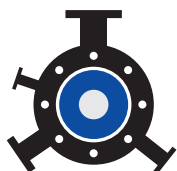


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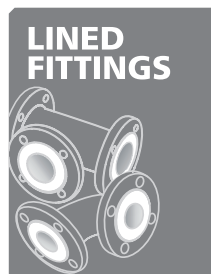
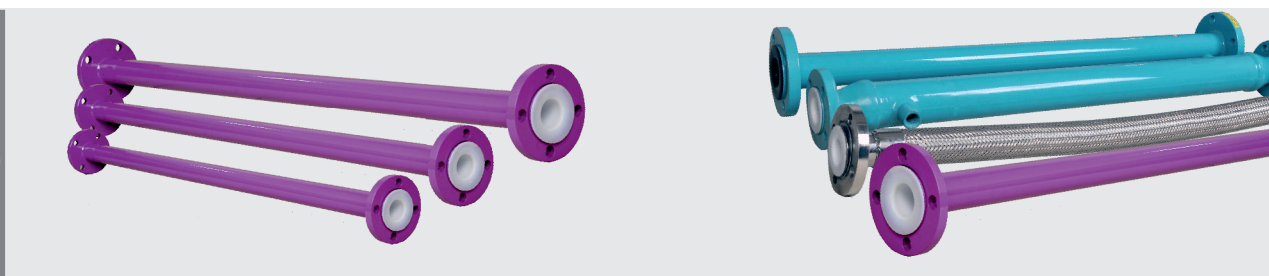
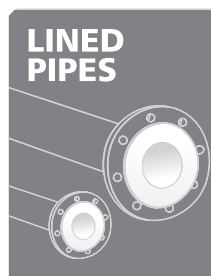
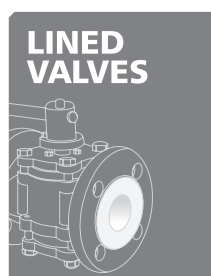
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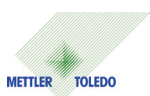


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PM addresses G20 Energy Ministers' Meet



New Delhi, India: The Prime Minister underlined that even though every nation has a different reality and pathway for energy transition, he firmly believes that the goals of every country are the same. Throwing light on India's efforts in green growth and energy transition, he pointed out that India is the most populated nation and the fastest-growing large economy in the world and yet is strongly moving towards its climate commitments.

The Prime Minister informed that India has achieved its non-fossil installed electric capacity target nine years in advance and set a higher target for itself. He mentioned that the nation plans to achieve 50% non-fossil installed capacity by 2030. "India is also among the global leaders in solar and wind power", the Prime Minister said as he expressed delight that the Working Group delegates got a chance to witness the level and scale of India's commitment to clean energy by visiting the Pavagada Solar Park and Modhera Solar Village. He also touched upon starting the largest agricultural pump solarization initiative in the world and India's domestic electric vehicle market projection of 10 million annual sales by 2030.

He also highlighted commencing the rollout of 20 percent Ethanol Blended Petrol this year which aims to cover the entire country by 2025. For decarbonizing India, the Prime Minister said that the country is working on Mission mode on Green Hydrogen as an alternative and aims to transform India into a Global Hub for the production, use and export of Green Hydrogen and its derivatives.

India-UAE Joint Statement on Climate Change



New Delhi, India: Narendra Modi, Prime Minister of India, and His Highness Sheikh Mohamed bin Zayed Al Nahyan, President of the United Arab Emirates (UAE) recognized the urgent need to address the global challenge of climate change through global collective action while respecting the foundational principles and obligations under the United Nations Framework Convention on the Climate Change (UNFCCC) and the Paris Agreement. The leaders committed to enhance cooperation on climate ambition, decarbonization, and clean energy, and work together to have tangible and

S Sundaram set to be next Director (Projects) of NTPC Ltd



Shanmugha Sundaram is set to be next Director (Projects) of NTPC Limited, a Maharatna PSU under the Ministry of Power. He has been recommended for the post by the Public Enterprises Selection Board (PESB) panel. Presently, he is serving as Head of Project at NTPC Kaniha, Odisha.

The Director's (Projects) post in NTPC will fall vacant on December 1. Currently, U K Bhattacharya is serving as Director (Projects) of NTPC.

S Sundaram is a veteran power professional and has over 34 years of experience in the power sector. He joined NTPC in 1988 and started his career as an Executive Trainee from Badarpur. Prior to joining NTPC Kaniha, Sundaram was posted as the Head of the Project at Baruni Thermal Power Station, Bihar.

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meaningful outcomes from the 28th Session of the UNFCCC Conference of Parties.

Prime Minister Narendra Modi congratulated the UAE as the selected host country of COP28 in 2023 and extends his full support to the UAE's COP28 Incoming Presidency. His Highness President Sheikh Mohamed bin Zayed Al Nahyan, in turn, congratulated India for its leadership role in the G20.

Both leaders underscore the imperative of achieving ambitious, balanced, and implementation-oriented outcomes at COP28 across all the important pillars of global climate action; namely the mitigation, adaptation, loss and damage and means of implementation including climate finance. The leaders call upon all Parties to engage constructively and demonstrate solidarity in the pursuit of these outcomes.

Mahanadi Coalfields Ltd to impart Virtual Reality-based Safety & Operational Training to 17,000 Workforce

New Delhi, India: Mahanadi Coalfields Limited (MCL), Ministry of Coal has introduced Virtual Reality (VR)-based skill development programme for providing safety and operational training to its 17,000 workforce by year 2026. The Coal India subsidiary has earmarked a budget of ₹ 6.5 crore for skill enhancement among coal miners.

MCL plans to upgrade the technical skills of workforce involved in operational activities, to achieve 300



Million Tonne (MT) coal production by 2026 and enable Coal India Ltd achieve the target of one billion tonne production. VR-based training to the workers would save cost and time yet provide impartial and auto-generated feedback on the skills attained by the trainees.

Initiated as a step towards digitalisation in business processes, introduction of VR-based training for around 17,000 departmental as well as contract employees will serve as a major initiative for 18 training modules leveraging this modern technology.

The initiative, spearheaded jointly by the Innovation Cell, Safety & Rescue, Electrical & Mechanical, Excavation and Electronics & Telecommunications departments of MCL, is envisaged to integrate seamless training on 3D simulated VR-platforms. This would provide safe training environment to the workers before they actually take up jobs in the coal mines or workshops, all the while mitigating direct exposure to hazardous activities in initial training and induction.

Sandeep Zanzaria Appointed Managing Director of GE T&D India Ltd



GE announced the appointment of **Sandeep Zanzaria** as Managing Director and Chief Executive Officer of GE T&D India Limited effective April 17, 2023. He succeeds Pitamber Shivnani, who retired from the post of Managing Director and CEO on December 31, 2022.

Sandeep brings with him more than three decades of experience in the power sector. He joined GE in 2017 as the regional commercial leader for GE Grid Solutions, South Asia, and was responsible for commercial strategy and order intake for the region. Sandeep began his career at BHEL in 1990 and spent over 14 years in a range of roles that involved increasing responsibilities in commissioning, project management, and engineering. Later, he took up various roles at Areva T&D, Alstom T&D and Schneider Electric. Prior to joining GE in 2017, he was Vice President (head of Project Business) for Schneider Electric in South Asia.

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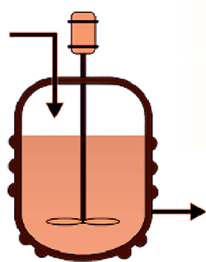
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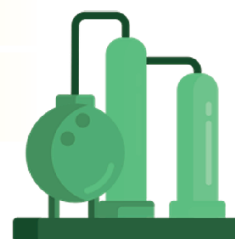
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Climate change impact assessment study by Government of India

New Delhi, India: Climate change is a cross-cutting issue spanning various Ministries/ Departments and institutions under them. Studies on adverse impacts of climate change is mainly sponsored by the Department of Science and Technology (DST), Ministry of Earth Sciences (MoES), Ministry of Environment, Forest and Climate Change (MoEFCC), Indian Space Research Organisation (ISRO), Ministry of Agriculture and Farmers Welfare, and Council of Scientific and Industrial Research (CSIR).

The GoI through its various organizations has been carrying out regular scientific studies to monitor the changes in Himalayan glaciers. One such study conducted by MoEFCC and ISRO, monitored 2,018 glaciers between years 2000 to 2011, which showed that 87% of the glaciers showed no change, 12% retreated and 1% glaciers have advanced.

Various R&D projects are being supported for studying Himalayan Glaciers under the National Mission for Sustaining Himalayan Ecosystem and National Mission on Strategic Knowledge for Climate Change. Several areas in the Himalayan States have also been declared as National Parks or Protected Areas, such as, Gangotri National Park, Nanda Devi Biosphere Reserve, and Great Himalayan National Park.

There is no established study for India providing a quantified attribution of climate change leading to increased outbreak of floods. While many studies

monitor disasters such as floods, drought and heat, the science of attribution of these changes particularly to climate change is far more complex and currently an evolving subject. Most studies so far have relied on mathematical modelling of climate change impacts, but these are not empirically verified.

Re-bidding of 20 GWh Advanced Chemistry Cell (ACC) manufacturing under PLI scheme

New Delhi, India: The Ministry of Heavy Industries (MHI) has announced the re-bidding of performance linked incentives (PLI) for 20 GWh Advanced Chemistry Cell (ACC) manufacturing. With this auctioning process, the prospective applicants can submit their bids to set-up domestic manufacturing facility for advanced chemistry cell, which will help them qualify for incentives under ACC PLI scheme.

The MHI will be facilitating a stakeholder consultation with industry representatives on Monday, July 24th, 2023, for their inputs and suggestions before the start of the re-bidding process of remaining 20 GWh capacity. A Public Notice regarding this, inviting the stakeholders, has been issued. The consultation shall be chaired by the Secretary, Ministry of Heavy Industries (MHI). The Ministry is committed to finalize the bidding documents and proceeding with the rebidding process at the earliest.

ACCs are the new generation of advanced storage technologies that can store electric energy either as

Rajiv Kumar Porwal takes charge as Director (System Operation) of Grid India

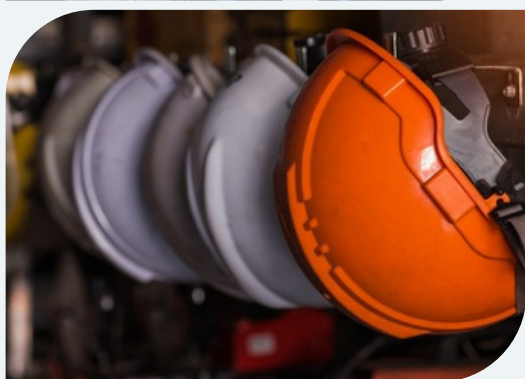


Rajiv Kumar Porwal has assumed charge as Director (System Operation) of Grid Controller of India Limited (Grid-India). Prior to this, he was contributing as Executive Director, NRLDC, Grid-India.

Porwal will be responsible for the overall secure and reliable operation of the India's Power System, operational planning, grid integration, scheduling and dispatch of electricity, monitoring real-time electricity grid operations, post facto analysis of the grid operations through the NLDC & RLDCs as well as cyber security.

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electrochemical or as chemical energy and convert it back to electric energy as and when required. These have major applications in the electric vehicles, maintaining grid stability, solar rooftop, consumer electronics etc. With India's commitment towards renewable energy and achieving net-zero by 2070, energy storage is expected to play a crucial role in the overall energy ecosystem.

In May 2021, the Cabinet, chaired by Prime Minister, had approved the Production Linked Incentive (PLI) Scheme on 'National Programme on Advanced Chemistry Cell (ACC) Battery Storage' for achieving manufacturing capacity of Fifty (50) Giga Watt Hour (GWh) of ACC and 5 GWh of "Niche" ACC with an outlay of ₹ 18,100 Crore.

Roadmap for Promoting Solar Energy for Universal Energy Access Released, at 4th G20 Energy Transition Working Group Side Event

New Delhi, India: At a side-event of the 4th Energy Transition Working Group in Goa today, the Ministry of New and Renewable Energy (MNRE), Government of India, in association with the International Solar Alliance, released a Roadmap of Solar Energy for Universal Energy Access. A workshop and panel discussion were also held, where energy access issues and solutions were deliberated upon.

Addressing the workshop, Bhupinder Singh Bhalla, Secretary, Ministry of New and Renewable Energy,



Bhupinder Singh Bhalla, Secretary, Ministry of New and Renewable Energy, Government of India

Government of India highlighted "The challenge to provide Universal Energy Access cuts across other global energy transition issues and hence, unless we make rapid strides towards providing reliable, sustainable, and affordable energy access to all, our progress in other areas will get

hampered. India has made ambitious commitments as part of our transition towards clean energy. We are planning to achieve 50 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030. Although a wide variety of renewable technologies are available, each with their unique advantages, solar energy in particular has emerged as the technology of choice that can play a key role in driving energy access, energy security and energy transition. Through this report on 'Roadmap of Solar Energy for Universal Energy Access', developed under India's G20 presidency in 2023, we aim to showcase how solar energy, in its various configurations, can play a key role in achieving electricity access and in providing socio-economic benefits in countries around the world."

PM Prasad takes charge as Chairman & Managing Director of Coal India



PM Prasad has assumed charge as the new Chairman-cum-Managing Director (CMD) of Coal India Limited (CIL) on Saturday. Prior to this, he was serving as Chairman-cum-Managing Director (CMD) of Central Coalfields Limited (CCL) since October 1, 2020.

He has over 38 years of experience in the varied facets of operations and management. In 1994-95, he was instrumental in reopening of DRC mines which was affected by the underground fire during his posting in WCL. He was awarded as 'Best Mines Manager' from Secretary Coal, Ministry of Coal (MoC) and Chairman, Coal India Limited in 1995.



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Government has put in an eco-system for development of Green Hydrogen: Hardeep Singh Puri



Hardeep Singh Puri, Union Minister of Petroleum & Natural Gas and Housing & Urban Affairs

New Delhi, India: The three-day International Conference on Green Hydrogen (ICGH-2023), being organized during 5th – 7th July 2023 at Vigyan Bhawan, New Delhi saw a resounding footfall of stakeholders from India and across the world with endeavour of the Government of India to

ramp up Green Hydrogen production and align it with global trends in technology, applications, policy, and regulation.

Speaking at the Valedictory Session of the coveted conference, the Union Minister of Petroleum & Natural Gas and Housing & Urban Affairs Hardeep Singh Puri expressed his extreme satisfaction and said, "The conference being organised under the aegis of Ministry

of New and Renewable Energy, in partnership with the Ministry of Petroleum and Natural Gas, Council of Scientific and Industrial Research, Office of Principal Scientific Advisor to GoI and the Confederation of Indian Industry, has witnessed the presence of Captains from the Industry, deliberating through 25 expert sessions with over 1500 people attending these sessions. It is satisfying to see that we are moving towards Hydrogen Based Economy, which is need of the hour."

Speaking on the immense potential India beholds for the world in the domain of clean and renewable energy, Shri Puri said that India is climatically blessed and with the government's unwavering commitment for making the world a better place to live, the leading financial institutions have shown keen interest to invest in India. "The European Investment Bank (EIB) will be our Hydrogen ally and would support for developing large scale Industry hub with a funding of 1 billion Euros. The Asian Development Bank (ADB) has recently conveyed their intent to provide USD 20-25 billion over five years to aid India's aspirations for green growth. That's not all, The World Bank has approved USD 1.5 Billion in Financing to Support India's Low-Carbon transition journey", shared the Petroleum Minister.

Mineral Production Goes up by 5.1 % during April 2023

New Delhi, India: The index of mineral production of mining and quarrying sector for the month of April 2023 (Base: 2011-12=100) at 122.5, is 5.1% higher as compared to the level during the month of April 2022. As per the provisional statistics of Indian Bureau of Mines (IBM),

Bani Verma set to be Director (Industrial Systems & Products) of BHEL



Bani Verma is set to be next Director (Industrial Systems & Products) of Bharat Heavy Electricals Limited (BHEL). She has been recommended for the post by the Public Enterprises Selection Board (PESB) panel. Presently, she is serving as Executive Director in the same Maharatna PSU.

Verma will be a member of the Board of Directors and will report to the Chairman and Managing Director (CMD). She will act as the Business Sector Chief and be responsible for marketing management of systems and products pertaining to industry sector covering captive power, transmission, rail transportation, defence, industrial products and renewable energy segments.



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the cumulative growth for the period April- April, 2022-23 over the corresponding period of the previous year is 5.8 per cent.

The production level of important minerals in April 2023 were coal 731 lakh tonnes, lignite 32 lakh tonnes, natural gas (utilized) 2671 million cu. m., petroleum (crude) 24 lakh tonnes, iron ore 247 lakh tonnes, limestone 386 lakh tonnes and bauxite 1562000, chromite 273000, copper conc. 9000, lead conc.29000, manganese ore 265000, zinc conc. 130000, phosphorite 162000, magnesite 10000 tonnes each, gold 102 kg and diamond 2 carat.

Important minerals showing positive growth during April 2023 over April 2022 include: Phosphorite (29.1%), Magnesite (27.7%), Iron Ore (13.1%), Limestone (12.7%), Copper Conc. (12%), Lead Conc. (10.6%), Coal (8.8%), Manganese Ore (6.9%) and Zinc Conc. (4.1%). Other important minerals showing negative growth include Petroleum (crude) (-3.6%), Natural gas (U) (-2.8%), Gold (-8.1%), Lignite (-21.2%), Bauxite (-24.7%) and Chromite (-40.1%).

Special Ministerial Consultations and Recommendations on Global Biofuels Alliance

Goa, India: Energy Transitions Ministerial Meeting has highlighted Fuels for Future (3F) as one of the priority areas. In this context, on the sideline of the Energy Transitions Ministerial Meeting a standalone event on Consultations and Recommendations for the Global Biofuels Alliance was organized on 22nd July 2023 in Goa.

This GBA event witnessed participation from the Energy Ministers of thirteen countries and Heads of nine international organizations. India, Argentina, Bangladesh, Brazil, Canada, Italy, Kenya, Mauritius, Paraguay, Seychelles, the United States, UAE and Uganda, and international organisations such as the Bio future Platform, International Civil Aviation Organisation, International Energy Agency, International Energy Forum, International Renewable Energy Agency, World Bank, World Biogas Association, and World Economic Forum who were part of the event welcomed the initiative.

Emphasizing the importance of biofuels and collaboration, Union Minister for Petroleum and Natural Gas & Urban and Housing Affairs, Shri Hardeep Singh Puri, said "True success of Global Biofuels Alliance will depend on moving this project from a project of the government to the project of the people."

Jennifer Granholm, Secretary of Energy, US, remarked that the United States recognize the establishment of a Global Biofuels Alliance as a critical step in their biofuels journey and that they look forward to moving from "test tube to test drive and field to fuels"

Mr. Alexandre Silveira de Oliveira, Minister of State of Mines and Energy, Brazil, highlighted that to meet sustainable energy needs multiple forms of energy will be required and, in this context, reinforced the importance of the alliance.

Koppu Sadashiv Murthy set to be next CMD of BHEL



Koppu Sadashiv Murthy is set to be the next Chairman & Managing Director (CMD) of Bharat Heavy Electricals Limited (BHEL). The Public Enterprises Selection Board (PESB) panel has recommended the name of Murthy for the BHEL's CMD post.

The CMD post in BHEL will fall vacant on November 1st, 2023. Dr. Nalin Shinghal is the current CMD of BHEL.

Murthy has been recommended for the post of CMD of BHEL from a list of two candidates who were interviewed by the PESB panel in its selection meeting held on June 30. Another candidate on list was also from BHEL.

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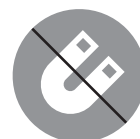
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India and the United States today jointly launched a call for proposals on Critical and Emerging Technology



New Delhi, India: US Secretary, Department of Energy, Ms Jennifer M. Granholm called on Union Minister of State (Independent Charge) Science & Technology; MoS PMO, Personnel, Public Grievances, Pensions, Atomic Energy and Space Dr Jitendra Singh at North Block here today and discussed bilateral collaboration between the two countries. The meeting assumes special significance as it comes close on the heels of PM Narendra Modi's US visit. Ms Jennifer was accompanied by a high-level American delegation.

India and the United States also jointly launched a call for proposals on Critical and Emerging Technology: Quantum Technologies and Artificial Intelligence for Transforming Lives. The Indo-U.S. Science and Technology Forum (IUSSTF) and the Secretariat for USISTEF have designed the program.

Dr Jitendra Singh said, through this competitive grant program, the USISTEF selects and supports promising joint U.S.-India technology innovation and entrepreneurial initiatives that are commercially viable and socially relevant. He said, these joint initiatives can originate from U.S. and Indian entities including Startups, government, academic, or commercial endeavours, and any combination thereof provided they focus on applied R&D, incorporate a business plan and proof of commercial concept, and have significant sustainable commercial potential.

The call will remain open till August 31, 2023, and will invite promising joint Indo-U.S. technology innovation and entrepreneurial proposals that are commercially viable and socially relevant. It will provide a significant

boost to the domestic as well as the US priorities looking at various facets of Sustainable Development Goals (SDG).

NITI Aayog releases Analytical Tools for managing Climate Change and exploring Net Zero Pathways

New Delhi, India: A Revamped India Energy Security Scenarios (IESS) 2047 (IESS 2047 V3.0) to assess the integrated impact of various green energy policies of Government of India was released by NITI Aayog today. An open-source tool, IESS incorporates several policies related to alternative energy resources like Green Hydrogen, Energy Storage, Renewable Purchase Obligations, PM-KUSUM, offshore wind strategy, Electric Vehicle policy, Energy efficiency, etc. Assessing the demand and supply of energy in the country, the tool helps in analysing emissions, cost, land, and water requirements till 2047.

With an aim of making this technology available to the people, this version of IESS is easily downloadable and facilitates users to generate their own pathways. It will help researchers and think tanks to develop user-specific scenarios and the option of customised applications on the basis of share of industry/services/ agriculture, population, the pace of urbanisation, end-use energy demand etc.

IESS 2047 is a user-friendly interactive tool that can help ministries/ departments to develop a variety of energy transition scenarios to achieve net-zero. The tool is flexible enough to provide many permutations and combinations of net-zero pathways. It provides capabilities to compute the energy needs and estimates of the country and hence reduce India's dependency on external agencies for the estimates.

Designed with the help of IIT Bombay, the revamped IESS 2047 will be updated on yearly basis. The baseline has been standardised at 2020 and calibrated up to 2022.

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DOMO Chemicals inaugurates new production line in Mahape, Navi Mumbai



Navi Mumbai, India: DOMO Chemicals has inaugurated a new compounding line at its Indian facility in Mahape, Navi Mumbai on April 24th, 2023.

DOMO Chemicals has experienced double-digit growth in Asia operations which is driven by strong demand for their polyamide-based solutions across the automotive, electrical & electronics, consumer & industrial goods sectors. Fabrizio Cochi, General Manager Asia says, "This new line is another milestone in our commitment to growth and innovation in the Asia region. With a gradual total capacity of 8 KT of high-quality engineered materials based on polyamide, our state-of-the-art factory is now equipped with the latest technology to serve our customers in India. It is fantastic that we were able to celebrate this milestone in the presence of some of our key customers.

The company has been active in Navi Mumbai since 2016. Its technical centre is equipped with advanced facilities for the development of new solutions for the Indian market which have a focus on metal replacement and light-weighting solutions, electrically friendly and flame-retardant materials for e-mobility, food and water contact grades targeting the home appliance market, as well as solutions for automotive cooling.

Anupam Rasayan India renews ₹436 crore (approx. USD 56 million) contract with a German MNC



Anand Desai, Managing Director of Anupam Rasayan

Sachin, India: Anupam Rasayan India Limited has renewed long term contract worth revenue of ₹436 crores with one of the leading German multinational for supply of patented life science specialty chemical for the next 3 years on exclusive basis. This renewal is in line with the automatic renewal clause agreed

upon by the parties in the long-term agreement signed three years ago, following the completion of the original contract duration of three years.

Anand Desai, Managing Director of Anupam Rasayan, said, "With a consistent supply at a lower cost owing to process optimisation led by strong R&D, this contract renewal reaffirms our position as a preferred supplier to the MNCs, showcasing the trust and reliability that have been established over the years. Furthermore, we anticipate the volumes of this molecule to increase beyond the minimum offtake volumes, considering the high-growth end market. The renewed contract not only solidifies our position as a reliable supplier but also highlights our agility in meeting the evolving needs of clients. This contract renewal, along with recently signed LOIs assures the consistent and steady growth trajectory of the company."

Technip Energies, LyondellBasell and Chevron Phillips Chemical sign MoU for electric cracking ethylene furnace

Texas, USA: Technip Energies, LyondellBasell and Chevron Phillips Chemical (CPCChem) announced the signing of a Memorandum of Understanding (MoU) for the design, construction and operation of a demonstration unit for Technip Energies' electric steam cracking furnace technology (eFurnace by T. EN) to produce olefins. The demonstration unit will be located at LyondellBasell's site in Channelview, Texas, USA, and is designed to prove the technology at industrial scale.



Steam cracking furnaces play a significant role in the production of basic chemicals by breaking down hydrocarbons into olefins and aromatics. This cracking process requires a temperature of more than 1,500°F (850°C). Technip Energies, a leader in the ethylene market, developed the concept and design for the eFurnace by T. EN™ technology, which could achieve this temperature using electricity as the heat source. The use of renewable electricity in this process would contribute to significantly reducing GHG emissions associated with olefins production.

Arnaud Pieton, CEO of Technip Energies, stated: "We are delighted to team up with LyondellBasell and CPChem to bring the eFurnace by T. EN to fruition. Consistent with our purpose to engineer a much-needed sustainable future Technip Energies is making huge strides toward reducing the CO₂ emissions resulting from the production of ethylene and this design will enable olefins producers to take advantage of the growing supply of available renewable energy to operate the most energy-intensive part of the plant."

Chemplast Sanmar signs LOI to manufacture advanced intermediate



Dr Krishna Kumar Rangachari,
Deputy Managing Director,
Chemplast Sanmar Limited

Chennai, India: Custom Manufactured Chemicals Division of Chemplast Sanmar Limited recently has signed a letter of intent (LOI) with a global agrochemical innovator to manufacture an advanced intermediate. Last quarter, company announced that they

have been selected to manufacture an intermediate for an established generic Active Ingredient.

The LOI covers a period of 5 years. We anticipate commercial supplies to start from 4Q of FY23-24. This new product will be manufactured in our new multi-purpose production block which is on track for commissioning in 2Q of FY23-24. This development is in continuation of our earlier announcement with respect to another LOI (signed in November 2022 with a global innovator company for supplying an advanced intermediate for a new Active Ingredient), and our announcement in February 2023 to kick-start the next phase of expansion of the multi-purpose facility.

"This new LOI reaffirms the strength of our product pipeline, demonstrates our technical know-how, and our ability to combine a world-class research and development capability with a broad range of chemical technologies at a production scale," Said Dr Krishna Kumar Rangachari, Deputy Managing Director, Chemplast Sanmar Limited.

INEOS Nitriles launch Invireo bio-based acrylonitrile to deliver 90% GHG emission reduction

Cologne, Germany: INEOS Nitriles has launched its first bio-attributed product line for Acrylonitrile. The new product is to be sold under the Invireo brand. Invireo represents innovation in the global acrylonitrile market and offers a more climate-friendly and sustainable alternative to existing acrylonitrile. Manufactured at INEOS Nitriles' site in Cologne, Germany, Invireo is made using bio-attributed propylene, which enables the replacement of fossil fuel resources.

INEOS Nitriles' certification by the International Sustainability & Carbon Certification (ISCC Plus) and Roundtable on Sustainable Biomaterials (RSB) allows the use of bio, bio-circular and circular feedstock into the supply chain according to a mass balance approach. Acrylonitrile is essential to, and successfully used in, a variety of industrial applications such as wind turbines, automotive, aerospace, textile, chemicals for special applications and sporting goods. These applications are essential to our everyday life, and it is important that we continue to serve society's needs, whilst continually reducing carbon emissions.

Hans Casier, CEO at INEOS Nitriles said, "Through our sustainability programme we have developed this new, bio-based product line. Invireo™ supports our customers with drop-in products that meet their

rigorous quality and performance requirements. At the same time, they move the industry closer towards a lower-carbon economy for acrylonitrile without compromising the unique product qualities."

ARC's 21st India Forum on Driving Sustainability, Energy Transition, and Performance through Digitalization



Inaugural of ARC Advisory Group's 21st Indian Forum

Bangalore, India: ARC Advisory Group's 21st India Forum, titled Driving Sustainability, Energy Transition, and Performance through Digitalization, on July 12th and 13th, 2023 saw a turnout of over 300 delegates. This was the first in-person event that ARC India hosted after three years. The enthusiasm and excitement was palpable as the suppliers and end users networked, shared best practices, and got an overall view of market trends and requirements. In recent years, the resonating thread across all ARC global forums has been to achieve sustainability, energy transition, and enhance performance through digitalization. In sync with the Forum's theme, the inaugural was done by "eco-friendly watering of plants" by the 10 sponsors.

This two-day Forum featured 35+ executive speakers and panellists from several industries to share their experiences in digital transformation and sustainability initiatives; advances in automation: architectures, networks, standards; industrial AI and analytics; advanced automation enhancing operational excellence; OPA ecosystem developments; and plant asset management advances/enabling the energy transition. The pandemic years gave birth to new ways of thinking, communicating, and collaborating globally. While technology has opened new doors of opportunity, it is clear that organizations that do not adapt with agility to the accelerating pace of change will become extinct.

The welcome address by G. Ganapathiraman, Vice President and General Manager, ARC Advisory Group, India and the keynote addresses set the tenor for the presentations on both days.

Crux of the Presentations

Digital transformation is the only way to effectively respond to the challenges industries face and to meet ESG (environmental, social, and governance) goals. Energy transition and sustainability are now being woven into the core fabric of business strategies of industrial companies, particularly manufacturing, utility, and oil and gas organizations. The global need for an energy transition towards sustainability is urgent and requires immediate action. This transition presents significant opportunities for technology innovation and economic growth. Open process automation that is standards based, collaborative, and facilitates interoperability is an important part of the digital transformation journey. Failure to transform is likely to undermine the future viability of the organization.

Digital transformation is a whole new way of doing business, supporting customers, leveraging the available services, and adapting to a changed business environment. Customer relationships have become more dynamic. The growing demand for sustainable products and services coupled with regulatory mandates have made sustainability a vital component of organizational strategy. The last few years have been marred by geopolitical tensions, supply chain disruptions, and sudden changes in market regulations and demand. So, only those organizations that can adapt with agility can survive on this competitive turf.

Case studies and roadmaps highlighted effective implementations and provided strategic guidelines and direction to those treading on similar paths. The speakers advocated a step-by-step approach: Strategy should be linked to ground reality; Begin small and then scale up; Organizational culture must change to adapt to "new ways of doing old things."; Account for the human element in the transformation process.

The attendees garnered information and best practices from the early adopters and understood the pain points along the way. The interactive panel discussions that followed each session, cleared doubts about how new technologies can be deployed in a responsible and sustainable manner. ■

SDI Organics to set up organic chemical's facility in Vagra

Baruch Gujarat: SDI Organics plans to set up a synthetic organic chemicals' unit at Dahej in Vagra, Bharuch district of Gujarat. The proposed facility will spread over 5.77 acres of land.

In May 2023, SDI Organics received environmental clearance (EC) from the Ministry of Environment, Forest and Climate Change (MoEF&CC) for its upcoming project. The SDI Organics expects to begin work on the project in Q3 of FY24 and complete it by December 2024.

Nath Industries plan to set up organic chemicals unit in Vapi

Vapi, Gujarat: Nath Industries is planning to set up speciality organic chemicals manufacturing unit with capacity of 6,150 tpm at Vapi in Valsad district of Gujarat. The proposed unit will occupy over 2.3 acres of land.

As per the latest updates shared with Projects Today, the company has applied for environmental clearance (EC) for the project. The contractor and machinery suppliers are still being finalized.

The company expects to commence the work on the project by August 2023.

CEF to set up biogas plants in multiple states across India

New Delhi, India: Clean Effentech International (CEF) Group to produce compressed biogas (CBG) is setting up plants across the country to produce compressed biogas (CBG) and manure. The plants are part of the agenda of National Agricultural Cooperative Marketing Federation (NAFED) to deploy 100 such plants in a couple of years.

The construction of a manure plant is completed at Muzaffarnagar in Uttar Pradesh, while another will come up at Rohtak in Haryana. Also, six CNG and manure plants will come up in Uttar Pradesh, two in Punjab and one in Ahmedabad and one in Jammu.

The plants will produce CBG, and the solid digestate which is a by-product and will help in manure production after enrichment. Projects in the pipeline include a plant in Madhya Pradesh and along the Gujarat-Maharashtra border. The organic manure enriched with NPK (nitrogen, phosphorus and potassium) level at four percent and organic carbon content at 22 percent, will be a substitute for DAP and urea.

CEF will be funding the projects through a mix of equity and investments, while NAFED will be the facilitator. CEF has signed an agreement with Indian Oil (IOCL) and raw material suppliers, and the environmental impact assessment and permission from the pollution control boards are in place.

Core Green Sugar & Fuels plan to expand production capacity in Tumkur facility

Karnataka, India: Core Green Sugar & Fuels plans to expand its sugar manufacturing capacity from 5,000 tccpd to 8,000 tccpd at Tumkur, Yadgir in Kalaburagi district of Karnataka.

The capacity expansion will also involve a molasses-based distillery unit from 50 klpd to 200 klpd for ethanol production and a co-generation plant from 24 MW to 32 MW capacity. Core Green Sugar & Fuels intend to commence work on the project by December 2023 and is currently awaiting terms of reference (ToR).

thyssenkrupp awarded a contract for 60 KTPA Poly Butadiene Rubber Plant (PBR) by Indian Oil Corporation Limited.

Mumbai, India: Indian Oil Corporation Limited (IOCL) has awarded an EPC contract to thyssenkrupp Industrial Solutions India Private Ltd. (tkIS India) of approximately more than USD 100 Million for 60 KTPA Poly Butadiene Rubber Plant (PBR) for their Panipat Refinery & Petrochemical Complex, Haryana in India.

Polybutadiene rubber, manufactured from the polymerization of butadiene finds its applications in the manufacture of tires and additives. thyssenkrupp Industrial Solutions India Private Ltd. with its experience in implementing various refinery and petrochemical projects will execute this project on an LSTK basis based on technology from a reputed licensor.

The lump-sum EPC scope includes residual process engineering, detail engineering, Project Management, Procurement, Construction, & Commissioning of the plant. "thyssenkrupp Industrial Solutions (India) comes with a rich experience in the execution of petrochemical and refinery projects. We thank IOCL for their continued trust and support in our capabilities. This contract is proof of the engineering expertise we hold as an organization and we are motivated towards its successful completion", said Rajesh Kamath, CEO & Managing Director of thyssenkrupp's chemical plant business (thyssenkrupp Industrial Solutions) in India. ■

Reimagining Supply Chain Driving: Business Transformation and Sustainability



DR PRASANTA GUPTA

Senior Vice President & Head Corporate Procurement
Aarti Industries Ltd

The word "Transformation" is becoming a topic of discussion in almost all organizational functions in the current VUCA world. The prominence of the same is more meaningful in supply chain management (SCM) because SCM connects all the stakeholders from the point of produce to the point of consumption. There are countless stakeholders involved in this chain and even a minor gap among any two or more, creates a very high cascading effect in the supply chain commitments and efficiency. In India supply chain management is effective but not efficient.

The success of any industry sector depends on the efficiency of its supply chain management. During the last few years, the world witnessed an unprecedented uncertainty where disruption of the supply chain created a panic circumstances in front of human civilization. If the supply chain professionals do not learn from the past and initiate a corrective action & preventive action (CAPA) on yesterday basis, the supply chain would soon become irrelevant in the business.

Generally, the supply chain in any industry across the world works under tremendous pressure warranting availability of right product of right quality & right quantity from the right source at the right place at right time and right price (7R). If They further deep dive in search of the roadblocks which push supply chain towards the stres sed zone, They find the following:

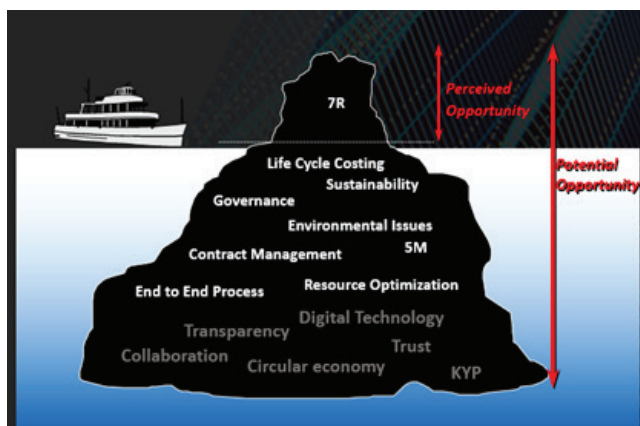
- Unplanned procurement
- Frequent emergency procurement
- Missing consolidation
- Fragmented need validation
- Lack of collaboration
- Poor sense of capital deployment and cash flow management
- Knowledge gap
- Sense of urgency
- Inadequate accountability
- Ineffective inventory management
- Absence of Waste identification and elimination
- Avoidance of emerging Digital Technologies
- Incognizant of climate change
- Higher logistics costs
- Missing Transparency
- Lack of trust
- Challenging traceability
- Unsustainable practices and so on...

The above cited roadblocks can just not be eradicated without addressing the inherent challenges and reimagining the supply chain processes. The success lies in the strategic implementation of the reimagination and adoption of digital technology in the supply chain which is nothing but the "Transformation". If They draw the flowchart of transformation, it will look something like this:

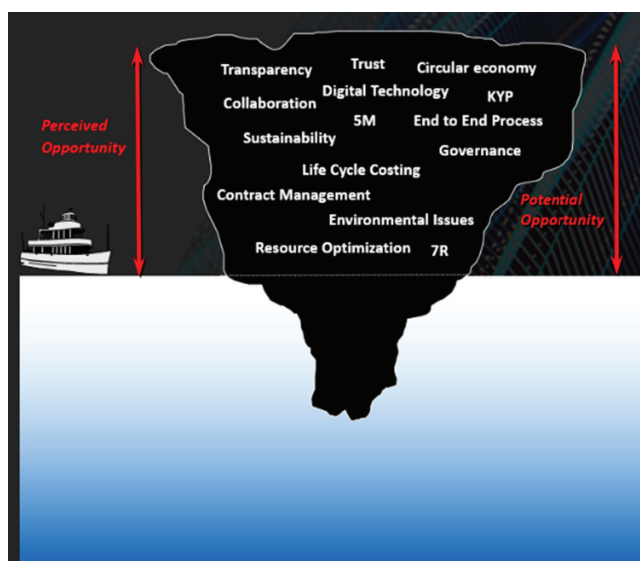
- Create an environment of cooperation, collaboration, coordination and trust with strategic suppliers.
- Understand the gap of expectations!
- Develop a culture of addressing all the so-called vendors, suppliers, contractors, etc as "Business Partner (BP)".
- Truly believe in BPs contribution as a critical success factor in the organizational growth.
- Communicate the organizational vision to its Supply Chain Business Partners and understand their world of Sustainability.
- Construct a transparent, trustworthy and collaborative sustainable supply chain ecosystem which is paramount important at this hour for the growth of any organization.

- Adopt digital technology to connect the dots.....
- Exercise change management at every level in the organization and influence the ecosystem for mutual success.
- Make the Supply chain agile, resilient and future ready.

The supply chain in the present era is depicted here under:



The first principle of supply chain transformation calls for a turnaround of the iceberg ensuring equality between the potential opportunities and the perceived opportunities.



Drivers for Supply Chain Resilience

Partner Ecosystem: Creation of an Ecosystem in which partners also grow along with the organization. We need to develop an environment of mutual respect. We in Aarti Industries renamed all our suppliers and

contractors as business partners. We assess the performance of business partners and recognise “the best business partner of the month”.

Circular Economy: Basically, it gives impetus on Reduce, Reuse and Recycle. Additional revenue through innovation of eco-friendly products/services, price premium or income from recycling programmes. We critically started evaluating the condition of any equipment or components or process and explore the possibilities of refurbishing, recondition and reuse before declaring it as a scrap. In this process cost benefit analysis emerges as the prime mover

Cost Reduction: Reduction in total cost of ownership linked to reduced energy costs, reduced over-specification, optimized consumption, social and environmental compliance costs. In Aarti Industries, we are driving “Fit for Purpose”, “Focus and Finish” and “Right First Time” strategies. All these three are emphasizing on the resource optimization, efficiency enhancement and operational excellence.

Risk Reduction: Financial impact on brand value from bad supplier practices (e.g., child labour, local pollution); economic cost of sustainable procurement disruptions (e.g., non-compliance to environmental regulations); Increased Safety and Quality of materials. We conduct sustainability assessments of all interested agencies involving renowned third-party assessors before acknowledging and onboarding them as our business partners. We also publish the name of our sustainable business partners on the Aarti Website to promote them in the industry segment which in turn becomes a credential to them for showcasing wherever applicable for business opportunities.

Digital Technology: Nowadays Artificial Intelligence (AI), Machine Learning (ML), Robotic Process Automation (RPA), Blockchain Technology (BLT) are the buzzwords in the industry. But unfortunately Supply Chain had never been the front runners in the adoption of these emerging technologies. In the prevailing uncertain business world, supply chain fraternities understood the importance of early adoption of this game changing digital technologies to unlock values and its true potentials. As a part of transformation, AIL is in different stages of adopting digital tools and technologies to improve operational efficiency of the supply chain and business as a whole.

Case Study

The case study focuses on a chemical company with over 24,000 registered Business Partners (BPs). Over the past two years, they have had 3,801 active BPs. They conduct sustainability assessments, averaging 388 assessments per year. They also organize a Sustainable Business Partner Conclave that brings together industry experts, academia, authorities, and global agencies.

Interestingly, the top 10 BPs contribute to 15% of the total order value. Each of these top BP manages a minimum customer base of 500 Procurement Organizations, totalling to say 5,000 customers. The cost of assessing one BP is USD 350 (₹28,000), which amounts to USD 1,750,000 (₹14.35 Cr.) for assessing all 5,000 BPs. However, if the 500 Procurement Organizations collaborate and form a consortium, only 10 assessments would be sufficient, reducing the cost to a mere USD 3,500 (₹0.03 Cr.).

This approach allows for significant cost savings while still ensuring comprehensive assessments for a large number of BPs.

Case Reimagining

This case envisions a reimagining of the business landscape with the aim of driving sustainability, circular economy practices, agile operations, and resilient supply chains through collaboration and co-creation. The proposed approach involves establishing a blockchain-enabled consortium to facilitate Know Your Business Partner (KYP) processes. By doing so, repetitive assessments by individual procurement organizations can be avoided.

The consortium members, with the assistance of subject matter experts, will collaboratively define the assessment guidelines. Any Business Partner (BP) certified by one procurement organization would be recognized and accepted by all consortium members. The cost of assessment would be shared among consortium members using fungible tokens, promoting cost efficiency. Additionally, the members can transparently share the Learnings, Practices, and Performance (LPP) evaluations.

To ensure data security and confidentiality of sensitive information, a private decentralized blockchain network would be established. This reimagined framework becomes especially relevant in the era of digital trafficking and the increasing use of drones in logistics.

Ultimately, this innovative approach fosters trust, transparency, collaboration, circular economy practices, resource optimization, KYP compliance, and alignment with overall business goals.

Conclusion

Some of the most critical success factors of supply chain like, trust, transparency, traceability and collaboration are unfortunately at the bottom line of potential opportunities and hence unclear. The supply chain transformation in the reimagining scenario will not only bring them up on the top but will also develop agility and resilience in supply chain making it future ready.

In today's world, the performance of any organisation is no more limited to its financial bottom-line alone. Security and Exchange Board of India (SEBI) has already made it compulsory for top 1000 listed companies to declare triple bottom line of their respective businesses. Supply chain transformation is surely going to provide a long-term solution to organisational sustainability highlighting the importance of triple bottom line i.e., "Environmental Bottom-Line", "Social Bottom-Line" and "Economic Bottom-Line" of business. ■

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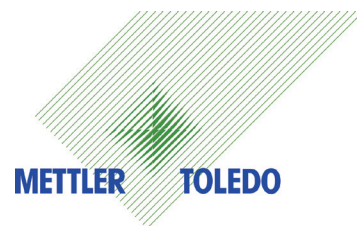
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Differential Scanning Calorimetry (DSC) is frequently used to measure the enthalpy and rate of chemical reactions. These measurements are important for identification, designing processes and assessing potential hazards in chemical synthesis and decomposition reactions as well as for thermodynamic and kinetic calculations. Whether a product is thermally unstable or represents a potential explosion hazard (thermal run away) must be determined at a very early stage of process design.

Introduction

Identification and evaluation of potential risks and hazards in chemical processes are of utmost practical significance. It is essential for developing and controlling chemical reactions both on the laboratory scale and in an industrial environment. Frequently chemical accidents are due to loss of control and incorrect handling. The result of this is often a so-called runaway reaction that can lead to an explosion.

The risk of a thermal runaway and an explosion is significant, if

- The reaction enthalpy is large and exothermic,
- The rate of increase of temperature is high or even self-accelerating,
- Gaseous products or vapors produced, whether through decomposition or evaporation
- The reactor system cannot withstand high pressure and/or high temperatures,
- Subsequent complications such as fires or environmental pollution are caused.

In such risk analyses, the determination of the reaction enthalpy or a decomposition enthalpy is often the starting point for further investigations. The focus is naturally on high risks.

Past experience has shown that all chemicals and reactions must be investigated, not just those that are

thought to be potentially dangerous. A rapid screening method is very desirable in view of the fact that a large number of tests have to be performed. DSC has proven to be an ideal technique for providing the necessary information at an early stage of chemical product development. The DSC results help one to assess the risks with regard to thermal stability as shown schematically in Figure 1.

DSC measure's reaction enthalpy (Δh_r) and specific heat capacity (C_p). These two quantities can be used to estimate the highest temperature, ΔT_{ad} , that could reach in of a thermal runaway:

$$\Delta T_{ad} = \Delta h_r / C_p$$

If the adiabatic temperature increase is more than 50 K, the situation is potentially dangerous. If the increase is 200 K, the situation becomes extremely dangerous. The boundaries of course depend on the particular circumstances. In fact, the rate of production of heat is just as important as the reaction enthalpy itself. If the heat exchange with the surrounding is inadequate, dangerous adiabatic behavior may occur. This is particularly critical with fast reactions.

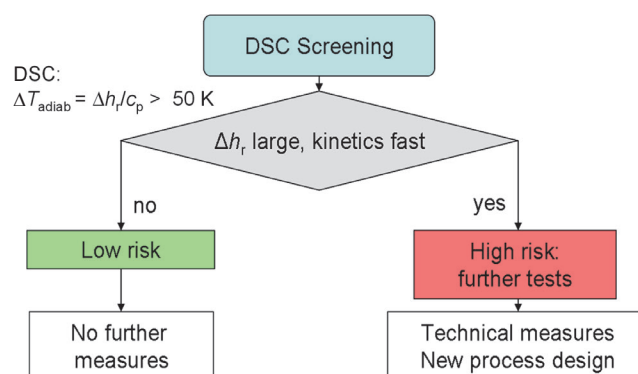


Figure 1: Risk assessment using DSC measurements, starting point for further tests on the thermal behavior of a process.

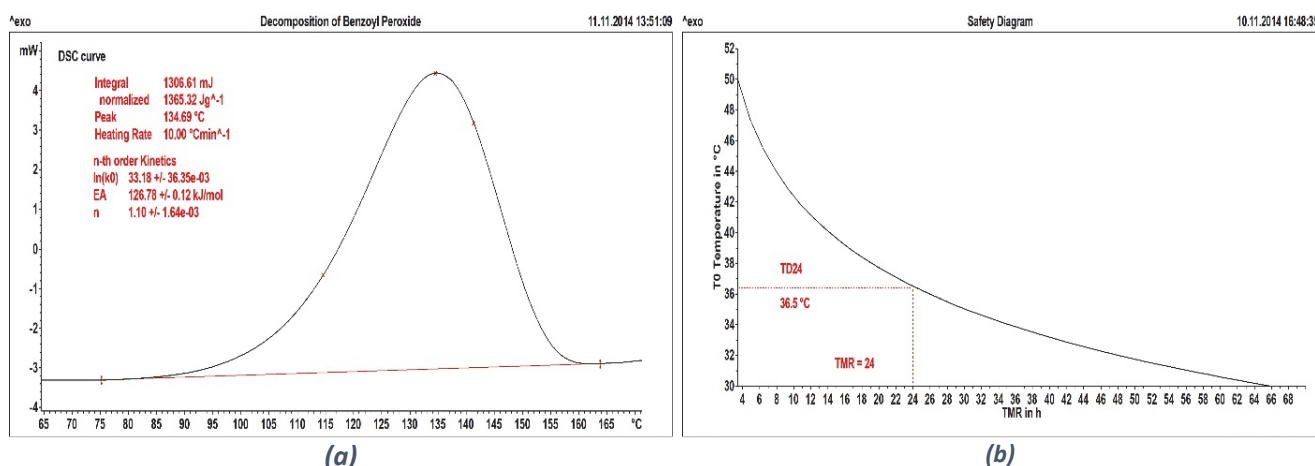


Figure 2 (a) Dynamic DSC Measurement of the decomposition of benzoyl peroxide dissolved in dibutyl phthalate. (b) Variation of adiabatic TMR and the starting temperature, T_0 .

Example 1

The adiabatic course of a reaction can be calculated using data from a dynamic DSC experiment. Kinetic evaluation of one or more DSC measurements allows reaction behavior to be predicted with regard to time and temperature using nth order kinetics.

The time to maximum reaction rate (TMR) can also be determined with relatively simple calculations. For example, in case of decomposition of Benzoyl Peroxide, as shown in Figure 2a, the thermogram shows a dynamic DSC measurement of the thermally induced decomposition reaction at a heating rate of 10 K/min. The measurement curve shows that the reaction begins at about 80 °C. It takes place over a temperature range of 80 K and generates an exothermic enthalpy of reaction of 1365 J/g. Assuming a constant specific heat capacity of 2 J/(g K), the adiabatic temperature increase, ΔT_{ad} , is calculated to be 682.5 °C – a value that is so high that the material would completely decompose.

The graph in Figure 2(b) shows the relationship between TMR and the process temperature, T_0 . For situations with temperatures above 36.5 °C, the process can be considered as inherently unsafe. It is therefore not acceptable in a production environment and needs changes or a redesign.

Example 2

The conversion of a reaction can be described as a function of temperature and time with the aid of just a few DSC measurements followed by evaluation using Model Free Kinetic (MFK). The results allow predictions to be made about the long-term behavior (e.g., storage conditions) or short-term behavior (explosions) of substances.

For example, in order to assure safety in chemical plants, a thorough understanding of the thermal hazard of materials like the potential explosive 2-Nitrophenol is essential.

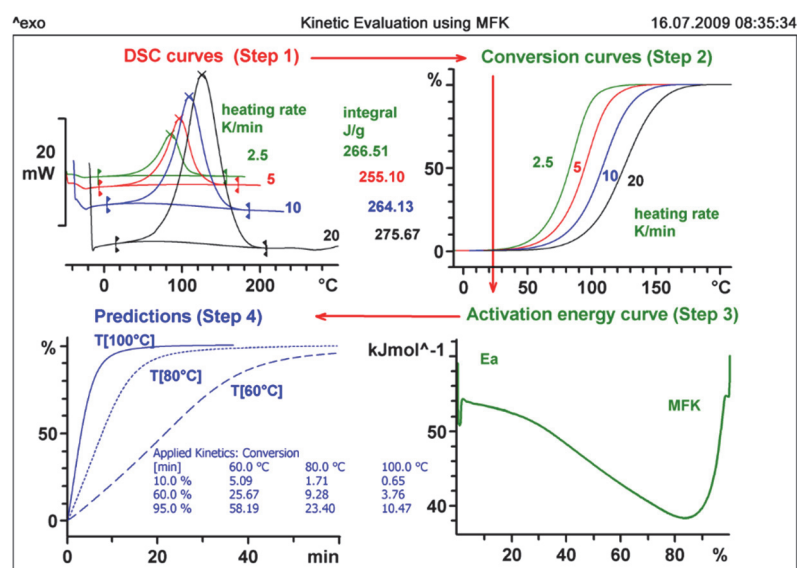


Figure 3: Kinetic evaluation and prediction of reaction using Model Free Kinetics (MFK)

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For safety investigations, dynamic DSC measurements at four different heating rates were performed. These are displayed in the top left quadrant of Figure 3. The advanced model free kinetics software calculates the conversion (top right) and displays the activation energy as a function of the reaction conversion (conversion plot, bottom right). Model free kinetics assumes that the activation energy does not remain constant during a reaction but changes. The conversion-dependent activation energy can now be used to make predictions, for example for the conversion of a reaction at a particular temperature as a function of time. This is done on the bottom left for three different temperatures.

between 100 and 150 °C. The predictions should be checked by performing a real measurement under the appropriate conditions.

Conclusion

Mettler Toledo DSC instrument along with STARe software tool provides the best solution to study highly exothermic reactions and determine the maximum energy of the reaction, heat of reaction and the corresponding temperature range. The risk associated with exothermic reactions can be calculated using DSC measurements by determining the Time to Maximum Rate (TMR) and the adiabatic temperature increase, ΔT_{ad} , using nth order kinetics. The reaction path can be predicted using advanced model-free kinetics at practically any temperature

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Leveraging Connected Data for Refinery, Petrochemical & Gas Processing Unit Optimization

In today's digital era, the Oil and Gas industry is undergoing a transformative shift through the adoption of digitalization and automation solutions. This article explores the profound impact of digitalization on the downstream sector specifically refinery lifecycle operations, and asset management through the role of automation and data science. Specifically, we delve into the capabilities of Connected Services, which play a pivotal role in maximizing the performance of processing units in collaboration with our customers.

Process Monitor revolutionizes data collection and data processing by automating these tasks. Continuously tracking key performance indicators (KPIs), empowers refiners with near real-time actionable insights and enables the early detection of potential issues. Our Global Solutions Command and Control Center at Gurgaon, India monitor these process units round the clock, ensuring proactive measures are identified to maintain optimal operations.

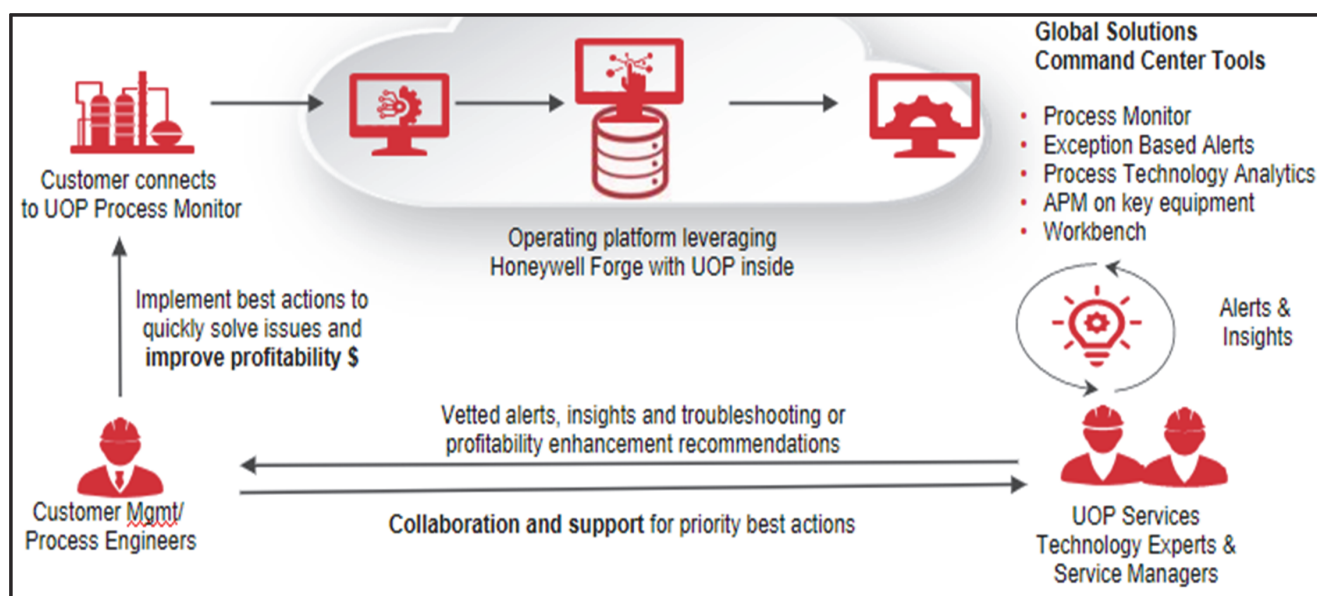
The data-driven solutions such as Exceptional Base Alerts (EBAs), Benchmarking, and Process Technology Analytics (PTAs) added on top of Process Monitor and backed by UOP process expertise and models, translate

data into actionable insights for our users. Additionally, we offer outcome-based solutions tailored to assist our customers in achieving their key targets.

In conclusion, digitalization not only enhances efficiency and productivity for operators directly. When packaged as Connected Services, digitization enables UOP services to be more proactive and provide better & faster solutions that add additional value.

Connected Services

These are digitally enabled services that leverage plant operating data, a variety of digital tools, and our



FEATURES

UOP technology experts to provide higher quality recommendations to solve problems better and faster as well as Identify opportunities to increase profitability.

UOP provide 24/7 monitoring and expert support with state-of-the-art digital tools, a vast database of knowledge articles, and easy access to other technology experts, R&D, and Engineering resources.

Typical Problems Addressed

Process issues and equipment failures lead to unplanned downtime. Changing feed or objectives without adjustments can lead to performance being less than optimal. Process engineers do not always have the tools, experience, and/or in-house support to quickly find root causes and solve problems fast or manage changes for optimal performance with reduced risk.

Value to Users

Users can leverage Connected Services such as offered by UOP to help solve problems faster and identify opportunities for increased profitability. Typical benefits range from ~ \$1M to \$5M / year depending on unit technology complexity, production value, and operating costs. Improvements in production/yields, reliability, catalyst life, and reduction in energy are common drivers.

Cross-Integration Additional Value

Digital tools such as Process Technology Analytics utilize the same simulation base as development, engineering, operating training simulators, and other tools allowing

EBA dynamic alert helped the refiner reduce Para Di-ethyl Benzene loss from the raffinate column side-cut by reducing the TDIC resulting in the saving of ~0.2-0.4M \$/yr*.

output to work seamlessly and consistently. Leveraging Honeywell's expertise in Cyber-Security, Data Historians and other connected solutions strengthen our offerings and reliability.

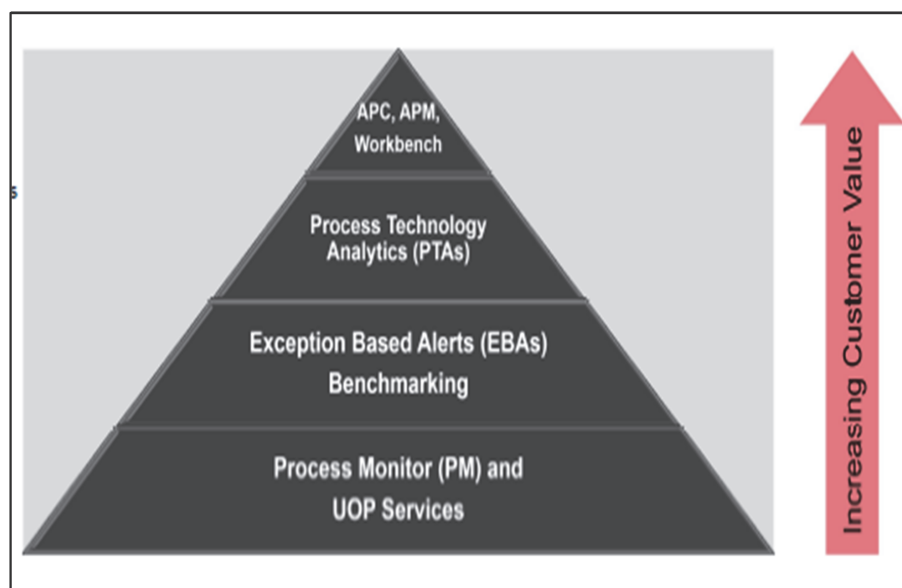
An Introduction to Connected Digital Solutions

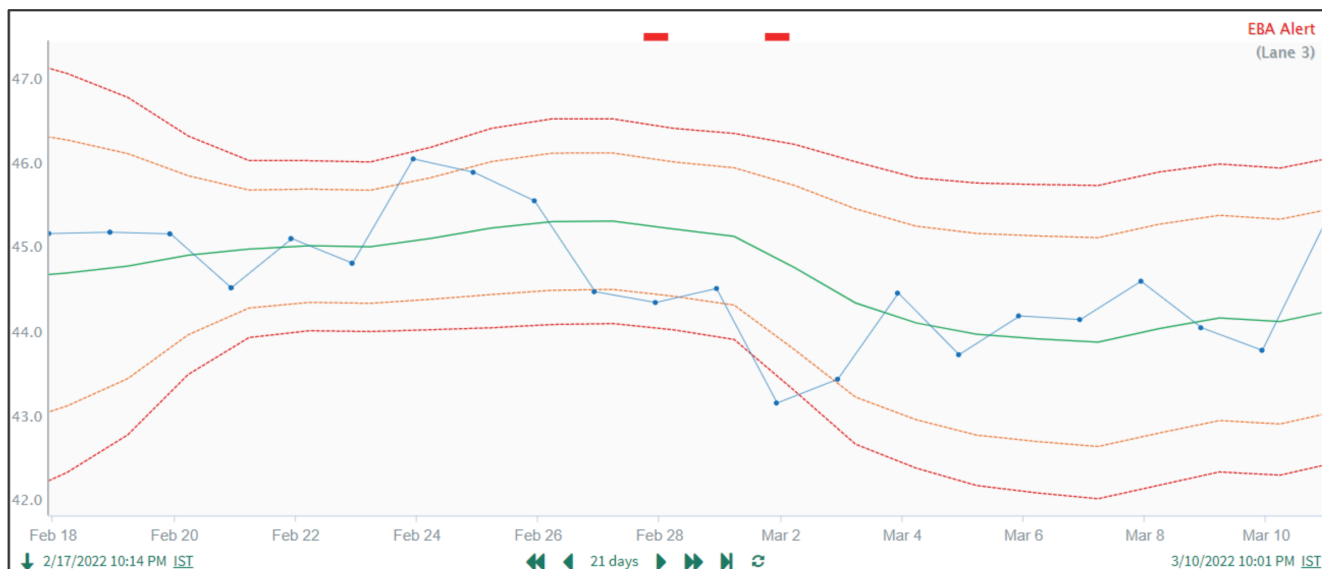
Exception Based Alerts (EBAs)

- EBAs offer 24/7 alerting protocol to refiners on an expanded set of critical technology-specific composite operating indices for early detection of problems to get timely remedial advice.
- EBAs help optimize the unit's operations and improve margins by preventing long-term performance degradation. Enable informed decision-making with predictive capabilities
- Identifying and pre-emptively addressing technical issues before they become costly problems, to improve operations reliability.
- EBA uses core operational variables, UOP proprietary Kinetic Model based KPI calculations, and advanced analytics for proactive alerts. Each process technology has a set of UOP proprietary composite variables to assess operations.

Connected Benchmarking Solutions

Data connected Benchmarking brings actionable insights through operational and performance benchmarking for refiners who are constantly curious about how their unit performs in comparison to its peers. It provides an anonymous comparison of the Unit's operations with the





operations of connected peers of the same technology across the globe.

The objectives of a benchmarking solution are as follows:

- **Increased Efficiency:** By identifying opportunities for performance optimization, refiners can adopt adaptations to improve operational efficiency.
- **Improved Margins:** Enhanced performance leads to cost reductions and higher margins.
- **Better Decision Making:** Benchmarking Solutions' practical insights support refiners in making informed decisions.
- **Streamline and Process fine-tuning:** By aligning with peers' best practices and making required process adjustments, benchmarking can help refiner fine-tune the processes and streamline the operations

Operational Benchmarking

- Aimed at optimizing operational efficiency
- Focused on assessing catalyst performance and processes
- Identifies best practices & areas of improvement to upgrade unit operations

Performance Benchmarking

- Aimed at improving performance effectiveness
- Focused on assessing energy consumption and unit reliability
- Identifies areas to improve competitiveness

Process technology analytics

Process Technology Analytics (PTAs) is technology-specific interactive digital analytics built on top of UOP Process Monitor and backed by UOP Technology Kinetic models to address key operational challenges for optimal Unit performance and operational planning.

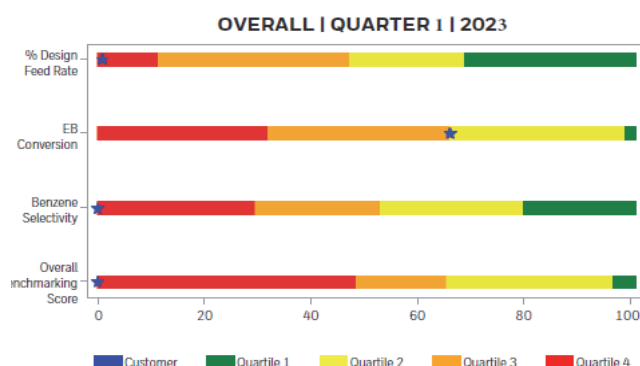


Fig -3 Snapshot of Benchmarking report for an Aromatic Isomar TM Unit; Star indicate customer standing in the Quarter against different Index

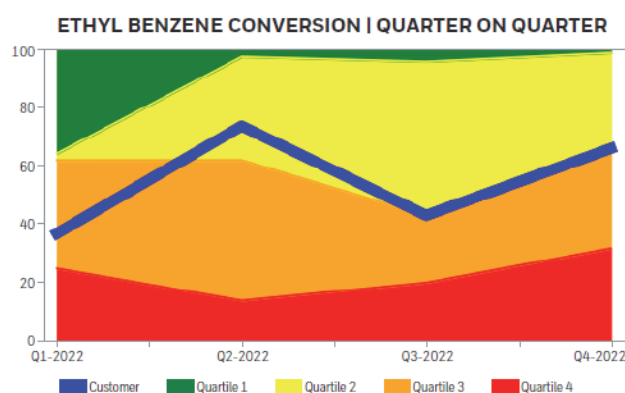


Fig -4 – Blue line indicates the customer standing Quarter by Quarter

FEATURES

UOP Benchmarking assisted in identifying a performance gap to enhance the Ethyl Benzene Conversion by 5 wt.% for one of UOP's customers in Asia using a UOP IsomarTM Process, a potential profit improvement of ~0.2-0.5 M\$/per quarter* from the Aromatic Complex

'Performance Predictor' is a Process Technology Analytics, developed for CCR PlatformingTM Process Units. It is meant for all CCR PlatformingTM process operators interested in proactive planning and consistently optimal Unit operations.

It is interactive digital analytics for Case Scenarios Evaluations and sensitivity Analysis. It gives a Self-serve capability to the Unit Process engineers to evaluate changes in specific Unit operating variables and predict the new optimal operating conditions, product yields, and qualities.

These advanced analytics would be extremely helpful for CCR PlatformingTM Units that experience frequent variations in unit throughput, feed quality, or mode of operations, such as operating severity adjustments in response to octane demand.

UOP also offers PTA's in OlefinsTM & PolybedTM PSA technology and expanding swiftly in another technology area with a focus on EcofiningTM and PenexTM this year. UOP has plans to expand and integrate PolybedTM PTA's with Advance Process Control (APC) in the future and working to offer Asset Performance Services in PolybedTM PSA valve Analytics.

In Conclusion

Digitalization & services solutions in the Refining Petrochemical, and Gas industries, offer a comprehensive approach to improving operations. Through exception-based alerting, benchmarking, and process technology analytics, we address specific challenges faced by our customers, enabling them to operate more efficiently.

Exception-based alerting allows for the early detection of anomalies and deviations from desired operating conditions. By continuously monitoring key process

parameters, any potential issues can be identified promptly, minimizing downtime, and optimizing overall performance.

Benchmarking plays a crucial role in driving continuous improvement. Our solutions enable customers to compare their operational performance against industry standards and best practices. This valuable insight helps identify areas for optimization and sets targets for enhanced efficiency.

Process technology analytics empowers refineries with in-depth data analysis, uncovering hidden patterns, correlations, and optimization opportunities backed by UOP Process models. By leveraging advanced data science techniques, our solutions provide actionable insights that support decision-making and enable refineries to achieve their operational objectives.

One of the UOP customers used the PTA to optimize the CCR PlatformingTM Process Unit operations 24 hours quicker during a switch to high octane mode operation with a more paraffinic feed saving potentially ~0.2-0.3M \$* for this instance.

By employing UOP digitalization solutions, customers gain a competitive edge in the industry. They can proactively address challenges, make data-driven decisions, and optimize their refinery operations. Our goal is to enable our customers to operate more efficiently, reduce costs, and maximize their productivity. ■

** \$ representation is directional and depends on the operation of the units, feed variability, and constraints.*

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The Safety Challenges of Alternative Energy: Are we Ready to Manage Risk Exposures Presented by Green Hydrogen?



There are many tools (HAZID, HAZOP, SIL Analysis, LOPA, FMECA, QRA, BRA, FERA, Fire & Gas, ALARP, Bowtie, ATEX, among others) that can be used depending on the engineering phase, the project to be developed, the objectives pursued and the risk management policy that the project's promoter and engineers have defined. Their application yields important safety benefits throughout the facility's lifecycle, such as:

- Identifying dangerous situations
- Evaluating damages
- Determining the probability of a disaster
- Assessing and quantifying risks

Safety in Operations

Process safety management systems that ensure assets are functioning properly are essential. The fundamental pillars of such a system are:

- Commitment to safety at every organizational level, from management to workers.
- An understanding of the risks and hazards arising from the hydrogen production process.

- Risk management tools to facilitate the monitoring of processes as well as having reliable safety mechanisms in place.
- The ability to learn from experience by translating lessons learned into improvements.

Moreover, ignition source management via bonding, grounding, and ensuring that electrical devices meet applicable hazardous area classification requirements is basic to hydrogen safety in operations, as are leak and flame detection systems.

Finally, human factor assessments can close gaps in hazard awareness and provide step-by-step guidance for carrying out tasks. For process safety to be successful, it must be more than a management system: it must be a fundamental component of an organization's culture. DEKRA has created a solution to foster a positive process safety culture in order to protect people, the environment and assets.

Organizational Process Safety Diagnosis (OPS)

The technical aspects of avoiding risks are important, but they cannot be implemented effectively without developing organizational competency, culture, and management systems. Facilities that best manage their risk recognize the importance of developing work processes and robust management systems at their facilities.

The Centre for Chemical Process Safety (CCPS) offers complementary resources to implement a risk-based process safety program that can be scaled based on the complexity of the process and the organization



IMPACT FEATURE

managing the risk. It is unique from other legal requirements in that it introduces a set of management systems in addition to organizational culture and competency-building components.

DEKRA offers an organizational process safety assessment solution that can be used to identify operational blind spots, benchmark management system and culture against best practices, and help develop a roadmap for continuous improvement.

The risk-based process safety program helps to

- Build the competency and skill development of all staff, including frontline workers, their supervisors, and technical support personnel
- Build a strong facility culture that is aware of the explosive properties of hydrogen and willing to stop work if conditions seem unsafe
- Implement robust management systems that establish a technical basis of safety, hazard identification and risk assessments, safe work practices, emergency procedures, operational excellence around procedures, and a robust asset integrity program.

Process Safety Advisory and Training Services



DEKRA Organizational and Process Safety is a behavioural change and process safety consultancy company. Working in collaboration with our clients, our approach is to assess the process safety and influence the safety culture with the aim of making a difference.

In terms of behavioural change, we deliver the skills, methods, and motivation to change leadership attitudes, behaviours, and decision-making among

employees. Supporting our clients in creating a culture of care and measurable sustainable improvement of safety outcomes is our goal. The breadth and depth of expertise in process safety makes us globally recognized specialists and trusted advisors. We help our clients understand and evaluate their risks, and we work together to develop pragmatic solutions. Our value-adding and practical approach integrate specialist process safety management, engineering, and testing.

We seek to educate and grow client competence in order to provide sustainable performance improvement. Partnering with our clients, we combine technical expertise with a passion for life preservation, harm reduction and asset protection.

We are a service unit of DEKRA SE, a global leader in safety since 1925 with over 45,000 employees in 60 countries and five continents. As a part of the world's leading expert organization DEKRA, we are the global partner for a safe world.

Conclusion and Recommendations



Green hydrogen is an energy vector that can contribute to the decarbonization of the planet. With such high stakes, its development must be accompanied by the highest levels of safety in design and engineering, as well as in operation and maintenance.

The starting point is the presence of knowledgeable, competent personnel prepared to meet the challenges of process safety for hydrogen plants. Secondly, the use of advanced tools for the identification, evaluation and management of risks is key.

These make it possible to select the appropriate technologies and materials for the construction of the facility and to monitor and analyze risks during

operations. They include HAZID, HAZOP, SIL, LOPA, QRA, BRA and FERA, among others.

Finally, a Process Safety Management (PSM) system, such as DEKRA Organizational Process Safety, helps prevent adverse events.

Do you want to learn more? Contact our experts!

PhD. Jesus Ceballos

Jesus Ceballos is a chemical engineer with a master's degree in process engineering and a PhD in engineering. He works as a Project Manager for Process Safety Management at DEKRA Chile.

Michael D. Snyder

Michael D. Snyder, PE, CSP, CFEI, CFPS is the Vice President of Operational Risk Management for DEKRA North America and an advisor in chemical process safety testing and consulting services. He was previously the Global Director of Safety and Loss Prevention for Dow Corning Corp, responsible for leading the company's occupational and process safety programs. He current serves on the Centre for Chemical Process Safety (CCPS) Governance Board and is a former member of the National Fire Protection Association (NFPA) Standards Council.

Dr. Arturo Trujillo

Dr. Arturo Trujillo is Global Director of Process Safety Consulting. His main areas of expertise are diverse types of process hazard analysis (HAZOP, What-if, HAZID), consequence analysis and quantitative risk analysis. He has been involved in many projects over the last 35 years, especially in the oil & gas, energy, chemicals and pharmaceutical industries. ■

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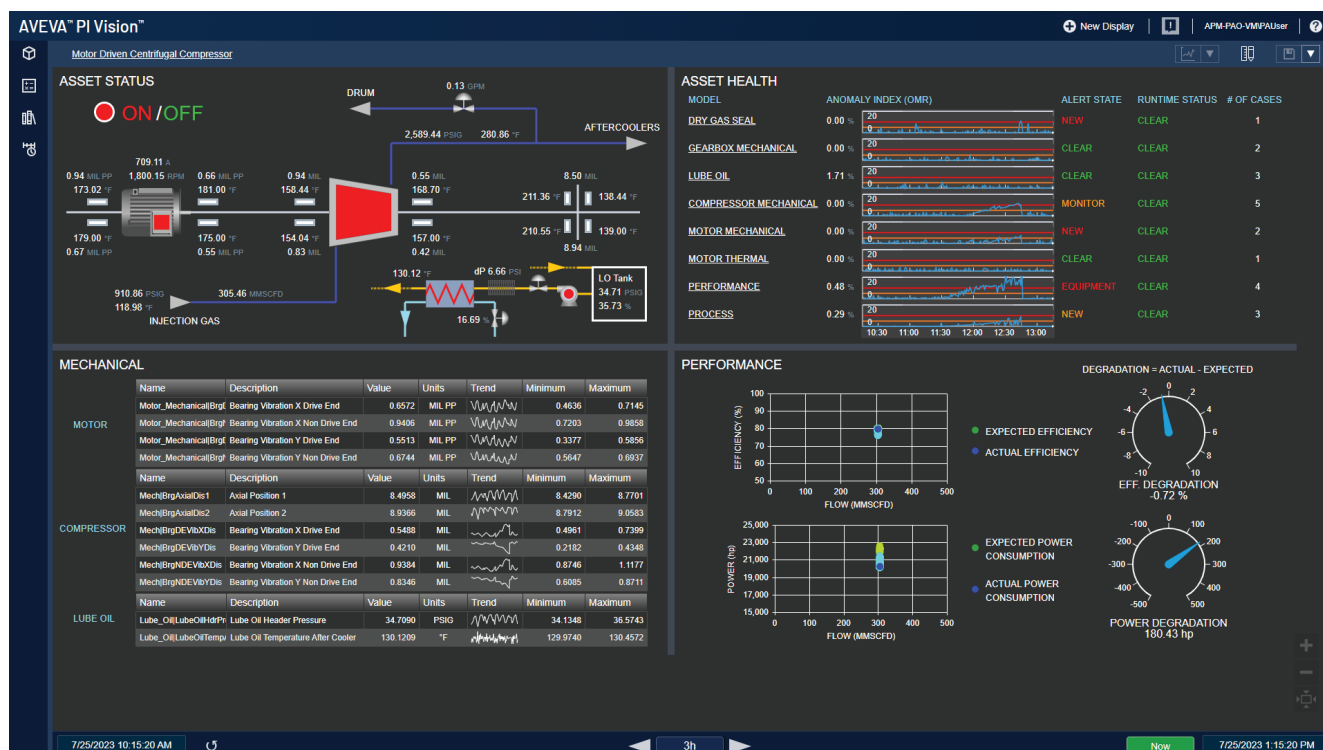
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Leveraging AI to improve profitability while enhancing asset reliability and safety



It's safe to say that running a chemicals plant has never been more nuanced or challenging. Today's companies face myriad pressures from all directions, including increased competition and demand, safety concerns, and sustainability initiatives. Overcoming these challenges requires plants to optimize assets and processes, maximize production, reduce unplanned downtime, and ensure reliable and safe operations that meet wider business goals.

Of course, technology is the key to improved performance. But while many companies have already adopted data infrastructure and analytics systems, today's growing plant complexities call for even greater technology powers in the form of artificial intelligence (AI).

Forward-looking chemical companies are choosing to layer rigorous models and AI-based advanced analytics on top of their data historians, to extract value and gain faster and better insights into processes and assets.

Advanced process simulation is key

Next-generation process simulation can now calculate key performance indicators (KPIs) beyond those that can be measured directly in the plant, while predictive analytics can detect performance anomalies and predict asset failure. Taken together, these high-level insights enable operations teams to deftly analyze risk and devise

plans that maximize efficiency and profitability.

As such, the implementation of AI solutions allows companies to proactively manage asset performance, minimize unplanned downtime and reduce maintenance costs. Every chemical plant is on its own unique data-driven journey. While some operations are using data collection and analytics as a historian, others have moved further along the utilization curve and are using streaming calculations or advanced analytics.

Regardless of where a plant is in its journey, users can still find new ways to optimize plant operations to increasing profitability, while meeting safety requirements and meeting sustainability goals.

Moving from reactive to predictive maintenance

Chemicals companies around the world are choosing to leverage AI and Machine Learning (ML) models as deep learning tools to forecast an asset's remaining useful life, giving teams critical information and prescriptive insights to analyze cost-versus-risk and devise plans that maximize efficiency and profitability.

Users can define leading indicators based on sensor and other operations data and use this information to detect even subtle changes in asset performance. Once teams have identified an anomaly, they can use advanced AI

tools to predict performance degradation and component failures and then work together to prioritize maintenance needs based on urgency, schedules, available teams, resources and spare part availability.

In addition to preventing asset failure, predictive AI-based guidance allows companies to minimize energy usage and compare asset performance, helping chemicals plants meet regulatory and contractual obligations.

With future insights into asset performance at hand, companies can take action to minimize inefficiencies that affect financials, gauge future consequences, assess risk, avoid disruption, and even increase customer satisfaction.

Enhancing Operations Digital Twin using process simulation

While process simulation and predictive analytics are well-established approaches, these tools have continually improved over the past few years. Now, real time data combined with first-principal process models can be used to create operations digital twin. This operations digital twin, enhanced with AI capabilities, can be used to identify most optimal operating conditions and act as advisors to operators to get more out of their asset.

These operations digital twin gives engineers and technicians insight into unmeasurable process variables, allowing tools to proactively predict best operating conditions, to increase yield, reduce energy as well as reliability issues for rotating and stationary assets across the enterprise.

Equipment monitoring and maintenance programs

Traditional equipment monitoring programs rely on data measured throughout the process to inform maintenance decisions. For example, temperature and vibration data may be used to predict a variety of failure modes for a centrifugal pump.

By using historic data, reliability engineers can determine a baseline value for each measurement and configure alerts when values fall outside of this range. This is known as condition-based monitoring and is a simple way to begin using measured data to improve process reliability.

While condition-based monitoring is useful for assets with relatively stable operation, accounting for different operating windows or process modes can quickly become a challenge. Engineers may need to frequently adjust operating windows or deal with nuisance alarms that can quickly breakdown the efficiency and effectiveness of a predictive maintenance program.

Instead of condition-based monitoring, many chemical companies now rely on predictive analytics as part of a robust Asset Performance Management program.

Predictive analytics combines real-time process data and AI to better predict equipment failures and provide Remaining Useful Life (RUL) estimates. This information can help reliability engineers plan what equipment requires maintenance and when it should be scheduled. Like condition-based monitoring, it relies on process measurements to establish operating baselines.

However, since predictive analytics solutions can leverage ML for multivariate analysis instead of simple condition-based alerts, it provides a greater range of detection across many operating modes compared to condition-based monitoring alone. The ML models used in a typical predictive analytics solution can also help identify specific failure modes based on previous fault signatures for each piece of equipment.

By using a powerful combination of real-time data, predictive analytics, and first-principles simulation companies can improve asset reliability and reduce downtime by proactively predicting reliability and integrity faults for critical rotating and stationary assets.

In conclusion

Amid an increasingly cut-throat global chemicals industry, where pressures are mounting and balance between business growth and meeting decarbonization goal is critical, AI will be the key to optimizing forward-looking businesses through the intelligent streamlining of their operations.

By layering advanced AI on top of existing data infrastructure, chemical companies can take advantage of real-time and historical operations data to gain access to deeper, faster, and more valuable insights to support business objectives and the overall business strategy. This allows chemical companies to find the balance between risk-based and reliability-centered maintenance, improve overall performance, and avoid potential equipment failure.

With advanced insights at their fingertips, chemicals plant teams can make better, faster decisions that continually improve plant performance, safety, and sustainability—while increasing profitability. ■



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Enhancing Efficiency and Reliability in BPCL Refineries through Operation Driven Reliability

BPCL Refineries in Mumbai, Kochi, and Bina stand as crucial pillars of India's oil and gas sector, refining crude oil to produce high-quality petroleum products. With a strong focus on quality, safety, and efficiency, these refineries cater to the nation's energy needs and industrial requirements. The refineries' operations involve intricate refining processes, reliable and effective SOPs, cutting-edge technologies, skilled workforces, and sophisticated equipment to ensure the production of fuels, lubricants, petrochemicals, and other value-added products while emphasizing environmental sustainability and responsible energy consumption.

At the heart of these refinery operations are the field operators, often referred to as the frontline soldiers. These operators undertake the critical responsibility of continuously observing the running plant and taking appropriate actions to ensure smooth operation of the process units. The trained field operators recognize the deviation or abnormality in the equipment and the early detection of these minor problems is important as it may lead to escalating into major breakdowns. Their expertise and vigilance are crucial in maintaining the safety and efficiency of Refineries.

The Importance of the Field Log Sheet



Refineries being very complex & hazardous industry, use automated controls in reducing the need for manual intervention in critical operations. The use of sensors,

transmitters, control panels and interlocks minimize the risk of accidents, ensuring a safer working environment for employees. While most operating parameters are accessible through modern sensor technologies on control panels, field rounds remain an indispensable practice. During the field rounds, operators inspect the running equipment, its physical conditions, look for any abnormal behaviour with respect to past, go through the standard checklists of each equipment and note down their observations. These observations are meticulously recorded in physical log sheets, serving as essential references when needed.

Field monitoring for equipment reliability

Monitoring of the equipment operating parameters are very crucial for equipment reliability which is one of the important performance indicators of refineries. The reliability of equipment in the refinery is paramount, as it directly influences the smooth, uninterrupted, and safe operation of the plant with the desired throughput.

Monitoring various operating parameters allows the operations team to detect potential failures before they occur, ensuring enhanced efficiency and safety. Though most of the critical equipment in refinery are equipped with sensors, sensing operating conditions of the running machine 24x7, not every abnormality can be detected through sensors. Hence field rounds and field monitoring are of utmost importance.

Digitalization Initiatives at BPCL



BPCL Refineries have been at the forefront of embracing digitalization, seeking to innovate and incorporate advanced technologies into daily operations. Numerous digital interventions, such as digitizing workflow processes, using drones for safety surveillance, and deploying plant Wi-Fi, have revolutionized the way personnel work.

Lately BPCL has also started thinking in lines of using digital technologies to improve the reliability of process equipment and adopting predictive maintenance using AI based machine learning models.

The Evolution of Operation Driven Reliability

Nearly a decade ago, the concept of Operation Driven Reliability (ODR) was introduced in BPCL Refineries, and a taskforce was made which aimed to improve the equipment reliability with the help of field data collection by operators using intrinsic safe devices and facilitate insightful analysis over this data. Manual log sheets being used by field operations had certain limitations like no insight on data being recorded and challenges in quick retrieval of past data for analysis. Digital field records allow operators and engineers to access critical data in real-time, facilitate data analysis through advanced analytics tools.

By harnessing the power of big data and data mining techniques, refineries can identify patterns, trends, and anomalies in equipment performance and process data. Digital field records also enable root cause analysis when incidents or deviations occur. By analysing past records, refinery personnel can identify the underlying reasons for equipment failures or process upsets,

allowing them to implement corrective actions and prevent recurrence. Over the years, the concept of ODR has evolved alongside technology advancements.

Initial Attempts with RFID Tag-Based Devices



In the early stages of ODR implementation, BPCL Refineries utilized RFID tag-based devices carried by field operators during their rounds. These devices were programmed to have a list of parameters specific to each equipment upon

successful scanning of the RFID tag placed nearby. While this method improved data collection, some challenges surfaced, including the inconvenience of carrying heavy devices and the need for offline data transfer.

Moving Towards Digital Checklists



Recognizing the limitations of RFID tag-based devices, BPCL Refineries transitioned to Digital Checklists, a system developed in-house. This innovation allowed operators to collect daily data and access it through an intranet extended via outdoor Plant Wi-Fi. However, network coverage issues and hardware usability persisted, requiring further refinement.

A Breakthrough with Asset Performance Management System

A significant breakthrough came when BPCL Refineries leveraged the Asset Performance Management System (APM) provided by GE for digitizing the Digital Log Sheets. This system facilitated seamless communication with various databases and applications, such as SAP, historians like IP21, and the Lab Information Management System. Additionally, APM offered a

CASE STUDY

module for designing operator rounds and collecting data through the mobile application.

Benefits of APM-Driven ODR

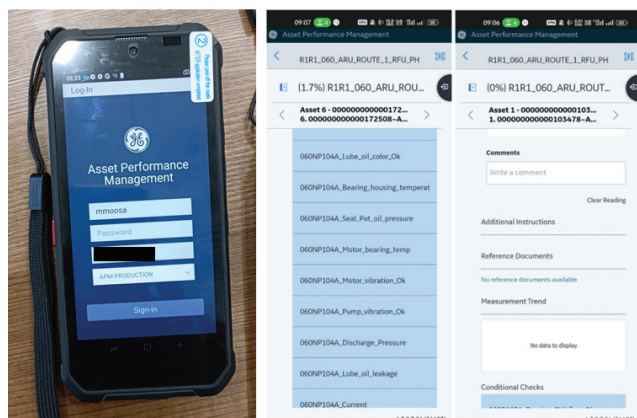


The APM-driven ODR solution addressed several challenges faced earlier. Operators now had the flexibility to enter data online or offline, eliminating network connectivity constraints. The data captured

offline by the plant operators can be synced to the GE APM system later, on availability of network.

Moreover, comprehensive data visualization and user-friendly dashboards made data analysis more efficient. The application also featured threshold parameter value configurations, along with relevant messages and alerts, making it interactive and easy to use for field operators. Lightweight and handy android-based intrinsic-safe devices replaced the previous heavy devices, streamlining data collection during daily operator rounds.

Realizing the Benefits of ODR



The adoption of ODR using APM has yielded significant benefits for BPCL Refineries. Improved visibility into machine data has allowed for enhanced performance analysis. Trending of equipment parameters helps in identifying patterns and trends before potential failures, contributing to better mean time between failures and supporting preventive maintenance efforts. This

leads to improvement in equipment reliability thereby reducing operating costs.

Future Prospects and Conclusion

In a rapidly evolving technological landscape, digitalization holds the key to unlocking greater operational efficiencies and refining decision-making processes. The incremental data being generated on a day-to-day basis has become invaluable for business decisions, especially in the manufacturing domain. BPCL Refineries' reliance on skilled field operators, coupled with their focus on Digitalization and Operation Driven Reliability, exemplifies the industry's commitment to excellence, safety, reliability and environmental sustainability. With a continued drive for innovation and technological advancements, we are poised to remain dynamic and critical contributors to India's energy sector. ■

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Sustainable IT: A key ingredient in the winning formula for The race to net zero

The race to net zero not only drives attention to the areas where we must cut back, and re-orient, but also triggers businesses to put measures and controls in place to assess how businesses are doing. With ever-increasing IT technology penetration, it has become imperative that the technology itself needs to be managed and assessed so that in the long haul it does not become a liability but a key enabler to finish the race to net zero.

We live in a finite world system and hence our needs should be met with finite resources. The whole focus and motive of Sustainability is on defining the limits of being finite. In contrast, our core human drive is to strive for maximizing the accumulation of resources rather than meeting finite ends and coexist.

IT technology can help businesses to make better decisions (applied analytics, simulated outcome), practice more agility in business operations (real-time data, service base model) and manage data (360 degree one-truth view of the business, past-present-probable future). Using these value outcomes, the business can develop strategies and assess its trajectories to achieve net zero. Sustainability in context of IT

- Manufacturing of IT components (all associated hardware and peripherals),
- Utilization for a business/purpose outcome (deployment and software application),
- Management of software application and systems lifecycle, hardware and firmware upgrades
- Disposal (migration and obsolescence) of Information Technology ecosystem in a way that minimizes its impact on the environment and business ecosystem.

In totality the subject covers on how IT technology is consuming resources (infrastructure, natural resources, electricity, utilities, man power) to build and run software application to deliver a business outcome.

End-user Perspective

The two dynamic aspects of Utilization and Management can make a difference from the perspective of an end-user company on how IT technology is sweated and made use of in the race to net zero.

Utilization

This aspect deals with how the needs of IT technology are sized, evaluated, provisioned/procured, and put into use to deliver a business outcome. From the hardware perspective, the line items can range from a simple networking switch to lengths of cable, servers, IT infra racks, routers, converters, network towers, and components, UPS, power & cooling requirements, physical space & protection, access points, and user peripherals. The software stack comprises of coding/application build platform, software deployment system, the front end (user-facing) and the back end of the application, the database which stores all the data, and complete package software ecosystem which can deliver a business result by interacting with the users.

Decision makers must evaluate on what shall be the load of utilization on the assets and what flexibility they shall have to monitor the utilization and if required to crank up/turn down the asset usage. Latest breakthrough technologies like

- On-Demand computing which Deals with the churning of IT resources as and when the business demands and hits peak limits on how they are

provisioned and sized. For e.g.: during peak load of business hours, the computational and network resources can be optimized to deliver business users' needs and in offload hours the same resources can be used for back-end activities like back-ups, archives, policy updates, and software application maintenance.

- Virtualization which provides an edge to mitigate dependency on physical infrastructure and provision on-demand resources with help of in-house virtualization technologies or from cloud service providers where one can provision a basic server, scale up ports, interfaces, connections, update policies on a switch/firewall at the click of a button. It is the optimum use of these technologies that the same e-comm websites work flawlessly at any point in time (sale, non-sale, festive, or usual) of the year be it day or night, rain or shine.

These are very instrumental to keep a tab on the utilization aspects of sustainable IT.

Management

Once you are done with the first time build and deployment of IT infrastructure, resources and software application system there is an ever-inflating need to manage the ecosystem which includes

- Software application system updates
- Bug fixing
- Hardware firmware upgrades
- Updates to mitigate risks for known cyber vulnerabilities
- Interfacing with the new application system,
- End-user support
- Database tuning
- Data cleansing
- Supporting the application ecosystem to cater to evolving business needs.

These tasks are open ended and are worked on as needed basis. Of course, there is a planning and strategy behind to manage the activities but what shall be the actuality and cost associated are practically unknown. Worst case scenario can be like laying down

a road and opening it to the public and discovering that within 1 year the resources spent on its maintenance and upkeep have overshooted the cost of building a new one. On top of that, there is no rule book apart from practical ground experience and best practices to get it done right the first time.

Provisioning IT infrastructure and ensuring its reliability

Recovery Time Objective (RTO) specifies the duration of restoration of IT resources and user experience post a disruption/failure and Recovery Point Objective (RPO) quantifies the duration the data loss is tolerable by the business. These are the two aspects on which the needs must be quantified otherwise one can land in under/overkill of Disaster recovery systems. RPO Both these KPIs must be well assessed and must be practically tested periodically to assess the cost of keeping a disaster recovery ecosystem to deliver reliability to business users. Netflix has been experimenting with the concept of Chaos Monkey which autonomously and sporadically disrupts their IT ecosystem and forces the ecosystem to be resilient on a global scale and also tests the needs and limits of the ecosystem increasing resilience.

Emerging trends in Sustainable IT

- Green Coding encourages programming produced and written in a way that minimizes the energy consumption of software. To deliver a particular functionality there are a number of ways a software application can be built and deployed. Apart from the coder's/solution designer's experience, there is hardly any governing factor that can ensure that the application is built and deployed in a way that consumes the least amount of resources.
- Containerization enables new methods to build and deploy an application. It significantly lowers application deployment time and requirements for the nonproduction environment where build and testing take place while also giving the flexibility to be independent of Operating System (OS – Windows, Linux) environment and distributed computing with microservices architecture. Breakthrough application like BHIM, Paytm,

ONDC(Open Network for Digital Commerce), etc which works on the principle of open and distributed computing heavily utilizes such technologies.

Sustainable IT Roadmap

- Analyse and Assess your IT application landscape on a periodic basis.
- Build a sustainable IT platform: continuous cycle of application design-build-deploy-maintain-retire/upgrade.
- Keep a watch on your IT CO2 footprint to account for resource consumption apart from money.
- Kick start and develop a culture that is conscious of Sustainable IT and contributes to sustainable business.

Conclusion

In the race to net zero, one needs to be nimble but still scalable and better decisions, improve response time and be closer to responding to real-time events, and eventually decide faster on what business model and strategy works well for you. In the sea of unknowns and uncertainty, only the learner and adaptable shall be the first survivor. Businesses that can respond quickly will not only have an early mover advantage but also have tacit learning unique to them. Technology and data can be your secret tools for survival, provided you get them right at the right time. ■

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Smart Process Factories



Normal Situation of Chemical Process Factory

Process facilities often hire a large workforce in combination of contractors and employees, working simultaneously on different processes and in different areas / blocks of a given jobsite. Not only does this pose challenges to workplace safety as it involves handling of hazardous chemicals / gases / solvents, it often leads to bottlenecks, cost overruns, and a decline in productivity.

Role of Conventional Automation

Conventionally, Automation is used to monitor and control the chemical manufacturing process which involves Raw Material dosing, stirring / mixing, liquid-liquid separation, solid-liquid separation, Drying, FG Packaging, Waste Treatment, Utilities etc. (multiple Manufacturing Processes) from a central location.

The purpose of automation has been conventionally like safety, quality, energy optimization and Data Acquisition etc.

IIOT Use Real Time Data in Chemical Process Factory

The Process data can be transferred to a central cloud application in real-time using industrial communication networks.

IIoT for the chemical industries use real-time data of process equipment, monitors its performance, helps predictive maintenance and most importantly, it evaluates equipment utilization to improve Overall Equipment Effectiveness (OEE). It helps managers quickly identify which equipment is being underutilized and adds value by providing tips to improve the utilization.

Benefits Of An IIoT Platform For Chemical Process Industries

The Industrial Internet of Things (IIoT) includes a network of inter-connected devices, equipment, and machines that collect real-time jobsite data.

IIoT platform offers a true digital transformation for the chemical Process industries. It enables processing plant to improve automation, cost efficiency, jobsite safety and productivity with coincident real time monitoring of processes, equipment, and people.

IIoT platform gives user complete visibility by leveraging data collection mechanisms ranging from direct sensor to soft sensor to computerized AI vision. This real time digitized data will derive the productivity monitoring / Utility consumption monitoring. This technology enables real time visibility of following aspects of chemical manufacturing process – effective process control, optimized asset utilization, reinforce operational inefficiencies and alert the user against any potential safety hazards before they occur.

Reduce Production Costs By

Auditing your operation by div into every manufacturing process.

- Workforce Utilization - being used efficiently and training is sufficient.
- Reviewing floor inventory like WIP, looking at Semi finished products.

Implement Continuous Improvement Programs Many costs can be reduced.

- With initiatives to optimize processes.
- Also, by eliminating redundant paperwork, automating data entry, and changing equipment and material staging.

Improving Visibility

Many manufacturing companies are completely dependent on manually prepared log sheets and reports. This allows gaps and errors in the visibility and planning. Material goes in one end of the factory, and finished goods come out the other; what happens in between is often mysterious and costly.

- Visibility gain by using process monitoring solutions.
- Opportunity is enhanced further when the software captures and analyses data in real-time.
- Real-time visibility provides actionable information for authorities to intervene when needed.
- This is the tool to see the events when they are occurring when it matters the most.

Implement Predictive Maintenance

Traditional reactive maintenance strategies can be upgraded to

- Technology and advanced equipment data platforms-based strategies like predictive maintenance.

Eliminate leaks & losses

Material & Energy waste caused by inefficient processes or human error.

- Clear visibility to the manufacturing process helps making the team and assets accountable, which in turn can lower production costs and boost efficiency.

Maximize Capacity Utilization Of Equipment

- Drive continuous improvement using real-time analytics and performance monitoring.
- Optimize job standards, scheduling and step by step costs
- Gain real-time visibility into operational and asset performance
- Enable knowledge sharing and collaboration using a single source of truth driven by data

Real-Time Visibility

Continuous improvement in manufacturing starts with capturing data from process operations - specifically process equipment / assets. Automated equipment / assets / machine data collection to deliver data-driven insights in a matter of minutes. The data captured from equipment drives immediate insights for both people and systems, enabling them to make better, faster decisions as well as drive automation.

Effective Analytics & Reporting

To make smart decisions with real-time data IIOT ensure, you know exactly what's happening on the manufacturing unit, down to each individual asset. Establish accurate standards to plan, quote, and schedule more effectively. There are more than 12 categories of major data reports which can be derived from the real time data. They are Informational Reports, Analytical Reports, Operational Reports, Product Reports, Industry Reports, Department Reports, Progress Reports, Internal Reports, External Reports, Vertical & Lateral Reports, Research Reports, Strategic Reports.

Conclusion

In today's dynamic world of manufacturing and competitive environment, walking with the time in real time is the need of the hour. Implementation of IIOT / Industry 4.0 with complete involvement and domain expertise is the key. Having an informed edge in the competitive market always shortens the ROI and IIoT provides this Smart edge. ■



Author

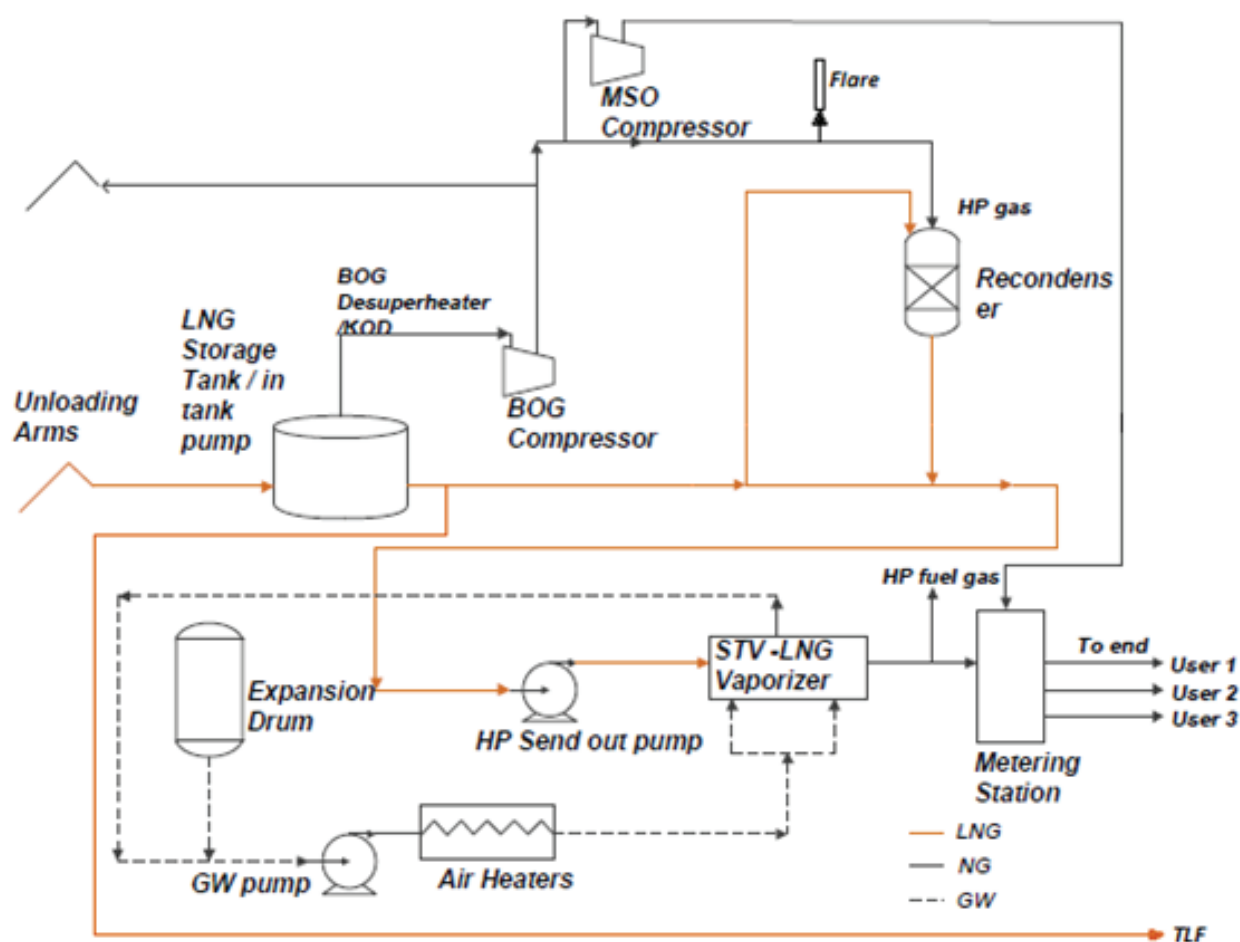
Shriram B. Sampagaonkar

Director
PRETECH Automation Pvt Ltd. Pune

Digitalization of Training through Operator Training Simulator

LNG operations is inherently a risky affair. There is little room for operator error - hence professional training is of paramount importance to keep abreast of these complex units which can include both routine & non-routine operations. Safety in process operations for a greenfield LNG regassification unit can be particularly challenging. Reasons are many! Inexperience in LNG operations, staff turnover, remoteness of sites, availability of experienced trainers to mention a few.

To train operators even before a new plant has been commissioned and started up is imperative to ensure safe operations. Operator Training Simulator (OTS) is a digital tool that can be effectively implemented for acclimatizing the new operators to various simulated scenarios. They acquire experience in handling various modes including emergencies in a simulated environment allowing them to learn from mistakes and improve operability. The training ensures that inexperienced operators do not lead to inefficient operations and potential disasters. OTS brings



DLTPL Process flow diagram

faster learning, more efficient personnel training, contextual knowledge & higher safety. The cost of OTS implementation is paid off through less errors leading to product losses and reduced downtimes.

Operator Training Simulator

The main engine of an Operator Training Simulator (OTS) is the Process Simulation Model of the plant that replicates actual plant operation in a virtual system. Although simulators may originally be developed by companies for presentation of technical process & unit operations, process optimization or design in software, they can also be developed further to provide an important part of basic, refresher, troubleshooting/ abnormal conditions, and emergency trainings.

OTS have long been recognized as the best method of training in the airline, nuclear power, aerospace, military, and process industries. In process industries OTS provides a virtual plant on your computer, allowing plant operators to train in plant operations ahead of plant start-up and throughout plant lifecycle. OTS enables the plant operators to gain experience in an off-line, non-intrusive environment without any damage on the actual plant, for both inexperienced and experienced plant operators.

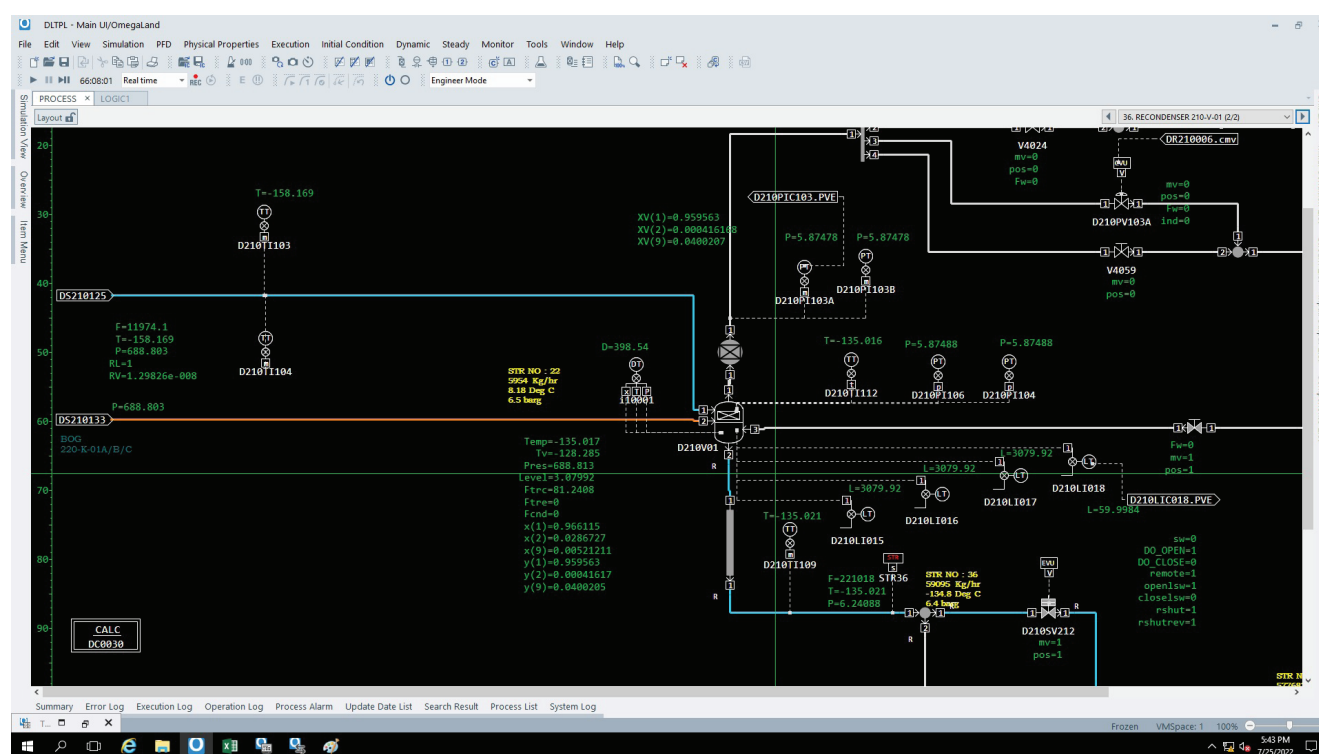
LNG Regas Process Description

LNG from the ship is unloaded into LNG storage tanks by connecting unloading arms on jetty. This stored LNG is then pumped to Recondenser and high-pressure pumps by low pressure in-tank pumps.

Since the LNG in the tank is stored at bubble point, there is continuous generation of boil off due to heat leak in the tank from atmosphere. The challenge of this boil off gas is managed by recondensing in Recondenser by sub cooled LNG. High pressure LNG is then regasified in shell & tube vaporizers by using glycol water as heating media. Regasified LNG eventually leaves plant battery limit to customers via sendout line after fiscal metering.

Why implement training simulators?

- With an OTS, it is possible to train plant operators and plant engineers.
- Training on a virtual plant with identical look and feel, reproducing realistic plant behaviours with identical DCS and SIS operational environments.
- Various tasks and situations training at any time.
- Plant start-up, shut-down and normal plant operations experience without impacting actual plant operations.



OTS Model

FEATURES

- Offers hands on experience of the most credible scenarios, so that operators are ready to respond in real-life.
- Increases process knowledge and confidence in operators for better plant operations
- Validates procedures & checkout controls to fix problems before commissioning.
- Any minor deficiencies or inefficiencies in DCS discovered during OTS project can be changed in the DCS configuration before DCS commissioning.

Process of Implementation, Project Schedule

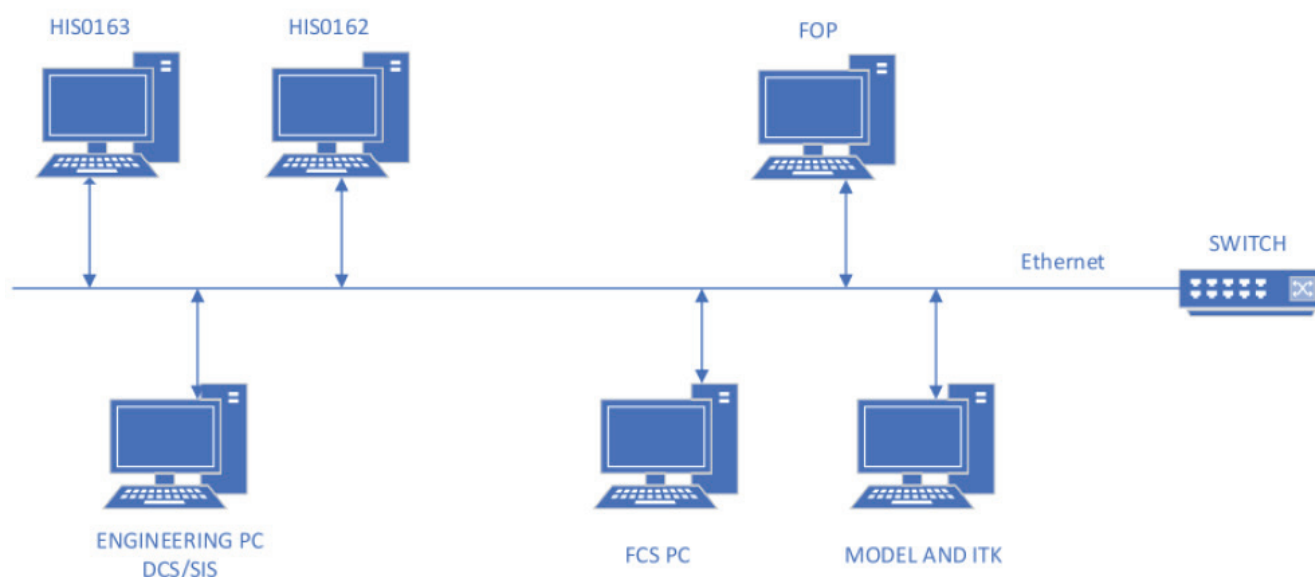
OTS project implementation starts with finalizing Functional design specification of project in consultation with client → Data Collection for modelling (e.g., P&IDs, Process descriptions, Process datasheets, HMB etc.) → Model Building on Simulation software → Model Validation Test → DCS integration → Factory Acceptance Test → Site Acceptance Test → Operators Training.

Generally, project schedule of implementation of OTS project depends upon the complexity of plant process, however a typical LNG regasification terminal OTS development project schedule is in range of 8 to 10 months.

Model Development & Validation

The single most important component in an OTS is the mathematical model that should accurately simulate the dynamic behaviour of the process. Model Development work is done by competent simulation engineer based on fundamental principles of chemical engineering and appropriate thermodynamic properties using simulation software that provides an integrated, dynamic simulation environment.

Typically, model is a replica of plant (digital twin) that is created using Process flow diagram & P&IDs. Process data input is given by using Heat & Mass Balance, Equipment datasheets to prepare robust process model that exhibit model behaviour close to real plant operation. The model tuning is done to match Heat & Mass Balance & then validated using various test functions that are finalized in functional design specification by involving multi-disciplinary team having hands on experience in plant operations & domain knowledge. This team includes experienced Plant Operators, Process Engineers & Instrumentation Engineers. The deviations observed during Model Validation Test are liquidated by Simulation Engineer before DCS integration. Once the confirmation of model validation is done after implementing the required changes, model is then integrated with plant DCS. The final validated model which behaves exactly in line with plant operating conditions is then accepted.



OTS System Configuration



DLTPL OTS Room

The Operator Training Simulator System consists of Model-PC, ENG-PC, Operator Stations- PC, Field Operation Station (FOP-PC), FCS/SCS-PC

OTS Application at DLTPL

One of the applications is for training to handle Cooldown operation. The operators have been trained in OTS to get familiarised before actual cooldown of unloading headers. Cooldown of the 2.4 km unloading headers is a critical process while introducing LNG first time in the terminal. As per guidelines, the lines to be cooled at the rate of 10 °C/hr. This process has been simulated in the OTS model by using series of Heat exchangers to predict cooldown behaviour of the lines during actual cooldown.

The training is imparted by OTS Instructor who is competent person possessing the thorough knowledge of Model & Plant Process. Total 4 Panel operators have been trained by instructor to respond against equipment malfunctions and emergency situations like how to maintain Tank pressure in case of BOG compressor trip. Training scenarios are set up by an instructor without any impact on the actual process. Training typically includes start-up and shutdown, change of load and critical process situations.

Conclusion

- To overcome the ever changing technological/ process upgrades and training needs arising thereon, OTS implementation can be an effective solution.

- OTS develops competency & confidence of operators to achieve flawless start-up of plant, which gives immediate benefits to management like less time to start up & to meet commissioning target.
- Several benefits can be achieved with OTS which includes, teaching operators how to operate in critical conditions and to run the plant in a safe manner.
- Plant engineers can practice and witness different plant scenarios, to conduct what-if analyses and monitoring the dynamic process behaviour. ■

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PRODUCTS

0.3% Pt /AT Selectoxo R4754 by BASF

BASF Selectoxo is a Pt based catalyst in tablet form to selectively convert CO with O₂ in the presence of H₂. Selectoxo is a catalyst in the form of tablets with a nominal size of 3 x 3 mm and with Platinum as active component. In addition, a promoter modifies the activity of the Pt to allow for selective conversion of CO in the presence of H₂.

Product Application: Selectoxo was originally developed as a complement to methanation in ammonia plants. Selectoxo is used to remove carbon monoxide from hydrogen streams by conversion with oxygen. Due to its modification, the catalyst can suppress as far as possible the reaction of hydrogen with oxygen.

Special Operations: Selectoxo might gain maximum activity via a short activation procedure. Before unloading, the material should be oxidized.

Poisons: Selectoxo will last for very long times if it is not subjected to poisoning by certain impurities. The principal poisons are sulfur and chlorine compounds as well as oil. These materials will deactivate and may eventually poison the catalyst permanently.

Storage: Selectoxo does not deteriorate or constitute any hazard when stored in sealed containers. The containers should not be allowed to become damp or wet and should not be stored in contact with organic or easily oxidizing vapours.

Know more on: <https://catalysts.basf.com/products/selectoxo-0-3-pt>

EnviCat N2O-S by Clariant



(HNO₃) plants. Nitrous oxide – also known as happy gas or laughing gas – is around 300 times more harmful to the climate than CO₂.

“Secondary abatement” catalyst for removal of the climate-changing gas nitrous oxide. The catalyst EnviCat N2O-S removes nitrous oxide (N₂O) from the off-gas of nitric acid

EnviCat N2O-S is a so-called “secondary abatement catalyst”: it is installed in the ammonia oxidation reactor directly underneath the primary precious metal gauze pack in a reactor basket.

Benefits: Converts up to 95% of N₂O into harmless oxygen and nitrogen; the catalyst can also slightly increase nitric acid yield by improving the efficiency of the ammonia oxidation process; Convenient “drop-in” solution as catalyst is easy to install with little or no engineering modifications; Catalyst shapes optimized for low-pressure drop; High mechanical strength; robust in commercial operation.

Known more on: <https://www.clariant.com/en/Solutions/Products/2021/07/27/08/09/EnviCat-N2OS>

AH axial flow pump by Sulzer



Loop reactor circulation pump for very high-pressure applications. The Sulzer Ensival Moret model AH high pressure loop reactor circulation

pumps are specifically designed for the circulation of polyethylene and polypropylene slurry. Operation of the reactor loop for extended periods helps boost productivity. It is not uncommon to find model AH pumps running more than 5 years between overhauls.

Benefits: Heavy-duty engineered pumps tailored to process requirements; Designed and built following API 610 (ISO 13709) and associated international standards; High efficiency performance for best total lifetime cost; Specifically designed for circulation of slurry with large free passage between two adjacent blades; Robust design for long Mean Time Between Maintenance (MTBM); Direct mounted or with sprung baseplate to accommodate thermal expansion of loop reactor vessel.

Applications: Polyolefins industry; Slurry phase polypropylene (PP); Slurry phase polyethylene (PE)

Know more on: <https://www.sulzer.com/en/shared/products/ah-axial-flow-pump>

AVEVA™ Predictive Analytics

Predict and prevent, AVEVA™ Predictive Analytics enables industrial companies to avoid costly unplanned downtime in a no-code environment. With more than 15 years of experience delivering AI-based predictive analytics at scale, AVEVA™ Predictive Analytics helps industrial users identify asset anomalies—weeks or months before failure. It can forecast time to failure, so maintenance priorities can be set, and it offers prescriptive advice, such as actions to remediate problems.

Industry leaders trust AVEVA™ Predictive Analytics to maximize asset reliability and prevent unplanned downtime.

Features: Anomaly detection; Fault diagnostics; Time to failure forecast; Native integration with AVEVA™ PI System™; Proven Scalability; Security et cetera.

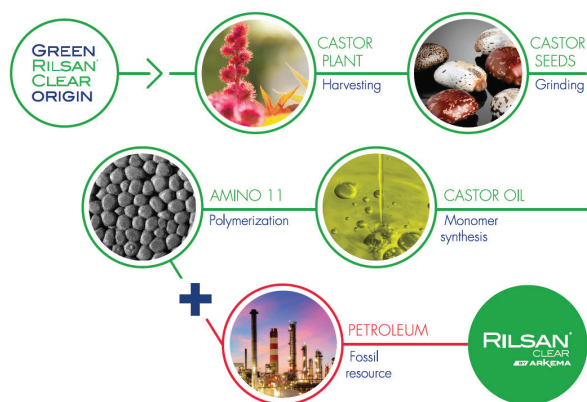
Know more on: <https://www.aveva.com/en/products/predictive-analytics/>

environment space, which translates seamlessly into expert guidance and service for customers.

Benefits: Improve plant performance; Enhance Uptime; Knowledge management.

Know more on: <https://www.thermaxglobal.com/edgelive/>

Arkema increases bio-based offer with a new range of mass balance acrylic materials

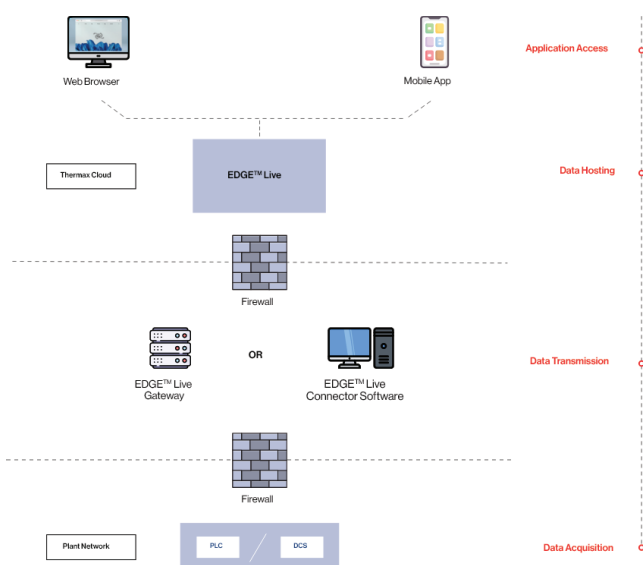


In a key milestone in the transition to a more renewable and lower carbon economy Arkema launches new range of bio-attributed acrylic monomers and specialty acrylic additives and resins, mass-balance certified under the International Sustainability and Carbon Certification-PLUS (ISCC+) framework. This launch would enable Arkema's customers in achieving their climate plan goals by reducing their scope 3 greenhouse gas emissions.

These novel performance bio-based segregated solutions are: Rilsan and Pebax Rnew polyamide 11 advanced polymers, Sartomer Sarbio UV-curing resins, Synaqua alkyd emulsions, Crayvallac and Coapur rheology additives, amongst many others.

Known more on: <https://hpp.arkema.com/en/product-families/rilsan-polyamide-11-resins/rilsan-clear/>

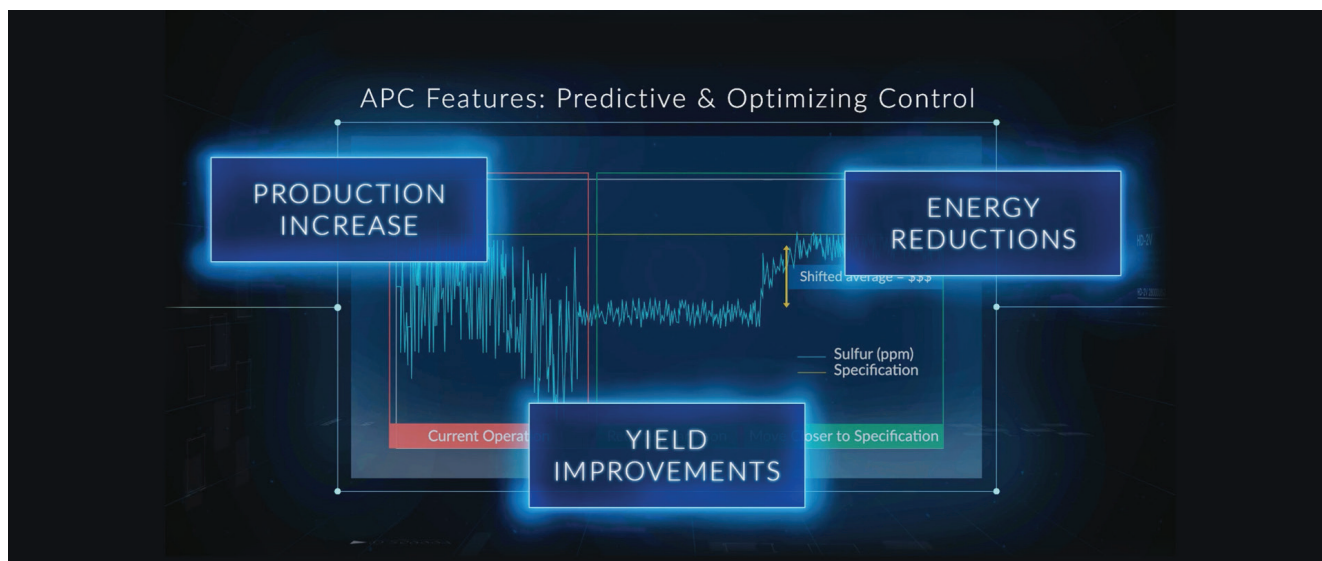
Thermax EDGE™ Live



Enterprise Asset Performance Enhancement Solution: Thermax EDGE™ Live is a digital solution powered by advanced capabilities of artificial intelligence, machine learning and Thermax engineered algorithms. It integrates all your industrial assets across the globe and can perform data analytics at the click of a button.

Besides serving as a digital solution, it leverages the company's longstanding experience in energy and the

Aspen Technology Introduces New Software Release to Advance Customers' Sustainability and Operational Excellence Initiatives



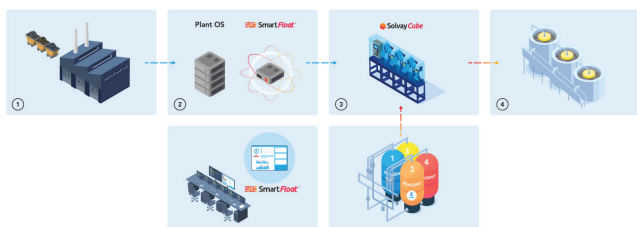
Aspen Technology, Inc., a global leader in industrial software, announced the availability of its latest aspenONE® software release, V14. The new release delivers advanced intelligence and guidance capabilities that improve decision-making abilities and further boost operational excellence. In addition, V14 enables customers to accelerate sustainability projects with more than 100 sample models and to manage Scope 1 and 2 emissions for reducing carbon footprints. aspenONE V14 enables industry to jumpstart progress in the areas of emissions management, hydrogen economy, carbon capture, materials circularity, bio-based feedstocks, and renewable energy. V14 automates CO2 emissions data collection from multiple sources for decarbonization compliance/reporting and enables

customers to model these emissions in operations to achieve sustainability targets.

"It's a critical time for companies to optimize efficiency and sustainability across their operations," said David Arbeitel, Senior Vice President of Products at AspenTech. "Our customers are uniquely positioned to support the dual challenge of meeting the increasing demand from a growing population in a more sustainable way. The new capabilities in V14 will help customers streamline progress toward sustainability goals and operational excellence for stronger business outcomes."

Known more on: <https://www.aspentech.com/en/products/engineering/aspen-plus>

Solvay Introduces SmartFloat- A digital mining solution



SmartFloat, A first of its kind AI enabled digital system that improves floatation of base metal which improves operational efficiency, metallurgical results and also improves sustainability aspects. SmartFloat also has integrated innovations to help mining operators to automate tasks, streamline decision-making and optimize recovery.

Utilizing proprietary Flotation Matrix 100TM methodology, SmartFloat uses real time data to recommend best suitable reagent formulation along with dosage information based on the obtained latest real time data in a short time. This can enable miners to respond faster in depending upon the ore composition data collected by the system, resulting in reduced wastage of reagents, energy et cetera.

Known more on: <https://www.solvay.com/en/brands/smartfloat> ■

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World Meet of the **CHEMICALS, PETROCHEMICALS, BIOPHARMA & PROCESS** Industry in India



Ministry of Chemicals & Fertilizers
Department of Chemicals and
Petrochemicals, Government of India



31st International Exhibition & Conferences

4-7 March 2024

Venue: Bombay Exhibition Center, Goregaon (East), Mumbai, India



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- Chemical & Pharma Processing
- Process Plants & Equipment
- Thermal & Mechanical Processing
- Engineering Procurement & Construction
- Technology Licensors
- Project Management Consultants
- Refining
- Chemicals & Petrochemicals
- Specialty Chemicals
- Chloroalkali
- Fertilizers
- Water & Waste Management
- Environment Technologies & Services
- Digital Services
- Industrial Automation
- Instrumentation & Process Automation
- Electrical Equipment
- Research & Development

- Biotechnology
- Green Chemistry
- Banking Finance & Insurance
- Lab & Analytical Instruments

PHARMA & BIOPHARMA

- Ingredients
- Bulk drugs
- R&D
- Warehousing
- Cold chain
- Packaging
- Contract Research & Manufacturing

CLEAN ENERGY

- Hydrogen
- Biofuels
- Methanol

- Carbon Capture Utilization & Storage
- Renewables – Solar Wind & Hydro

LOGISTICS

- Logistics Services
- Containers
- Supply Chain Management
- Packaging
- Material Handling
- Storage & Warehousing
- Cold Chain Management

CORROSION CONTROL

- Industrial Coatings
- Corrosion Control Technologies & Services
- Surface Engineering Solutions
- New metallurgies
- Inspection & Monitoring Technologies

Concurrent Events



ChemTECH World Expo 2022

300+ EXHIBITORS & PARTNERS	19350 VISITORS	6 CONFERENCES	150 SPEAKERS	650+ DELEGATES	200 STUDENTS	27 COUNTRIES
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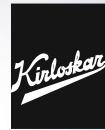


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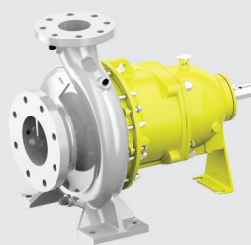
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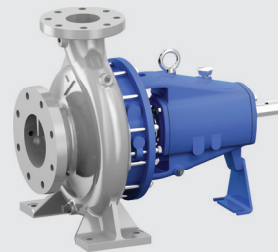
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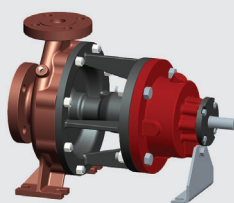
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