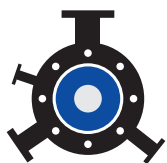


CHEMICAL ENGINEERING WORLD

www.jasubhaimedia.com



PTFE LINED SYSTEMS
VALVES | PIPES | FITTINGS | COATINGS

www.ptfeindia.com

| PTFE | PFA | FEP | ETFE
| PVDF | ECTFE | PP | HDPE



APPLICATOR

a Global Trusted Brand

YOUR SUSTAINABLE BUSINESS PARTNER
IN FLUOROPOLYMER LINED PRODUCTS SINCE 1994



Material options available on customer request from world renowned fluoropolymer suppliers



HI-TECH APPLICATOR

1102-B, Phase-3, G.I.D.C. Ind. Estate, Vatva, Ahmedabad - 382 445, Gujarat - India.
+91 79 4030 7621 / 2583 3040 / 2589 1740 | +91 97370 46491 | hitech@ptfeindia.com





**MIST RESSONANCE
ENGINEERING PVT. LTD.**



LEADING
**COOLING TOWER
SPECIALISTS**
SINCE 1990



MODEL - I

LOUVER TYPE MIST COOLING SYSTEM

(Guaranteed approach of 1°C to design WBT)

- Close Approach to WBT ensuring huge process benefits
- FAN-LESS, FILL-LESS Design
- Maintenance free Operation due to Choke-less design of Nozzles.
- Rugged structure with HDGI MOC & FRP casing, Saran3 PVC Nozzles, ensuring a life of 15 years plus.

MODEL - II

INDUCED DRAFT MIST COOLING TOWER

(Fill-Less Technology)

- Approach to 3°C to design WBT with temperature drop up to 15°C.
- Direct saving of 30 to 50% on Fan Power due to low pressure drop across the Tower.
- Maintenance free operation due to absence of Fills even for contaminated water application.
- Rugged structure with pultruded FRP/HDGI MOC with FRP casing & Stainless Steel 304 Nozzles, ensuring a life of 15 years plus.



GLOBAL PRESENCE

Guatemala, Honduras, Puerto Rico, EL Salvador, Nicaragua, Costa Rica, Panama

Peru

Uganda, Rwanda, Kenya

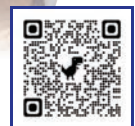
Zambia

Malawi

Iran, Nepal, Bangladesh

Thailand

Indonesia



explore more

*Copyright © 2026, MREPL, All rights reserved

1304/04, 'Anandi', Bajirao Road, Pune, India
+91-89569 94718 / +91 20-2447 2726

mistcreation@gmail.com
www.mistcreation.com



500+ Clients



30+ Years of Operation

CHRONICLING PROCESS INDUSTRY INNOVATIONS SINCE 1966

VOL.61 | ISSUE 9 | SEPTEMBER 2026 | MUMBAI | TOTAL PAGES 50 | PRICE ₹ 150

CHEMICAL ENGINEERING WORLD

www.jasubhaimedia.com

Digitalization & Automation

Upcoming Event:


ChemTECH
WORLD EXPO 2028

 **14-17, March 2028**

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





sealmatic®



MECHANICAL SEALS

Oil & Gas
Refinery
Petrochemical
Chemical
Power

Fertiliser
Pharmaceutical
Paper
Aerospace
Marine

Sealmatic India Ltd.

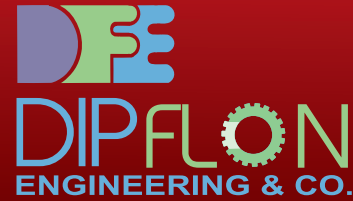
Bldg A, Indiplex IV, Survey No-12, Hissa No-9A,
Village Ghodbunder, Shanti Vidya Nagri Road,
Mira Road (E). Thane - 401104. India.

T : +91 22 50502700
E : info@sealmaticindia.com



sealmaticindia.com

www.dipflon.com



SHIELDING AGAINST CORROSION

Quality is never an accident it is always the result of High Intention, Sincere Effort, Intelligent Direction and Skillful Execution.



PFA/FEP/PVDF/PP LINED VALVES



PFA/FEP/PVDF/PP LINED FITTINGS



PTFE LINED SPOOL PIPES & PIPE FITTINGS



DIP-FLON ENGINEERING & CO.

Factory : Plot No. 803/804 & 1002/1003, Phase-II, G.I.D.C., Industrial Estate, Chhatral - 382 729, Dist : Gandhinagar, Gujarat.

Ph.: +91-2764-234232 | M.: +91 98987 94440, +91 99244 99948

Office : B-413, B. G. Towers, Near Delhi Darwaja, Shahibaug Road, Ahmedabad-380 004. Gujarat. India.

Ph. : +91-79-2562 4003, 2562 4169 | M. : +91 98987 94440 / +91 92276 84378 | E-mail : info@dipflon.com, sales@dipflon.com

CHEMICAL ENGINEERING WORLD
RNI REGISTRATION NO. 11403/1966

CHAIRMAN

Maulik Jasubhai Shah

PUBLISHER & CEO

Hemant Krishna Shetty

EDITOR

Hemant Krishna Shetty

SR. ASSOCIATE EDITOR

Dr. Priyaankaa Mathur

DEPUTY EDITOR

Reshmi Menon

CREATIVES

Arun Parab

GENERAL MANAGER SALES

Prashant Koshti

Amit Bhalerao

BRAND MANAGER

Sudhanshu Nagar

SALES

Godfrey Lobo

Chandahas M Amin

The Publishers and the Editors do not necessarily individually or collectively identify themselves with all the views expressed in this journal. All rights reserved. Reproduction in whole or in part is strictly prohibited without written permission from the Publishers.

Single Copy Price: ₹ 150/-

Annual Subscription: ₹ 1620/-, Foreign: USD 180

Registered Office: 26, Maker Chambers VI, 2nd Floor,
Nariman Point, Mumbai 400 021, INDIA.

Tel.: 022-4037 3737 Fax: 022-2287 0502

E-mail: sales@jasubhai.com

PLACE OF PUBLICATION

JASUBHAI MEDIA PVT. LTD.

210, Taj Building, 3rd Floor, Dr. D. N. Road, Fort,
Mumbai 400 001, Tel: +91-22-4037 3636

Published by Mr Hemant K. Shetty

Address: 406-D, The Karachi Citizens Co-Op Hsg Soc Ltd.,
Juhu Varsova Link Road, Andheri West, Mumbai - 400053.

Printer: Harilal Gangaji Patel

Printing Press (Name & Address): The Great Art Printers

25, Unique House, S A Brelvi Road, Fort, Mumbai 400 001.

Published from Jasubhai Media Pvt .Ltd. 3rd Floor, Taj Building,
210, Dr. D N Road, Fort, Mumbai 400 001.

AD INDEX

Aeron Composite Limited	7
Dip-Flon Engineering & Co.	5
Hi-Tech Applicator	1
Mist Ressonance Engineering Pvt Ltd	2
Sealmatic India Ltd	4
Suraj Limited	9

CHEMICAL ENGINEERING WORLD

Dynamic Platform
to Connect with
Chemical Industry
Ecosystem

Direct Reach to

**>200,000
Readers**

across

**>50 countries
in Print and
Digital Version**



**PRINT
VERSION**



**DIGITAL
VERSION**



**GLOBAL
REACH**



Contact:
+91-22-4037 3636



Email:
sales@jasubhai.com



Website:
www.jasubhaimedia.com



More than
800+
Satisfied
Clients

**CORROSION FREE
COMPOSITE SOLUTIONS**

Save Project Costs Without Compromising Strength



FRP CABLE
MANAGEMENT SYSTEMS



FRP GRATINGS



FRP HANDRAIL



FRP REBAR



FRP TANK



FRP CUSTOM SOLUTIONS



FRP TRENCH COVER

Approved with all major consultants and EPC Contractors
for Chemical and Process Plants



Corrosion/Chemical
Resistance



High Strength



Light Weight



Electrical Non
Conductivity



Thermal Non
Conductivity



Ease of
Fabrication



Low Life Cycle
Cost



Sustainable



Flame Retardant

MANUFACTURER OF FIBERGLASS / FRP / GRP

Cable Trays | Gratings | Structural Profiles | Ladders | Pitt Cover | Crossovers | Fencing
Handrails | Staircases & Platforms | Safety Marker Line | Cable Cleats | FRP Rebar | FRP Tank



AERON COMPOSITE LIMITED

Survey No. 170 to 174, Jornang - Akhraj Road, Via Ambaliyasan,
Jornang, Dist. - Mehsana, Gujarat - 382732 (INDIA)

T : +91-99099 88266, +91-90331 58500 | F : +91-79-26561238

E : info@aeroncomposite.com | W : www.aeroncomposite.com

Dealers & Distributors Inquiry Solicited

CONTENTS

GUEST COLUMN

Digitalization in the Chemical Industry - Part II: Commercial Realities and the MSME Blueprint

16



Shrey B. Patel
Founder-Director
Angiras Rasayan LLP, IN

Sustainable Sourcing is Changing The Aroma Chemicals Industry

19



Mahesh Babani
Chairman & Managing Director
Privi Speciality Chemicals Ltd

The Next Frontier for Indian Coatings: Reducing Dependence on Imported Raw Materials

22



Tushar Bhaskar
President
Rubix Data Sciences

INTERVIEW

"Digital manufacturing and automation give us greater visibility and control over our manufacturing processes"

25



Mr. Anurag Roy
Managing Director
ELANTAS Beck India Limited

FEATURE

How IoT Remote Condition Monitoring Helps Optimize Efficiency

29



Robert Stevens
Director of Marketing & Programmes
Busch UK Ltd

Project Delivery & Contracts Intelligence: Delayed Site Possession & Unforeseen Ground Conditions Claims

32



Rashid Hussain
Executive Director and Project Director
3C Corporate Consulting Contracting

Large-Size PTFE Gaskets for Critical Equipment in Chemical Processing

36



Julia Köder
Application Engineer
TEADIT



Oliver Zach
Director of
International Sales
TEADIT



Angelica Pajkovic
Client Specialist
TEADIT

IMPACT FEATURE



Suraj Limited: Dedicated towards Technical Excellence & Quality Products

40



From Hydrogen to Data Centers: The Evolving Role of Expanded PTFE Sealing Technology

42



High Efficiency Mist Cooling System & Induced Draft Mist Cooling Tower: A Superior Alternative to Conventional Cooling Towers

45

NEWS

10

PRODUCT NEWS

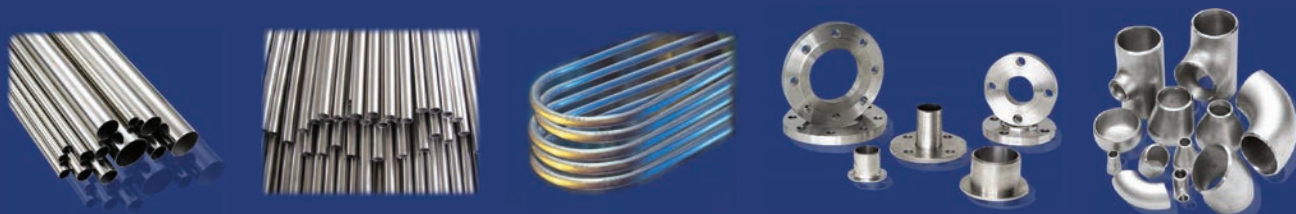
13

PROJECT UPDATES

14

SURAJ

India's Leading Manufacturers of Stainless Steel, Alloy steel,
Carbon steel Seamless Pipes, Tubes, Fittings & Flanges.



Fast response, Guaranteed Quality. In a large Stock & Production Range.
Deliver Customized Near Net Shape & Finish with Smaller to Large Quantity.
All Required Testing Facility Available In-house.
We are Supplying under all Customer & Third Party Inspection Agencies.



SURAJ LIMITED

Serving World Wide Oil, Gas & Power Industries

Quality first Since 1960

+91 95124 11444

suraj@surajgroup.com

www.surajgroup.com

CHEMICAL ENGINEERING WORLD

Dynamic Platform to Connect with
Chemical Industry Ecosystem



Direct Reach to
>200,000
Readers



across
>50
countries

in **Print** and **Digital Version**

UPCOMING ISSUE - OCTOBER 2026

PUMPS & VALVES



The October 2026 edition of
Chemical Engineering World
will bring insights in to the various
new upcoming growth opportunities
in the **Pumps & Valves**.



Upcoming Projects:
Details about the various
new projects,



Guest column:
Views of subject matter
experts,



Features:
Research - based articles &



Interviews:
With Industry Leaders.



Send Editorial submissions before 19th October 2026 to
editorial@jasubhai.com



Contact:
+91-22-4037 3636



Website:
www.jasubhaimedia.com



Hindalco and Metalshub enter partnership to introduce digital tenders for metallurgical-grade alumina



Dusseldorf/Mumbai: Hindalco Industries Ltd., through its subsidiary Utkal Alumina International Limited, has partnered with Metalshub, a strategic partner of the London Metal Exchange (LME), to introduce a first-of-its-kind digital tendering process for the sale of metallurgical-grade alumina.

The initiative comes against the backdrop of a growing need for greater transparency in alumina price discovery. Of the 55-60 million tonnes of third-party alumina shipments traded globally each year, only around 10 per cent is sold through the spot market. Despite representing a relatively small share of overall trade, spot transactions play an important role in shaping benchmark prices that influence a much larger volume of alumina sales, including long-term contracts.

Unlike aluminium, which has an established exchange-based pricing mechanism, alumina pricing relies significantly on privately published indices based on voluntarily reported transactions, which may not capture the full breadth and quality of market information available to participants.

By taking a significant step towards structured digital tendering, Hindalco aims to address this need by enabling competitive bidding for spot cargoes,

supporting broader market participation, greater transparency and more robust, market-driven price discovery.

Through its collaboration with Metalshub, Hindalco will introduce a structured digital bidding mechanism, enabling competitive electronic bidding within defined tender windows. By taking an early step towards digital tendering, the company aims to support greater transparency, broader market participation, and robust price discovery.

Saurabh Khedekar, CEO, Alumina Business, Hindalco Industries, said, "Alumina is a critical raw material for aluminium, a metal that is increasingly enabling light weighting, recyclability and the transition towards a circular economy. By implementing digital tenders for spot sales, our aim is to broaden market participation, strengthen competitive price discovery and bring greater efficiency and transparency to the global alumina market."

Hugo Brodie, Head of Sustainability and Physical Market Development, LME, said, "I am excited to see one of the LME's key brand producers, Hindalco, join forces with Metalshub to establish a pathway towards more robust and trusted price discovery in the alumina space. The development of independent, transaction-led price references will bring greater pricing transparency and overall market efficiency."

Dr. Sebastian Kreft, Managing Director, Metalshub, said, "Hindalco is the first major to take this important step towards structured digital tendering for alumina. While only a small fraction of the world's alumina is sold in the spot market, these transactions play an important role in shaping trade price for the entire market. Structured digital tenders open each cargo to competitive bidding from a wider set of buyers and produce firm, verifiable transaction data rather than voluntarily reported numbers. Metalshub is working closely with LME Insight to support more reliable, transaction-based price discovery for critical raw materials such as alumina. We believe Hindalco's initiative can encourage wider industry participation."

Currently, Hindalco markets its alumina using a mixture of long-term contracts and spot selling where commercial arrangements are made for spot sales via a standard RFQ process. Digital tenders will be used to replace the existing sales processes at Hindalco.

The Metalshub platform will enable participants to take part in secure digital tenders and has been vetted from an information security and data governance perspective to support compliance throughout the transaction lifecycle.

Hindalco's first digital tender is expected to take place between October and December 2026.

Dr. Jitendra Singh inaugurates SPROUT facility at BRIC-NIPGR



New Delhi: Union Minister of State (Independent Charge) for Science & Technology and Earth Sciences and MoS PMO, Dr. Jitendra Singh inaugurated the "SpeedSeed Phenotyping and Resource Optimization for Unified Trait Analysis" (SPROUT) facility at BRIC-National Institute of Plant Genome Research (BRIC-NIPGR), New Delhi, describing it as an important indigenous capability for developing climate-resilient crops suited to different weather conditions.

The Minister said that in a country as geographically and agro-climatically diverse as India, the ability to study and evaluate crops under different environmental conditions is critical for strengthening

agricultural resilience. The event was attended by Prof. Manoj Prasad, Director, BRIC-NIPGR; Dr. Senthil K. Muthappa, BRIC-NIPGR; and Dr. Nitin Jain, Scientist-H, Department of Biotechnology (DBT). During the programme, Dr. Jitendra Singh inaugurated the SPROUT facility and planted a sapling under the "Ek Ped Maa Ke Naam" campaign. He also interacted with scientists and officials of BRIC-NIPGR.

SPROUT is a season-independent, controlled-environment facility designed for high-throughput phenotyping, precision stress screening and evaluation of germplasm, breeding populations, mutants, transgenic and genome-edited lines. With a major focus on chickpea, the facility will help connect advances in genomics and genome editing with precise trait evaluation and breeding. This will

strengthen the ability to move more efficiently from gene discovery to trait validation and ultimately to crop improvement.

NIPGR has also developed SpeedSeed, a separate technology for accelerated generation advancement. In chickpea, optimized protocols can reduce the generation cycle to approximately 40 days, considerably shortening conventional breeding and research timelines.

The technology can be used within SPROUT or adapted to other suitable controlled-environment facilities. Together, SPROUT and SpeedSeed can accelerate the evaluation and advancement of promising crop traits and shorten the path from research to improved varieties.

Government reviews use of steel from ship recycling to boost steel manufacturing

New Delhi: A joint meeting was held under the chairmanship of H D Kumaraswamy, Minister of Steel & Heavy Industries and Sarbananda Sonowal, Minister of Ports, Shipping and Waterways to discuss and review the usage of steel obtained from recycling of ships.

The meeting was attended by key stakeholders, including the Department of Science and Technology (DST), Bureau of Indian Standards (BIS), Gujarat Maritime Board (GMB), and the Ship Recycling Industries Association (SRIA), to examine the existing regulatory framework and explore avenues for usage of secondary steel obtained from ship recycling.

The discussions were held focusing on expanding the application of recycled ship steel to additional sectors, with a view to enhancing value generation from ship recycling and reinforcing India's position as the world's leading ship recycling hub.

The meeting underscored Government's commitment to promote circular economy practices, supporting domestic steel manufacturing, and ensuring that India's ship recycling industry continues to set global benchmarks in sustainability and efficiency.

Evonik Oxeno issues white paper: More resilience for Europe's petrochemical industry

Germany: Evonik Oxeno has published its second white paper on the future of the European petrochemical industry. The publication outlines key levers for more resilience that companies can pull to remain competitive in an increasingly challenging market.

The publication comes at a time when resilience has moved to the center of the European petrochemical debate. Under the theme "Rethinking Resilience", the upcoming 60th Annual Meeting of the European Petrochemical Association (EPCA) will address how Europe can strengthen competitiveness, advance sustainability and maintain global connectivity.

Oxeno's white paper contributes to the discussion by identifying and promoting key drivers that companies can deploy to strengthen their competitiveness in a changing market environment.

The European petrochemical industry is undergoing a profound transformation as market dynamics and geopolitical developments reshape the environment. At the same time, Europe's strengths - integrated production networks, decades of process expertise, a highly skilled workforce and close cooperation across value chains - continue to provide a solid foundation for building resilience and creating long-term value.

"In the petrochemical industry, resilience is the ability to remain competitive and profitable in the face of disruptions," says Frank Beissmann, Managing Director of Evonik Oxeno GmbH & Co. KG. "Many of the factors that determine resilience are firmly embedded in our industry. The challenge is to keep strengthening them and to translate them into long-term competitiveness."

The white paper identifies levers including efficiency, innovation and Artificial Intelligence, strong partnerships across the value chain and regional production networks to navigate increasingly uncertain markets. Beyond company level, the White Paper also highlights the importance of a supportive policy framework to enable the industry's long-term competitiveness across Europe. "Building resilience is a joint effort," says Beissmann. "Petrochemical companies must continuously work on their strengths, while policymakers must create a framework that allows Europe to remain attractive for industrial production."

The White Paper "Building Resilience in the Petrochemical Industry" is available for download at: <https://c4-chemicals.evonik.com/en/media/oxeno-whitepaper-2026-311148.html> ■

LANXESS launches Disflamoll Advance Platform for extremely Low TPP plasticizing flame retardants



Disflamoll Advance can be used in PVC flooring, among other applications.

Mumbai: Specialty chemicals company LANXESS has launched Disflamoll® Advance, its next-generation platform for plasticizing flame retardants featuring extremely low triphenyl phosphate (TPP) content of less than 0.1 percent. Tailored to diverse applications, it is designed to help manufacturers navigate an increasingly complex regulatory landscape and emerging compliance requirements while maintaining the performance standards customers expect.

Beyond its extremely low TPP content, Disflamoll® Advance maintains high flame retardancy and strong smoke suppression. Due to its properties, it helps reduce or eliminate antimony trioxide (ATO) in formulations and improves processing efficiency.

"Disflamoll® Advance helps customers stay ahead of regulatory developments while continuing to achieve outstanding product performance," said Heiko Tebbe, Head of Application Development for Polymer Additives at LANXESS. "The platform brings together regulatory preparedness, technical performance and sustainability in a flexible portfolio designed to help customers address both current and future market requirements."

The first product introduced under the new platform is Disflamoll® Advance OT. It is specifically designed for use in polar polymer systems. Key applications include flexible polyvinyl chloride (PVC) used in flooring, tarpaulins and synthetic leather, insulation foams, thermoplastic polyurethanes (TPU), synthetic rubbers, and cellulose esters.

Developed to address evolving market, regulatory and sustainability needs, Disflamoll® Advance OT combines extremely low TPP content with the flame-retardant, plasticizing and smoke-suppressing properties customers expect from the Disflamoll brand.

Moreover, due to the use of renewable energy and raw materials, the carbon footprint can be up to 40 percent lower than conventional alternatives.

Disflamoll® Advance OT is available now, with additional solutions planned as the platform expands to address evolving customer, market and regulatory requirements.

Petro-SIM 7.7 advances process simulation with AI/ML-enabled hybrid modeling

Walton-on-Thames: KBC (A Yokogawa Company) has announced the launch of PetroSIM® 7.7, an advanced process simulation, optimization, and digital twin platform for engineers and safety specialists working across the refining, petrochemical, chemical, and process industries. Built on nearly 50 years of refinery and process engineering expertise, Petro-SIM 7.7 integrates AI/ML-enabled hybrid modeling with first-principles simulation within one platform.

By combining engineering physics with machine learning, it helps engineers make safer, more informed decisions while maintaining high-fidelity digital twins and optimizing large-scale operations across traditional and emerging energy systems. Gartner predicts that more than half of enterprise generative AI models will be domain specific by 2027, reinforcing the importance of AI built on industry expertise.

"Industrial AI delivers the greatest value when it is grounded in engineering physics," said Philippa Hayward, Product Manager for Petro-SIM. "Process engineers need an accessible way to develop and apply hybrid models within a trusted simulation environment, helping them solve increasingly complex problems without specialist data science expertise."

Petro-SIM 7.7 provides the engineering foundation for process digital twins and KBC Acuity™ Process Twin Pro, a digital twin application that continuously monitors model health, identifies deviations from plant performance, and helps keep models current throughout their lifecycle.

Together, they enable more accurate monitoring, optimization, and operational decision-making across refinery and petrochemical value chains. "Industrial AI is only valuable when engineers can trust it," said Simon Rogers, Chief Technology Officer. "That trust is built on transparency, engineering rigor, and results that can be validated. AI should strengthen engineering judgment, not replace it. Our vision is to embed intelligent technologies across our software portfolio, helping engineers solve increasingly complex challenges with confidence." Petro-SIM 7.7 is another step in KBC's mission of Bringing Decarbonization to Life®. ■

Shivtek Spechemi Industries announces ₹15 crore capacity expansion at Kurnool plant

Gurugram: Leading specialty chemicals manufacturer Shivtek Spechemi Industries Ltd, a flagship company of the Shiva Group of Industries, announced a strategic capacity expansion of 14,000 MT at its flagship manufacturing facility in Kurnool, Andhra Pradesh. The expansion, involving a capex of approximately ₹15 crore, focuses on scaling production within the company's core Chlorinated Paraffins (CP) product category.

Commercial production from the expanded line is scheduled to commence by July 2028. The decision to scale up follows sustained supply constraints, with Shivtek's Kurnool facility operating at 100 per cent capacity utilization. The expansion comes on the back of intense market demand across key industrial verticals, including PVC compounds, industrial coatings, flame retardants, and high-performance lubricants.

Speaking on the strategic expansion plans, Mr. Amitt Nenwani, Managing Director, Shivtek Spechemi Industries Ltd, said, "Demand for specialized performance additives across India and global export markets is outpacing current supply allocations. Operating at peak utilization has given us a clear directive - our customers need scale, fast execution, and strict compliance. This ₹15 crore investment at Kurnool directly addresses our existing and potential order pipeline. Crucially, as we expand capacity, we are integrating zero-emission process technologies and energy-efficient manufacturing into the plant, ensuring that even our legacy product lines adhere to modern, sustainable operational standards."

The new facility is projected to deliver an annual top-line revenue contribution of ~₹100 crore at full scale, generating high return on capital employed (ROCE) and driving margin efficiency.

This expansion forms a crucial component of Shivtek's overarching growth trajectory, supporting India's transition into a global specialty chemicals manufacturing hub. By enhancing domestic availability of high-grade Chlorinated Paraffins, Shivtek continues to align its portfolio with national import-substitution goals and supply-chain resilience.

The Kurnool facility expansion will incorporate advanced

eco-friendly process technologies, zero-emission standards, and strict environmental compliance, reinforcing Shivtek's position as a preferred green-chemistry partner to global supply chains.

Sudarshan Chemical divests VP4 Frankfurt to Celanese, sharpening focus on core pigments business

Pune: Sudarshan Chemical Industries Limited has announced the sale of its step-down subsidiary VP4 Frankfurt GmbH to Celanese Corporation, USA, further sharpening the company's focus on its core pigments business. VP4 Frankfurt is engaged in the manufacture of certain intermediates such as Diketene, primarily as a tolling operator for Nutrinova, an affiliate of Celanese Corporation and Mitsui & Co. Japan. VP4 Frankfurt became part of Sudarshan through its acquisition of the Heubach Group. This divestment strengthens Sudarshan's strategic focus and operational position.

VP4 Frankfurt serves Nutrinova as its principal customer, with only a small share of its output going to Sudarshan for captive consumption. Diketene is an important intermediate for functional food ingredients, making the asset a stronger strategic fit with Celanese and Nutrinova, a producer of additives for the food industry such as sweeteners. The transaction, therefore, places VP4 Frankfurt more closely aligned with its principal customer. Following completion of the transaction, Nutrinova will continue to supply Sudarshan with the materials it requires.

"The sale of VP4 Frankfurt is a strategic step in sharpening our focus. Pigments and colorants are where we create the most value for our customers. VP4 is a well-run business with a strong team, and it now moves to the company it already serves. That is the right outcome for the asset, for its employees, and for Sudarshan," said Rajesh Rathi, Chairman & Managing Director, Sudarshan Chemical Industries Limited.

Macro Engineering and Ingenia Polymers strengthen their innovation partnership



(L-R): Zach Charlton, Chief Technology Officer at Ingenia; Prof. John Vlachopoulos of McMaster University; Prof. Costas Tzoganakis of the University of Waterloo; Dr. Karen Xiao, VP of Technology at Macro; and Prof. Andrew Hrymak of Western University celebrating Ingenia's 40th anniversary and the expansion of the Brantford Innovation Centre.

Canada: Macro Engineering & Technology Inc. and Ingenia Polymers have strengthened their longstanding partnership through the installation of Macro's advanced 7-layer blown film labline at Ingenia's newly expanded Brantford Innovation Centre, Ontario facility. The labline consists of seven 1.25" extruders, paired with Macro's proprietary blown film die and air ring technology that can produce film widths of up to 500mm (or 20").

The system is equipped with a 24" wide Macro's Automax surface winder capable of producing rolls up to 12" in diameter. The new lab-scale system expands Ingenia's capabilities to develop, evaluate, and optimize advanced multilayer film structures while accelerating material innovation and product development. The installation reflects a shared commitment between Macro and Ingenia to drive innovation in polymer development and strengthen Canada's leadership in multilayer film technology.

Ingenia Polymers is one of the most trusted thermoplastics providers in the world today, and the preferred supplier to some of the most recognized household brands. Ingenia offers products and services to resin producers, compounders, plastic processors, converters and rotational molders. Ingenia supports customers globally with manufacturing facilities in Asia, North America, and Europe.

Macro Engineering & Technology is a global supplier of film and sheet extrusion systems that specializes in barrier film lines and custom engineered extrusion systems. Founded in 1978, Macro manufactures blown,

cast and Quadex™ biaxially-oriented coextrusion lines for multilayer films up to 13-layers. The company also supplies sheet extrusion lines for specialty applications, along with coextrusion dies, air rings and winding solutions to meet the needs of complex requirements.

Vishnu Chemicals and France's DCX Chrome enter strategic joint venture to set up greenfield chromium metal plant in Visakhapatnam

Hyderabad: Vishnu Chemicals Limited (VCL), India's premier specialty chemical manufacturer, announced that it has executed a definitive Joint Venture Agreement (JVA) with DCX Chrome SAS, France (DCX), a globally renowned pioneer in the manufacturing of high-purity aluminothermic chromium metal and specialized chromium powders.

Under the terms of the JVA, VCL and DCX will establish a new greenfield manufacturing facility in Visakhapatnam (Vizag), Andhra Pradesh, India. Both companies will hold an equal 50 per cent equity stake in the proposed joint venture company. The plant is engineered to operate with a substantial installed capacity of 6,000 MTPA (Metric Tonnes Per Annum), dedicated entirely to producing high-purity chromium metal. This joint venture represents a monumental milestone in strengthening India's domestic capabilities for advanced engineering materials that are currently almost entirely imported. ■

Digitalization in the Chemical Industry – Part II: Commercial Realities and the MSME Blueprint

Shrey B. Patel

Founder-Director
Angiras Rasayan LLP, IN



Last year, this month, in these pages, I set out a beginner's roadmap to digitalization, aimed at demystifying artificial intelligence and machine learning for traditional chemical manufacturing. Since then, the industry conversation has moved decisively from pilot projects to plant-floor deployment. What has not moved, across most of the Indian mid-market, is the plant floor itself. This matters more here than elsewhere.

India's competitive strength does not lie in base petrochemicals but in specialty chemicals, agrochemicals, dyes and pharmaceutical intermediates — and these are batch and semi-batch industries almost without exception. Gujarat and Maharashtra alone accounts for over 55 per cent of national chemical capacity, having overwhelmingly MSMEs running multi-product campaigns through shared equipment. Batch operation is precisely where combinatorial complexity lives, and therefore where mathematical optimisation earns the most. It is also where adoption is slowest.

The reason is not capital. CyberMedia Research's 2025 survey of Indian MSMEs found that 43 per cent have reached basic digital maturity through ERP and cloud tools, but only 23 per cent have moved into analytics and AI. Among the digitally hesitant, 84 per cent

said they could not see clear value in the investment. That is not a financing problem; it is an explanation problem. And our own industry has caused most of it, beginning with the word it insists on using.

Vocabulary is the First Barrier

Most of what pays for itself on a batch plant within two years is not machine learning (ML) at all. It is deterministic mathematical optimisation: mixed-integer linear programming (MILP), constraint programming, pinch analysis. Four decades of peer-reviewed literature stand behind these methods, and more importantly, they produce an auditable answer. When a scheduling engine tells you to run Product B before Product A, it can show you the binding constraint that made the difference. That is not a black box. It is a Gantt chart with arithmetic behind it.

ML has a real but separate role: estimating what first-principles models cannot capture — fouling rates, trace-impurity effects, a heat transfer coefficient that has quietly drifted over two monsoons. The productive architecture is hybrid, with conservation laws carrying the structure and learned terms carrying the residual. Vendors who collapse this distinction into a single “AI platform” are why so many projects fail, and why so many promoters have concluded the entire field is vapour.

Once the vocabulary is corrected, four applications stand out as commercially proven. They are worth taking in order of increasing proximity to the running plant, because the engineering caution each demands rises accordingly.

Batch scheduling stays furthest from the reactor. Routing multiple products through shared equipment, around cleaning cycles, campaign sequencing and boiler capacity, is a combinatorial problem manual planning cannot solve well. McKinsey’s assessment of batch process industries places the available prize at 20 to 30 per cent throughput, 2 to 5 per cent yield and 5 to 10 per cent energy cost, over and above gains from conventional operational improvement. The engines delivering this are MILP and constraint-programming solvers, and their output is a plan a planner can overrule.

Batch heat integration moves onto the plant but remains an offline exercise. Pinch analysis was built for steady state; batch plants have time-varying heating and cooling demand, so a hot stream and a cold stream that could exchange energy may simply never coexist. Published industrial work on resins and pigments plants — product categories familiar to every second unit in our clusters — reports 8 to 20 per cent savings on process heating cost from rescheduling and direct recovery alone, before any capital equipment is bought. For a unit burning furnace oil or briquettes, where energy typically ranks third in the cost sheet after raw material and labour, that is straightforward margin recovery.

Dynamic reactor modelling moves the work inside the batch. Mass and energy balances remain the foundation, but they cannot see real-time fouling or feedstock variability — a persistent issue where

Machine Learning has a real but separate role: estimating what first-principles models cannot capture — fouling rates, trace-impurity effects, a heat transfer coefficient that has quietly drifted over two monsoons. The productive architecture is hybrid, with conservation laws carrying the structure and learned terms carrying the residual. Vendors who collapse this distinction into a single “AI platform” are why so many projects fail, and why so many promoters have concluded the entire field is vapour.

intermediates are sourced from multiple traders with inconsistent assay. Hybrid models fuse the thermodynamics with a learned correction, allowing operators to adjust feed rate or coolant flow while the reaction is still running rather than discovering an off-spec result after the batch has completed.

The golden batch sits closest of all to the control room. Streaming temperature, pressure, agitator torque and pH builds a multivariate fingerprint of the runs that went right, and flags live deviation from it. McKinsey reports a specialty chemical plant where real-time operator guidance lifted output by over 30 per cent, raised yield six percentage points and cut energy consumption 26 per cent within a month. These are consultancy figures rather than peer-reviewed results and belong at the optimistic end of any business case.

It is at this fourth application that the objection I hear most often in plant meetings becomes unavoidable — and it is the right objection to raise. Recognising a golden batch on a dashboard and permitting an algorithm to move a steam valve during a live exothermic reaction are entirely different propositions. Any engineer who conflates the two should not be trusted with your plant.

The resolution is staged, and it is standard practice. Stage one runs open loop: the model recommends, the operator decides, and every recommendation

is logged against what the operator actually did. After a few hundred batches you hold an auditable record of whether the model was right — evidence, not assurance. Stage two closes the loop only on slow, forgiving variables, jacket setpoint rather than emergency cooling, inside hard limits the model cannot exceed. The safety instrumented system is never in scope. It remains independent, as IEC 61511 requires, and nothing about digitalisation touches your SIL rating.

Seen this way, the first-mover hesitation deserves more respect than it usually receives. Waiting on thin margins is a rational position, not a failure of nerve. But the staged sequence has a precondition most plants overlook: stage one only begins if the batches are already being logged. Every unrecorded batch is data that cannot be recovered later.

Which makes the real first step smaller, and cheaper, than expected.

Almost every plant I visit falls into one of two categories, and each has a different first move. The first still runs on paper log sheets. Here the starting point is not AI; it is instrumentation and archiving — temperature, pressure, agitator load and utility flow, timestamped and stored. Nothing can be optimised until it is measured, and this stage repays itself on visibility alone. You will find idle time and boiler peaks you did not know existed.

The second already has a DCS and a historian quietly accumulating gigabytes that nobody interrogates. The constraint here is interpretive, not infrastructural. The data exists; what is missing is someone who can read a batch trajectory and say whether the deviation is a control problem, a heat transfer problem or a kinetics problem.

Neither case requires replacing your DCS or launching a capital programme — and the funding question now has an unusually good answer. The Ministry of Power's ADEETIE scheme, implemented by the Bureau of Energy Efficiency, lists chemicals and pharmaceuticals among its fourteen eligible sectors across sixty industrial clusters. For Udyam-registered MSMEs it reimburses investment-grade energy audit and detailed project report costs up to ₹75,000 for micro

and small units and ₹1 lakh for medium and provides 5 per cent interest subvention for micro and small enterprises and 3 per cent for medium on project loans between ₹10 lakh and ₹15 crore.

The eligibility condition is the instructive part: the project must achieve and sustain at least 10 per cent energy savings. That cannot be demonstrated without measurement. The Government has, in effect, made instrumentation the price of admission and is paying for the audit that establishes your baseline. The scheme runs to FY 2027–28.

Choosing a Partner

There is a straightforward test.

- Ask a prospective vendor which constraint is currently binding in your schedule, and why.
- Ask what temperature approach they have assumed, and what happens to their model when the exchanger fouls.
- Ask whether their optimiser is exact or heuristic, and what optimality gap they accept.

A partner rooted in process engineering will answer directly. One selling a generic data platform will change the subject. Such questions are the honest measure of where your own plant stands. If they are difficult to put to a vendor, they are worth putting to your engineering team first — the answers will tell you which of the two starting points you occupy, long before anyone quotes you for software or optimization of existing set-up.

The plants that compete over the next decade will not do so on installed capacity, but on how well they understand their own unit processes and operations. The technology is commercialised, the economics are documented, and for the next two financial years the audit is subsidised. What is required is not courage. It is the discipline to start with one measurement. ■

Sustainable Sourcing is Changing

The Aroma Chemicals Industry

Mahesh Babani

Chairman & Managing Director
Privi Speciality Chemicals Ltd



For years, the aroma chemicals industry competed on a relatively familiar set of parameters: product quality, consistency, price and the ability to deliver at scale. Those fundamentals continue to shape purchasing decisions. A more important question is now influencing supplier behaviour throughout the entire value chain for fragrances and consumer goods: Where does the molecule originate? How sustainably is it sourced? How efficiently is it manufactured? **Mahesh Babani, Chairman & Managing Director, Privi Speciality Chemicals Ltd**, throws more light on this changing scenario.

The question matters because sustainability commitments made by consumer-facing companies are increasingly reaching into the manufacturing processes behind their products. Procurement teams are examining the specification and commercial terms of an ingredient alongside the origin and traceability of its raw materials, production footprint, use of energy and water, waste generation, solvent consumption and the visibility available across the supply chain. Environmental performance is becoming part of the supplier proposition.

Aroma chemicals are particularly exposed to this transition because they sit upstream of some of the world's largest personal care, home care and fine

fragrance businesses. The global market¹ was valued at more than USD 6 billion in 2024 and is expected to grow at around 5.7 per cent CAGR through 2033, driven by continued demand across these categories. This growth creates significant opportunities for manufacturers while increasing the importance of supply chains that can support volume alongside increasingly demanding environmental expectations.

The competitive advantage is consequently moving closer to the manufacturing process itself. Manufacturers are investing in sustainable feedstocks, material recovery, lower resource intensity and process innovation to improve the value derived from every unit of raw material. Sustainability is consequently

becoming a question of industrial capability, with chemistry, engineering and infrastructure playing a central role in determining how efficiently an aroma chemical can be produced.

Procurement Is Moving Upstream

The fragrance industry's approach to sourcing is changing as sustainability expectations travel deeper into the value chain. The IFRA-IOFI findings² are significant in this context, responsible sourcing has become a defined focus area for the sector, while sustainability considerations are increasingly being integrated into research, innovation and governance.

Regulation is reinforcing this direction. The European Union's Corporate Sustainability Due Diligence Directive establishes requirements for covered companies³ to identify and address actual or potential environmental and human-rights impacts associated with their own operations, subsidiaries and, in relevant circumstances, business partners across their chains of activities. The framework also calls for companies to integrate due diligence into policies and risk-management systems.

For suppliers serving international fragrance and consumer goods companies, this creates a stronger case for environmental data, traceability and responsible production practices further upstream. The scrutiny increasingly reaches questions around the origin and utilisation of raw materials, the processes used to manufacture them and the management of associated environmental impacts.

This is especially pertinent when it comes to sourcing renewable and secondary feedstocks. Renewable feedstocks can present alternatives to traditional feedstock based on fossil resources, whereas secondary feedstocks or industrial waste streams can offer another source of feedstocks. The important thing for producers is that it is not only about diversification, but also about creating viable ways of sourcing these feedstocks.

An illustration of how this strategy can be applied within industrial value chains is provided by crude sulphate turpentine, which results as a by-product in the pulp and paper industry. By using specific

The aroma chemicals industry is entering a period in which sustainability considerations are becoming embedded across sourcing, manufacturing and product development. Industry commitments, regulatory developments and changing procurement expectations are converging around greater visibility of the environmental performance of chemical production.

processing techniques, crude sulphate turpentine may be turned into useful aroma chemicals and become yet another feedstock source. The model illustrates how process chemistry can connect two industrial value chains and extract greater value from an existing resource.

Backward integration adds another dimension to sustainable sourcing. Greater control over key raw materials can improve consistency, strengthen supply security and reduce exposure to logistical disruptions. For international customers managing complex sourcing networks, these capabilities can support greater visibility and reliability across the supply chain.

Efficiency Is Becoming Part of the Sustainability Equation

The manufacturing process itself presents another significant opportunity. Aroma chemical production can involve multiple stages of synthesis, extraction, separation and distillation, each carrying implications for energy, water, solvents and waste.

Solvent recovery systems can enable manufacturers to recover and reuse materials within production, reducing fresh solvent consumption and the volume of hazardous waste generated. The recovery of useful materials from production streams can similarly improve resource utilisation while supporting operating efficiency.

Water management is another important area. Recycling systems, process optimisation and advanced effluent treatment can reduce freshwater

requirements and improve the resilience of manufacturing operations. Technologies such as Zero Liquid Discharge can further support water management in facilities where they are technically and economically viable. To achieve waste reduction, one of the important aspect is to reduce it or otherwise make it a saleable product which can be used as a feedstock by other industry. This circular economy helps downstream industries as well.

Energy efficiency carries similar significance. Heat recovery, process automation and utility optimisation can reduce energy consumption across energy-intensive operations such as distillation and extraction. Emission-control systems, meanwhile, are becoming increasingly important for monitoring and managing volatile organic compounds and meeting environmental requirements across global markets.

These measures require sustained investment in process engineering. Catalysis, separation technologies, continuous processing and process optimisation can improve yields and resource efficiency while supporting consistent product quality. The resulting capabilities become particularly valuable when manufacturers are required to scale production while maintaining tighter environmental parameters.

India's Manufacturing Opportunity Is Expanding

India is gaining greater relevance in global aroma chemicals and speciality chemicals as international companies diversify their supply chains. Industry reports from IMARC⁴ and Grand View Research⁵ point to rising global demand for aroma chemicals, creating opportunities for manufacturers with the required production scale, technical capabilities and export infrastructure.

The country's speciality chemicals ecosystem has developed expertise in process engineering, complex synthesis and manufacturing scale-up. Investments in automation, energy efficiency and compliance infrastructure are further strengthening the capabilities available to global customers.

India also stands to benefit from developing competencies in the area of renewable feedstocks

and by-products utilization. Such development of alternative sourcing channels may assist in diversifying the sources of raw materials while ensuring efficient pathways for producing the aroma chemicals.

Responsible Manufacturing Will Shape the Next Phase of Growth

The aroma chemicals industry is entering a period in which sustainability considerations are becoming embedded across sourcing, manufacturing and product development. Industry commitments, regulatory developments and changing procurement expectations are converging around greater visibility of the environmental performance of chemical production.

The manufacturing response requires capabilities across the production system. Renewable and alternative feedstocks can broaden sourcing options; industrial by-product utilisation can improve material efficiency; backward integration can strengthen supply security; and recovery, recycling and process optimisation can reduce resource consumption.

The chance for India would be to develop a supply system based on a combination of having consistent access to raw materials with traceability, resourcefulness, and manufacturing capacity. This could aid local suppliers in meeting the more complex sourcing demands of global fragrance manufacturers.

Sustainable sourcing in aroma chemicals in the future will depend on how well all these factors fit together. The sustainability credentials of the aroma chemicals will now depend on the source of its raw material and how effectively it is converted into the final product. For manufacturers, sustainable sourcing has become a necessity within the supply chain as well as an innovative and competitive edge. ■

References

- 1 <https://www.grandviewresearch.com/industry-analysis/aroma-chemicals-market>
- 2 https://ifragrance.org/latest-updates/ifra-news/ifra-showcases-fragrance-sectors-progress-on-sustainability-in-third-joint-report?utm_source=chatgpt.com
- 3 <https://eur-lex.europa.eu/eli/dir/2024/1760/2025-04-17/eng?utm>
- 4 <https://www.imarcgroup.com/aroma-chemicals-market>
- 5 <https://www.grandviewresearch.com/industry-analysis/flavors-fragrances-market>

The Next Frontier for Indian Coatings:

Reducing Dependence on Imported Raw Materials

Tushar Bhaskar

President
Rubix Data Sciences



The Indian paint aisle today looks unrecognizable compared to what it was five years ago. A wave of aggressive expansion by industrial conglomerates, coupled with high-profile market entries and intense price competition, has fundamentally altered shelf dynamics across every price tier, leaving the customer spoilt for choice. Yet while heightened competition dominates current industry headlines, the defining factor for market leadership over the next decade will move from retail positioning or pricing tactics to the mastery of the complex global supply chains that supply India with Titanium Dioxide (TiO₂), acrylic resins, and epoxy resins, opines **Tushar Bhaskar, President, Rubix Data Sciences**.

India's paint and coatings industry is growing at a brisk pace. Valued at approximately USD 9.6 billion in 2024, it is projected to grow at a CAGR of 9.4 per cent to reach USD 16.5 billion by 2030, supported by urbanization, rising incomes, shrinking repainting cycles, and growing reach of government housing programmes into rural and semi-urban India.

While it looks like everything is going for it, the trade numbers for the Indian paints and coatings industry tell a different part of the story. India still

imports far more paint and coating material than it exports, roughly 3.4 times more by value, and the gap continues to remain wide. In FY2026, exports clocked USD 124 million against imports of USD 426 million. For FY2026 as compared to FY2025, exports increased by 4 per cent whereas imports increased by nearly 8 per cent. Import dependence is deepening, not easing.

One Chemical Compound Tells the Whole Story

TiO₂ is the pigment that gives most paints their whiteness and opacity, and it is a useful lens on the

India's paints and coatings industry has the demand story it needs. Housing, real estate, and a fast-growing automotive sector will keep pulling consumption higher till 2030 and beyond. What remains to be decided is whether that growth builds an industry that controls its own inputs, or one that keeps sending an ever-larger cheque to Beijing and a handful of European and American chemical majors every time it wants to make a can of paint.

problem because the numbers around it are stark. It accounts for 12 per cent to 35 per cent of raw material costs in a typical formulation, and India's imports of it have grown at nearly 5.5 per cent CAGR a year since FY2020, crossing USD 1 billion in FY2025. However, in FY2026, it recorded a nearly 22 per cent decline in imports. That said, the data for the latest quarter falls back in line with the same trend.

Imports between April 2026 and June 2026 (Q1 FY2027) grew 40 per cent compared to the corresponding quarter of the previous year (April–June 2025). The origins of this TiO_2 are a source of concern. China's share of India's TiO_2 imports climbed from 44 per cent in FY2020 to 58 per cent in FY2026 over six years, growing at almost 5 per cent annually. This means three out of every five dollars India spends importing this single pigment now goes to China. Furthermore, China's share in India's imports of TiO_2 in the first quarter of FY2027 (April–June 2026) stood at 71 per cent, reinforcing India's high dependence on China.

Then there are crude-oil-derived inputs such as acrylic and epoxy resins, which make up more than half of total raw material costs. Much of these is also imported. As a result, a large portion of what goes into an Indian can of paint is never manufactured in India.

India exports and imports three types of coatings: solvent-based, water-based, and others, such as distempers, certain specialty coatings, etc. Of these, solvent-based coatings dominate both exports (85 per

cent) and imports (74 per cent) because of demand in industrial and automotive applications. India's solvent-based imports come predominantly from Italy, Germany, the US, China, and South Korea, which are all economies with decades of head start in advanced formulation chemistry. Meanwhile, India's water-based exports flow mostly to developing markets like the UAE, Bhutan, Nepal, Maldives, and Nigeria. Broadly, India exports the formulations it can make easily and imports the ones it cannot yet make well.

A Structural Problem

It would be easy to file this under "supply chain risk" and move on, but that undersells how deep the exposure runs. Raw material dependency now ranks among the industry's most serious challenges, on par with the disruption caused by new entrants and the compliance costs of tightening environmental regulation, and it is not expected to ease over the next three to five years.

For large, listed players, the immediate effect is on margins. A currency swing or a supply disruption from China feeds directly into the cost of goods sold, at a time when the top five manufacturers are already dealing with compressed margins and a rare year of declining revenue. For India's roughly 3,000 small and mid-sized paint manufacturers, who make up a large, fragmented tail of the industry, the exposure is more serious still. Lacking the balance sheets required to hedge input prices or absorb sharp cost increases in TiO_2 and resins, these players face severe operational stress during volatility cycles.

What Self-reliance Actually Looks Like in Practice

Some of the industry's biggest players have already begun treating raw material security as a strategic priority in its own right, not just a cost line to manage. Market leaders are committing capital directly to foundational chemical production. Investments in domestic manufacturing capacity for Vinyl Acetate Ethylene (VAE) emulsion and Vinyl Acetate Monomer (VAM) supported by dedicated raw material storage infrastructure mark a structural shift toward localised value chain control. Strategic long-term joint ventures are similarly securing access to high-tier industrial,

Nanotechnology is a second, less obvious substitution path worth watching. Nano-titanium dioxide and nano-silicon dioxide can deliver the durability, UV resistance, anti-corrosive protection, stain resistance, and self-cleaning properties manufacturers currently source partly through imported inputs, often at lower material intensity.

marine, and automotive coatings technologies without relying on finished product imports. Furthermore, capacity expansions into adjacent categories like adhesives, sealants, and construction chemicals allow producers to internalise more of their core product mix.

Nanotechnology is a second, less obvious substitution path worth watching. Nano-titanium dioxide and nano-silicon dioxide can deliver the durability, UV resistance, anti-corrosive protection, stain resistance, and self-cleaning properties manufacturers currently source partly through imported inputs, often at lower material intensity. Acquisitions in this direction by major paint manufacturers and the arrival of dedicated nano-coatings manufacturing capacity from specialist companies suggest that manufacturers are going down a genuine domestic substitution path.

The sustainability regulations and the bid to comply with them are pulling paint makers in the same direction, almost by accident. Water-based, low-VOC formulations rely far less on the petrochemical derivatives that drive much of the industry's import bill than solvent-based paints do. As manufacturers are expanding their eco-friendly lines with new brand variants and smaller players are experimenting with natural ingredients, they are also reducing import exposure, even though that is not the primary goal. Regulatory compliance and raw material security, in this one instance, happen to point in the same direction.

The Gap That's Left to Close

Raw material self-reliance in the paints and coatings industry is still a long way off. Backward integration at

scale takes years and capital. Most of the industry's smaller manufacturers have neither, and without some form of shared infrastructure, cluster-based manufacturing support, or financing designed for this specific problem, they risk being squeezed out just as the market they operate in grows fastest.

India's paints and coatings industry has the demand story it needs. Housing, real estate, and a fast-growing automotive sector will keep pulling consumption higher till 2030 and beyond. What remains to be decided is whether that growth builds an industry that controls its own inputs, or one that keeps sending an ever-larger cheque to Beijing and a handful of European and American chemical majors every time it wants to make a can of paint. The players moving first on backward integration, nanotech, and water-based chemistry are making their answer clear. Whether the rest of the industry, and particularly the smaller manufacturers that can least afford to sit this out, can follow them is the real story to watch over the next few years. ■

Data Source: Rubix Industry Insights, "Paints and Coatings," December 2025

“Digital manufacturing and automation give us greater visibility and control over our manufacturing processes”

Mr. Anurag Roy

Managing Director
ELANTAS Beck India Limited



ELANTAS Beck India Limited is a global specialty chemicals company with a strong legacy in developing high-performance chemistries for electrical insulation and electronic protection applications. With over seven decades of experience, the company has built deep expertise in formulating and refining chemistries that are designed to perform reliably across diverse industrial applications. **Mr. Anurag Roy, Managing Director of ELANTAS Beck India Limited**, in a free-wheeling interview with *Chemical Engineering World*, shares his perspectives on the evolving requirements from the electrical and electronics sectors.

As electrification and renewable energy projects grow, what technical innovations are shaping your insulation materials for next-generation electrical equipment?

As electrical equipment becomes more compact and powerful, it is also being exposed to higher electrical and thermal stresses. This is changing what insulation materials are expected to do. Beyond electrical protection, they need to support thermal management, durability and long-term reliability, enabling equipment to operate efficiently and consistently under increasingly demanding conditions.

One of the most important areas of innovation is the integration of electrical insulation with thermal management. As power densities increase, efficient heat dissipation becomes critical. We are developing thermally conductive adhesives, thermal interface materials, potting compounds and encapsulants that combine insulation with heat-transfer capabilities. By helping manage heat more effectively, these materials can support higher power densities and reliable performance in applications such as battery energy storage systems and power electronics.

We are also advancing low-emission impregnation resins, high-voltage epoxy systems and specialised

resins for wind-energy applications. For sensitive electronics, conformal coatings, encapsulation materials and UV-cured flood-coating technology provide additional protection against environmental and operating stresses, helping critical power electronics such as inverters and other high-voltage systems maintain consistent performance.

The broader direction is towards multifunctional materials. Insulation systems are increasingly expected not only to provide electrical protection, but also to manage heat, withstand mechanical and environmental stresses, and support more sustainable equipment design. By bringing these functions together, advanced insulation materials can enable equipment to operate at higher performance levels while maintaining the reliability and durability required over its operating life.

How is ELANTAS Beck India helping OEMs improve the efficiency, reliability and lifespan of transformers, motors and generators through advanced insulation technologies?

Transformers, motors and generators are operating under increasingly demanding electrical and thermal conditions, often for long periods with limited tolerance for failure. Our focus is therefore on insulation systems that help manage these stresses and support reliable equipment performance over a longer operating life.

For motors and generators, our wire enamels insulate winding wires, while low-voltage insulation systems provide additional protection and support thermal performance. High-thermal-class polyimide resins enable enamelled-wire winding systems to operate at temperatures of up to 240°C, while mica-tape solutions provide insulation for high-voltage alternators operating under demanding conditions.

In transformer applications, advanced epoxy resin and impregnation technologies help protect windings and electrical components against thermal, electrical and mechanical stresses. For dry-type transformers used in data centres and other high-density applications, we also support the qualification of Electrical Insulation Systems in accordance with IEC 61857, complemented by humidity and thermal-cycling evaluations for demanding operating environments.

We are also developing lower-emission alternatives, including low-VOC epoxy-anhydride resins, VOC-free unsaturated polyester resins and water-based systems.

Together, these technologies are aimed at helping OEMs improve reliability, reduce the risk of premature failure and extend equipment life while responding to growing expectations around efficiency and sustainability.

Sustainability is now influencing material selection across industries. How is your R&D team developing low-emission and environmentally responsible specialty chemicals?

Sustainability is increasingly becoming part of the technical specification itself. Customers are looking for materials that meet demanding performance requirements while also helping them address emissions, regulatory requirements and resource-efficiency objectives.

Our R&D teams are responding to this at multiple levels. At the formulation level, our portfolio includes water-based varnishes, low-VOC and cresol-free wire enamels, monomer-free resins and lead-free electronic protection solutions, providing alternatives to more conventional chemistries.

Beyond formulation, our R&D programmes are exploring alternative feedstocks, resource efficiency, product durability and circularity. The focus is on identifying opportunities to reduce energy, water, waste and material consumption across the value chain without compromising the performance required for the application.

Ultimately, the objective is to integrate sustainability into the chemistry itself rather than treat it as an additional feature. The material still has to perform its primary function reliably, but how it is formulated, manufactured and used is becoming an equally important part of the development process.

The demand for high-performance insulation materials is evolving rapidly. How is ELANTAS Beck India developing sustainable solutions without compromising electrical and thermal performance?

For us, a sustainable insulation solution is one that can continue to perform reliably over the life of the equipment. As electrical systems become more compact and powerful, insulation materials are being exposed to higher electrical and thermal stresses, often over longer operating cycles.

This makes durability a critical performance requirement. The insulation material needs to retain its electrical and

“

Digital manufacturing and automation give us greater visibility and control over our manufacturing processes, which is particularly important for maintaining consistency as production becomes more complex. The implementation of SAP S/4HANA has strengthened process integration and access to operational data, while advanced automation and digitised controls help us manage process parameters more precisely and maintain consistent product quality.

”

thermal properties under these conditions, helping protect the equipment from premature degradation and supporting reliable performance over a longer operating life.

We continue to develop and adapt our chemistries to withstand these evolving operating conditions without compromising performance. By helping insulation systems perform consistently for longer, we can support longer equipment life and reduce the need for premature repair or replacement.

With EVs placing higher demands on electrical insulation, what product innovations has ELANTAS Beck India introduced to meet these technical challenges?

EV applications are placing greater electrical, thermal and mechanical demands on components such as motors, power electronics and onboard chargers. This is driving the need for insulation and protection materials that can withstand higher temperatures, thermal cycling, vibration and demanding electrical conditions.

One recent example involved a leading EV manufacturer in India that was addressing reliability challenges in its onboard chargers. We developed a portfolio-based potting solution tailored to the specific OBC module and designed for integration into the customer's automated manufacturing process.

The solution improved heat dissipation and reduced hotspot temperatures, while enhancing resistance to vibration and thermal cycling. It also supported a more consistent manufacturing process. This reflects how EV applications are shaping the future of material innovation-- the chemistry has to respond to the specific electrical, thermal and mechanical demands of each component.

What role do advanced resin and impregnation technologies play in improving energy efficiency and reducing equipment failures for your customers?

Advanced resin and impregnation technologies play an important role in how electrical equipment manages heat and withstands continuous operating loads. By protecting windings and other electrical components against thermal, electrical and mechanical stresses, they help limit insulation degradation and reduce the risk of premature failure.

The choice of impregnation resin depends on the operating conditions of the equipment, including temperature, electrical load and mechanical stress. When the insulation system is well matched to these requirements, it can maintain its properties more consistently over time, supporting efficient operation and extending equipment life.

For customers, this translates into greater reliability, fewer failures and potentially lower maintenance requirements over the equipment lifecycle.

How are digital manufacturing, process automation and quality control helping ELANTAS Beck India deliver consistent, high-performance products while reducing environmental impact?

Digital manufacturing and automation give us greater visibility and control over our manufacturing processes, which is particularly important for maintaining consistency as production becomes more complex. The implementation of SAP S/4HANA has strengthened process integration and access to operational data, while advanced automation and digitised controls help us manage process parameters more precisely and maintain consistent product quality.

We are carrying this thinking into our upcoming facility as well, where Industry 4.0 practices will support greater operational efficiency and process control.

The same capabilities also contribute to our environmental objectives. Better process optimisation can help reduce resource consumption and waste, while energy-efficient equipment, VFDs and high-efficiency motors support more efficient energy use. Alongside initiatives to reduce VOC emissions and waste, these measures allow us to improve manufacturing performance while progressively reducing the environmental impact of our operations.

Ultimately, technology is most valuable when it delivers measurable improvements in quality, productivity, safety and resource efficiency.

Many industries are looking to lower their carbon footprint. How is ELANTAS Beck India supporting customers through sustainable insulation materials and energy-efficient manufacturing practices?

We see two dimensions to this. The first is supporting customers with insulation materials that can help reduce the environmental impact of their applications while continuing to meet the required electrical and thermal performance standards.

The second is reducing the environmental footprint of our own manufacturing. We are improving energy and resource efficiency through process optimization, energy-efficient equipment and systems, greater use of renewable energy, waste reduction and more efficient water management.

These efforts need to progress together. Developing more sustainable materials is important, but so is how those materials are manufactured. By working on both, we can support customers' sustainability objectives while continuing to improve the environmental performance of our own operations.

What are the biggest technical challenges facing the electrical insulation industry today, and how is ELANTAS Beck India preparing to address them through innovation?

One of the biggest technical challenges today is that electrical insulation materials are being asked to perform across a much wider range of applications and operating conditions. Data centres, renewable energy, energy storage, e-mobility and advanced electronics each place different demands on materials, from continuous operation and higher thermal loads to greater power density and exposure to mechanical and environmental stresses.

As a result, insulation can no longer be considered only in terms of electrical protection. Materials are increasingly expected to combine multiple properties, including thermal management, mechanical strength, environmental resistance, durability and safety, often within more compact and powerful systems.

This is also moving the industry away from a one-size-fits-all approach. We are responding by expanding the range of capabilities across electrical insulation and electronic protection, while adapting and validating materials for specific operating environments. The challenge for innovation is ultimately to drive performance without compromising the reliability expected from the insulation system.

Which emerging technologies, such as advanced insulation systems, smart materials or circular manufacturing do you believe will redefine the industry, and how is ELANTAS Beck India positioning itself for this transformation?

The next phase will be shaped by materials that can do more within the same application while using resources more efficiently. Advanced insulation systems, for example, will increasingly need to combine electrical protection with thermal management, mechanical strength and environmental resistance as equipment becomes more compact and power-dense.

We are also seeing greater attention on lower-emission chemistries, alternative feedstocks and circularity. Over time, developments in smart materials could add another dimension, particularly where materials can respond more effectively to changing thermal or electrical conditions. These are areas that will continue to influence how specialty chemicals are designed and used.

We are preparing for this shift by strengthening our material, R&D and manufacturing capabilities while continuing to evaluate technologies against real application requirements. The opportunity is not simply to introduce new chemistry, but to develop materials that can meet more complex performance requirements while making better use of energy and resources across their lifecycle. ■

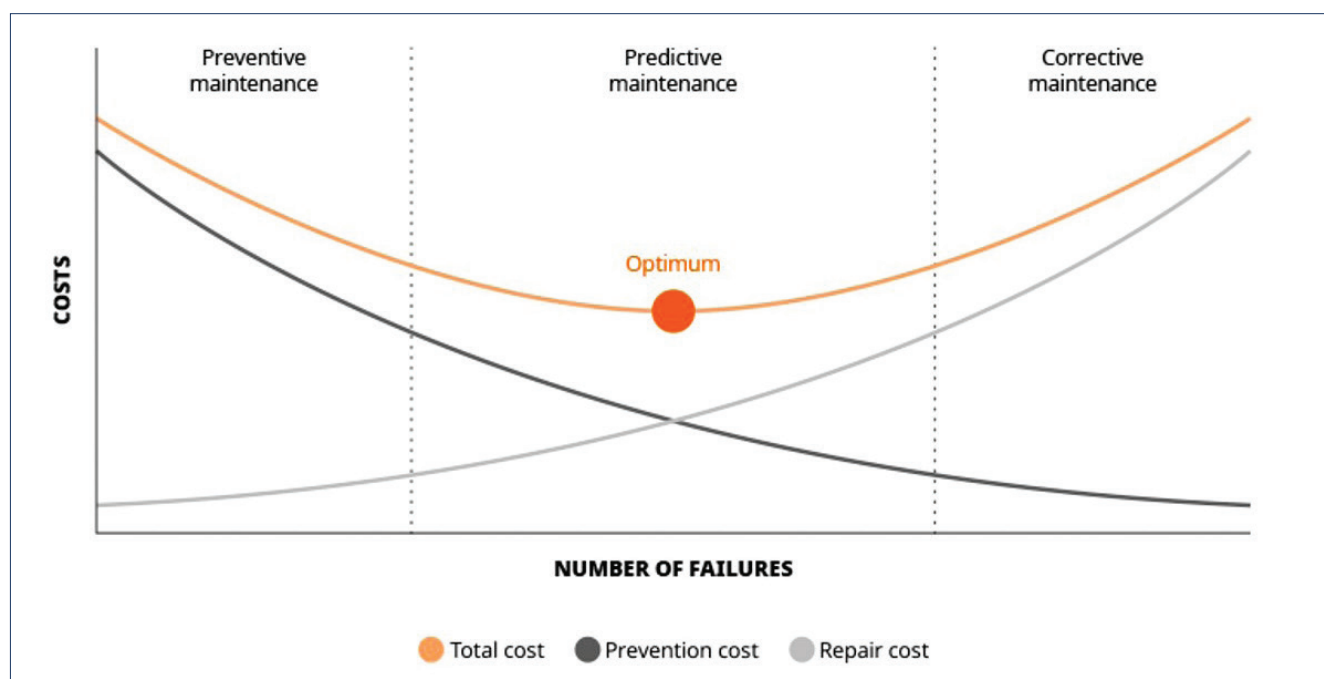
How IoT Remote Condition Monitoring Helps Optimize Efficiency

“You cannot improve what you do not measure” is a familiar phrase in business. The same can be said of the health, performance and efficiency of vacuum pumps and systems. This is where IoT (internet of things) remote condition monitoring can help. These monitoring systems use sensors to measure vibration, temperature, pressure, and other critical parameters. This data is then sent securely to the cloud for interpretation and analysis, where it is used to give early indications of developing issues. **Robert Stevens, Director of Marketing & Programmes, Busch UK Ltd**, explains how IoT remote condition monitoring helps optimize efficiency.

Internet of Things (IoT) remote condition monitoring Internet of Things (IoT) remote condition monitoring systems track the health and performance of vacuum systems and send alerts if an issue is identified. For example, high vibration levels could be detected, potentially indicating bearing wear. The alert would enable timely intervention by replacing the worn bearings, preventing bearing failure, and avoiding costly damage to larger components such as rotors or end plates. Although this is the core benefit of IoT remote condition

monitoring, there are several other ways that it can add value, such as:

- **Detecting wear or oil degradation early** to avoid costly failures and unplanned downtime
- **Supporting the optimization of service schedules** to ensure vacuum pumps are not being serviced more or less than they need to be



Graph illustrating the relationship between maintenance strategy and cost, showing the balance between preventive, predictive, and corrective maintenance to minimize total cost. Image source: Busch Group.

FEATURES

- **Tracking energy usage** in real time to identify inefficiencies
- **Monitoring process stability** by identifying irregularities in system pressure or flow that could impact product quality or process consistency
- Enabling **remote monitoring** of multiple vacuum pumps and systems across locations via a central dashboard
- **Allowing performance benchmarking** between vacuum pumps, systems or sites to uncover best practices and efficiency gaps
- **Transforming raw data into insights**, uncovering opportunities for process improvements and system upgrades.

How IoT Remote Condition Monitoring Adds Value

By continuously measuring key operating parameters, IoT remote condition monitoring provides the data needed to make informed, timely decisions. The following key areas show how these insights translate into efficiency improvements.

Predictive Maintenance vs Traditional Maintenance

Traditional maintenance often relies on fixed service schedules, known as preventive maintenance, or reacting to breakdowns, known as corrective or reactive maintenance. Both approaches can lead

to unnecessary costs, unplanned downtime, and missed early signs of wear. By moving away from rigid maintenance schedules, predictive maintenance enables servicing based on the actual condition of equipment, rather than fixed time intervals.

In predictive maintenance, the optimal service point is calculated by analyzing equipment performance data and identifying trends that indicate when maintenance will be most effective. IoT-based remote condition monitoring is a key enabler of this approach, providing continuous insight into operating parameters such as pressure, temperature, and vibration. This prevents premature servicing whilst avoiding the risk of late intervention, therefore reducing unplanned downtime and maintenance costs.

Energy Efficiency with Real-Time Data

Consumed energy is often the largest expense associated with the total cost-of-ownership of any vacuum pump, yet it is often not monitored. IoT-enabled remote monitoring records power use, operating hours, and vacuum performance data, helping to highlight inefficiencies that would otherwise go unnoticed, such as:

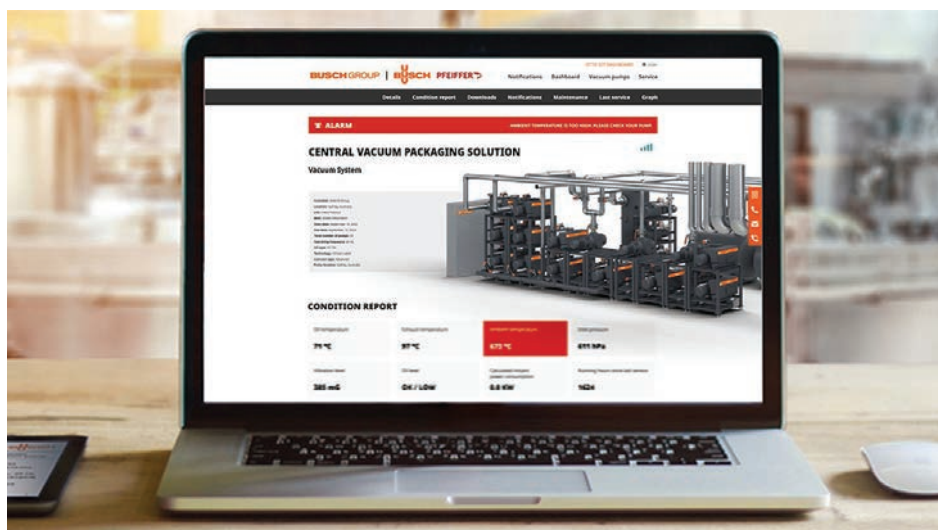
- Oversized pumps consuming excess energy
- Vacuum pumps running unnecessarily during idle periods
- Systems operating outside their optimal pressure range



Vacuum pump equipped with IoT sensors and wireless monitoring device for real-time condition data acquisition. Image source: Busch Group.

- Pumps operating too often or for longer than anticipated due to leaks
- Incorrect duty set points causing pumps to overwork

Armed with these insights, energy use can be intelligently optimized. Operators can refine control strategies, repair leaks, or make upgrades to reduce energy consumption and carbon emissions.



Digital dashboard displaying condition monitoring data and system status for a central vacuum installation. Image source: Busch Group.

guiding decisions on standardization, training, or capital investments.

Summary

In processes where uptime, efficiency, and reliability are paramount, IoT-enabled remote condition monitoring plays a pivotal role in the management of vacuum systems. It empowers operators with real-time insights to make smarter, faster and data-backed decisions. For vacuum pumps

and systems, this is more than convenience — it is a pathway to measurable efficiency gains. IoT-enabled condition monitoring replaces reactive maintenance with proactive optimization, reduces energy waste, and ensures consistent process performance. The result is higher efficiency and reliability, lower operating costs, and improved sustainability. ■

Remote Monitoring and Faster Responses

One of the crucial benefits of IoT-based remote vacuum system monitoring is the ability to oversee operations remotely via a dashboard on a computer or portable device. These centralized dashboards give maintenance teams a real-time overview. Alerts for pressure changes, vibration spikes, or high temperatures enable quick intervention. This also reduces manual inspections and speeds up troubleshooting. With OTTO – Digital Services, the IoT remote condition monitoring system from Busch, service technicians are also notified of any alerts and will contact operators to make a service appointment.

Ensuring Quality and Making Data-Driven Improvements

Changes in vacuum level can affect product quality or throughput. IoT monitoring helps identify vacuum system performance drifts and irregularities early. This enables prompt corrective action, ensuring that the vacuum system continues to support optimal process conditions. This visibility also aids in validating whether the vacuum system is still appropriately sized and configured to suit the demands of the process if they have evolved over time. In addition, by collecting and analyzing data across different systems, sites, or operational periods, companies can benchmark performance and identify best practices. This comparison often reveals inconsistencies or overlooked inefficiencies,

Author



ROBERT STEVENS

Director of Marketing & Programmes
Busch UK Ltd

Project Delivery & Contracts Intelligence: Delayed Site Possession & Unforeseen Ground Conditions Claims

A project may be contractually commenced yet remain practically immobilized. The employer may hand over only fragments of land, restrict access corridors, retain utilities or delay statutory clearances. Conversely, the contractor may enter the site and encounter rock, groundwater, contamination, buried services or obstructions materially different from the tender information. These are related but distinct risks. Delayed possession concerns the promised time and extent of access. Unforeseen physical conditions concern what is encountered after access. Both can affect the critical path, productivity, cost and completion, but entitlement depends on the chosen contract, amendments, governing law and disciplined proof, emphasizes **Rashid Hussain, Executive Director and Project Director, 3C Corporate Consulting Contracting.**

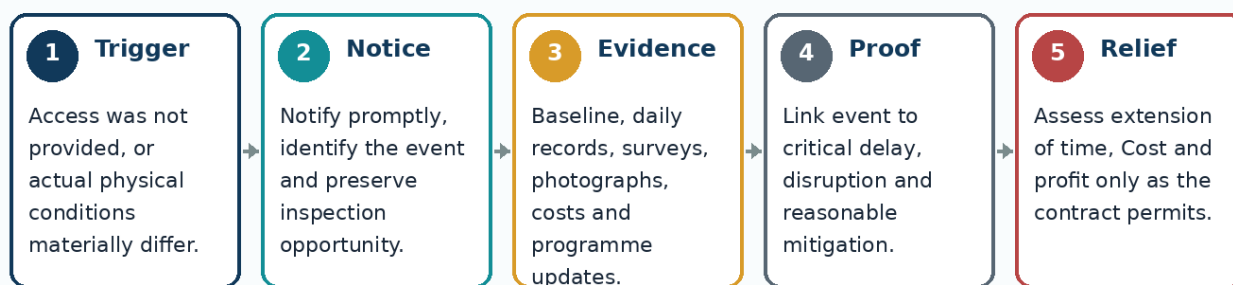


Site possession should mean usable access to the workfronts required by the accepted programme, not merely a ceremonial handover. The contract should identify possession dates, sectional access, rights of way, interfaces, exclusions and consequences of non-availability. The contractor should promptly notify restricted access, demonstrate the affected activities and mitigation, and update the programme without treating every late parcel as automatically critical.

Two risks, one management discipline

For physical conditions, the central questions are what an experienced contractor should reasonably have foreseen at the contractual reference date, what reliable information was available, where risk was allocated, and whether the actual condition caused proven time or cost effects. Fédération Internationale des Ingénieurs Conseils (FIDIC), the International Federation of Consulting Engineers, identifies access and unforeseeable physical conditions as

Entitlement chain: from event to recovery



A claim succeeds when every link is demonstrated. Contract wording and governing law remain decisive.

The five-link entitlement chain

important risk-allocation subjects. Under commonly used FIDIC-based forms, prompt notice, inspection, contemporary records and causal proof are vital. The Silver Book approach may transfer substantially more site risk to the EPC contractor than the Red or Yellow Books, particularly after bespoke amendments.

Three Essential Training Modules for all Aspirant and Applied Case Studies

- **Module 1 | Site Possession Readiness and Handover Protocol**

Learning objective: Convert legal possession into verified, safe and programme-aligned workfront access.

Working template: Record parcel or workfront, contractual access date, actual date, boundary coordinates, benchmarks, permits, utilities,

encumbrances, safety status, photographs, exclusions, responsible parties and signed reservations.

Case study: A refinery expansion contractor receives 70% of the plot, but the heavy-lift route and pipe-rack corridor remain occupied. The joint protocol maps unavailable zones against the baseline programme. Notice is issued, off-site fabrication is resequenced and the crane plan is protected. The record supports focused relief for the proven critical restriction, rather than a broad claim for the entire site.

Training outcome: Participants produce a possession matrix, joint inspection checklist and access-impact notice.

- **Module 2 | Ground Baseline, Investigation and Notice**

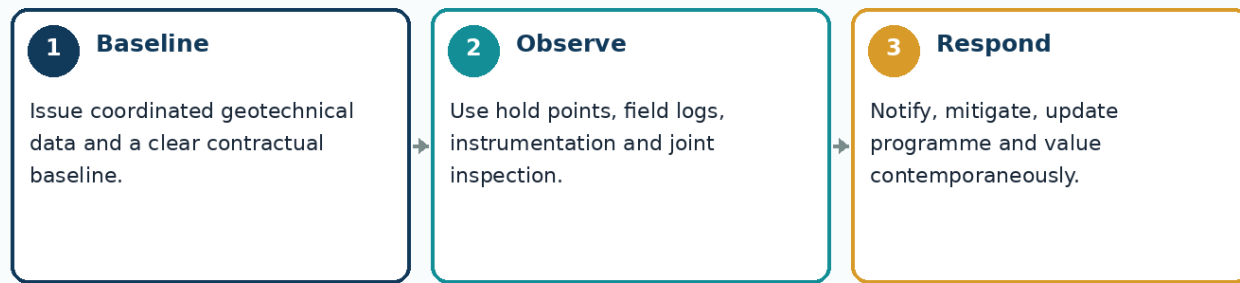
Site possession readiness gate



Do not confuse symbolic handover with usable, safe and continuous access to the planned workfronts.

Four gates before accepting possession

Three-line defence against ground-condition disputes



Better baseline plus better records plus early decisions equals fewer disputes and faster project recovery.

Prevention is cheaper than forensic reconstruction.

Learning objective: Compare tender assumptions with observed conditions and preserve the employer's opportunity to inspect.

Working template: Capture borehole or trial-pit reference, baseline parameter, actual observation, location and depth, test result, photograph, drawing, work affected, immediate safety action, foreseeability explanation and notice chronology.

Case study: During metro foundation excavation, continuous hard rock appears between sparse boreholes where the interpreted profile indicated weathered material. Work stops only in the affected zone, the engineer attends a joint inspection and additional tests establish extent. The contractor separates factual observation from contractual conclusion and proposes alternative excavation methods while reserving time and cost rights.

Training outcome: Participants prepare a differing-condition comparison sheet and compliant early notice.

• Module 3 | Cause, Programme Impact and Quantum

Learning objective: Translate the event into demonstrable critical delay, disruption and reasonable cost.

Working template: Link event date, affected activity, baseline and update IDs, logic path, float, mitigation, resource records, measured quantities, invoices, plant and labour hours, prolongation period, concurrency review and requested relief.

Case study: An industrial water project encounters an unrecorded live utility crossing the planned trench. Daily logs and survey coordinates establish the obstruction; time-slice analysis shows a 12-day critical effect after mitigation, while five days overlap with contractor-caused procurement delay. The submission transparently addresses concurrency and values only supported additional resources and prolongation.

Training outcome: Participants build a cause-effect-cost matrix and executive claim narrative.

Complete Site Takeover: Advantages and Challenges

Complete possession improves logistics, survey control, mobilization efficiency, safety segregation, productivity, interface planning and programme certainty. It reduces repeated remobilization and gives the contractor clearer custody and security responsibilities. Yet full takeover may be unrealistic on brownfield, urban, live-plant, railway, port and linear infrastructure projects. Land acquisition, residents, utilities, permits, operations and third-party rights may require sectional access. Early takeover can also transfer security, environmental and maintenance obligations before design or approvals are mature.

The better objective is not possession at any cost. It is possession that is complete where feasible, or contractually sequenced, measurable and aligned with the programme where sectional handover is unavoidable.

Recommended Project Controls

- Define parcels, access dates, permits, temporary rights, utilities and acceptance criteria in the contract and program.
- Use adequate geotechnical investigation and, for suitable projects, a clear geotechnical baseline report that separates data from contractual assumptions.
- Conduct joint pre-possession surveys covering boundaries, condition, services, contamination, interfaces, photographs and unresolved reservations.
- Operate early-warning and notice registers with contractual time limits, owners and escalation triggers.
- Maintain native programme files, daily records, quantities, labour and plant allocation, photographs, instructions and mitigation decisions.
- Form a rapid-response team comprising project, contracts, planning, geotechnical, survey, design, HSE and commercial specialists.
- Use dispute-avoidance meetings or boards early, before positions harden and evidence becomes expensive to reconstruct.

Conclusion and Lessons Learned

Three commercial options usually exist: grant justified time and cost under the contract; agree a prospective variation or acceleration plan with defined assumptions; or refer the disputed issue promptly to the contractual dispute-avoidance mechanism while work continues. The best option is the one that preserves safety, progress and contemporaneous evidence while preventing an unresolved risk from becoming a final-account crisis.

The enduring lessons are simple. Do not accept ambiguous possession. Do not rely on a tender soil report without understanding its contractual status. Notify early and factually. Preserve joint inspection. Separate event, entitlement, causation

and valuation. Update the programme honestly, address concurrency and document mitigation. Most importantly, manage the site as one integrated legal, engineering, surveying, architectural, planning, safety and commercial system. A well-administered project may still encounter difficult ground, but it need not lose control of the outcome. ■

References

- *FIDIC, Why Use FIDIC Contracts, risk allocation topics including site access and unforeseeable physical conditions:* <https://fidic.org/node/7089>
- *World Bank, Standard Bidding Documents for Procurement of Works, conditions addressing possession and physical conditions:* <https://documents.worldbank.org/curated/en/458841468739545677/pdf/multi-page.pdf>
- *HKA, Unforeseeable Ground Conditions in Construction Claims, 14 August 2023:* <https://www.hka.com/article/unforeseeable-ground-conditions-in-construction-claims/>

Author



RASHID HUSSAIN

Executive Director and Project Director
3C Corporate Consulting Contracting

ABOUT THE AUTHOR

Rashid Hussain has more than 35 years of international experience across oil and gas, refinery, petrochemical, power, EPC, EPCM, PMC, infrastructure, contracts, claims, project delivery and AI-enabled training and automation.

Large-Size PTFE Gaskets for Critical Equipment in Chemical Processing

Selecting a gasket that can maintain tightness, simplify installation, and support long-term reliability in demanding plant conditions requires a clear understanding of how available manufacturing technologies and material choices address the mechanical and operational challenges associated with large-diameter flanged joints in chemical service, emphasize **Julia Köder, Oliver Zach, and Angelica Pajkovic, from TEADIT®.**

Industrial chemical plants frequently require flat gaskets in dimensions that exceed standard sheet sizes. These large-diameter connections, typically above 1500 mm or 60" in diameter, are often found in reactors, storage vessels, columns, electrolyzers, and other critical equipment where sealing reliability directly impacts safety, environmental compliance, and uptime.

When addressing large gasket applications, plant personnel often ask what the most reliable manufacturing approach is for large PTFE gaskets in chemical applications, and how it compares to alternative joining methods in terms of sealing performance and practicality.

Why Large-Diameter Gaskets are Considered Critical Applications

Large-diameter flange connections present unique mechanical and sealing challenges compared with smaller bolted joints. As flange diameter increases, the total separating force generated by internal pressure rises significantly, even at relatively low pressures. Maintaining an adequate, uniform bolt load across the entire flange is essential to preserve gasket compression and prevent leakage.

These joints are also frequently exposed to thermal cycling and differential thermal expansion between connected components. Equipment constructed from different materials can experience relative movement during temperature changes, introducing transverse stresses that may reduce local gasket stress and compromise sealing integrity.

In addition, manufacturing tolerances and surface

irregularities become more pronounced in large equipment. Flange flatness deviations and dimensional variations require gasket materials with sufficient compressibility and adaptability to conform to the sealing surfaces and maintain tightness.

For these reasons, large-diameter applications require gasket materials that combine chemical resistance with controlled compressibility and compensation capability. PTFE-based gasket materials are well-suited to these conditions, as they can adapt to flange imperfections while maintaining resistance to aggressive chemical environments. However, the method used to manufacture and assemble large gaskets has a decisive influence on long-term sealing reliability.

The minimum recommended gasket thickness for large-diameter applications is typically 3 mm or 1/8", depending on required compensation capacity and permissible gasket stress. Operating pressure, temperature, and media compatibility must always be evaluated, and the material's maximum allowable gasket stress must be verified for the specific application.

Restructured PTFE Sheet Gaskets: Welded Construction

For restructured PTFE (rPTFE) sheet materials, welding is the recommended manufacturing method for large diameters. However, to ensure consistent repeatability and uniform weld thickness, the correct machining technique is of paramount importance. At TEADIT® a proprietary technology is utilized to halve the gasket at its midpoint and join it together with a puzzle-like connection.

The fused connection creates a homogeneous joint that, when executed precisely, achieves leakage performance comparable to that of a gasket made from a single piece. Testing according to EN13555 demonstrates that leakage rates of welded gaskets are on the same level as one-piece constructions.

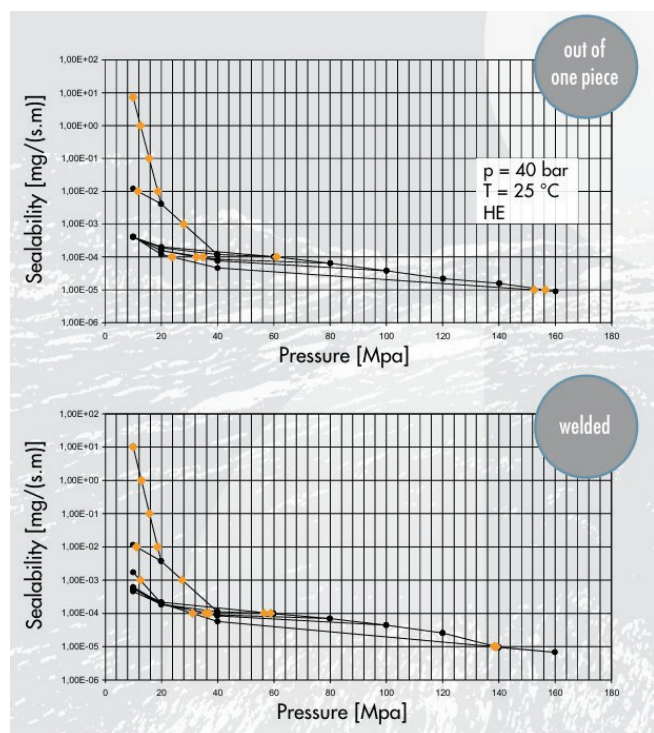


Figure 1: Comparison sealability test for 2mm thick Tealon® TF1580 according to EN13555.

In contrast, mechanically joined segment designs, such as dovetail or buttonhole connections, although widely used, cannot match the technical quality of a properly welded joint. While they may function acceptably when executed correctly, they introduce geometrical discontinuities that can affect sealing integrity under stress and thermal movement.

How fusing solves the issue:

- Maintains consistent sealing performance across the entire circumference
- Avoids stress concentrations at mechanical joints
- Preserves tightness class equivalent to one-piece construction gaskets
- Allows exact dimensional control by the manufacturer

An additional operational benefit is logistics. Welded gaskets can be delivered rolled in compact packaging, reducing transport space and simplifying handling at

the site. Installation can be performed without delay, provided the weld is continuous and free of gaps or missing material.

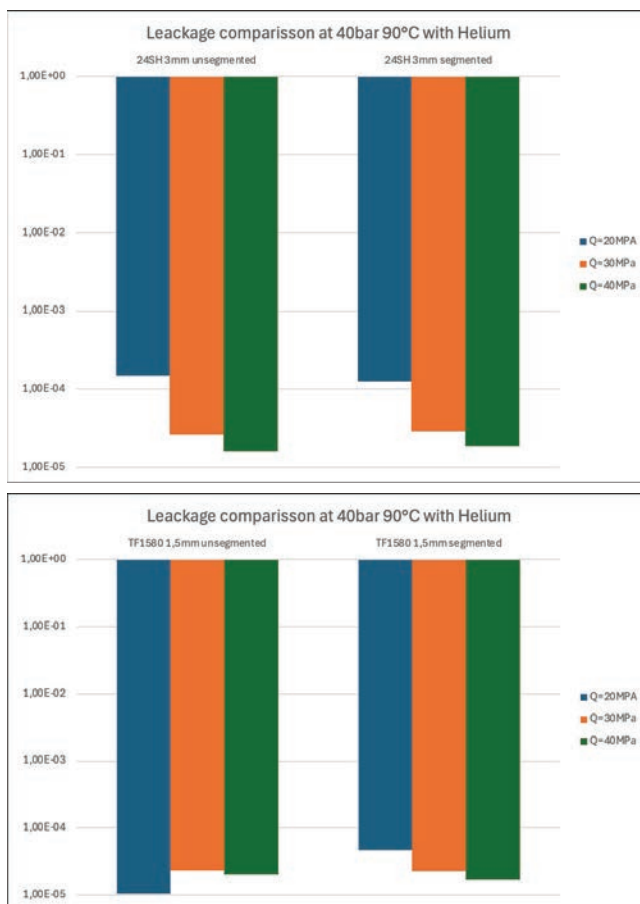


Figure 2 and 3: Leakage comparison test.

Multidirectional Expanded PTFE Sheet Gaskets: Cut and Bonded Segments

Expanded PTFE (ePTFE) sheet materials behave differently from restructured PTFE (rPTFE) during welding, as the weld zone can harden disproportionately, potentially compromising performance. For this reason, TEADIT® has not adopted welding for ePTFE materials. In practice, achieving consistently reliable joints in ePTFE has proven extremely difficult, and a robust welding method that ensures dependable connections has not been identified. While some manufacturers employ welded ePTFE solutions, many manufacturers choose not to use this approach due to the challenges in maintaining consistent material integrity and joint quality.

FEATURES

For large-diameter gaskets manufactured from ePTFE sheets, the recommended method is TEADIT®'s patent-pending technique. In this process, the gasket is partially cut into interlocking segments that form a precision 'puzzle-type' or finger joint geometry. The mating edges are shaped so that the two sections mechanically engage, increasing the effective bonding area and preventing relative movement during handling and installation. The joint is then secured using a compatible adhesive, creating a continuous gasket while maintaining dimensional stability. This approach is conceptually similar to the method used for rPTFE; however, unlike rPTFE, the ePTFE segments are bonded rather than fused.

Testing shows that leakage rates of properly overlapped bonded segments are comparable to those of one-piece gaskets. By contrast, double dovetail designs demonstrate significantly higher leakage rates.

How ePTFE solves the issue:

- The interlocking half-cut "puzzle" joint, formed with skived overlapping sections, maintains uniform gasket thickness across the connection, ensuring that gasket stress is distributed evenly around the entire circumference.
- High compressibility of the material makes the method forgiving during installation
- Minimizes the formation of leakage paths caused by creep under gasket stress

Segments may be supplied pre-cut (not recommended) or as fully bonded assemblies.

This design significantly simplifies transportation by allowing the gasket to be handled in sections; however, on-site installation becomes more complex due to the need to accurately align and assemble the joints. To improve transport stability while facilitating

installation, duplicate segments with staggered (offset) joint locations can be supplied, preventing the connection points from aligning in the same circumferential position and thereby enhancing structural integrity during handling and assembly

Multidirectional ePTFE Sealing Tape: Single-Joint Construction

For the fastest and simplest production of large-diameter gaskets, multidirectional ePTFE sealing tape offers a distinct advantage.

Unlike segmented sheet constructions, tape-based gaskets require only a single joint for flanges up to 30m in diameter. This significantly reduces the number of potential leak paths. The mechanical characteristics of the tape are comparable to those of multidirectional ePTFE sheet materials, and its leakage performance is comparable to that of one-piece sheet gaskets.

How ePTFE Tapes solve the issue:

- Rapid on-site fabrication
- Self-adhesive backing simplifies positioning and installation over head
- Only one overlapping joint
- Height in the joint area adjusted to approximately 120% of tape thickness to ensure proper compression

Skiving is performed with a sharp knife, with approximately 18 mm overlap for 3 mm thickness. Used tapes can be removed cleanly without residue, facilitating maintenance turnarounds.

An additional advantage is the flexibility it provides in repair situations. Extra layers can be applied locally as shims to compensate for flange damage or surface irregularities. It is also highly beneficial for connections involving mixers or other equipment where installing a conventional gasket is not feasible without demounting the mixer or other equipment.

For maintenance teams working under time constraints, such as during shutdowns or emergency repairs, ePTFE tape provides:



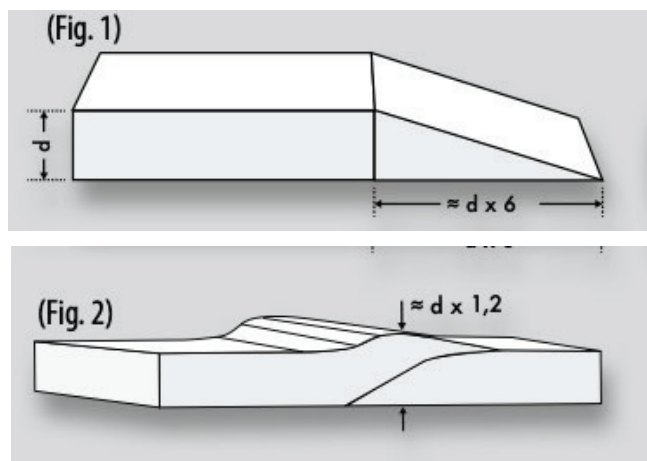


Figure 4: Segment and connection recommendation.

- Reduced fabrication time
- Simplified installation
- High-quality sealing performance
- Minimal tooling requirements

It is particularly advantageous when handling large sheets or precise segment alignment would be time-consuming.

Selecting the Appropriate Approach for Your Facility

When evaluating large-diameter PTFE gasket solutions in a chemical processing plant, the decision should consider:

- Operating pressure and temperature
- Chemical compatibility
- Required tightness class
- Permissible gasket stress
- Installation resources and time constraints
- Flange condition and dimensional tolerances

In summary:

- Welded restructured PTFE sheets provide high technical joint integrity for critical services. The patent-pending technology also applies to PTFE segmentation.
- TEADIT® patent-pending technique to bond the expanded PTFE sheet segments offers reliable sealing.
- Expanded PTFE sealing tape delivers the most practical and efficient on-site solution with minimal joints.

Each of the described methods addresses the core challenge of large-diameter sealing: maintaining uniform stress distribution and tightness despite thermal movement, transverse forces, and manufacturing tolerances.

For chemical plant personnel responsible for equipment reliability, understanding the specific benefits of each manufacturing approach allows informed selection aligned with plant operating conditions, maintenance strategy, and safety objectives. ■

References

https://www.teadit.com/wp-content/uploads/2021/09/PTFE_Katalog_102019_E_WEB_431-431W.pdf

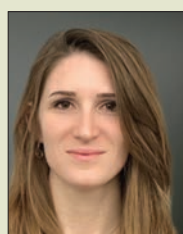
ABOUT THE AUTHORS



Julia Köder is an Application Engineer at TEADIT International Produktions GmbH. Her responsibilities include providing technical consultation to clients, conducting training sessions and offering support for technical inquiries. Before taking on this role in July 2022, Julia worked as a project engineer in the automotive section, a position she held from October 2019 after completing her master's degree in Mechanical Engineering.



Oliver Zach is the Director of International Sales at TEADIT International Produktions GmbH. A mechanical engineer and sealing industry expert, he began his career at SGL Group in 1995, supporting chemical industry applications during the transition from asbestos-based materials. He later spent 10 years in sales and management roles across Asia before joining the TEADIT Group in 2011.



Angelica Pajkovic is a Client Specialist at Teadit, with a particular focus on technical content development. Hailing from Toronto, Canada, she has over eight years of experience in the industrial sector. In her previous role as Editor-in-Chief at an industrial B2B Publishing company, she gained a rounded understanding of the challenges, interests, and business relationships in the industrial sector. Contact: angelicap@teadit.com

Suraj Limited: Dedicated towards Technical Excellence & Quality Products



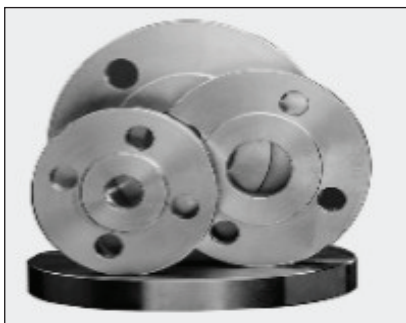
Suraj Limited, is an ISO-9001:2015, 14001:2015, OHS AS 45001:2018 certified company, PED approved and Government Recognized Export House and one of the world's leading producers and exporters of stainless steel, alloy steel, carbon steel seamless pipes, tubes, fittings and flanges. With over three decades of expertise, we serve critical industries including Oil & Gas, Petrochemicals, Power, Nuclear, Defense, Fertilizers, and Water Treatment across 60+ countries.

Suraj Limited operates from two state-of-the-art plants in Gujarat, India:

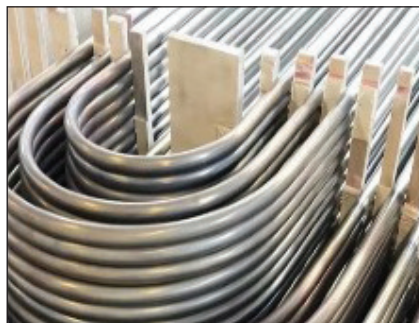
- **Thol Plant:** Dedicated to seamless pipes, tubes, and fittings with hot extrusion, cold pilgering, and finishing facilities.
- **Chandarda Plant:** Specialized in carbon and alloy steel forged fittings and flanges with advanced forging, heat treatment, and machining lines.

Our total installed capacity exceeds 24,000 MT per annum.

Manufacturing Infrastructure



Stainless Steel Flanges



Stainless Steel Seamless Heat Exchanger U-Tubes



Stainless Steel Forged Rings



Stainless Steel Seamless Butt Weld Fittings



Stainless Steel Seamless Heat Exchanger Tubes



Seamless Hot Finish Mother Pipe

Quality Assurance

We have our own in-house testing laboratory with modern testing equipment to carry out all mandatory as well as optional tests on the products. Complex tests for which we do not have in-house facilities will be conducted at an external third party approved test house. Products will also be supplied under third party inspection where customer demands.

Certifications & Approvals

- Our manufacturing is PED 2014/68/EU approved, and we hold product approvals from IBR, EIL, ONGC, BHEL, NTPC, and major global EPCs.

- We are also approved by international inspection agencies like Bureau Veritas, DNV, TUV, Lloyd's, and SGS.

Commitment

At Suraj Limited, we believe every customer has unique needs. Our

Key Highlights

- Gujarat-based Suraj Limited is one of the world's leading producers and exporters of stainless steel, alloy steel, carbon steel seamless pipes, tubes, fittings and flanges.
- SO-9001:2015, 14001:2015, OHS AS 45001:2018 certified company.
- PED approved and Government Recognized Export House.
- Operates from two state-of-the-art plants in Gujarat.
- Company's total installed capacity exceeds 24,000 MT per annum.

technical and commercial teams work closely with clients to offer customized solutions, reliable delivery, and dedicated after-sales support.



Stainless Steel Seamless Pipes

- **Heat Exchanger 'U' Tubes:**
12.70 mm to 50.80 mm OD
- **Hydraulic & Fuel Injection Tube:**
6.00 mm to 114.00 mm OD

Grades: AISI-304, 304L, 304H, 304N, 304LN, 309, 310, 310S, 316, 316L, 316H, 316Ti, 316N, 317, 317L, 321, 347, 405, 410

Duplex: UNS-S32750, S32760, S31803, S31500, S32205, S32304 and Its Equivalents in DIN, NFA, JIS, etc.

Length: Pipes up to 11.800 meter long and tubes up to 20 meter long ■

For detailed product information, please visit :
www.surajgroup.com

Product Range

- **Stainless Steel Seamless Pipes:**
1/8 NPS to 6 NPS
- **Stainless Steel Seamless Butt-weld Pipe**
Fittings: ½ NPS to 12 NPS
- **Stainless Steel Seamless Stubends (Type A):**
½ NPS to 12 NPS
- **Stainless Steel Flanges:** ½ NPS to 40 NPS
- **Stainless Steel Forged Rings:**
Max. 1200 mm OD
- **Heat Exchanger Tubes:**
6.00 mm to 101.60 mm OD

From Hydrogen to Data Centers: The Evolving Role of Expanded PTFE Sealing Technology



Author

Giovanni Pasqua

International Business Development Manager
KWO Dichtungstechnik GmbH, Germany

*Industrial transformation is creating a new generation of sealing challenges. Hydrogen infrastructure, carbon capture, utilization and storage (CCUS), high-performance data centers and other emerging technologies are placing increasingly demanding requirements on fluid-handling systems. Although these applications are very different, they share a common requirement: the integrity of every connection is critical. A relatively small sealing component can influence system efficiency, emissions, equipment reliability and process safety, emphasizes **Giovanni Pasqua, International Business Development Manager, KWO Dichtungstechnik GmbH.***

Expanded polytetrafluoroethylene (ePTFE) is already well established in chemical processing and other industries handling aggressive media. Today, however, its combination of broad chemical resistance, high conformability and adaptable mechanical characteristics is creating opportunities in applications that were hardly considered when the technology was originally developed.

The challenge is no longer simply to identify a material that is chemically compatible with the process fluid. Modern sealing engineering must determine whether the gasket can establish and maintain the required tightness throughout the operating life of the connection.

Why Expanded PTFE?

PTFE is known for its exceptional chemical resistance, broad temperature capability and resistance to ageing. Through a controlled expansion process, PTFE develops a characteristic microscopic structure consisting of nodes interconnected by fibrils.

This expanded structure gives the material a high degree of conformability, allowing it to compensate for surface irregularities and establish a seal at comparatively low gasket stresses. This can be particularly valuable on large flanges, irregular sealing surfaces and equipment where excessive bolt loading must be avoided.

These characteristics are increasingly relevant as sealing technology moves into new applications.

Hydrogen: Tightness Becomes Increasingly Important

Hydrogen is expected to play a role in the decarbonization of sectors where direct electrification can be difficult, including parts of heavy industry, chemical production and long-duration energy storage.

From a sealing perspective, hydrogen presents particular challenges. Its small molecular size places strong demands on the tightness of connections. Systems may also operate under significant pressure and experience pressure and temperature cycles. This means that selecting a gasket based only on the chemical compatibility of PTFE with hydrogen would be insufficient.

The ability of the gasket to conform to flange surfaces, achieve the required tightness and maintain sufficient gasket stress during operation becomes equally important. Bolt load, flange stiffness, surface finish, temperature and pressure therefore need to be evaluated together.

Expanded PTFE can be considered for various hydrogen-related sealing duties where its chemical resistance and conformability are advantageous. However, there is no universal “hydrogen gasket.” Suitability must be established for the actual operating conditions and connection design.

This illustrates a broader development in sealing engineering: as allowable emissions and leakage expectations become more demanding, material compatibility must increasingly be combined with quantified tightness performance.

CCUS: More Than Simply Sealing CO₂

Carbon capture, utilization and storage (CCUS) is another rapidly developing field where sealing technology will play an important supporting role. A CCUS chain can include CO₂ capture, treatment, compression, transportation, injection and storage. The conditions encountered at different stages can vary considerably.

Furthermore, captured CO₂ streams are not necessarily pure. Depending on the source and process, they can contain moisture and various impurities. Pressure, temperature and physical state may also change throughout the system.

For gasket selection, the question therefore cannot simply be whether a material is “compatible with CO₂.”

The actual process composition and operating conditions must be considered, together with the mechanical characteristics of the connection.

Here, the broad chemical resistance of PTFE provides an interesting foundation. Expanded PTFE adds the ability to adapt to flange surfaces and can offer advantages where chemical resistance and reliable sealing need to be combined.

At the same time, CCUS demonstrates why application-specific engineering is essential. A gasket used in a capture plant, for example, may experience conditions very different from one installed in a CO₂ transport or compression system. The entire sealing system must therefore be evaluated rather than treating CCUS as a single operating condition.

Data Center Cooling: A Very Different Sealing Challenge

Perhaps one of the less obvious emerging applications for advanced sealing materials can be found in data centers.

The rapid growth of artificial intelligence and high-performance computing is dramatically increasing computing density and associated heat generation. As thermal loads rise, liquid-based cooling architectures are becoming increasingly important alongside traditional air cooling.

This creates a new fluid-handling environment involving cooling distribution units, pumps, piping, manifolds, heat exchangers and other equipment.

The process conditions may appear less severe than those encountered in a chemical plant, but the consequences of leakage can be significant. Cooling systems operate in close proximity to extremely valuable electronic equipment, making long-term connection reliability particularly important.

Different cooling architectures may also use different fluid chemistries, and systems can experience temperature changes and repeated operating cycles.

For sealing engineers, the application therefore requires a different balance of properties: chemical compatibility with the coolant, high conformability, reliable sealing at the available bolt load and stability over repeated thermal cycles.

Expanded PTFE sealing solutions can potentially address a range of these requirements, particularly in auxiliary piping, cooling distribution equipment and heat exchangers. As always, the specific material and gasket design must be selected according to the actual system.

Beyond Today's Traditional Applications

Hydrogen, CCUS and data-center cooling are only three examples of how the environment for industrial sealing is changing.

Battery production, semiconductor manufacturing, electrolyzers, fuel cells, alternative fuels and high-purity processing are creating additional applications where chemical resistance, cleanliness, tightness and controlled mechanical behaviour can be important.

These industries also demonstrate an interesting evolution in gasket requirements. Historically, gasket selection was often strongly associated with pressure, temperature and chemical compatibility. Those parameters remain fundamental, but new applications increasingly add requirements related to emissions, purity, reliability, energy efficiency and lifecycle performance.

The result is a move from simple material selection toward engineered sealing solutions.

From Material Compatibility to Sealing Engineering

Modern gasket characterization reflects this development. Test methodologies such as EN 13555 allow important gasket properties, including minimum seating stress, tightness behaviour, maximum allowable gasket stress and creep/relaxation, to be quantified. Such data can then support calculations

of the complete bolted connection, for example according to EN 1591-1.

Sealing the Technologies of the Future

Expanded PTFE has evolved from a material primarily associated with chemically aggressive industrial applications into a versatile sealing technology capable of addressing a much broader range of engineering challenges.

Its future role will not depend simply on the inherent properties of PTFE. It will depend on how material structure, gasket design, testing and bolted-joint engineering are combined to meet the requirements of each application.

Hydrogen requires increasingly controlled leakage performance. CCUS combines complex process streams with demanding operating conditions. Data-center liquid cooling places exceptional value on reliability and leak prevention. Other emerging industries will introduce their own challenges.

What connects them is the need to look beyond basic material compatibility.

As industrial technology evolves, the question for sealing engineers is therefore changing from "Can this material resist the medium?" to **"Can this sealing system maintain the required performance throughout the complete operating cycle?"**

That shift from material selection to sealing engineering is likely to define the next generation of expanded PTFE applications. ■

India Contact

KWO has partnered with Champion Seals India to support customers and applications in the Indian market.

For further details, please contact:

Email: sales@championseals.in

Mobile: +91 98201 71162

High Efficiency Mist Cooling System & Induced Draft Mist Cooling Tower: A Superior Alternative to Conventional Cooling Towers



Makarand A. Chitale

Whole Time Director

Mist Ressonance Engineering Pvt. Ltd.
Pune

*Water cooling has played an important role in all types of process industries and power plants since its inception. Efficiency of a process industry largely depends on availability of designed cold-water temperature through-out the year. However especially in summer and monsoon. During these months when humidity is high, cooling tower fails to achieve desired cold-water temperature which results in lower efficiency of plant. Now it is time to find new solution to get desired cold-water temperature throughout year. Through this article, **Makarand A. Chitale, Whole Time Director, Mist Ressonance Engineering Pvt. Ltd.**, reviews basic types of cooling systems utilized in process/chemical plants and other industries. He also explains why new mist creation system is superior than conventional cooling towers.*

The ultimate Mist Creation Technology is the best alternative to conventional cooling towers. This advanced mist creation system can achieve an approach of 1 to 2°C to Wet Bulb Temperature (WBT) as against 5 to 6°C approach for conventional cooling tower. Hence guaranteed cold water temperature of around 30°C could be obtained throughout the year in our tropical climate. Also, the spraying head is equivalent to the height of cooling towers thus requiring same pumping power. As mist creation system does not require fans for cooling it saves huge

amount of power. Also, as there are no moving parts involved in Mist Creation System the maintenance cost is negligible and system runs trouble-free.

Introduction

In process/chemical plants, product vapour generated in the process is condensed in a heat exchanger and is recovered back. The condensation of steam/vapour requires a cooling medium. In early days this was achieved by using water from a river, a basin or seawater. The cold water is pumped through a heat

exchanger and the warm water is discharged back to the water source. This is called once through cooling system. A once through system is an open loop system. The necessity to reduce the huge amount of water gave birth to the idea of closed loop system. Thus, the wet cooling system came into effect.

In a wet cooling system, water is circulated to condense the steam in the same type of heat exchanger that is used in once through cooling. The warm water, instead of being returned to the water source, is cooled in a cooling tower using air as the cooling medium. Only the water carried away due to evaporation, drift and blow-down needs to be replenished by make-up water. Thus, requirement of water quantity is vastly reduced.

Wet Cooling Systems

1. Wet Cooling Tower System

We will first consider the wet cooling tower system. The wet cooling tower system is based on the principle of evaporation. The heated water coming out of the surface condenser is cooled as it flows through a cooling tower, where air is forced through the tower by either mechanical or natural draft. Now a days, mostly, all wet cooling towers are mechanical draft cooling towers, where the air flow is accomplished by the fans.

The principle cooling device used in an induced draft cooling tower are fans which run at the top of Cooling Tower (CT). Air enters through side louvers and escapes from the top. Water enters at the top and trickles down while getting cooled by air draft.

A correctly designed induced draft CT can give an approach of 4 to 6°C to WBT with a ΔT of 10°C. Even a very highly efficient CT can not give an approach less than 4°C to WBT. Moreover, if ambient temperature or humidity levels rise, efficiency of CT reduces.

2. Mist Cooling System

Mist Resonance Engineering Pvt. Ltd. (MREPL) has come out with a solution by designing Mist Cooling System (MCS), which is a high efficiency system, which ensures an approach of 1°C to prevailing WBT with a ΔT of 12 to 15°C even in adverse climatic conditions.

In tropical conditions, worst WBT even at coastal applications is maximum 30.5°C. Hence MCS will

always maintain cold water of around $31^{\circ}\text{C} \pm 1^{\circ}\text{C}$ throughout the year. No other cooling system can operate with such efficiency and it makes cooling tower/spray pond systems obsolete.

Various Models of Mist Cooling System / Tower to Suit Site Conditions

Model-I: Open Type Mist Cooling System: Here, MCS ensures an approach of 1°C to design WBT with a ΔT of 12 to 15°C. Water loss due to drift is 0.1 to 0.25 % depending on wind speed.



Model-I: Open Type Mist Cooling System.

Model-II: Louver Type Mist Cooling System: Model-II Louver type mist cooling system is a perfect option for conventional induced draft cooling tower. Here MCS pond is closed from sides, up to a height of 8 to 10 m by louver type cover sheeting. This reduces the plot size by 60% of open pond design. MCS ensures an approach of 1 to 2°C to WBT with a ΔT of 12 to 15°C. Drift loss comes down to 0.02% and also space requirement reduces considerably.



Model-II: Louver Type Mist Cooling System

Salient Features of Open/Louver Type Mist Cooling System:

1. Cold Water Temperature:

Mist Cooling System ensures an approach of 1°C to WBT with a ΔT of 12°C to 15°C.

2. Energy Savings:

Due to such high temperature drop obtained, water quantity required at the process side is much less. MCS requires water pressure equivalent to the height of cooling tower. Hence, considerable amount of energy is saved on circulation water pumping. Also, MCS does not require any fans for cooling. Thus, a huge amount of energy is saved on circulation and cooling.

3. Process Benefits:

MCS will supply cold water at a temperature very close to WBT (Approach of 1°C) as against an approach of 4 to 5°C in cooling tower. This will reduce the product vapour losses in shell and tube heat exchangers. This will ensure that your plant operates at an enhanced yield in summer and monsoon, also giving stable output throughout the year. Hence installation of MCS will ensure large commercial benefits to you in the form of additional product obtained at a higher yield.

4. Maintenance:

MCS has no moving parts. It does not use any fills and fins for cooling. Also, material used in the MCS is special grade saran3 polymer, a highly non-corrosive material having a life of more than 10-15 years. This

makes MCS absolutely maintenance free.

As against this, conventional cooling towers require a heavy maintenance in the form of replacement of fills, louvers, fan blades, etc. every year.

5. Choke-Less Design of Nozzles:

MCS operates with a choke-less design. Size of smallest opening in MCS is more than one inch (25 mm) in diameter. Hence chances of particles choking the system are remote.

Table Top Design: Prevents water stagnation, minimizing algae formation by directing water to a covered suction pit.

MCS Design for Dusty Environments:

Unique suction pit design prevents dust entry, draining it via valve, and ensures clear water supply to circulation pumps.

6. System Flexibility (Capacity Turn Down Ratio):

MCS is offered with individual line isolation valve. MCS is the only system, which gives such a high flexibility in operation.

7. Hydro-Balance Valve:

HBV is provided to take care of sub-cooling, which may happen in winter. It is also helpful to release excess pressure which may develop on system at times.

8. Chemical Treatment:

Chemical dosing requirements are similar to that of cooling tower as same hold up of water is maintained in suction pit of table top MCS.

9. Pay-Back Period:

The pay-back period of the MCS in most of the cases, will be obtained in less than one year only.

Model-III: Induced Draft Mist Cooling Tower (Fill-Less Design):

Model-I and Model-II require higher basin size by 3 to 4 times in comparison to conventional IDCT. To eliminate this drawback, first time in the world, we have combined the technology of Mist Creation with induced draft fan thus cooling the water most efficiently. This uses our patented technology of Mist Creator Nozzles. Mist Creator Nozzles breaks water in micron size, thus giving highest surface area for heat transfer.

This technology completely eliminates fills inside cooling tower making it maintenance free. Due to elimination of fills it reduces air pressure drop across cooling tower and hence BkW of fan drops by 30 to 50% with respect to conventional IDCTs.

Models available from 50 m³/hr to 3000 m³/hr with an approach of 3°C to WBT and ΔT of up to 15°C.



Model-III: Induced Draft Mist Cooling Tower

Salient Features of Induced Draft Mist Cooling Tower (Model-III):

1) Approach & Temperature Drop: An approach of 3 to 4°C is ensured to design WBT with a ΔT up to 15°C.

2) Fill-Less Design: No fills used as required surface area is created by mist formation.

3) Footprint: Footprint required is same as compared to Conventional IDCT.

4) Life Expectancy: Rugged structure with pultruded FRP/ HDGI MOC and FRP casing with SS 304 nozzles, ensuring a life of 15+ years.

5) Maintenance: Choke-less design of our Mist Creator Nozzles ensure a maintenance free operation for lifetime. Guaranteed designed performance even in summer & monsoon.

6) Make-Up Water: IDMCT requires same make-up water in comparison to conventional IDCT.

7) Guarantee: Guaranteed designed performance even in summer and monsoon.

Refurbishment of Conventional Induced Draft Cooling Tower to Induced Draft Mist Cooling Tower by installing Revolutionary Mist Creation System inside existing cooling tower. The fills are completely removed as nozzles carry out work of fills and at higher efficiency. ■

For further details

Contact: +91 - 020-24472726/24471184

Email: mistcreation@gmail.com

Website: www.mistcreation.com





INTERNATIONAL INTEGRATED ENERGY EXHIBITION & CONFERENCES

CONNECTING ENERGY | POWERING FUTURE | SUSTAINING GROWTH



3-5, MARCH 2027

BOMBAY EXHIBITION CENTER,
GOREGAON (E), MUMBAI, INDIA

POWER + COAL
World Expo 2027

Nuclear ENERGY
World Expo 2027

RE GREEN HYDROGEN
World Expo 2027

Health Safety & Environment
World Expo 2027

SMP
Shipyard, Maritime & Ports
WORLD EXPO 2027

Oil & GAS
World Expo 2027

GAS WORLD TECH
Expo 2027

Refining Petro
CHEMICALS 2027

Surface Engineering Coating & Corrosion
World Expo 2027



Organised by: **Jasubhai Media Pvt Ltd**

Taj Building, 3rd Floor, 210, Dr. D N Road, Fort, Mumbai – 400 001, INDIA.

Tel: +91-22-4037 3636, **Email:** sales@jasubhai.com

Ahmedabad / Vadodara - +91-93262 90114 | Bangalore - +91-93262 90114 / 98926 44177 |
Chennai/Coimbatore - +91-63806 01379 | Hyderabad / Pune - +91-98222 09183



SCAN TO VISIT

Supported by



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



Connect. Collaborate. Grow.
The Global Stage for Innovation,
Technology & Business.



Expand Your Network.
Build Partnerships. Drive Success.



Empowering Industries.
Shaping a Sustainable Future.



33rd International
Exhibition &
Conferences



14-17, March 2028

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



HIGHLIGHTS OF CHEMTECH WORLD EXPO 2026



800+
EXHIBITORS
FROM 15+ COUNTRIES



26000+
VISITORS
FROM 60+ COUNTRIES



9
TECHNICAL
CONFERENCES



1500+
BUSINESS
DELEGATES



250+
GLOBAL
SPEAKERS



1200+
ENGINEERING PHARMA & SCIENCE STUDENTS AT
STUDENT OUTREACH PROGRAM
FROM 28 STATES & UNION TERRITORIES



100+ GLOBAL
CLIMATE TECH
STARTUPS
FROM 20 COUNTRIES
40 TECHNICAL
PRESENTATIONS

Concurrent Events



World Expo 2028



WORLD EXPO 2028



World Expo 2028



World Expo 2028



Develop Future Leaders

Organised by:



Jasubhai Media Pvt Ltd

Taj Building, 3rd Floor, 210, Dr. D N Road, Fort, Mumbai – 400 001, INDIA.

Tel: +91-22-4037 3636, Email: sales@jasubhai.com

Ahmedabad / Vadodara - +91-93262 90114 | Bangalore - +91-93262 90114 / 98926 44177 |

Chennai/Coimbatore - +91-63806 01379 | Hyderabad / Pune - +91-98222 09183



sales@jasubhai.com



www.chemtech-online.com