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VOL.57 | ISSUE 2 | FEBRUARY 2022

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CHEMICAL ENGINEERING WORLD
RNI REGISTRATION NO. 11403/66

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

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Eriez Magnetics India Pvt. Ltd. is a wholly owned subsidiary of Eriez-U.S.A. has manufacturing plant in Chennai. Eriez-India manufacturers equipment for separating **COARSE & FINE TRAMP IRON** from process materials and feeding equipment for industries such as Food, Pharmaceutical, Chemical, Feed, Minerals etc.

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Sujoy Choudhury takes over as Director (Planning & Business Development) on IndianOil Board

Sujoy Choudhury, Director (Planning & Business Development), IndianOil Corporation

New Delhi, India: Sujoy Choudhury has taken charge as Director (Planning & Business Development), Indian Oil Corporation Limited, one of India's largest commercial enterprises and among the leading Indian companies in the Fortune Global 500 listings.

A Mechanical Engineer and MBA (Finance) from Jadavpur University, Kolkata, Choudhury brings with him a vast cross-functional experience spanning every facet of the Indian energy business. He has rich experience working in Eastern, Western and Northern regions of the country and across various oil industry functions, including Engineering, Retail Sales, and Petrochemicals functions of the Corporation. During his more than three decades of service, Choudhury has held several leadership positions. Before assuming the office of Director (Planning and Business Development),

Somaiya Vidyavihar University appoints Dr. Raman Ramachandran as Head of Management Development Programmes

Mumbai, India: Somaiya Vidyavihar University is delighted to announce the appointment of Dr. Raman Ramachandran as the Chairperson of the Management Development Programmes and Professor of Practice at K J Somaiya Institute of Management.

Dr. Raman will be responsible for the major activities in K J Somaiya Institute of Management and other Somaiya Vidyavihar University institutions. He will facilitate in developing and executing a world-class annual plan for both open, online and customized Management Development Programmes (MDP). He will be assessing various sectors, curating innovative programs for appropriate audiences, and promoting those programs through various channels and

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methods including networking events, digital and social media promotions, etc.

"We are pleased to welcome Dr. Raman Ramachandran to the Somaiya family", said Samir Somaiya, Chancellor, Somaiya Vidyavihar University "Raman's deep expertise in strategic thinking, planning, and resource management will enable Somaiya institutions in developing, leading, and executing at the forefront to create a dynamic approach towards education with various stakeholders for business development. Dr. Raman Ramachandran, Head of MDP, K J Somaiya Institute of Management said, "I am excited to join Somaiya Vidyavihar and look forward to translating my 3 decades of corporate experience to management education".

KBR Appoints Geetha Ramamoorthi as Managing Director for KBR India Operations

Geetha Ramamoorthi, MD, KBR India Operations

Pune, India: Ms. Ramamoorthi has over 30 years of experience and joins KBR from WS Atkins India Pvt Ltd, a global design, engineering and project management consultancy where she has served in various progressive roles including Vice President - Digital and India Operations Director managing 1800+ employees based at its global centers across Bangalore, Gurgaon and Mumbai.

"I am pleased to welcome Geetha to lead KBR operations in Chennai, Gurgaon, and Pune," said Jay Ibrahim, KBR President, Sustainable Technology Solutions. "She has a track record of managing large delivery centers spread across multiple locations and driving transformation. Her multi-disciplinary experience, as well as her business and finance acumen, will be indispensable as we further develop our engineering and technology centers in India." Ms. Ramamoorthi is a Chartered Accountant from The Institute of Chartered Accountants of India and Cost & Works Accountant from the Institute of Cost & Works Accountants of India. She obtained a Bachelor of Commerce degree from Ethiraj College for Women, Chennai, India. In addition, she holds certifications from leading international institutions on digital transformation and strategy and is an active speaker in various forums focused on technology, leadership, and diversity & inclusion.

SCHUTZEN Earns USDA Certified Biobased Product Label

Mumbai, India: Schutzen care private limited announced that it has earned the U.S. Department of Agriculture (USDA) Certified Biobased Product label. Third-party verification for a product's biobased

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content is administered through the USDA BioPreferred Program, an initiative created by the 2002 Farm Bill (and recently reauthorized by the 2018 Farm Bill). One of the goals of the BioPreferred Program is to increase the development, purchase and use of biobased products.

The USDA Certified Biobased Product label displays a product's biobased content, which is the portion of a product that comes from a renewable source, such as plant, animal, marine, or forestry feedstocks. Biobased products are cost-comparative, readily available, and perform as well as or better than their conventional counterparts. "This proactive approach by Schutzen on acquiring these voluntary certifications marks our commitment towards sustainability, A small step for Schutzen, A Giant leap for the environment," said Raj Mahendra Tanna Founder & Managing Director Schutzen care private limited.

Products from Schutzen care private limited are contributing to an ever-expanding marketplace that adds value to renewable agriculture commodities, creates jobs in rural communities, and decreases reliance on petroleum. According to a report that USDA released in July 2019, biobased products contributed $459 billion to the U.S. economy in 2016 (a 17% increase from 2014) and support, directly and indirectly, 4.6 million jobs. The report's research team estimates the reduction of fossil fuels and associated GHG emissions from biobased products equivalent to approximately 12 million metric tons of carbon dioxide (CO2) prevented as of 2016.

LANXESS appoints Neelanjan Banerjee as the Global Head of its Lubricant Additives Business

Mumbai, India: Neelanjan Banerjee will be taking over as the new Global Head of the Business Unit Lubricants Additives at LANXESS Corporation, USA effective July 1, 2022 after a brief work-in period. He has been Region Head, Vice-Chairman & Managing Director for LANXESS India Private Limited since August 2018 and has also been an Executive Director since 2009. He has held senior management positions in the last 16 years with the organization.

Headquartered in Shelton, CT in the US, the Business Unit Lubricant Additives (BU LAB) is globally positioned with around 800 customers worldwide and production sites in East Hanover, Fords, (USA), Elmira, West Hill (Canada), Altamira (Mexico), Mannheim (Germany), Latina (Italy), Kaoshiung (Taiwan) and Nantong, Qingdao (China). It also has a manufacturing facility in Geismar, Louisiana in the US (Rubicon - a joint venture between LANXESS and Huntsman). The business unit has 5 global technical competence centers located in Naugatuck (USA), West Hill (Canada), Manheim (Germany) and APAC Application Development Center (AADC) at Shanghai (China). It also has 3 regional sales hubs located in the Americas, Europe and APAC region.

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For more information about our company and INOLUB™ PTFE additives, please refer: **www.inolub.com**

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Galaxy Surfactants Limited Q3FY22 Results

U. Shekhar, MD, Galaxy Surfactants Limited

Mumbai, India: Total volume increased by 2.0% for 9MFY22, on a YoY basis, Total Revenue (including other income) stood at Rs. 2,644.1 Cr, a YoY growth of 31.6% led by an increase in realizations owing to rising feedstock prices and better sales mix, EBITDA stood at Rs. 267.1 Cr, YoY decline of 21.4%; primarily due to volatility in feedstock prices, unavailability of critical feedstocks, increased lead time caused by supply-side constraints. Further, the export incentive realized in Q3FY21 to the tune of Rs.14 crore was not realized this quarter, PAT stood at Rs. 164.4 Cr, YoY decline of 26.4%

Galaxy Surfactants Limited, a leading manufacturer of performance surfactants and specialty care products with over 210 product grades used in the Home and Personal Care industry, has announced its unaudited financial results for the quarter and nine months ended 31st December 2021.

Commenting on the performance U. Shekhar, Managing Director, Galaxy Surfactants Limited said, "The supply-driven volatility that impacted our Q-2 performance continued in Q-3. Rising input costs along with supply chain constraints, be it in terms of on-time container availability or port congestions severely impinged our ability to service our customers. While Volumes have remained flat Y-O-Y, the decline in EBITDA/MT impacted our overall performance significantly. Both these factors need to be understood in the Global Context.

Akzo Nobel India Announces Q3 2021-22 Results

Rajiv Rajgopal, MD, Akzo Nobel India

Gurugram, India: The Board of Directors of Akzo Nobel India, a leading Paints and

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Coatings company and maker of Dulux Paints, announced the unaudited financial results for the quarter ended December 31, 2021. Commenting on the quarter performance, Rajiv Rajgopal, Managing Director, Akzo Nobel India said, "Akzo Nobel India has registered its highest ever quarterly revenue in Q3 FY22 with strong contribution coming from both businesses. In decorative paints, growth was aided by the healthy festive season and projects segment. We see a continued uptick across infrastructure, power, marine and real estate segments that propelled growth in coatings business." Q3 FY22 versus Q3 FY21 Registers highest quarterly Revenue from operations at ₹ 914.3 crore, up 18%, Price increase of ~17% versus same quarter last year, EBIT from operations at ₹108.8 crore, Delivers double digit profitability at 11.9%, Profit after tax (PAT) at ₹ 83.8 crore "This quarter, persistent raw material inflation headwinds continued to impact both businesses. However, pricing initiatives limited the margin dilution," added Rajiv Rajgopal. "The Board of Akzo Nobel India remains committed to creating value for its shareholders. Hence, based on the performance in the nine months ended 31st December 2021, the Board is delighted to announce an interim dividend of ₹ 40 per share for the year 2021-22," said. Oscar Wezenbeek, Chairman, Akzo Nobel India.

Recent highlights AkzoNobel India Corporate Social Responsibility initiatives wins award In another validation of its People. Planet, Paint approach of sustainable business, AkzoNobel India won the 'Commendation for Significant Achievement in Corporate Social Responsibility' in the CII-ITC Sustainability Awards 2021. Akzo Nobel India continues to strive and lead the industry by empowering people and local communities.

Tata Chemicals Limited Q3 FY22 Consolidated Income at Rs. 3,142 Cr up by 21%

R. Mukundan, MD & CEO, Tata Chemicals Ltd

Mumbai, India: Tata Chemicals Limited declared its financial results for the quarter ended 31st December, 2021. The Company reported income from operations on consolidated basis at Rs. 3,142 Cr, up by 21% as compared to Rs. 2,606 Cr of the corresponding quarter of last year. Consolidated PAT from continuing operations for the quarter was at Rs. 340 Cr, up by 69%, as compared to Rs. 201 Cr for corresponding quarter of last year. The increase is mainly due to higher Soda Ash Volumes and the better realisations from the market.

Consolidated Gross Debt stood at Rs. 6,937 Cr, as compared to Rs. 7,108 Cr as on 30 Sept, 2021. Also Cash & cash equivalents stood at Rs. 2,817 Cr, as compared to Rs. 2,950 Cr

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as on 30 Sept, 2021. The Company's results by reporting segments showed income from operations for the Basic Chemistry Products at Rs. 2,448 Cr, up by 23%, and Specialty Products at Rs. 679 Cr, up by 10%.

Commenting on the results,. R. Mukundan, Managing Director & CEO, Tata Chemicals Ltd., said,

"With the re-opening of businesses in all markets, the overall demand environment continues to be positive. While this positive demand momentum is expected to continue, the input supply-side environment especially energy costs remains high compared to historical levels, and supply chain challenges continue to be seen in the market. The team has responded well to ensure customers are served with agility. We continue our long-term focus on excellence by leveraging digitalization and sustainability. In addition to the operational excellence, we continue to focus on executing the growth capex in India.

Godrej Process Equipment Builds its Largest Equipment for a High-Quality BS-VI Visakhapatnam Refinery

Mumbai, India: Godrej & Boyce, the flagship company of the Godrej Group, announced that its business Godrej Process Equipment delivers a critical LC Max Vacuum Tower to a Refinery Modernization Project in Visakhapatnam, Andhra Pradesh.

The Supersized equipment with a diameter of 9600 mm is the largest equipment manufactured by Godrej Process Equipment. This Tower weighing approximately 700 tonnes and 65 metres in length will be deployed at a Residue upgradation Facility in Vishakapatnam, Andhra Pradesh to convert the heaviest Crude oils into high-quality BS-VI fuel while simultaneously increasing feedstock and product flexibility. This refinery up-gradation will process an additional 80,000 barrels of crude oil per day.

The Vacuum Tower has been manufactured and supplied from Godrej & Boyce's state-of-the-art, coastal manufacturing facility located in Dahej, Gujarat through its self-owned Sea-going jetty which enables handling of large over-sized consignments.

Hussain Shariyarr, Senior Vice President & Business Head, Godrej Process Equipment said, "We are delighted to deliver the LC Max Vacuum Tower along with other fractionator columns & high-pressure vessels for the Hydrocracker unit which is one of the most critical units in a refinery. In line with our philosophy of continual improvement and capacity advancement, we have set another benchmark for us by manufacturing this tower with a 9.6 m diameter that's the maximum by Godrej so far. In addition to supplying this Key equipment for the refinery, the execution of this order is yet another contribution in achieving the goal of "Aatmanirbhar Bharat."

BASF India Limited announces Q3 2021-2022 results

Mumbai, India: BASF India Limited registered sales of Rs. 32,917.6 million for the third quarter, which ended on December 31, 2021, as compared to Rs. 25,065.4 million in the corresponding quarter of the previous year, representing a growth of 31%.

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Narayan Krishnamohan, MD, BASF India Limited

The Company reported Profit before tax (before exceptional items) of Rs. 1,372.2 million as compared to profit before tax (before exceptional items) of Rs. 1,965.7 million in the prior-year quarter. "BASF registered a sales growth of 31% over prior year quarter with a double digit growth in both volumes and prices. Supply chain disruptions in key customer industries such as the Automotive sector impacted by chip shortages, caused challenges in demand. However gains in market position and new business secured through enhanced customer engagements enabled the company to overcompensate and grow volumes", said Narayan Krishnamohan, Managing Director, BASF India Limited. "Maintaining healthy margins and cost levels in an inflationary environment continues to be a priority for the company", he added.

For the nine months ended on December 31, 2021, the Company registered sales of Rs. 97,101.7 million, as compared to Rs. 67,527.6 million for the corresponding period of the previous year, an increase of 44%. Profit before tax (before exceptional items) stood at Rs. 5,688.5 million for the nine months ended December 31, 2021, compared to profit before tax (before exceptional items) of Rs. 2,672.6 million for the corresponding period of the previous year.

Celanese to Acquire Majority of Dupont's Mobility & Materials Business

Dallas, US: Celanese Corporation (NYSE: CE), a global chemical and specialty materials company, announced the signing of a definitive agreement to acquire a majority1 of the Mobility & Materials ("M&M") business of DuPont for $11.0 billion in cash. Celanese will acquire a broad portfolio of engineered thermoplastics and elastomers, industry-renowned brands and intellectual property, global production assets, and a world-class organization.

"The acquisition of the M&M business is an important strategic step forward and establishes Celanese as the preeminent global specialty materials company," said Lori Ryerkerk, Chairman and Chief Executive Officer. "For nearly a decade, we have implemented, enhanced, and increasingly extended the Engineered Materials ("EM") commercial model to generate shareholder value. M&M will be a high-quality addition to EM and will unlock significant opportunities to generate further customer and shareholder value. We are eager to welcome the M&M team to Celanese and jointly elevate the future growth and cash generation of the combined Celanese portfolio." "The M&M business is a uniquely complementary specialty materials asset to EM, spanning product, geography, and end-market" said Tom Kelly, Senior Vice President Engineered Materials.

Yokogawa Selected as System Integrator for Open Process Automation Field Trial

Toyko, Japan: Yokogawa Electric Corporation announces that it has been selected by ExxonMobil as the system integrator for the first field trial of an Open Process Automation* (OPA) system designed to operate an entire production facility. The field trial will take place at an ExxonMobil manufacturing facility located on the U.S. Gulf Coast, replacing the existing distributed control system (DCS) and programmable logic controllers (PLC) with a single, integrated system that meets the Open Process Automation Standard (O-PAS™). The project will incorporate enhanced control capabilities enabled through the implementation of OPA technologies and interfaces.

"ExxonMobil is excited to have reached this important milestone with Yokogawa and progress the first field trial of an OPA system at an existing ExxonMobil manufacturing plant," stated Ryan Smeltzer, OPA program manager for ExxonMobil Research and Engineering Company. "The project will take advantage of significant progress made testing OPA components and the O-PAS standards in close collaboration with Yokogawa. The OPA field trial is the next step in commercializing OPA and capturing additional value from our automation and control systems."

Most process industries are burdened with integrating multiple proprietary systems in almost every process plant and facility. These include manufacturing execution systems, DCSs, PLCs, and their respective human-machine interfaces and inputs/outputs (I/O). This can result in elevated capital costs on new projects and a high total cost of ownership, especially in the operation and maintenance of such systems. An OPA system is designed to remedy these challenges by supporting the integration of best-in-class components from different suppliers through configuration and application portability. This enables optimization of the total cost of automation systems.

The field trial is a major milestone in Yokogawa's continued support of ExxonMobil and OPA, and shifts OPA technology from concept to a viable alternative to traditional automation for process industries. The company has commenced work on the Front-End Engineering Design phase of the project. The OPA field trial system, which involves over 2000 I/O, is expected to be commissioned in 2023. For the past two years, ExxonMobil and Yokogawa have been developing, testing, and improving OPA technologies through the joint operation of an OPA test bed located near ExxonMobil's Houston, Texas campus. This collaborative work has developed and qualified many of the core OPA functions in preparation for the field trial. In addition to the field trial, test bed engineers at the Houston-area development office will continue to implement and refine OPA technologies in-line with the latest version of the O-PAS standard. ■

A Clarion Call for Decarbonizing Core Businesses

Shridevi Bale
Managing Director, Lead - Energy
Advanced Technology Centers in India, Accenture

What are your thoughts on "The Energy Future" that can be designed and applicable to India's net-zero pledge, and the corresponding opportunities in this area?

The energy industry is at a point of rapid transition. For years now, energy companies have struggled to achieve optimal returns, capture investor interest and secure public trust. Challenges posed by Covid-19, along with an urgent need to decarbonize, have also impacted operations at a global level. Recently, India has also set its own net-zero targets. 2022 will be the year where energy companies across geographies will accelerate their energy transition efforts to bring them closer to their net-zero targets. Most headway will be made from oil and gas firms shifting towards lower-carbon-emission hydrocarbon portfolios and building digital proficiencies that optimize the end-to-end value chain. This will open new opportunities to deliver value through decarbonizing their core business, which involves mechanisms to produce clean

hydrocarbons while maintaining the existing infrastructure. Besides, oil and gas companies are emphasizing increasing asset reliability by optimizing operations to improve profitability and reduce risk, in turn opening further opportunities in this area. Additionally, there are opportunities within the energy storage space (though they are not commercially available at scale now), which require aggressive investments from industry players.At Accenture, we are really thrilled about the opportunities that lay ahead for our clients in this sector and are partnering with them to take charge of their transition towards net-zero.

Keeping in mind how the energy demands would increase dynamically by 2050, oil & gas will continue to be an integral part of the energy ecosystem. In your view, what are the challenges & risks facing this industry in the immediate future to address the climate emergency?

The scale of the challenge and the pace of change faced by the oil and gas industry today calls for immediate action. Oil and gas companies are under tremendous pressure to prove their relevance in a decarbonizing world, requiring them to revisit old paradigms and define strategies for reinvention.

As companies look ahead to 2030, they face an additional set of structural shifts that are poised to permanently change the environment in which they operate. Competition from new energy sources, environmental accountability, talent scarcity, and investor apathy top the list. These challenges are on the rise, with no signs of slowing down. Moreover, in the decarbonizing economy, profit pools are shifting away from fossil fuels and so diversification and optimization of portfolios are crucial. Going forward, an oil and Gas Company's portfolio will no longer be solely determined by break-even economics, but also by its environmental impact from Scope 1 and 2 emissions.

A recent Accenture report had stated. 'Oil & Gas companies most committed to radical reinvention amid Covid', Please share insights into how the oil & gas companies are planning the transformational journey ahead.

Most companies have realized the need to transform themselves to achieve profitability and maintain their relevance during and after the energy transition. Yet, many struggle to understand what this transformation will mean for their business models and future ways of working. Accenture believes that reinvention in the oil and gas industry must be anchored on the "5Cs" –

Competitiveness – It's key to shape a resilient portfolio and operating model, including ways of working that achieve accretive returns through cycles. The key actions that the industry is witnessing in that regard are:

Partnering with technology players to accelerate digital transformation programs, Expanding natural gas infrastructure and demand as a lever in the energy transition, Pursuing new business opportunities with a focus on renewables generation, Changing operating models and reorganizing around ventures outside oil and gas, Rebranding to reflect a move towards a more holistic approach to energy.

Connectivity – Oil and gas firms must enable intelligent and secure enterprises with end-to-end connectivity, optimization and autonomous capabilities. To build their connectivity capabilities for reinvention, industry players are turning to mobility and industrial technologies such as augmented reality and the Internet of Things. But it is their embrace of cloud computing that is most striking. Significantly more leaders are using cloud computing to drive transformation.

Carbon – They should look to achieve carbon neutrality by transforming/ shifting investments, operations and products. The key actions are – Setting aggressive ESG and emissions targets for the next decade and beyond.

Investing in building capacity in low-carbon solutions such as Carbon Capture, Utilization, and Storage (CCUS) and hydrogen.

Expanding portfolios of renewable fuels.

Customer – They must aim to deliver superior (both business-to-business and business-to-consumer) customer experience through design, services, and formats/channels.

Culture – Building a distinct purpose-led culture and employee experience with an emphasis on innovation and agility will be essential.

Which technologies are going to enable the ambitious transition of the energy sector?

To stay relevant, oil and gas companies are developing and investing in technologies that help them achieve their net-zero targets. Technologies such as digital twins, cloud and artificial intelligence (AI) are not just helping companies in their energy transition journey but are also opening up new revenue streams. In the next few years, we'll see more traction with these technologies. However, technology is just one piece of the puzzle, and considering the scale of the challenge

ahead, there is no one size fits all solution. However, we believe advances in carbon capture and biofuels will play an important role for industry players but bringing these technologies to scale will require heavy investment.

How is Accenture supporting the energy industry as a partner?

As the energy transition gains momentum and the energy system expands, oil and gas players are managing disruption on multiple fronts. Their competitive edge depends on how well they adapt to changes in supply and demand, their response to stakeholder pressure for low-carbon solutions, their adoption of advanced technologies and how deftly they pursue new value pools that are moving away from oil wells and moving closer to the customer.

At Accenture, we help organizations with all the above through our industry expertise, insights, and global ecosystem of partners.

For instance, methane is a rapidly accelerating environmental concern, and it is important we devise suitable interventions now to tackle its impact. To that end, Accenture is working closely with its clients and partners to demonstrate our technology, innovation and AI capabilities in this space and help address sustainability challenges like this in the industry.

The other key area of focus is asset utilization. Accenture is helping industry leaders improve profitability and reduce asset-related operational risk over the life cycle by defining and deploying intelligent asset management solutions. Our solutions such as Enterprise Digital Twin, Asset Digital Twin, Asset Analytics and Enterprise Asset Management (EAM) Transformation, to name a few, help our clients unlock 360o business value through better decision making powered by data and AI on the cloud. ■

Corrosion Control with Electrochemical Impedance Spectroscopy Measuring Technique

Performance testing with regards to corrosion protection is very important for both coating developers and coating customers. How else can we judge if a coating system is delivering the properties that we require. In this paper a short overview will be given of the possibilities that we have and the problems that we face with the performance testing.

One of the less well-known techniques for looking at anti-corrosive coating systems is Electrochemical Impedance spectroscopy. Although EIS is around for quite a long time, little is published on EIS testing on coating systems. In the past, EIS was mostly used to describe corrosion processes and not in a way to try to prevent corrosion in an early stage or even to help in the development of better anti-corrosive coatings. Prevention of corrosion can be done by proper maintenance. So to know in an early stage when to do maintenance would be very useful. Here we will discuss one such technique.

Electrochemical Impedance spectroscopy is an official ISO test (ISO 16773). The ISO 16773 describes how the test should be carried out and what kind of equipment is necessary. What ISO 16773 does not tell you is how to evaluate the measurements. Here experience and sometimes even companies' intellectual properties come into place. This of course hinders an industry-wide acceptance of this technique.

How to do performance testing of anti-corrosive coatings?

Performance Testing can be divided into two main groups.

Outdoor Exposure Testing

Outdoor exposure testing is of course what everybody would prefer. However, this kind of testing in general will take 10 to 20 years. In coating developments

this is of course not feasible. It is not even sure if the materials that were used are still available in 10 to 20 years' time. Legislation might very well change as well. Furthermore, outdoors is not well defined making it impossible to use a test result achieved in one place, for example the north of India, for a different location, for example the south of India. So what can we test for?

During and just after application we can do a visual inspection, measure Wet Film Thickness (WFT), Dry Film Thickness (DFT), holiday testing and finally adhesion testing, which will damage the coating system. None of these test will be a good predictor for coating performance. Only in the case that the specifications for the coating system are not met, a negative prediction can be made.

During service life of a coating system we can do a visual inspection, measure DFT and do an adhesion test. These tests will not give an indication if there is already the beginning of corrosion underneath the coating system and that maintenance should be scheduled, making them not very suited for corrosion control.

Accelerated Testing

This is what everybody in the coating industry is doing and what most customers are requesting. The advantage of the accelerated tests is of course that they are quick, typically they will take six months or less. The results are in general reproducible which makes them suitable for comparison (between similar systems) and you will find them in specifications for big projects. The big question of course remains how good the relation between the accelerated tests and real life weathering is. This question is unfortunately not often asked and accelerated test results are taken as true predictors for real life exposure. This can lead to strange project specifications, for example salt spray results for a dessert project. It is not possible to relate an accelerated test results to an in service life coating condition. In short an accelerated test result does not give an indication of the performance of an anti-corrosive coating system during it service life thus making it not suited for corrosion control either.

What would we like to have?

We would like to have a test that will deliver quick results that are the same for outdoor tests as well as for laboratory tests. The test should be reproducible, non-destructive and should give a good indication for anti-corrosive behavior. It would also be important if the test could be used to follow the anti-corrosive behavior of a coating system in time.

In the laboratory, an EIS test is performed direct, after 24 hours, after a week and finally after three weeks. Thus making it a very fast test. Especially if you compare

this with salt spray or immersion test that can take up to half a year or less.

EIS testing can also be done outside the laboratory thus making it possible to compare laboratory results with real-life results. Every EIS result is a good indication of the current condition of the coatings system. So for example a decrease of the EIS results is an indication of the necessity of system maintenance in a very early stage.

Explanation Impedance measurements

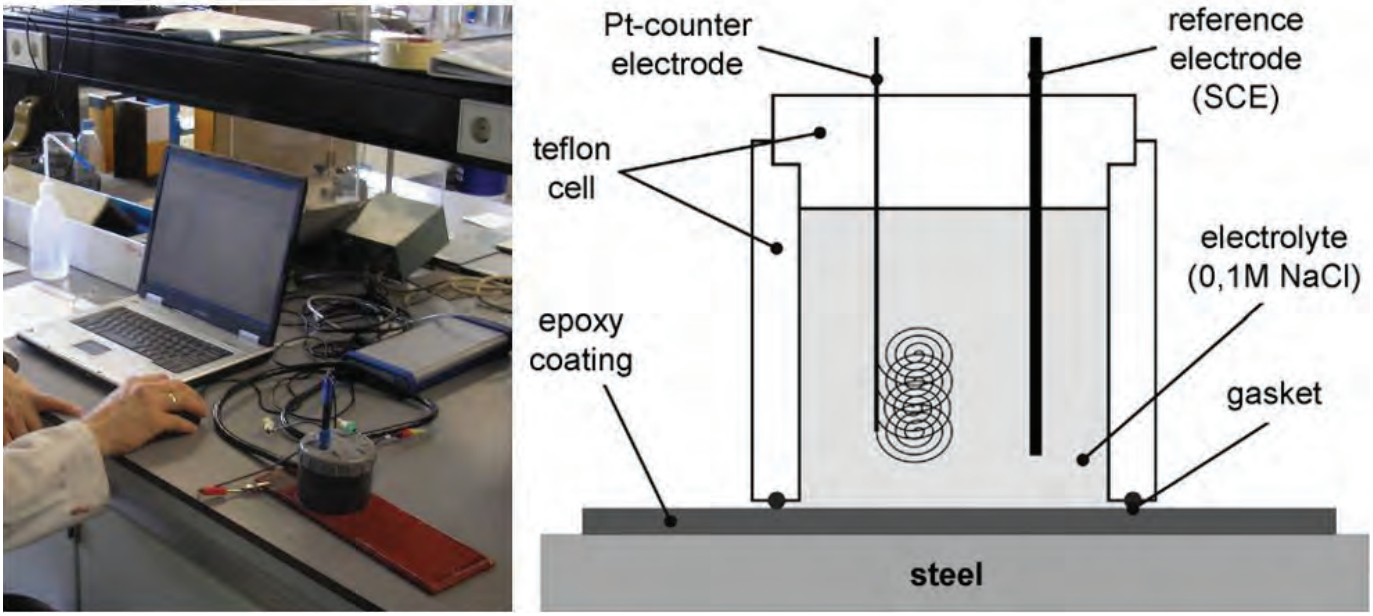
EIS is an electrochemical measuring method that quantifies the protective behavior of coatings. Besides the general performance of coatings also protective mechanisms can be identified.

The advantage of the method is a rapid evaluation of the coating performance as well as a better correlation with the expected performance in the field.

Electrochemical Impedance Spectroscopy (EIS)

Impedance measurements on organic coatings, involve an application of an alternating voltage over a counter electrode and a coated (metal) substrate, while the response of the system is measured. Since the Impedance is frequency-dependent, the measurements are executed over a range of frequencies.

The data measured need to be processed in order to provide some meaning. In general the data are fitted assuming that process changes within a coating follow



Set-up of the measurement and a graphical representation of the cell itself

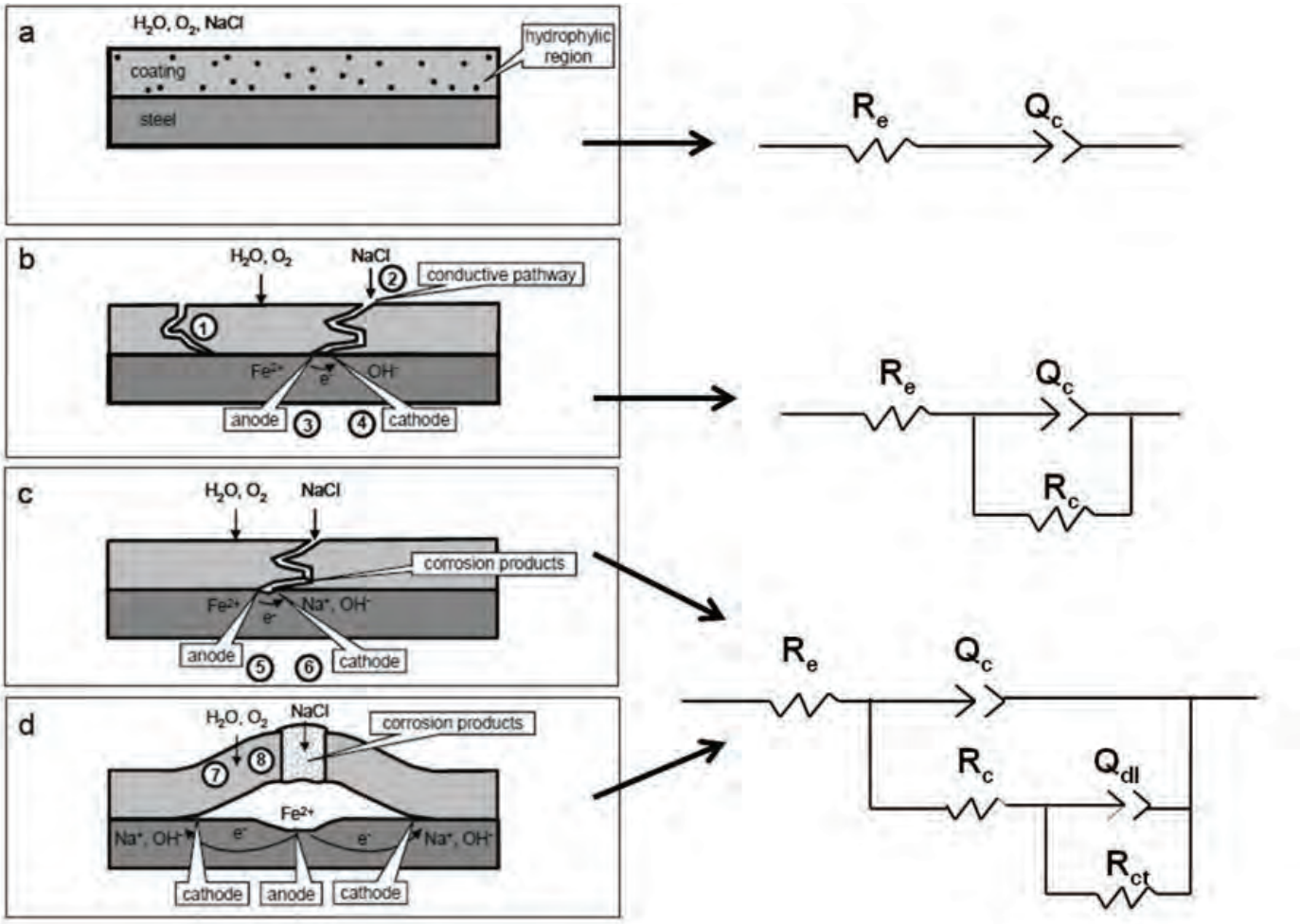
a unified degradation mechanism model, which is founded on the formation of conductive pathways (see figure 1 on next page).

This figure shows the degradation from an ideal coating a, to what mostly is measured for a new or properly protecting coating b, an intact but degraded coating c and in the last time of service before failing d. A number of equivalent circuits were used to fit the data in our tests. The parameters that can be derived from these fits are: electrolyte resistance (R_e), constant phase element (CPE, Q_c), coating resistance (R_c), metal double layer capacitance (C_{dl}), charge transfer resistance (R_{ct}).

The constant phase element (CPE) allows for small deviations from ideal capacitance behavior and is characterized by two parameters, Y_0 and n. Y_0 can be related to coating capacitance if n=1, while n itself represents deviation from ideal coating behavior. For ideal coatings, n =1, while practical systems show a deviation with results below 1

Most Probable Equivalent Circuit (MPEC) fitting model based on a uniform degradation mechanism

The coating resistance R_c expressed in Ω/cm^2 is a measure for the resistance to ion transport through the coating. The



most important factor of protection against corrosion by barrier coatings is through their resistance to ion transport.

The results provide the data on the following parameters:

n value: The n-value shows the deviation of ideal coating behavior. An ideal coating has an n- value of 1. In practice, the n-value will be a few hundredths lower. The n-value decreases with time.

Y_0 value : The Y_0 value of a coating can be related to the number of polarisable groups in the coating. The value increases with time. From Y_0, the relative water uptake can be calculated.

R_c: R_c equals the resistance that charge carriers (ions) encounter as they migrate through the coating. A good coating has a high Rc value. Rc decreases with time.

These values are useful when the coating is still intact, see figure b.

However, when corrosion products have been formed beneath the coating, figure c and d come into play and a different equivalent circuit has to be considered. Then two new parameters can be calculated.

The Q_{dl} provides an indication of the development of the electrochemical double layer underneath the coating, which can be related to the progress of delamination.

The R_{ct} is the charge transfer resistance and can be related to the corrosion rate of the process.

Concluding, for an intact coating, no values for Q_{dl} and R_{ct} should be found.

Interpretation of coating performance

Data from literature has led to the following qualification range, which was used in a project report for the Corus group. (A copy can be obtained from central office).

$R_c > 10^{10}$ Ohm/sq.cm - Best corrosion protection.

$R_c > 10^8$ Ohm/sq.cm - Better corrosion protection.

R_c107 - 10^8 Ohm/sq.cm - Standard corrosion protection

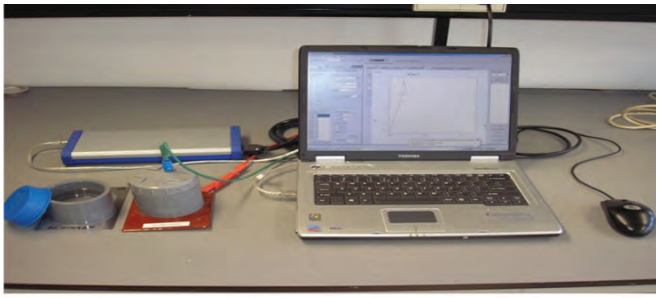
R_c 10^6 - 107 Ohm/sq.cm - Doubtful corrosion protection.

$R_c < 10^6$ Ohm/sq.sm - Poor corrosion protection.

These values should be used with caution, judgment of coating systems must be done by their total performance and not by only one parameter. Measurements at TNO has led to the conclusion that the relative water absorption calculated from Y0 after 1-day immersion should be less than 0,1 for a heavy duty coating. Finally, the following data was taken from the Corus report and

gives average values for a generic class of coating.

Experimental: Laboratory setup



Example of the setup as it was used in the laboratory for EIS measurements

Steel Q-panel QD-46 (102cm x 152cm) were solvent washed and then air spray coated with different 1k and 2k ant-corrosive coatings. A PVC ring was glued upon the surface and then an electrolyte solution was poured into the ring. A graphite electrode was used for the measurements, an potentiostat and a laptop / PC. The frequency range ran from 10^6 Hz to 0.01 Hz. Measuring to even lower frequencies simply would take too long making this setup less usable.

Example of the setup as it was used in the field

Field setup

In the field we need two electrodes in order not to damage the coating.

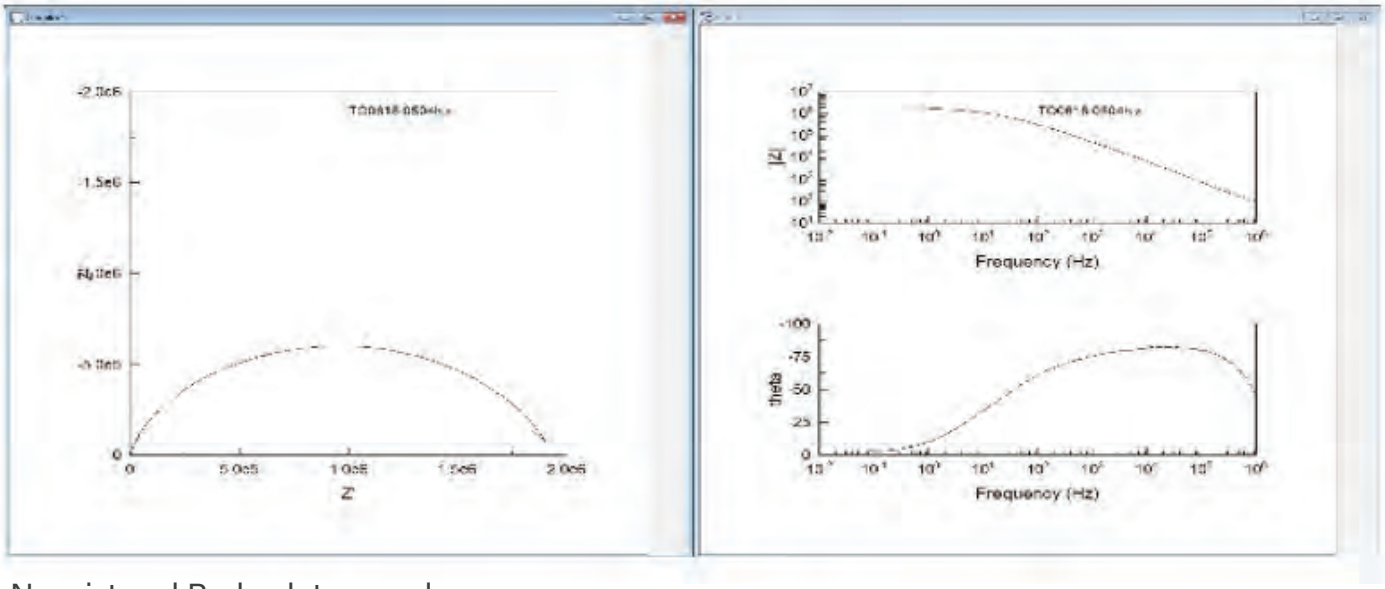
EIS data graph example

This kind of data presentation is not easy to interpret, for that reason a more common presentation is the Nyguist and Bode plots:

For more experienced EIS users these plots give already a lot more information. However, we would like to have simple numbers to compare coatings systems. To be able to get these we need an (electrical) model that imitates these measurements. There are numerous models that can we used, but the most popular uses a Constant Phase Element. Together with a Resistor for the electrolyte (Re) and a Resistor for the coating (Rc) the behavior of a good ant-corrosive coating can be modeled.

From the CPE we can calculate an Y0 admittance constant and a n-value that is the power of the CPE.

For coatings the Y_0 is an indication for number of polarizable groups in the



Nyguist and Bode plot example

coating. The value increases with time. Can be related to relative water absorption by using Brasher-Kinksbury equation.

For coatings the n-value shows the deviation of ideal coating behavior. An ideal anti-corrosive coating has an n-value of 1.

Results

In our laboratories, we successfully use EIS to evaluate our research and development tests.

With use of the Re, Rc, Y_0, n-value and the relative water take-up that can be calculated from two Y_0 numbers we were able to build up an extensive database of anti-corrosive coatings. We were able to make a ranking on anti-corrosive properties of our coating range. We were able to relate the real life measurement in the field on aged coating systems to those measurements that were done in the laboratory on the same or similar systems. In this way we were able to give advice on maintenance strategies on big projects. Examples of these measurements will be given in the presentation.

EIS is extremely powerful to pick-up any modifications that influence the anti-corrosive properties of a coating and that can be very useful when developing anti-corrosive coatings as well as detecting application errors in real life.

Generic Coatings Impedance results after 21 days.

Conclusions

Electrochemical Impedance spectroscopy (EIS) can be used both in the laboratory as well as in the field on real life objects to predict anti-corrosive protection.

Group	Rc (Ohm/ cm2)	Yo (sn/Ohm)	n	Rel. water uptake after 24 hr
Splash zone Epoxy Coatings	$8.0 * 10^{8}$	$5.5 * 10^{-11}$	0.96	0.01
Aluminium flake coating	$2.6 * 10^{8}$	$2.1 * 10^{-10}$	0.94	0,02
IOZ + HS Epoxy	$2.6 * 10^{8}$	$1.2 * 10^{-10}$	0.92	0,08
Heavy Duty Epoxy	$2.1 * 10^{8}$	$4.8 * 10^{-11}$	0.96	0,04
Novolac Epoxy Linings	$1.1 * 10^{8}$	$9.4 * 10^{-11}$	0.93	0,06
Surface Tolerant Epoxy, underwater curable	$1.1 * 10^{8}$	$4.2 * 10^{-10}$	0.85	0,28
Ceramic filled epoxy Lining	$9.4 * 10^{7}$	$1.0 * 10^{-10}$	0.93	0,10
High Solids Epoxy	$1.9 * 10^{7}$	$2.9 * 10^{-10}$	0.90	0,24
Amine Cured Phenolic Epoxy	$1.8 * 10^{7}$	$3.3 * 10^{-10}$	0.88	0,26

EIS is a fast and non-destructive test.

EIS is not yet industry wide accepted as good indicator for anti-corrosive performance of coating systems. ■

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INOLUB™ PTFE Micropowders for Coating applications

Polytetrafluoroethylene (PTFE) Micropowders are low molecular weight (LMW) PTFE, typically produced by degrading high molecular weight (HMW) PTFE. Gujarat Fluorochemicals Limited offers a range of PTFE Micropowders marketed under the brand name INOLUB™ T- series for coatings and paints applications to reduce friction, improve abrasion resistance and anti-fouling properties.

For coating applications, PTFE Micropowders are commonly used to significantly improve surface protection from abrasive forces during processing and transportation. INOLUB™ PTFE Micropowders are used as an additive in paints and coatings offering improvement in anti-sticking and slip properties, reduced friction and enhanced release properties, and resistance to microbiological growth – "Anti-fouling" effect. INOLUB™ T series PTFE Micropowders can be used in:

- Cookware/bakeware
- Industrial protective equipment
- Consumer electronics
- Architectural coil
- Metal cans
- Wood and plastic
- Marine paints
- Interior/exterior paints

INOLUB™ T series PTFE Micropowders enhance the properties of coating applications in a variety of ways to provide optimum performance. A concentration of 0.5 – 3.0% is typically required for the applications with higher concentrations required in case of cookware coatings. The particle size distribution and average particle size of the grades used in these applications should be properly selected. This helps to ensure that the desired surface appearance and characteristics are maintained in the cured coating. The thermal properties of PTFE improve the temperature resistance of the coating and maintain thermal stability during any high-temperature curing process.

INOLUB™ T PTFE Micropowders may be used independently as an additive or in combination with polyethylene waxes. The PTFE content at the surface layer is required in order to impart the properties of PTFE to the coating.

Sustainable Solution

Most commonly, the method used for producing PTFE Micropowders is degradation through exposure of HMW PTFE to e-beams or γ-rays. The primary products produced by radiation exposure of PTFE are terminal (-CF2–ĊF2) and middle (-CF2-ĊF-CF2-) fluoroalkyl radicals resulting from the detachment of fluorine atoms and polymer main chain scission. The free radicals lead to the generation of end groups like COF, COOH & CF3. The (Carbonyl Fluoride) COF end groups hydrolyse to carboxylic end groups (-COOH) in the presence of atmospheric humidity/moisture resulting in formation of PFOA (perfluorooctanoic acid). PFOA are resistant to biological degradation, breaking down very slowly in the environment, because of this they are classified under persistent organic pollutants (POPs) by Stockholm Convention in annex A and are considered to have an adverse effect on human health.

GFL has developed alternative technologies to produce a range of EU REACH compliant PTFE Micropowders grades for various applications like polymer & rubber compounding, lubricants & grease, coatings and inks & paints.

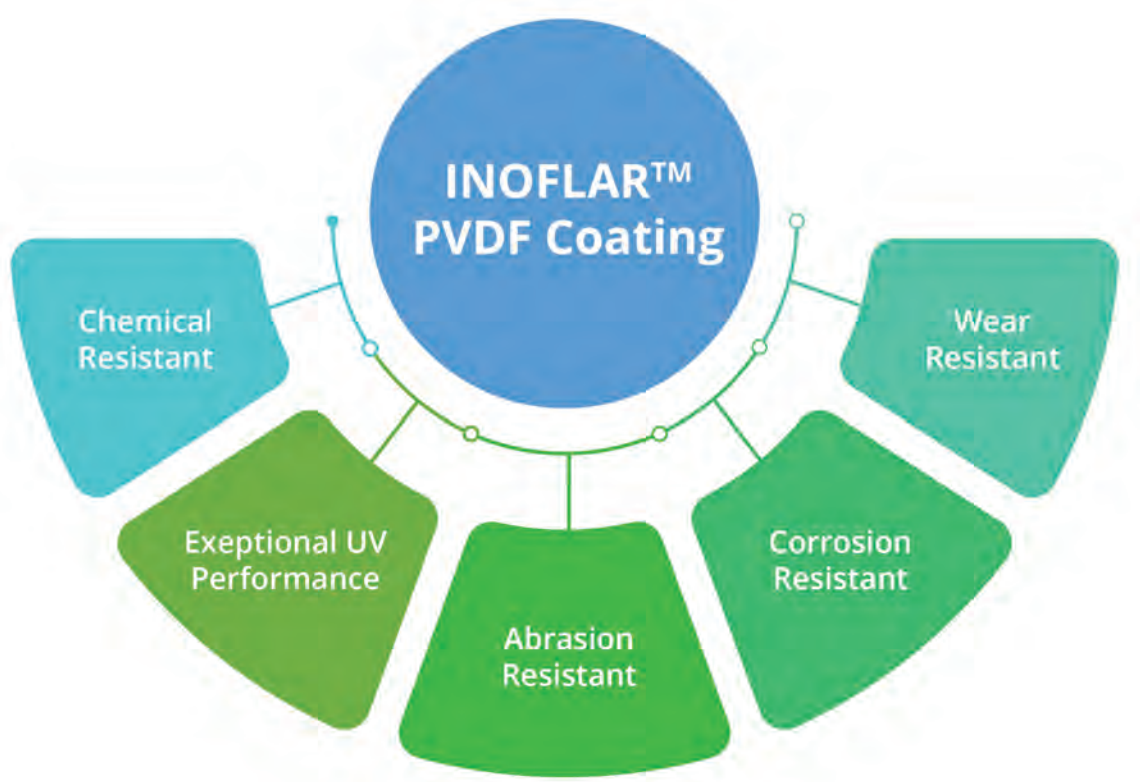
- T - 200 series: Directly polymerized (PMP)
- T - 300 series: Thermo-mechanically produced (XMP)
- WD - 200 series: PTFE micropowder aqueous dispersion
- T - 5000 series: Combination of two distinct morphologies
- R series: High molecular weight PTFE

Products produced using PMP and XMP technologies are compliant with EU REACH regulations. INOLUB™ PTFE Micropowders grades meet the compositional requirement of food contact regulations US FDA 21C.F.R.177.1550, US FDA 21C.F.R.175.300 and EU 10/2011 and comply with REACH regulations for POPs as per (EU) 2019/1021 & EU 2020/784 for PFOA and the revised limit (< 25ppb) that will come into force from 5th July 2022, and the proposed restriction limit for C9-C14 PFCA related compounds (< 260ppb). INOLUB™ PTFE micropowders contain PFOA << 25ppb and C9-C14 PFCA related compounds << 100 ppb.

INOFLAR™ PVDF FOR COATINGS

INOFLAR™ PVDF is a partially-fluorinated, semi-crystalline polymer with exceptional thermo-mechanical and chemical properties offering excellent abrasion and UV resistance. PVDF is the preferred material of choice in many specialty applications such as oil and gas, semiconductors, membranes for water filtration, plumbing, architectural coatings and photovoltaics.

Why INOFLAR™ PVDF



INOFLAR™ PVDF resins for Coating applications

INOFLAR™ PVDF coating is a pure thermoplastic fluoropolymer that is non-reactive and possesses multiple coating benefits. With an exceptional long-term UV (Outdoor) performance, INOFLAR™ coating is a chemical resistant, thick film barrier coating primarily used on chemical-processing equipment due to its low weight and low thermal conductivity. The coating is inert to most chemicals and solvents, and has excellent wear and abrasion resistance. INOFLAR™ PVDF coatings are especially resistant to solvents, acids and have a very low density compared to similar Fluoropolymers. INOFLAR™ PVDF coatings for steel, aluminium, and other metals also have a high dielectric strength, excellent resistance to weathering elements in harsh environment along with self-extinguishing properties generating very little smoke in an event of fire.

Solubility of INOFLAR™ PVDF resins

INOFLAR™ PVDF resins are produced via emulsion polymerization which yields a finer powder particle than obtained from suspension polymerization process. The higher surface area to volume ratio of INOFLAR™ PVDF powder aids easier and

faster dissolution of PVDF in solvents.

INOFLAR™ PVDF powder resins dissolve with comparative ease in the following solvents:

Active solvents		Latent solvents
Solubility ≈ 5 - 10% (w/w) @ 25 °C		Solubility < 1% (w/w) @ 25 °C
N-methylpyrrolidone (NMP)	Tetramethyl Urea	Acetone
Dimethylacetamide (DMAC)	Dimethyl Sulfoxide (DMSO)	Tetrahydrofuran
Dimethylformamide (DMF)	Trimethyl Phosphate	Methyl Ethyle Ketone

Generally, INOFLAR™ PVDF resins are not soluble in aliphatic hydrocarbons, aromatic hydrocarbons, chlorinated solvents, alcohols, acids, halogens and basic solutions. Some guidelines may be taken into consideration for improving the efficiency of this process. The method for adding the powder to the solution plays an important role in ease of dissolution and duration. Mixing speed, geometry of the stirrer and temperature of the solution play a key role in the kinetics of dissolution. There should be enough time for complete dissolution with slight heat that can improve the dissolution time. It is imperative to use dry materials and solvents and to operate in a dry environment in order to improve the dissolution process. ■

For more information

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Harnessing Total Engineering Solutions to Efficacy

Tell us about the manufacturing & services offered by Raschig PMC in India. What role do the Indian operations play in the group's global strategy?

For the domestic market, Raschig PMC India is offering engineering services for designing of distillation columns, absorbers and Liquid-Liquid Extraction columns. This includes both tangible and non-tangible services. Raschig PMC India is getting its products manufactured by third party organizations as per the quality standards of Raschig. Apart from this, Raschig PMC India is also offering back office engineering support to its head office situated in Ludwigshafen, Germany.

Walk us through the Total Engineering Solutions offered by Raschig PMC in India. Other than India which are the other key markets served by the Indian facility?

Raschig is offering Basic Engineering

Shrijeet Ray, Director, Raschig - PMC India Pvt. Ltd.

Services for units that comprise Distillation columns, Absorbers and Liquid-Liquid Extraction column. Our scope in Basic Engineering is not just limited to process design of the column, but also process design of all the associated equipment such as pumps, heat exchangers, blowers, tanks etc. We have presently serving the middle- east market apart from the local market in this field.

How do you address the issue of price point the in Indian market as there are many mid small-size companies in India that design and manufacture internal packing for columns and offer these to customers at a much lower price? What are the other challenges you have to address & how do you compare these with other markets?

This has been a very prominent issue for us for a very long time now as there are too many companies in the market offering the same product. This has ultimately brought a lot of saturation as a result of which one cannot expect decent margins in this product line not only in the local market but also overseas market. Hence the biggest challenge now is to constantly think of how to add new value to the customer for selling the same products. Raschig is currently focusing on providing total engineering solutions for columns as mentioned above and this by far is helping Raschig in gaining decent margins on the final hardware products offered as an engineering solution.

What is the competitive edge offered by Raschig PMC India Pvt. Ltd vis-à-vis other manufacturers & suppliers?

As mentioned above, Raschig with its in-house technology is offering a total solution for the process design of units comprising of columns. Also, Raschig is focusing on offering troubleshooting services to existing columns. This is where Raschig offers a competitive edge vis-à-vis other mid and small-size manufacturers & suppliers.

What are your future investment & growth plans?

We are now investing more and more in upgrading the skills of our employees in order to cater to the need of the customer for offering a total solution. We are also focusing on automating our work more and more in order to reduce the timeline of executing our projects. ■

For more information

https://raschig.de/en/home/

Avoiding Downtime with Proactive Maintenance

According to leading AI-powered predictive maintenance provider, Senseye, large plants lose an average of 323 production hours a year, adding that one hour of downtime can cost up to $532,000. Manufacturers cannot afford extensive periods of downtime, so proactively maintaining equipment is key to continuous production. Here Clive Jones, managing director of global UK-based thermal fluid supplier Global Heat Transfer explores how businesses using thermal fluid can prevent equipment failures with proactive maintenance.

Heat transfer systems and fluids can be challenging to maintain because once introduced to the pipes, fluid is invisible and therefore difficult to visually monitor. As a result, issues with the fluid may go unnoticed until there is a chemical blending failure, temperature inconsistencies, or extensive pipe damage.

Fluid degradation

Chemical reactions occur at high temperatures that thermal fluids must maintain for prolonged periods. Over time, operating for long periods at these temperatures can cause the fluid to degrade, due to oxidation and thermal cracking. These processes produce contaminants, such as carbon, which will start to build up inside the pipes and negatively impact heat transfer efficiency.

Taking accurate measurements

Regular sampling enables businesses to proactively monitor fluid condition. Maintenance engineers can gain accurate representations of the fluid's condition by taking samples at regular intervals from a hot, closed and circulating system. After sending a sample to a thermal fluid expert for analysis, plant managers can use the data to find any changes in fluid, such as


Regular sampling

carbon level, and intervene if adaptations to the maintenance programme are needed.

Incorrect sampling may give inaccurate flash point results, which can have dangerous consequences. Unless the fluid samples are collected when the oil is hot and circulating, the results may reveal artificially high flash point values. Incorrect sampling can lead to the inaccurate conclusion that the fluid is safe and does not require attention, or that systems need to be wrongly shut down.

Businesses may not have the in-house expertise to fix and maintain the heat transfer system, so they can invest in a thermal fluid expert to carry out the relevant tests and service needed to help extend boiler lifespan. Most thermal fluid specialists offer companies a seven-point test to determine the overall condition of the fluid. This test is sufficient, but some companies also offer more extensive analysis with eleven-point tests. These look at the sample in greater detail to ensure the results completely reflect reality.

The curve

Engineers can also use sampling to predict the lifespan of fluid, using data to monitor condition over time and detect trends. For example, as a fluid reaches the end of its lifespan, there is a gradual curve that drops off sharply, referred to by specialists as 'the degradation curve.' This sudden change in the quality of thermal fluids is one of the reasons why regular and preventative maintenance is so important.

At the beginning of this curve, plant managers can dilute the degraded fluid, by topping up the system as a cost-effective and durable option to return to optimal productivity. This is no longer an option when the condition of the fluid has significantly deteriorated. Instead,

General maintenance

plant managers must flush and clean the system, prior to refilling it with fresh heat transfer fluid as a long-term solution.

Automating fluid sampling

Operating a system efficiently and continual monitoring are the best methods for extending thermal fluid maintenance. Embracing digital technologies is one way that businesses can improve proactive maintenance. For example, many industries have benefitted from installing Industry 4.0 technologies that monitor machine performance. Traditionally, engineers have only sampled fluid manually, but the rise of Industry 4.0 technologies could change how engineers carry out thermal fluid management.

Light ends removal

Carbon is not the only cause of fluid degradation, as hydrocarbon chains break under high temperatures light ends are produced, lowering the flash point of the fluid and making it more flammable at lower temperatures. If samples show that light ends are forming rapidly, it indicates that the heat transfer fluid is not venting properly, allowing temperatures to rise. The build-up of light ends can be prevented by using a light ends removal kit (LERK), which removes light ends as they form.

Light ends removal kit

Engineers temporarily install a LERK to eliminate volatile light ends in the fluid. Light ends are collected when the hot thermal fluid flows through the distillation vessel and the gaseous light ends are collected in the liquid phase of the condenser. The light ends are either drained automatically or manually from the system.

Light ends can be managed on a more regular and automated basis by permanently installing a LERK on a new or existing system. Businesses can choose to install LERKs that use gravity to return the oil to the circuit or opt for a new range of active, floor mounted, LERKs that employ a frequency-controlled pump. ■

Author

Clive Jone
Managing Director
Global Heat Transfer

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Dellmeco Solid Block AODD Pumps for Additives, Pigments and Paint Industries

Fig 1: Dellmeco employee conducting Hydro Test of Pump

Industrial chemical production consists of three major categories. Commodities chemicals (aka bulk commodities), specialities chemicals and fine chemicals. Fine chemicals are high-purity chemicals produced in small quantities under stringent quality control. Commonly, used as an ingredient and building block for Pharmaceuticals, fragrances, additives, and pigments, solar panel and semiconductor industry.

These are way more expensive to produce than bulk chemicals because of complex and changing chemistry. Low tolerance on manufacturing specifications combined with high production cost necessitates strict measures in the production process to ensure precise quality. The slightest variation in purity may result in lot rejection by the end-user and subsequent loss in revenue while the negative impact on manufacturing reputation is inevitable.

Pumps are one of the major equipment which can influence the overall production process. To ensure uninterrupted production without any breakdown, the reliable operation of pumping systems is of utmost importance. Safety is the main selection criteria while handling highly toxic and dangerous material to avoid any potential health consequences and environmental impact. Pump handling flammable chemicals should be FLP and ATEX certified to meet statutory norms.

Let us analyze the suitability of various types of pumps based on the working principle.

Centrifugal Pumps

While centrifugal pumps are cost-effective and readily available, they are not particularly suitable for the process industry as centrifugal operation creates turbulence in the pumped liquid which may cause alteration in chemical properties. The presence of mechanical seals or packings makes them prone to leakage. Leakage can be reduced by using a double seal, however, the cost is high and additional maintenance is required. Another option is a magnetic drive centrifugal pump with zero leakage. Magnetic coupling has limitations on transferable torque, which in turn limits their use to low viscosity liquids. Again, the cost is the main restraining factor.

Positive Displacement Pumps

Gear pumps lack efficient and reliable operation, degrading gear teeth due to continuous meshing result in loss of efficiency and fluctuating flow. leakages from mechanical seals and packings are inevitable. Lobe pumps are prone to product slippage at low viscosity products, resulting in compromised production rates. PD pump maintenance is more and construction is bulky compared to available options of AODD pumps.

Air operated double diaphragm (AODD)

AODD pumps are popular choices due to their simple and safe construction operation, and suitability to handle flammable, corrosive, thick and thin liquids of different viscosity levels. reciprocating motion of flexible diaphragms ensures gentle handling of liquid, liquid with small solid particles can also be pumped. The absence of a mechanical seal ensures leak-free operation. Single model of AODD pump can be used for a wide range of flow and head requirements as per different system design, just by changing the input air pressure discharge flow and head can be altered. AODD pumps are portable solutions that eliminate the requirement of electric motors and complicated speed control mechanisms like VFD or gearbox. Additionally, setup and operation of FLP electric motors are in itself a risk in hazardous areas. Whereas AODD startup is much simpler, priming is not required, the pump can be started and run dry, and suction lift is up to 8-9 meters. Fire hazard is reduced as there is no electric involved, pump body can be grounded to dissipate static charges while handling any flammable liquids.

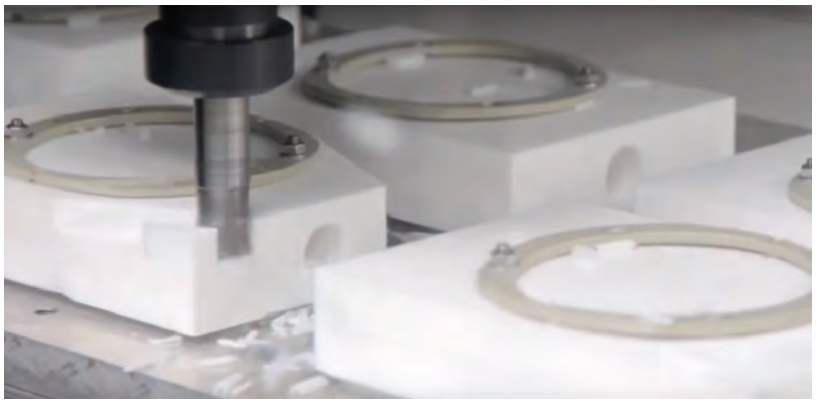


Fig 2: Plastic Body Dellmeco Pump under automated machining

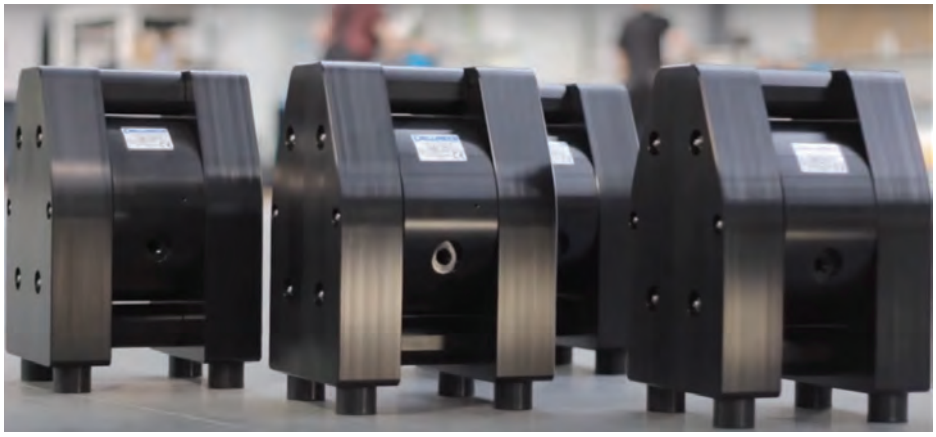


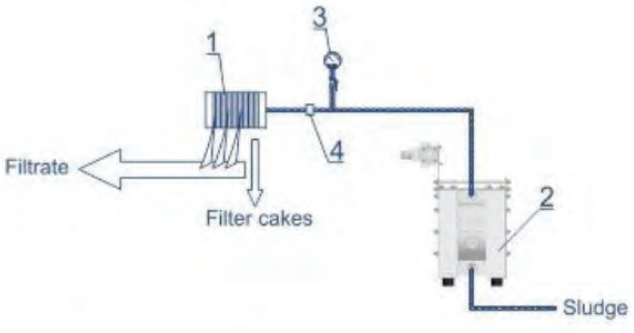
Fig 3: Fresh lot of Dellmeco ZTT Series, Dellmeco ZTT pump can be made from conductive Teflon and be used for almost all liquid.

Why Dellmeco?

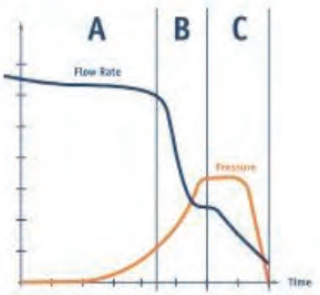
As we have seen above, the AODD pump is an obvious and logical choice in the process industry transfer application. Let's briefly go through the unique advantages that Dellmeco solid block AODD pump offers over conventional injection moulded counterparts.

Plastic body Dellmeco AODD pumps are CNC machined which ensures tight tolerances, Injection-molded plastic pumps can have small cavities or crevices in the body where liquids can accumulate and potential leak paths can be created. Solid block Pump is made out of a single piece that is machined, hence they are inherently stronger and have higher pressure ratings. Dellmeco AODD pump can operate up to 8 bar air pressure compared to competitors 6.5 bar. Under normal operation with 4 - 5 bar air pressure, higher pressure rating increases durability and delays common wear and tear.

During their operation, injection-moulded pumps can also vibrate or bounce more than solid-body models due to lower-dimensional integrity, which can loosen pipework and increase the chances that a leak path will form. Dellmeco



Part no.	Name
1	Filter press
2	Filling and pressure maintenance pump
3	Pressure gauge
4	Bursting disk



Typical operating cycle of filter press

A – High capacity filling allowing filter cake formation.
B – End of filling, filtration resistance, capacity reduction.
C – Pressure maintenance, filter cake formed, high filtration resistance,

Fig 4: Schematic diagram of Dellmeco HP pump with Filter Press System

pumps have 180 degree rotatable Inlet and outlet connection manifolds to help to accumulate existing pipeline work misalignments.

Dellmeco conductive PTFE pumps are unique due to their suitability to almost all types of chemicals, single pumps can be used for handling a wide range of acidic, caustic and solvents solution and flammable and non-flammable chemicals. Dellmeco ZTT series pump unleashes the possibility of using the common pump for different applications, the plant can interchange pumps during an unexpected breakdown. Also overall spare management will improve.

High-Pressure Applications

Another interesting application in the chemical industry is Filter Press. As the filter cake gets fully developed, resistance to flow increases and develops high discharge pressure. Dellmeco high pressure (HP) option is an especially designed compact booster that can be directly mounted to the pump. It is capable of doubling the delivery pressure, for example, with an available air pressure of 7 bar the pressure can be up to 14 bar. ■

For more information

www.shanbhags.com
info@shanbhags.com

AGRU PFA Sheets for the Sulphuric Acid Production at the OMV Refinery in Schwechat/ Austria

A new condenser design engineered by OMV and INWA AG using PFA foils from AGRU halved maintenance costs and increased the maintenance intervals as well as safety. A total of three condensers have already been rebuilt and renewed.

OMV, the largest industrial company in Austria, refines fuel products and petrochemicals in Austria. In the refining process crude oil and natural gas are converted into high-quality fuels, oils and other special products such as paraffin, heating oil, bitumen, sulphur and sulphuric acid. A downstream flue gas cleaning system (SNOx) cleans the flue gases and allows to burn high-sulphur fuels in the power plant. Due to the high sulphur content in the fuels, SO2 is produced during combustion, which is then used for the production of concentrated sulphuric acid. Since sulphuric acid is the most commonly used acid in the world, there is a global interest in this product. Contaminated flue gas is turned into clean exhaust air and a sellable industrial product, which is used in a variety of applications.

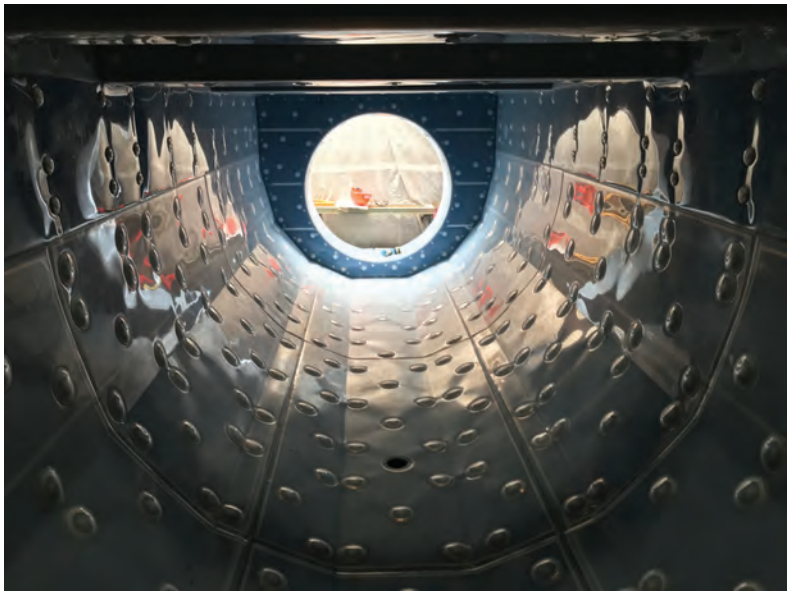
In the flue gas cleaning system dust is filtered via electrostatic precipitators in the first step. Afterwards the NOx is removed in a catalytic process in a second step. The remaining SO2 gases are then oxidised via converters to SO3. In the last step of the converter, the majority of

the SO3 reacts with H2O to form H2SO4 vapour. The vapour is transported to the heat exchanger, in which the gaseous sulphuric acid is condensed to liquid H2SO4 with a concentration >94 %. The condensing droplets of sulphuric acid are formed on the surfaces of the heat exchangers (acid condenser) and the surrounding equipment. The dew point of the flue gases is reached, if the gas temperature drops below approx. 240 °C - 260 °C, which depends on the exact combustion gas composition. The condensation of the acid droplets on metal surfaces would lead to the so called "dew point" corrosion, in which mild steels and stainless steels are destroyed quickly. In order to achieve sufficient resistance to the highly aggressive application conditions, a multi-layer structure is often used, which consists of the following materials: Chemical stone lining, foam glass layer, non-welded PTFE plates, chemical protection layer and a carbon steel tank.

This lining system was also used at OMV. Due to the significant increase in maintenance work and the associated operational downtimes and repair costs incurred, the economic efficiency of the SNOx plant decreased over time. During the repair work, it became apparent that the multi-layer structure did not create a long-term leak-proof lining system, which caused corrosion of the carbon steel tank by the condensing sulphuric acid. As a result, it was necessary to remove the lining system, which was already soaked with acid, to refurbish the steel structure and install a new lining in a further step.

AGRU commissioned a Swedish testing institute to carry out an exposure test, in which AGRU PFA natural foils were exposed for one year at temperatures and concentrations, that exceeded the operation conditions (260 °C, 98 % sulphuric acid) without any significant changes to the product properties. A PFA fixed-point lining system was specified as the optimal lining system.

Compared to the old design, the chemical protection layer now consists of two PFA foils located on top of each other, whereby the PFA foil at the bottom was simply installed for additional operational safety. The steel tank at the bottom, which is not in contact with the medium during normal operation, was additionally lined with a PFA foil in order to achieve a comprehensive corrosion protection even in the event of leakages.



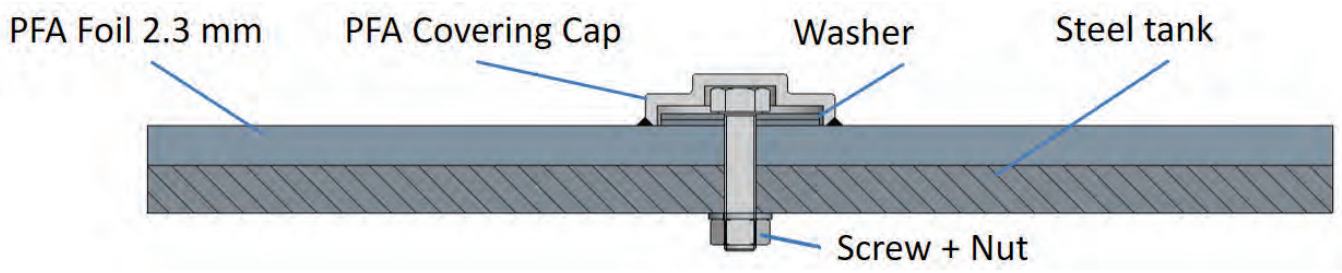


Figure 4: Sketch of mechanically fixed PFA sheet and injection moulded cover cap

The PFA fixed-point lining offers simple repair options since the foil can be welded again after proper preparation in the case of damages. Therefor time-consuming special repair work with different materials will no longer be necessary.

Figure 1 shows the installation and welding work of the AGRU PFA foils in the sump area. Figure 2 shows the final lined condenser, before put into operation.

PFA Fixed Point Lining

Procedure: a PFA natural foil is fixed to a steel structure by mechanical fastening using bolts or screws. This system is mainly used in flue gas applications and desulphurisation plants to withstand temperatures up to 260 °C.

In order to be able to seal the multi-layer PFA foil structure, a thermoformed PFA covering cap was developed in cooperation between INWA AG and AGRU, see Figure 3.

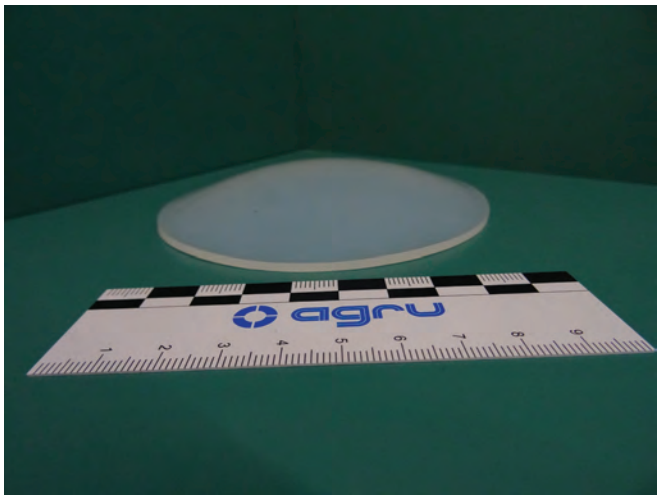


Figure 3: Thermoformed cover cap

Conclusion

In the course of a routine inspection no damages or abnormalities were detected on the PFA lining. Mr. Ronald Hoffer (OMV) concluded after the inspection: "Despite the highly aggressive application conditions, the PFA foil lining shows no noteworthy damage or changes after an operating period of three years. It seems that foil has just been installed".

The specified project goals were achieved:

- Increase in reliability
- Halving of maintenance costs
- Reduction of downtimes by 75 %
- Increased operational safety due to an additionally installed lining system. ■

For more information

https://www.agru.at or
office@agru.in

ABB India Smart Metering Solutions for Efficient Energy Management

Energy management is one of the biggest challenges in business applications and has a huge impact on the cost of operations. To ensure optimal energy efficiency, ABB India has launched a new series of electrical measuring and power monitoring meters for the electrical market which is growing at a CAGR of 6% for the period between 2017 to 2023. With this introduction, ABB India offers a comprehensive portfolio in addition to the existing range of single, multifunction meters and network analysers, catering to the Panel Meter market across industries such as healthcare, hospitality, infrastructure, and F&B to name a few.

These smart solutions in metering and energy monitoring enables users to make better choices to monitor their power consumption. The meters guarantee basic to complete power quality analysis and accurately monitor the energy assets for residential, industrial, and commercial building segments. The newly introduced M1M11, M1M DS, M1M 20B and M1M 30B cover the main submetering easily and cost-effectively by powering quality monitoring requirements inside power factor correction boards, motor control centres or sub-distribution switchboards of commercial and industrial buildings.

Kiran Dutt, President-Electrification at ABB India said, "The emerging Panel meter market and our introduction of new range of meters offers a huge potential for customers to better manage energy performance across industries. Thanks to their connectivity capabilities, M1M can now leverage on the integration in ABB's Ability™ Energy and Asset Manager cloud-computing platform to monitor, optimize, and control the complete electrical system.

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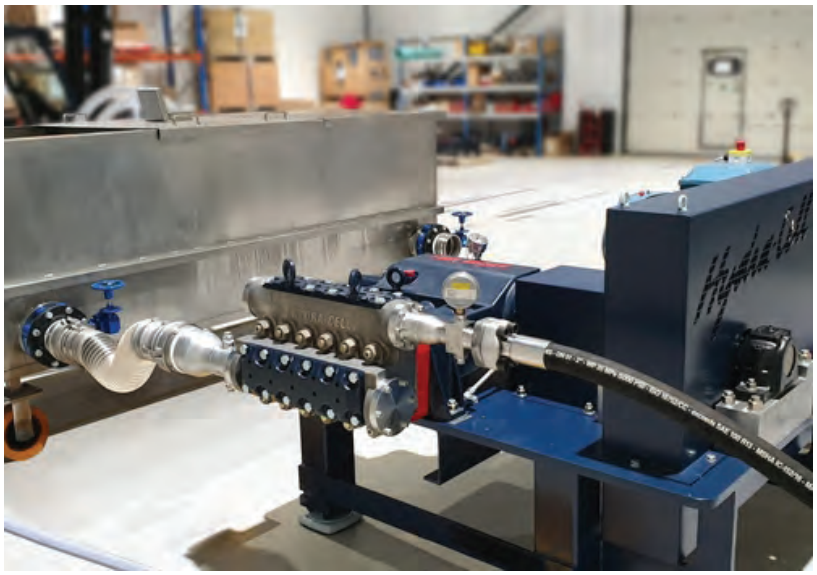
Reducing Energy Usage Up To 50% for Industrial Sectors

To mark the New Year, Wanner International has announced that it can reduce the total energy usage by up to a half for some industries that rely heavily on pumps for their processes. The company is focusing on the importance of reducing energy consumption in the wake of COP26, and wants to highlight that it is playing its part in making a more sustainable future a reality.

Wanner provides pumps for a range of industries across the globe, from oil and gas, through to food production, chemical and pharmaceutical production. Of course, it can't on its own solve the carbon crisis, but what it is doing is examining every pump it manufactures, helping customers reduce energy usage by careful placement of Hydra-Cell® pumps, and squeezing carbon out of the system.

Choosing the right pump technology can have an effect on energy usage. The Hydra-Cell® pump's true positive displacement action and minimal internal losses achieve high efficiencies from pump shaft to hydraulic power; this combined with the wide range of flow rate controllability ensures optimum energy usage. Alternative pump technologies with inherent internal losses, which get larger as internal parts wear, start to become lower in efficiency as the discharge pressure goes above 10 bar and only gets worse with increasing pressure.

Some of Wanner's Hydra-Cell® pumps have been reliably operating in the field for



a quarter of a century plus, which again frees resources that can be devoted into improving sustainability. Considering that some industries in which Wanner operates, such as oil and gas, are shifting heavily into renewables, the flexibility of the Hydra-Cell® pump to handle many different liquids coupled with its high energy efficiency and reliability has a large role to play in reducing the carbon footprint.

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Be it, Lubrication film or Bearing Damage, BC200 detects it and helps in optimizing bearing life thereby increased equipment reliability and productivity.

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R.N.I. No. 11403/1966 Date of Publication: 29th of every month

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