9TH SULPHUR AND SULPHURIC ACID CONFERENCE | 2025

27-28 MAY 2025 - CONFERENCE

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Abstract Book

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THE SOUTHERN AFRICAN INSTITUTE OF MINING AND METALLURGY JOHANNESBURG 2025

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FOREWORD

It is my pleasure to welcome you to the 9th Sulphur and Sulphuric Acid conference hosted by the SAIMM. The conference is hosted every second year and brings together role players in the sulphuric acid industry.

This year the conference is hosted from 27 to 28 May at the Protea Hotel Stellenbosch.

Preceding the conference, Topsoe will host a workshop on wet sulphuric acid technology to treat metallurgical off gas, and BASF will host a workshop on catalyst technology.

The conference proceedings will cover various topics such as sulphur and sulphuric acid supply and demand, sulphur handling, gas cleaning, acid production technology and digitalisation.

With the increase in mining and production of metals such as copper, cobalt and uranium in Sub-Saharan Africa, logistics is becoming a major topic of discussion. Sulphur and sulphuric acid needs to be sourced and then transported in large quantities over poor infrastructure to consumers.

The Sulphur and Sulphuric Acid Conference provides an opportunity for plant operators to interact with their peers, technology suppliers, and industry experts.

I encourage each delegate to actively participate and share your knowledge and experience.

Thys Claassens
Conference Chairperson

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Conference Chairperson

Thys Claassens

Vice President Metal Sales Africa
Metso

Career started in 1984 at the then Pelindaba.

Started in the Hydrofluoric acid plant in operations, moved to project management and commissioning, then moved New Business Development.

Joined Kynochem in 1999. Spend 3 years in Botswana to set up METSWAKO Chemicals as the O&M for the Bulk acid handling facility that supply HF and other acids to the Aquarium project at Jwaneng. In 2002 moved back to South Africa as Senior Project manager at Chemical Initiatives, focussing relocating an acid plant to the DRC and other Sulphuric acid related projects and sales.

Moved to Outotec in 2010. Currently Vice President Metal Sales Africa at Metso. Responsible for the successful marketing and technical support of Metals technologies (Roasting, Smelting, Gas cleaning and Sulphuric acid technologies)

Keynote Presenters

Freda Gordon

Director
Acuity Commodities

Freda Gordon, based in London, UK, is Director of Acuity Commodities. She complements the Acuity team with a focus on short- to medium-term market analysis in the global sulphur and sulphuric acid markets, which she has dedicated her career to analysing since 2010. She honed her experience and analytical skills editing several key price assessment publications and giving papers at international conferences. Her previous roles span journalism, business strategy, communications, marketing, public relations and social media.

Freda grew up in Hong Kong where she learnt to speak and write fluent English and Mandarin as well as Cantonese. She earned her bachelor's degree in biology at the Hong Kong University of Science and Technology and held editorial roles in Asia before relocating to London in 2008

Will Thomas

Senior Commercial Manager
BASF Metals, UK

Mr Will Thomas manages the Platinum Group Metals (PGM) sales for BASF in EMEA, as part of BASF's Environmental Catalysts and Metal Solutions (ECMS) business. BASF ECMS is an industry leader in automotive emissions control catalysts, and in the recycling and trading of PGMs, where Will specialises in managing price risk and supply risk for end-users of metal. Prior to BASF he gained broad experience of precious metal markets at a leading bullion bank (an investment bank specialising in precious metals) and a major international trading house. He has twice served on the Management Committee of the London Platinum and Palladium Market (LPPM).

Acid test: The future of sulphur and sulphuric Acid

F. Gordon
Acuity Commodities, United Kingdom

With increasing global turbulence, the commodities market – including sulphur and sulphuric acid – has undergone significant changes. This presentation will explore these shifts and their potential impact on the market over the next 6-12 months. The demand for sulphur and sulphuric acid is rising as their applications expand, leading to increased competition for these commodities as feedstock. As the world addresses climate change and advances in artificial intelligence, sulfuric acid is becoming increasingly popular for its use in producing various phosphate fertilisers, chemicals, and critical minerals. The demand for acid is expanding beyond fertilisers, copper, zinc, and nickel. We are closely monitoring developments in electric vehicles (EVs), battery technology, uranium, manganese, rare earths, and more. With Southern Africa rich in many such resources, we will examine the regional situation and discuss the increasing demand for critical minerals that is driving the demand for sulphur and acid over the next few years. The broader usage of sulphur and sulphuric acid also exposes these markets to global geopolitical changes. A new world order is reshaping international relationships. Amid shifting geopolitics and rising protectionism influencing policy changes, we must consider how these shifts will alter trade flows of sulphur, acid, fertilisers, and related commodities as various trade wars unfold. Will trade wars hinder economic recovery? This also exposes supply chain risks and creates uncertainties in pricing, which we will address. There was a period when many believed we were transitioning away from fossil fuels. Now it appears that a complete shift might not be feasible. The ambitious requirements are too great for uniform adoption worldwide, and many countries are instead adding to their energy sources. This will inevitably affect sulphur and sulphuric acid production. We will review the supply and demand for both commodities, with a specific focus on Southern African regions and relevant markets. Sulphur production and consumption are both expected to grow, and we will discuss the factors contributing to a slight surplus expected in 2025 and 2026. For acid, we will present our forecast for global production and consumption and discuss their contributing factors. We will also explore the drivers and constraints in both the east and the west of Suez, such as increases and delays in smelter acid production, and demand changes in the west, such as flat to weaker demand in Latin America and lower demand in Europe.

Regional growth prospects for acid

S. Sackett
Southern African Perspectives, South Africa

This paper we will highlight all the projects currently being planned, commissioned or under consideration in the region. How will they impact the sulfuric acid supply and demand balance from 2024 -2030? A few scenarios will be presented depending on how many projects actually become operational. The emergence of more metallurgical operations will compete with sulfur burners and the impact this will have on regional acid dynamics.

Steve Sackett
Director
Southern African Perspectives

Steve has been involved in the sulphur & sulphuric acid industry for over 40 years. He has held positions in production management, technical support, marketing and tradingfields and company management.

Steve is currently director of Southern African Perspectives, where he is also a shareholder.

Southern African Perspectives supplies market information in the form of bespoke market studies and offers strategy development and consultancy work, utilising the regional knowledge gathered over many decades.

Steve has presented papers at many conferences before both locally and internationally

Extending campaign lifetime and converter reliability with BASF's cutting-edge sulphuric acid catalyst technologies

J. Willersinn
BASF SE, Germany

With experience of over 150 years in sulphuric acid production and the first granted patent on the sulphuric acid catalyst ($V_2O_5/K_2O/SiO_2$) published by BASF, the company celebrated the patents 111th birthday in 2024. BASF provides effective and versatile solutions to support sulphuric acid producers achieve stricter emissions limits, as market conditions and environmental regulations increase. BASF recently embarked on a venture in superior catalyst geometry designs that greatly improve performance in various processes and strongly supports sulphuric acid producers to reach their emission standards. The introduction of the Quattro sulphuric acid catalyst family to the market in 2015 was only the beginning of this successful journey, followed by the launch of the X3D® technology in 2022. This step-change catalyst manufacturing technology enables significant increases in productivity as well as energy savings. In metallurgical units, the efficiency of reactors that convert sulphur dioxide (SO_2) into sulphur trioxide (SO_3) is largely influenced by the throughput of the smelter or roaster. BASF's new high-performance catalysts offer significant advantages in this context. By extending the operational lifespan of the plant and minimising extended start-up times and unplanned shutdowns, operators can achieve substantial cost savings. This economic edge is critical in a competitive market. BASF's Quattro catalyst range stands out due to its increased surface area, which facilitates lower operating temperatures and enhances conversion rates. Additionally, these catalysts boast significantly improved crush strength, allowing for longer campaign durations and minimising pressure drop build-up, which is essential for maintaining optimal reactor performance. In this presentation, we will showcase the significant benefits of BASF's high-performing Quattro catalysts within metallurgical units, illustrating how they can extend the duration of converter campaigns, optimise startup behaviour, and provide overall conversion enhancements.

Dr. Jochen Willersinn
Technology Manager Sulfuric Acid Catalysts
BASF SE

Jochen studied chemistry at the Johannes-Gutenberg-University in Mainz, Germany with a focus on polymer- and organometallic chemistry, followed by a diploma in polymer chemistry at the Max-Planck-Institute for Polymer Research in Mainz, Germany. After finishing his PhD at the Max-Planck-Institute of Colloids and Interfaces in Potsdam, Germany, he joined BASF in 2017 as Lab Leader in the Research Department. In 2022, Jochen joined BASF's Process Catalyst Division to work as Technology Manager for Sulfuric Acid Catalysts for the EMEA region. Here, he supports clients to achieve their emission and production targets with BASF's cutting-edge catalyst technologies for sulfuric acid production.

Capacity and uptime boost: Optimising sulphuric acid plant from 2200 to 3000 MTPD

P. Foith
CS Combustion Solutions GmbH, Austria

This case study presents a comprehensive strategy for the capacity enhancement and optimization of a sulphuric acid production plant principle of dry process. The current plant, producing 2200 MTPD of H_2SO_4, faces several operational challenges that hinder its efficiency and reliability. Key issues include poor atomization quality of pressure atomizers, inadequate mixing due to poorly constructed baffle walls, recurrent hot spots causing damage to the refractory, and significant problems with the carry-over of unreacted sulphur, leading to fouling and impaired heat transfer in the waste heat boiler tube sheet. Additionally, increased pressure drop due to sulphur in the catalytic beds necessitates frequent downtimes for cleaning. The proposed solution aims to increase the plant's production capacity to 3000 metric tons per day while addressing the aforementioned issues through a series of targeted optimizations:

1. Ultra-Sonic Nozzle Atomization: Replacing the current pressure atomizers with ultra-sonic nozzles to reduce the droplet size from 400 to 110 µm, significantly improving the atomization quality and enhancing the efficiency of sulphur combustion.
   Swirl Bodies for Sulphur and Oil Combustion: Incorporating swirl bodies in the combustion system to induce rotation in the combustion air. This modification promotes optimized flameformation and a more efficient combustion process.
2. Single Vector Wall Installation: Replacing the existing baffle walls with a single vector wall to ensure superior mixing and prevent the presence of unreacted sulphur, thereby minimizing carry-over and associated fouling issues.
3. Pre-Casted Dish-End Side: Replacement of the refractory of the dish-end side of the furnace with pre-casted bricks to eliminate hot spots and enhance the overall durability of the furnace lining.
4. Computational Fluid Dynamics (CFD) Study: Conducting a CFD study to model and optimize all proposed changes. This step ensures the most effective implementation of the upgrades, maximizing performance and minimizing risks before actual modifications are made.

These measures collectively address the primary operational challenges, significantly reducing downtime and maintenance costs, and enabling a substantial capacity increase. The innovative use of ultra-sonic nozzles and CFD modelling represents a forward-thinking approach to enhancing the efficiency and reliability of sulphuric acid production. The findings of this case study not only demonstrate a successful capacity increase but also provide a robust framework for similar plants facing comparable issues. The detailed analysis and implementation strategy offer valuable insights into the optimization of sulphuric acid production processes, contributing to the overall advancement of the industry. By presenting this case study at the upcoming conference, we aim to share our successful methodology and results with industry experts, fostering knowledge exchange and potential collaborations to further enhance sulphuric acid production technologies.

Peter Foith

Sales Manager
CS Combustion Solutions GmbH

A member of CS Combustion Solutions' Team of experts for burners & incineration applications and with over ten years of experience in the optimization of combustion processes, Peter Foith is bringing in his expertise as Sales Manager.

Supported by the decade-long know-how of the CS team the latest focus has been the case study, which shows the massive potential with revamps of existing Sulphur furnaces (dry process) by switching to pressure atomization systems.

Sulphuric acid recovery using nanofiltration: Boosting efficiency, sustainability, and ESG alignment in hydrometallurgy

T. Coetzee[1], D. Verwey[2]

[1]Memcon, South Africa
[2]BME Metallurgy, South Africa

The recovery and reuse of purified sulphuric acid using nanofiltration (NF) membrane technology present a transformative opportunity for hydrometallurgical industries to enhance both operational efficiency and environmental sustainability. Sulphuric acid is consumed in large quantities for metal extraction, incurring substantial cost, wastewater treatment and handling risk to operations. Nanofiltration membrane technology, enabling selective ion separation, offers an effective means to recover and purify sulphuric acid from waste streams in processes such as ion exchange (IX) columns in uranium extraction and acid electrowinning baths in copper production. This paper explores the fundamentals of NF membrane technology, which enables the selective permeation of sulphuric acid ions like $H_2SO_4^-$ while retaining multivalent metal contaminants, thereby allowing for the recirculation of purified sulphuric acid back into the system.

Through case studies, including successful implementations by Memcon in pilot tests and full-scale plants, this presentation demonstrates the benefits of NF membrane technology. Through integrating NF membrane technology, industries can achieve a circular economy model, aligning with environmental, social, and governance (ESG) goals and principles of green chemistry. This approach not only contributes to the recovery of valuable resources from waste streams but also minimizes the environmental impact associated with sulphuric acid disposal and the risks linked to acid transportation.

These findings underscore NF membrane technology as a viable, sustainable solution for hydrometallurgical processes that rely on sulphuric acid. The case studies provide valuable insights into operational optimization, while the broader discussion emphasizes the role of NF membrane technology in promoting sustainable practices within resource-intensive industries.

Thomas Coetzee

Engineering Manager
Memecon (Pty) Ltd

Thomas has worked in industry for 10 years. Starting in traditional bulk water treatment and the latter half of his professional career has been focused on membrane technology. He has worked internationally for a tech start-up (Netherlands) as well as a large membrane manufacturer (Germany). Thomas is currently the Engineering manager at Memcon based in JHB, South Africa. He aims to engage with the mining and hydromet industry on the massive benefits that membrane technology offers to these industries.

Daniel Verwey

Engineering Manager
Memecon (Pty) Ltd

Daniel Verwey studied Chemical Engineering graduating Cum Laude from the University of Pretoria and starting his career with a bursary from Impala Platinum as a Metallurgist and rose up the ranks. Thereafter he moved to Protea Mining Chemicals, now BME Metallurgy, heading up the technical department, before adding responsibility for business development. Amongst others he is responsible for driving development of the performance chemical strategy, including successful commercialisation of specialised reagent solutions across various metal extraction processes, including gold, copper and cobalt, uranium and PGM sectors.

Expanding the capacity of your sulphuric acid plant

T. Vanderwalt
Elessent, South Africa

During the life cycle of a plant the site requirements might change. This can be higher acid and/or steam demand, larger off-gas throughput and/or reduced emission. In this paper we will review aspects to consider at the beginning of such a project to decide on the general strategy. This will include design, bottleneck identification and methods to address bottlenecks. Planning and execution of such a project will be discussed, and pictures will be shared of two actual projects that were executed internationally to demonstrate specific considerations.

Tjaart van Der Walt
Execution Director
MECS® Europe/Africa

Joined MECS in 2001 in South Africa with sales and technical responsibilities and was transferred to Brussels in 2009. Until the end of 2017 he worked as Regional Alloy Product Manager and focused primarily on Technical support in EMEA and India. Currently working as Execution Director MECS® / Elessent Clean Technologies. Prior to joining MECS® in 2001, Tjaart worked for Kynoch Fertilizers for 7 years in sulphuric Operation, Maintenance, and Project Managements roles.

Challenges in sulphur melting and purification process for the sulphuric acid industry

J. Hermans
Sulphurnet, The Netherlands

The sulphur market is quite dynamic: due to the energy transition we are moving away from fossil fuels towards natural energy sources such as solar power, wind energy, and a variety of other alternatives.

The sulphur distribution channels are changing from a chemical by-product into a commodity chemical; with producers keeping prices high.

Because sulphur is a by-product of oil refining and gas recovery, the availability of liquid sulphur is becoming limited. As a result, different qualities of sulphur are entering the market which is not always beneficial to the sulphur melting and filtration process.
Sulphur remelting is a technology that requires skilled technology providers. Throughout the process we encounter a variety of steps that require extensive process understanding.

- Sulphur in solid form contains 10 parts per million of hydrogen sulphide (H2S) (according to general specification). Emissions must be kept under control. So, how can you build a melting system that releases the least amount of H2S while avoiding costly scrubbing systems?

- To minimise pressure build-up in the first catalytic bed, the converter requires highly pure sulphur. What is the ideal configuration for filtration cycles and melting capacity to get the most bang for your buck?

- The first self-cleaning liquid sulphur filter was installed by Sulphurnet. We can now give more details about this technology after one year of operation.

During the presentation at the 2025 SAIMM Conference in Stellenbosch, Sulphurnet will present the complete sulphur melting and filtration process and provide information about the above topics.

Jan Hermans

Director
Sulphurnet

Education in Process Engineering in the Netherlands.
Jan worked more than 20 years with Sparkler Filters International designing filtration systems and filtration solutions for the chemical process industry.
He was involved in sulphur filtration for the sulphuric acid industry since 1995.

In 2007 Jan started his company SULPHURNET and focused on sulphur purification and processing. Experience gained during plant audits resulted in improvements of the sulphur and purification process.
Since 2012 Sulphurnet offers complete engineering packages for sulphur melting and purification plants. Since 2012 Sulphurnet designed various plants with capacities between 2 to 100MT sulphur melting per hour. A fully automated 500MTPD melting and purification plant, including a Self-Cleaning Liquid Sulphru Filter Sulphurnet is in operation since 2018.

Over the years Sulphurnet continuous to offer conventional pressure leaf filters and liquid sulphur polishing filters as well the Self-Cleaning Liquid Sulphur Filters, Melting tanks and liquid sulphur pump systems.

In 2016 Sulphurnet developed some new technology for sulphur extraction. Elemental sulphur can be extracted from ores, waste streams and other sulphur containing products. The ore can be processed without producing sulphuric acid.
It can also be used to reduce the waste streams by removing the elemental sulphur.

In 2025 Sulphurnet is awarded with the design of the Largest European Sulphur Melting and Filtration plant. The construction is intended to start in 2026 and will go into operation in 2027, the 20th anniversary of Sulphurnet

Understanding the sulphuric acid catalyst properties and reaction resistances in the SO_2 oxidation – and their implications for catalyst design and selection

C. Frandsen
Topsoe, Germany

The alkali pyrosulfate-promoted vanadium catalyst for sulphuric acid production is a very dynamic chemical system; its performance, and thus the overall sulphuric acid plant performance, depends on an intricate balance between the changing gas composition, temperature and the impact of mass and energy transport. The temperature, gas strength, and pre-conversion levels differ in the individual beds and at each position in an SO_2 converter, thus impacting on the chemistry and intrinsic and overall rate of the catalyst. To develop a new catalyst for a specific environment or optimize the catalyst performance in a particular condition or bed, it is crucial to understand not only the behavior of the catalytic material itself and the reaction mechanism, but also the relative importance of different reaction resistances in this environment. The interdependent nature of catalyst and plant operation means that it is not sufficient to only understand the different parts – it is also necessary to model the behavior throughout the different conditions in the SO_2 converter. With over 80 years' experience as a catalyst producer, Topsoe is committed to constantly improving understanding of the working catalyst by using advanced laboratory techniques combined with kinetic and reactor modelling and full-scale experience from industrial plants. Our paper will explain and illustrate, with examples, how the different catalyst properties can be optimized to maximize their performance in different conditions. It will also demonstrate how this knowledge can be applied in practice to select the most suitable catalyst solution for a specific condition or to achieve a specific plant performance.

Casper Vittrup Frandsen

Account Manager
Haldor Topsoe

Casper started his carrier back in 1991 in Haldor Topsoe, where he took up a position as process engineer for Haldor Topsoe's new pilot plant facilities to development Topsoe's technology for different Chemical processes.

In 1995 he changed to the Research and development, where he has worked within in many catalyst fields: DeNOx, Automotive, Filtration technology, oxidations catalyst, sulphuric acid catalyst and technologies for the sulphuric acid industry and general new technologies within Haldor Topsoe.

In 2008 he changed to the Technical and Sales group where he worked as Senior Technical Advisor for some years before transferring to sales.

Today he is Account Manager for the sales and services of Haldor Topsoe Sulphuric acid catalyst business.

Maintenance and servicing of LEWIS® pumps equipment

I. Metin
Weir Minerals, Turkey

This paper provides a comprehensive guide on the maintenance and servicing of LEWIS® Pumps equipment, emphasising best practices to ensure optimal performance and longevity. LEWIS® Pumps, established in 1891 and based in Saint Louis, Missouri, has a long-standing reputation for excellence in the pump industry. The paper outlines the importance of maintaining a clean and well-lit work environment, utilising a mechanic and a helper for all maintenance tasks, and the necessity of thorough record-keeping to determine maintenance schedules and minimise downtime.

Key reasons for rebuilding pumps include wear and tear from continuous operation, cost-effectiveness compared to purchasing new pumps, downtime reduction, performance improvement through upgraded materials and parts, preventive maintenance to avoid unexpected failures, and environmental considerations by reducing waste. The paper highlights the critical role of serial number identification in ensuring the correct replacement parts are shipped and the importance of tracking parts used for each pump.

Detailed procedures for disassembly and inspection are provided, with a focus on shaft inspection, ensuring straightness, and proper ball bearing installation and lubrication to prevent premature failure. Common issues such as corrosion, sulphate formation, cavitation, and foreign particles are addressed, along with solutions to mitigate these problems. The paper also covers the proper storage of rebuilt pumps in vertical racks to check alignments and prevent dust entry, and installation tips to ensure correct pump operation.

Troubleshooting guidelines are included to address common issues like vibration, ball bearing failure, insufficient discharge capacity, and excessive power consumption. The risks associated with using non-OEM parts are discussed, emphasising the importance of using genuine parts to maintain pump integrity. Additionally, the presentation introduces various service tools designed to assist in the maintenance of LEWIS® vertical pumps, including assembly assist tools, ball bearing installation tools, lock nut wrenches, and impeller nut wrenches.

Overall, this paper serves as a valuable resource for mechanics and maintenance personnel, providing essential knowledge and practical tips to ensure the efficient and reliable operation of LEWIS® Pumps equipment.

Ilker Metin

Weir Minerals
Regional Account Manager Africa & Middle East

I am currently serving as the Regional Account Manager for Africa & Middle East at Weir. With a degree in Mechanical Engineering, I joined Weir in 2012 as a Service Manager. Over the years, I have had the opportunity to grow within the company, being promoted to Country Manager in 2018. Since October 2023, I have been managing accounts for Lewis Pumps, Delta Valves, and Hazleton Pumps.

My journey at Weir has been both challenging and rewarding. Starting as a Service Manager, I honed my leadership and technical skills, which paved the way for my promotion to Country Manager. In this role, I successfully managed operations and contributed to significant growth in my region.

As the Regional Account Manager, I now oversee key accounts in the Africa and Middle East regions. My extensive experience in the industry, combined with a strategic vision and commitment to excellence, has helped enhance our company's presence and performance in these markets. I pride myself on building strong relationships with clients and stakeholders and taking a proactive approach to problem- solving.

Digital solutions for maximum efficiency

T. Claassens
Metso South Africa (Pty) Ltd, South Africa

Digitalisation is key to overcoming day-to-day challenges such as achieving operational consistency support for remote locations and compensating for the lack of skilled personnel, as well as overcoming maintenance hurdles and corresponding productivity loss by process plant and equipment monitoring. It is essential to provide the right information at the right time to take informed decisions in the form of accurate, neutral, and unbiased reporting.

Platinum Group Metals: A critical moment

W. Thomas
BASF Metals, UK

Recent events, from the Covid-19 pandemic to the semiconductor shortage to the rising geopolitical and trade tensions we see today, have forced a rethink of supply chains globally. For users of raw materials in particular, the emphasis has shifted away from speed and leanness towards security and robustness. It has also brought into sharper focus the issue of "critical" raw materials – the concept is not new, but the urgency is. Many countries have designated the Platinum Group Metals (PGMs) as "critical" in one way or another to their industries and economies, and even to their security.

For South Africa, the PGMs have been "critical" for a long time, but in a different sense: the PGM mining industry is a major employer and a significant contributor to GDP. And for the global PGM markets, South Africa is critical in return, as by far the single largest source of primary PGM supply. But the PGM landscape is at the beginning of a fundamental and possibly irreversible change, as demand for automotive catalytic converters, which account for a significant majority of PGM end-use, goes into decline as non-catalysed Battery Electric Vehicles take market share from traditional Internal Combustion Engine vehicles. In other words, this is a critical moment for PGMs; we will discuss how things might play out in the coming years, and explore the possible implications for the future "criticality" of PGMs in all its aspects.

How to successfully run a four-year acid plant campaign

B. Mumba, T. Mwanza, P. Ng'ambi
Kansanshi Mining PLC, Zambia

The Kansanshi sulphuric acid plant reached ten years of operations in March 2025 and at the same time the plant has achieved four years of continuous operations without catalyst screening. Previously, high pressure drops in Bed 1 were a major challenge resulting in shorter catalyst campaigns and negatively affected the plant availability. This problem was overcome through multiple interventions over the years. A good plant design, good maintenance practices and good operational discipline are important in optimising the performance of an acid plant to protect it from corrosion and premature failures. Knowledge of areas that are vulnerable to corrosion, high thermal stresses and pressures is very important and tools have to be developed to continuously monitor them. This paper explores the Kansanshi sulphuric acid plant operations and the key parameters monitored, and practices adopted that have helped to extend the catalyst campaigns from two years to four years.

Trevor Mwanza
Senior Metallurgist
Kansanshi Mining plc

Trevor Mwanza is a Zambian metallurgist with over 10 years of experience in the mining and mineral processing industry. He holds a Bachelor of Mineral Sciences in Metallurgy and Mineral Processing from the University of Zambia. Currently, he is a Senior Metallurgist at Kansanshi Mining PLC, where he focuses on optimizing plant performance and developing innovative monitoring tools.

Zimplats SO_2 abatement plant design

S. Matutu[1], J. Bezuidenhout[2], G. Erasmus[2]
[1]Zimplats, Zimbabwe
[2]Hatch, South Africa

The 2024 expansion at the Zimplats Selous Metallurgical Complex (SMC) included the installation of a new 38 MW electric smelting furnace and two 12x24 Peirce-Smith converters. This expansion introduced new primary off-gas sources requiring off-gas cleaning and SO_2 abatement. The design of the primary off-gas system starts with understanding the upstream smelting process conditions and flow variability that influence the off-gas system's operation. Once the process conditions are defined, selecting the SO_2 abatement technology involves evaluating various options and screening them against project-specific criteria. This initial engineering phase provides the basis for further process engineering, flowsheet development and discipline engineering. These design steps are discussed as well as detail engineering considerations such as key process controls and mechanical layout development.

Keywords: Zimplats, Smelter Gas Cleaning, Sulphuric Acid, SO_2 Abatement, Platinum Group Metals (PGMs), WSA Plant, Electric Smelting Furnace, Peirce Smith Converting

Johan Bezuidenhout
Process Engineer
Hatch

Johan is a Registered Professional Process Engineer with 17 years' experience in the metallurgical industry, all with Hatch. Currently, Johan is part of the Industrial Clean Technology Group within Hatch which is focussed on developing industrial waste gas solutions across all commodities.

Is an acid plant overdue in Namibia to cater for the envisaged demand from upcoming uranium projects?

P. Aluvilu[1], H. Katty[2], D Garrard[3]
[1]Pamwe Royalties and Streaming (Pty) Limited, Namibia
[2]Punto De Vue Holdings (Pty) Limited, South Africa
[3]Pamwe Mining Fund (Pty) Limited, South Africa

Sulphuric acid, commonly known as oil of vitriol, remains key to the agricultural, chemical, textile and metal process industry; its global demand is forecasted to grow to meet food and metal demands. In Namibia, the third largest producer of uranium oxide, sulfuric acid is crucial in the extraction circuit where it dissolves uranium from ore, making it soluble. By the end of 2024, Namibia had an annual sulphuric acid domestic capacity of about 500,000t, but imported about 100,000t of sulfuric acid that year, which was almost entirely consumed by the uranium mines. By 202, Bannerman Energy's Etango Uranium Project is envisaged to commence production, with projected acid needs of 200,000t per annum. Other players in the manganese and agriculture space are expected to commence operations in 2027, thus the expected increase in the demand for sulphuric acid; which begs the question – does Namibia need an acid plant to cater for this envisaged demand? Combined with environmental regulations that would impact pyrite ore-generated acid and the supply chain disruption risk due to heightened geopolitics, a localised acid plant using sulfur could be the answer. The calculation indicates that a 330,000t per annum plant size, costing about R2.0 billion, using desalination water and selling generated electricity could be economically viable in Namibia.

Keywords: Sulfuric acid, sulfur, uranium, environment, supply chain, geopolitics

Protasius Aluvilu
Chairperson
Pamwe Royalties and Streaming (Pty) Limited

Protasius, Founder and Chairperson at Pamwe Royalties, is a mining engineer with over 10 years of experience across the mining operations value chain (exploration, production, processing, and management). He holds a Masters in Metals and Energy Finance and a professional certificate in Project Foundations.

Protasius is a professional engineer in training with the Engineering Council of Namibia [Reg. No.: PE2414239 (TR)] and a Member of the Southern African Institute of Mining and Metallurgy (SAIMM) [Membership No.: 705348].

State-of-the-art sulphuric acid making – platinum promoted honeycomb ceramics on the way to opex and capex reduction

P. Piantino, J. Hofer, A. Sigg
P&P Industries AG, Austria

The global demand for sulphuric acid is rapidly increasing, driven by several factors, particularly in the Southern African mining and metallurgical industries. The rise in base metal production, due to the demand for batteries in electric vehicles, is one of the key factors. As industries work to meet decarbonisation targets and manage fluctuating energy prices, the need for efficient sulphuric acid production is greater than ever. New sulphuric acid plants are being developed to support critical processes in these industries. However, these projects often face long construction timelines, and current supply chain challenges force companies to source sulphuric acid from remote locations. Additionally, stricter emission regulations and rising energy costs demand efficiency in both operational and capital expenditures.

P&P Industries AG offers innovative solutions across three critical processes that rely heavily on sulphuric acid, each addressing efficiency and sustainability challenges.

Off-Gas Cleaning after Smelting: The off-gases from smelting contain sulfur dioxide (SO_2), dust, and metal particulates. These gases must be cooled, dedusted using technologies such as electrostatic precipitators, scrubbers, and cleaned with several steps of processing. The SO_2 is then converted into sulphuric acid, ensuring that emissions are minimised. The proper gas cleaning is crucial to prevent clogging and poisoning of downstream catalysts, as well as maintaining continuous, efficient operations in metallurgical sulphuric acid plants. P&P's gas cleaning technologies are designed to optimise long-term plant performance and meet environmental regulations.

Spent Acid Regeneration after Metal Extraction/Leaching: The metal extraction process, where sulphuric acid is used as a solvent to dissolve target metals from ores and concentrates. Following this, the spent sulphuric acid can be recovered using P&P's patented Sulphuric Acid Regeneration (SAR) process. The process involves decomposing the spent acid, gas cleaning, and converting the SO_2 back into sulphuric acid. This reduces both environmental impact and operational costs by recycling the acid and minimising waste. SAR is a key component in ensuring that sulphuric acid can be reused sustainably in mining and metallurgical applications.

Hydrometallurgical Process: Sulphuric acid is critical for breaking down ores and freeing the metal for further processing. Fresh sulphuric acid can be generated from off-gases produced during smelting, allowing it to be used in the hydrometallurgical process. This closed-loop system enhances sustainability and reduces reliance on fresh sulphuric acid supplies. Additional high concentrated sulphuric acid (> 98,5 w%) can be manufactured from solid sulfur in a P&P sulfur oxidation plant (SOP).

To address challenges in sulphuric acid production, P&P Industries has developed a new generation of platinum-promoted honeycomb catalysts, which offer a promising alternative to traditional vanadium-based catalysts. These catalysts are more efficient in the SO_2-oxidation process, with lower ignition temperatures and lower pressure drop, which relates to reduced energy consumption. The use of platinum as the active material on a honeycomb structure results in higher activity and durability, reducing operational costs and maintenance requirements. P&P platinum catalysts reduce blower power consumption, eliminate catalyst screening, and have high recyclability, making them a sustainable choice for long-term operations. The design also prevents common issues like gas channelling, sagging, and attrition known for bulk catalysts. In a case study, the implementation of platinum-promoted catalysts in a 3+1 and 3+2 configuration demonstrates significant improvements in energy efficiency, reduced emissions, and lower operational costs. These catalysts are also well suited for retrofitting existing plants and optimising greenfield projects, helping the industry achieve stricter emission regulations and energy efficiency goals. This technology represents a major step forward in sulphuric acid production, contributing to cost reduction, environmental compliance, and long-term sustainability.

Paul Piantino

Senior Sales and Marketing Manager
P&P Industries AG

I have over two decades of experience in international sales, business development, and marketing. Throughout my career, I have successfully driven sales growth in global markets, developed strategic market entry plans, and built strong relationships with clients, consultants, and government authorities. I thrive in challenging environments, adeptly navigating complex trade regulations and adapting sales strategies to meet diverse cultural and regulatory requirements. My expertise lies in delivering tailored solutions and fostering customer satisfaction.

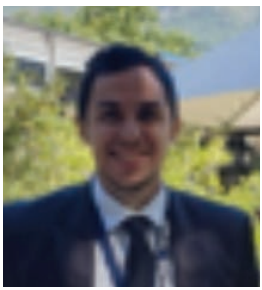
Beyond sales, I bring a creative approach to marketing, with hands-on experience in designing impactful brochures, organizing public relations campaigns, and delivering presentations to diverse audiences. My academic background in European Economy and Business Administration has further honed my skills in export management, marketing, and human resource management.

Outside of work, I am passionate about woodworking, running and experimenting with cooking.

Innovative energy recovery in existing sulphuric acid plants

E. Almeida
Clark Solutions, Brazil

With a history of safety risks in sulphuric acid energy recovery, most plants worldwide have opted for acid cooling by wasting energy through evaporation in water cooling towers. Addressing this issue, Clark Solutions has developed the SAFEHX, a three-fluid heat exchanger that physically separates acid and water even in the event of a leak, enabling safe energy recovery. Due to plant configurations designed to disregard acid energy recovery, the standard heat recovery solution involves significant changes to the existing layout. While this approach offers substantial returns, it requires a considerable initial investment and shutdown time. In response, Clark Solutions introduces one of the many possible SAFEHX installation configurations that requires reduced investment and minimal layout changes while delivering significant results by recirculating acid from the main pump tank to heat make-up water for deaerators.



Eduardo Almeida
Process engineering coordinator
Clark Solutions

Chemical Engineer graduated from the University of São Paulo. Coordinator of process engineering at Clark Solutions, responsible for sizing and pricing equipment, engineering studies, troubleshooting and debottlenecking mechanical separation and mass transfer processes, with experience in process evaluation, tailor-made solutions, computational fluid dynamics and multi-physics simulations.

Highly sophisticated gas cleaning systems for roasting plants optimised with digital solutions

K. Knabel
Metso, Germany

In the past decades ore grades have decreased, and environmental regulations exacerbated. Therefore, the roasting of copper concentrate and pyrite tailings are increasingly the focus of metallurgical operations. The off-gases from those applications are highly complex and need flexibly-designed gas cleaning solutions to cope with environmental regulations and to maintain targeted acid qualities. Based on two reference sites, Metso will demonstrate the solutions for high sophisticated gas cleaning systems, optimised by using digital solutions.

Dr. Klaus Knabel
Senior Sales Manager
Metso

Since 2000 - Lurgi Metallurgie, Outokumpu Technology, Outotec now Metso
Since 2015 - Head of Commercial product management sulphuric acid and off gas
Since 2019 - Senior sales manager Solution sales gas cleaning and sulphuric acid plants

A new era of alloy tower in the sulphuric acid industry

T. Vanderwalt
Elessent, South Africa

As a plant ages, there comes a time when large equipment must be replaced. This is also true for acid towers. In this paper we will review aspects to consider at the beginning of such a project to decide on the general strategy. This will include design, sourcing, logistics, schedule and installation. A case study of a large-scale project that was executed internationally will be used to demonstrate specific considerations. The paper will highlight safety considerations.

Tjaart van Der Walt
Execution Director
MECS® Europe/Africa

Joined MECS in 2001 in South Africa with sales and technical responsibilities and was transferred to Brussels in 2009. Until the end of 2017 he worked as Regional Alloy Product Manager and focused primarily on Technical support in EMEA and India. Currently working as Execution Director MECS® / Elessent Clean Technologies. Prior to joining MECS® in 2001, Tjaart worked for Kynoch Fertilizers for 7 years in sulphuric Operation, Maintenance, and Project Managements roles.