XPS Bulletin
ISSUE 9 - WINTER 2012

xstrata
process support

2012 – A Year of Milestones for XPS!

A warm welcome to the winter edition of the XPS Bulletin.

As the leaves have fallen from the trees in Northern Ontario and here in Canada, Leaf fans may be spared another season without Leaf playoff hockey, we at XPS are celebrating a year of milestones for our business.

At the time of publishing, XPS has gone about 2,000 days, almost 5.5 years or 800,000 man-hours without a lost time injury. This is quite an achievement, one we are all very proud of and one which is a credit to our employees and safety systems. It is in line with our values, *we act with care* and *we hold ourselves accountable* and it is reflected in the quality of the testwork and consulting services we provide.

After over 6 years, XPS has clients from all over the mining/processing industry with over 60% of our business from companies outside of Xstrata. This includes testwork and consulting in the base metals industry and also includes the refractory, free milling gold business and the rare earth business. This has required development of procedures and corresponding training of personnel. As always, our people have responded and we are very confident in our new capabilities. In addition, we have gained traction in development and sales of equipment, such as XPSFloat™ to be featured in future editions of the Bulletin. Our efforts to diversify our products and services is not complete. We are considering other areas including expanding our capabilities in hydrometallurgy.

Our Plant Support group, managed by Mike Papadakis has proven to be a real success story. Mike and his team of metallurgists and consultants have made significant contributions to successful start-ups at Nixon Fork, AuRico Gold Young-Davidson and at Hudbay. We provide specialized experience that is scarce today along with support from the XPS groups in Process Mineralogy, Process Control and Materials Technology. It's a winning combination.

In 2012, XPS reached another milestone of over 700 projects completed or in progress. These have varied in size and scope from initial scoping level studies to process control assignments and complete fl wsheet development projects, complete with mini-pilot plant campaigns. We are all very proud of this accomplishment and we thank you, our clients, for your continued loyalty.

We are also continuing to increase staff in the key areas of expertise. We would like to welcome Mika Muinonen to the position of Manager Extractive Metallurgy. Mika brings over 14 years of experience in technology/operations and project management in all areas of extractive metallurgy. Mika was also one of our first EITs.

In addition, we welcome back Tara Rana, Process Control Engineer; Jose Adante, Chief Engineer Plant Support; and Qiang (Shawn) Yu, Materials Project Engineer

Mika Muinonen
XPS Manager Extractive Metallurgy

to our XPS team of professionals. For the laboratory and in the field, we have added several graduate technologists and three Engineers in Training (EITs) to our existing experienced technical team. Our values guide us to responsible growth by hiring only the most qualified people to fill our needs and serve our valued customers.

Personally, 2012 has been an exciting year, full of change and "firsts". I have enjoyed it immensely and look forward to the challenges ahead as we execute our strategy.

We at XPS wish you and your families all the best for the coming holiday season and good health and prosperity in 2013.

Dominic Fragomeni
Director, XPS

In this issue

Look us up on SAMSSA

XPS can also be found on the Sudbury Area Mining Supply & Service directory

SAMSSA
Made in Northern Ontario for the World

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Young-Davidson Mine Declares Commercial Production with Assistance from XPS!

The Young-Davidson gold mine is located near the town of Matachewan, approximately 60 km west of Kirkland Lake in Northern Ontario. The property is situated on the site of two past producing mines that produced one million ounces of gold in the 1930s–1950s.

With the assistance of the XPS Plant Support group, the mine declared commercial production in September on schedule.

Current production is coming from an open pit forecast to produce 65,000-75,000 ounces in 2012 and 135,000-155,000 ounces in 2013. The mine is expected to ramp-up to over 250,000 ounces of annual peak production by 2016.

We provided experienced metallurgists to support the mill commissioning and subsequent stabilization of the processes. As part of the support XPS provided, we also developed and delivered operator training packages for key areas within the mill. As part of the mill stabilization effort XPS has been called upon to complete diagnostic testwork at our facility in Falconbridge, Ontario.

XPS was also called upon to provide temporary relief in the Mill Superintendent's role. XPS supplied a seasoned Mill Superintendent to assist by bridging the gap until the replacement was on site and fully up to speed. At the time of publishing, XPS is providing transition assistance.

"XPS added value to our mill commissioning and production efforts. They collaborated well with our team at AuRico Gold; bringing reliable skills, knowledge and expertise to our mill. XPS helped guide and implement projects to monitor our process, as well as increase our throughput and recovery in a safe manner. It was a pleasure working with XPS personnel"

Don Lively, Young-Davidson Mill General Foreman.

Our Plant Support group offers a full range of services focusing on in-plant, practical, hands-on technical assistance. The group consists of a team of experienced metallurgists and consultants that can lead or contribute to a Type 1 Start up of your plant.

XPS has complete gold diagnostic testing, gold cyanidation, and refractory gold pre-treatment testing capabilities

Mike Papadakis
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"XPS provides a very useful service for a seamless transition of department managers. The additional support ensures KPI's are met, safe operating procedures are followed and process improvements are sustained during the transition. XPS was also helpful in developing and leading action plans for the completion of the acid wash and gravity circuits which included oversight of final construction, supplier, SOP development, HAZOP analysis and commissioning."

Don Emms, Young-Davidson Mill Superintendent.

XPS personnel and the Young-Davidson Team at the Young-Davidson Mill.

Koniambo Commissioning Support – Control Infrastructure

Xstrata Nickel's Koniambo Project in New Caledonia is currently in commissioning as they prepare for first ore by the end of 2012. The project design relies heavily on the use of Profibus DP, a digital communications bus, to link field instrumentation and electrical motor controls to the ABB Distributed Control System that is used for control and monitoring of the facilities.

Digital communications buses such as Profibus have advantages in that they enable functionality such as remote configuration and diagnostics of devices from the same systems that are used to monitor the process value or status information. At the same time there are potential cost savings in installation as a single twisted-pair cable can be used to communicate to multiple devices. However the Profibus design guidelines must be adhered to, particularly with respect to communications speed and network topology, and the installation guidelines must be followed to ensure good signal quality and robustness to electromagnetic interference. Deviating from the guidelines makes communication errors very likely.

Gary O'Connell, Project Technical Director, along with Thierry Bonnet de Larbogne, KNS Process Control Manager, requested XPS Process Control group to assist in troubleshooting of the Profi us installations when problems were experienced during pre-operations testing. The Process Control group has two certified Profibus professionals (Alan Hyde & Phil Nelson) within the group.

A two week visit to the Koniambo site was made in August. This visit followed a brief visit two weeks earlier by a Profibus expert from Australia. The purpose of the XPS visit was to conduct further investigations of other Profibus networks to confirm the extent of the problems, and to determine if any other issues were present within the design and installation. Troubleshooting of digital communication buses requires different tools and techniques to traditional hardwired analog and discrete signals. One of the best tools for Profibus installations is Procentec's ProfiTrace tool. This is a combination of software and hardware that allows a connection to be made to the bus to monitor the communications traffi . An integrated digital oscilloscope allows the quality of the electrical signal and the waveform to be analysed. Using this tool, XPS along with personnel from KNS and Hatch, were able to identify issues in other networks not previously tested. A number of tests were conducted to verify the behavior of different network topologies at various communication speeds, along with the effect of individual hardware components.

At the end of the visit XPS was able to make a number of recommendations to improve the robustness of the Profibus networks and to achieve reliable communications – as intended by the design.

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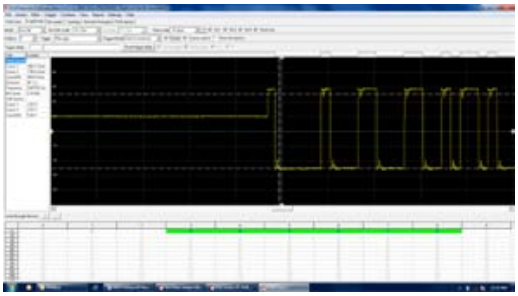
Koniambo Plant under construction.

ABB Profibus DP Communications Interface Modules



ProfiTrace oscilloscope output

Teck Coal Fording River Operations

Process Control Review at Teck Coal Fording River Operations

In June of this year, Alan Hyde, Chief Process Control Engineer, and Tara Rana, Project Metallurgist – Process Control, visited Teck Coal's Fording River Operations (FRO) to conduct a process control review of their wash plant. Teck FRO is located in the Elk Valley in south western British Columbia. The wash plant removes waste material from Run-of-Mine (ROM) coal to produce around 9 million tonnes annually of clean metallurgical coal for the steelmaking industry.

During the 1-week site visit Alan and Tara spent time with the plant process engineers, operators, PLC specialist, and maintenance personnel to discuss the wash plant design, control, and operation, along with current problem areas and their future vision for the plant. A wide range of topics were covered, including selection of field instruments for specific applications, control system design for operator effectiveness, control and operation of thickeners, dense media circuits, and flotation circuits, and project management.

To assist Teck FRO with a plan for a higher level of control and automation to meet the plant operating objectives, XPS delivered a comprehensive report detailing the discussions and observations made at site. The report provided information on best practices, as well as recommendations on instrumentation, control systems design, and process control improvements. Opportunities were identified in the area of implementation and commissioning of necessary higher level measurements and control strategies. Teck FRO have used these recommendations to initiate a project that will upgrade field instruments and automate large parts of the plant to meet the unique challenge of processing in excess of thirty coal seams.

Alan and Tara wish to thank Thomas Davidson and the rest of the Teck FRO team for their assistance in making the review a success.

Alan Hyde, ahyde@xstratacopper.ca
and Tara Rana, trana@xstrataps.ca

Wash Plant Control Room

Heavy Media Cyclone

Treatment of Refractory Gold Ores

While the recovery of free milling gold by gravity and direct cyanidation is normally relatively straightforward and well-established, refractory ores pose a very different challenge to producers and new mine developers.

The first challenge is determining the reason for the poor recovery by direct cyanidation, which can be caused by one or more contributors. The oldest and best understood is gold locked in sulphide, and most frequently pyrite. The second contributor to refractory behaviour is arsenic in the form of arsenopyrite or antimony in the form of stibnite, which causes low recovery even at low concentrations. The presence of carbon in the ore is also a frequent cause of poor recovery, not because it makes the gold unresponsive to cyanidation but because it readily absorbs gold in solution and leads to "preg-robbing". When these refractory contributors present themselves in combination, obtaining satisfactory gold recoveries can prove a real headache. Fortunately there are cures.

A key to success is a proper diagnosis of the cause. First, XPS executes a very systematic sequential leaching technique known as a "Diagnostic Leach" which clearly identifies where the gold is in the ore by systematically destroying key minerals, followed by cyanide leaching of the residue until all of the gold has been recovered. In addition, quantitative mineralogy to establish modal abundance of mineral species and sometimes even identify gold deportment is performed. With the new QEMSCAN FEG (see article Spring 2012 XPS Bulletin) a higher number of gold particles can be found thus improving deportment statistics.

Once the cause has been identified, there are a number of alternatives for treating the ore. Firstly, the gold can be made more amenable to cyanidation by ultra-fine milling, followed by a hot atmospheric leach – the Albion Process. A second solution is complete pressure oxidation (POX), which is effective for all conditions except carbon. The third method is roasting – either the well-established simple dead roasting to convert pyrite to hematite while oxidising any carbon present, or two-stage roasting to firstly remove arsenic by partial roasting followed by dead roasting.

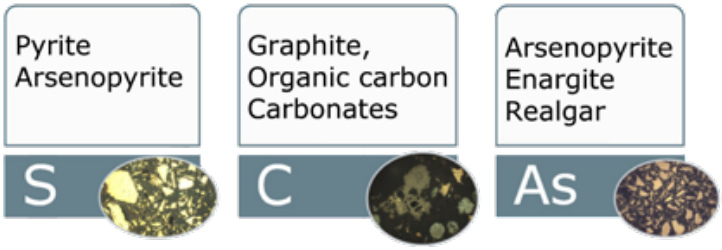


Fig 1 – The causes of refractoriness in gold ores

Since XPS has expertise in fine grinding, pressure hydrometallurgy and pyrometallurgy, these skills have been bundled into a "one-stop-shop". At XPS, a client can have the diagnostic leach performed to determine the cause of a particular refractory behaviour with quantitative mineralogy using QEMSCAN. This is followed by a review of the options and a recommendation as to which of the alternatives best suits the client's needs followed by appropriate testing in our fully-equipped laboratories.

With our combined experience in mineral processing, pyrometallurgy, and hydrometallurgy, XPS is well suited for the detailed metallurgical testwork required for successful refractory gold processing.

Arthur Barnes, abarnes@xstrataps.ca
and Rajan Pandher, rpandher@xstrataps.ca

Fluid Bed Roasting

Roasting can be completed in either 2" or 4" diameter continuous fluid bed roasters, each equipped with a cyclone, afterburner for combustion of arsenic and/or sulphur vapour, condenser, and scrubber. Typically, 1-5 kg of feed is suffi ient for preliminary comparative evaluation using the 2" roaster, while 20-50 kg can be sufficient for longer duration testing in the 4" roaster. Both roasters are fully instrumented with thermocouples, pressure measurements, and gas analyzers to ensure reliable data capture.

Pressure Oxidation

Pressure oxidation tests are carried out in a stirred 2L Parr bench-scale autoclave, which typically handles charges of approximately 1 kg. The autoclave is constructed of titanium and can be operated with an optional glass liner. It is fully automated to measure and control the temperature and pressure within the autoclave and the gas flow into the autoclave. The process measurements are captured continuously to a PI server.

The Albion Process

XPS has been engaged in metallurgical testing of ultrafine grinding for several years. We are currently in the process of installing and commissioning a bench-scale agitated leach tank to collect key metallurgical data for the evaluation of the Albion Process for a given ore or concentrate. The Albion setup at XPS comprises an M4 IsaMill to produce the ultrafinely ground ore or concentrate, followed by leaching in an agitated tank at atmospheric pressure. Approximately 15 kg of feed is required for determining the signature plot in the IsaMill, but a single Albion leach test can be carried out on 1 kg of ground material.

XPS Parr 2L Parr Autoclave

Cyanidation

Having removed the deleterious elements by roasting, pressure oxidation, or Albion leaching, the residue from the pre-treatment stage is leached in a cyanide solution to leach out and recover the gold. This is accomplished using standard bottle roll tests, which can be run for up to 72 hours. The key data such as slurry pH, dissolved oxygen content and cyanide concentrations are recorded and/or maintained throughout the experiment. Samples are taken at the same time, so that leach kinetics throughout the experiment can be subsequently determined. Multiple bottle roll tests can be run concurrently on our cyanidation rollers.

Following the cyanidation tests, the samples are assayed to determine the gold in solution and in the residue, from which the gold recovery can be calculated.

A "RARE" Skillset for "Rare Earth" Mineral Recovery

REO…? No….Not the '80s rock band…..The term Rare Earths refers to a group of minerals with chemically similar properties that are important in the manufacture of a wide range of high-technology products. They are used to make a variety of electronic goods, including smartphones and flat-screen televisions, and can be found in specialized industrial products like drills, components for electric automobiles and military equipment. They are also crucial to new clean energy technologies, ranging from compact fluorescent light bulbs to electric cars to giant wind turbines.

XPS Process Mineralogy has been engaged in several projects aimed at the mineralogical assessment and economic recovery of the key rare earth minerals and rare earth carriers such as Bastnasite, Allanite, Zircon and Monazite. Using a combination of QEMSCAN and Microprobe technology, we can determine rare earth element deportment by mineral. As elements are deported across a wide range of minerals, this critical first step is essential to define a processing route.

In addition to elemental deportment, liberation size and amenability to various processing routes can then be assessed. Once this is known, mineral processing process flowsheets, which potentially combine gravity separation, magnetic separation and flotation are tested; first at laboratory batch scale and then at the continuous mini-pilot plant scale.

Recovery of rare earth minerals to a concentrate of target grade is a challenge as both the economic and gangue minerals such as magnetite, hematite and dolomite are oxides, silicates and/or carbonates. This requires specific unit operations and reagents to affect the separation. XPS has been effective at simplifying the primary reagent chemistry necessary to separate the minerals and reduce the environmental and cost burden of more complex reagent schemes.

XPS Process Mineralogy is available to discuss your Rare Earth project and recommend a processing route, mineralogical assessment and/or test program.

Gregg Hill
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Sampling training attendees SMIKT

"Very useful and necessary information"

"Very clear and well explained"

"Particularly liked the sections on Ms calculations for float feed and tails streams"

"Tutorials very well laid out"

"Excellent use of computers and Excel. The notebook was good too"

"Very useful and practical tutorials"

XPS Sampling School Visits the University of Queensland

The Sustainable Minerals Institute Knowledge Transfer unit (SMIKT) of the University of Queensland, Brisbane, Queensland, Australia, invited Dr. Norman Lotter, Consulting Metallurgist, XPS, to present his short course on sampling in the mineral processing discipline to their postgraduate school in late June 2012. The course covered applications based on Pierre Gy's models of minimum sample mass, the safety line and the semivariogram, closing with a module on Statistical Benchmark Surveying of Operating Concentrators. The survey module covered presentation of true samples to mineral measurement systems such as the MLA and QEMSCAN. Several professionals from the mining industry also attended. The class rated the course an overall 91% on content and tutorials.

And then at Mt Isa, Queensland....

Our colleagues at Xstrata Zinc, Mt Isa, invited XPS to present a one-day abridged sampling course at Mt Isa in August 2012. Mr. Olaf Nölle, Manager Metallurgical Operations, kindly hosted the course.

Contact Dr. Norman Lotter for enquiries regarding training in this niche area of sampling and sample selection.

Dr. Norman Lotter
nlotter@xstrataps.ca

Phil Thwaites — In Demand as CIM Distinguished Lecturer 2012–2013

As announced in the Spring 2012 XPS Bulletin, Philip Thwaites, Manager, Process Control and EIT program, XPS, was presented with a CIM Distinguished Lecturer Award at the CIM Annual General Meeting and Exhibition in Edmonton May 7th, 2012. Selection to the CIM Distinguished Lecturer Program for the 2012 to 2013 season is on the basis of the recipient's accomplishments in scientific, technical, management or education activities related to the minerals industry. Philip's award is for his leadership and development of best practices in process control, leading to operational excellence.

Philip will be presenting his talk entitled "Manual Control, Process Automation – or Operational Performance Excellence? What is the Difference?" at the following CIM and CMP meetings over the next few months:

- Sudbury Regional CMP, Howard Johnson Plaza, Brady St., Sudbury – Nov. 8th 2012
- Saskatoon CIM & CMP & Students – Nov. 15th 2012
- Rouyn-Noranda Regional CIM & Students – Dec. 5th 2012
- National CMP 2nd Plenary lecture – Jan. 24th 2013
- Ft. McMurray Regional CIM – Feb. 20th, 2013
- Sudbury Regional CIM evening, Dynamic Earth – April 18th 2013

Please contact CIM (jcyr@cim.org) to schedule Phil for your next technical session/meeting

Phil Thwaites, pthwaites@xstrataps.ca

XPS Professional Development: Larry Bachus teaches "What You Need to Know About Industrial Pumps"

In October, Larry Bachus – known as 'The Pump Guy' – was invited back to Sudbury to give two courses: "Design and Operation of Industrial Mine Pumps" and "Operation & Maintenance of Industrial Mine Pumps." Larry was last here giving this course to our EITs and XPS professional staff in April of 2007 and again in June of 2008. His training has helped develop our skill-set in diagnosis of process pumping problems and control.

Larry is an inventor, writer and lecturer based in Nashville, Tennessee. A couple of his reference books are: *Everything You Need to Know About Pumps*, published by Bachus Company, Inc. and *Know and Understand Centrifugal Pumps,* published by Elsevier Science (ISBN# 1856174093).

Attending the recent courses were Laurentian University Mechatronics students / graduates, MIRARCO (research group of Laurentian University) graduate students, XPS EITs, XPS Engineers, Sudbury suppliers – Sling Choker and AquaTech, Bestech, Xstrata Ni, Barrick and Goldcorp.

XPS can set up pump training courses at your site. Contact us for more information.

Tara Rana, trana@xstrataps.ca
and Phil Thwaites, pthwaites@xstrataps.ca

"Larry was a great speaker and presented material very clearly."

"I would recommend sites to send teams consisting of Operations, Maintenance, engineering, reliability representatives to take the course together and discuss cases in their own sites – working as a team during the course."

Larry was an amazing presenter. The course material was presented in a very relatable way that will help in production environments."

"The concepts are simple, but the emphasis and application are invaluable."

Pump training course attendees

Failure Analysis for the Mining Industry

Despite best efforts, equipment failures happen. Root Cause Failure Analysis (RCFA) is the systematic investigation of the construction, application and history of a failed component, equipment or system to determine the failure mechanism and underlying cause. It is an effective tool which allows operations to reduce or eliminate the risks of failure reoccurrence. RCFA may be employed for:

- Safety and environmental reasons
- Failure prevention
- On-line time improvement
- Legal or insurance reasons

Having investigated more than a thousand failure cases in the mining industry, the XPS Materials Technology group has vast experience in root cause failure analysis for:

- Mining equipment
- Concentrators
- Smelters including refractory linings
- Hydrometallurgical plants
- Sulphuric acid plants
- Electrolytic refi eries

Our combined field and laboratory experience allows us to make practical recommendations to mitigate failures and to work with sites and suppliers to implement these. Our field experience and exposure to mining operations give us a significant advantage over many other failure analysis labs in this regard.
The XPS Materials Technology group in addition to RCFA services also provides the following:

- Materials testing and selection for corrosion & wear
- Fabrication and construction procedures
- Quality assurance and inspection in capital projects
- In-service plant assessment during planned shutdowns
- Design improvement
- Risk assessment

Finite element analysis, electrochemical testing, wear testing, metallography including SEM are some examples of the wide range of tools available at XPS.

XPS provides services to avoid and predict failures before they happen…but if and when they do, a proper diagnosis which will ultimately prevent a re-occurrence is essential.

For further information contact XPS Materials Technology.

Wilson Pascheto
wpascheto@xstrataps.ca

Case Study

During in-service inspection of an overhead crane used to transport molten metal ladles a large crack was found in a pinion shaft. The crack ran through a keyway located near a fillet radius (Figure 1) and extended approximately to one third of the shaft cross-section. To reveal the fracture origin and identify the failure mechanism, the crack was opened-up by carefully cutting pieces of the shaft around it. Examination of the fracture surface revealed that the mechanism of failure originated outside the keyway (Figure 2). Examination of the fillet radius surface at the crack origin by Scanning Electron Microscopy (SEM) revealed that the pinion from the pinion shaft assembly was in contact with the shaft fillet surface causing mechanical damage of the fillet (Figure 3), and this was the cause of the fatigue crack. We recommended inspection of the new pinion shaft and a review of the components dimensional tolerances and assembly practices. During inspection, it was discovered that the new pinion shaft assembly had similar problems, which was then ratified.

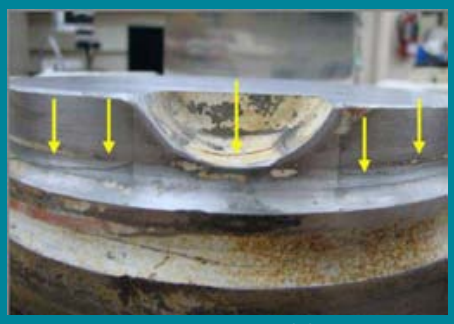


Figure 1: Arrows point to crack location

Figure 2: Fracture surface shows two crack propagation fronts

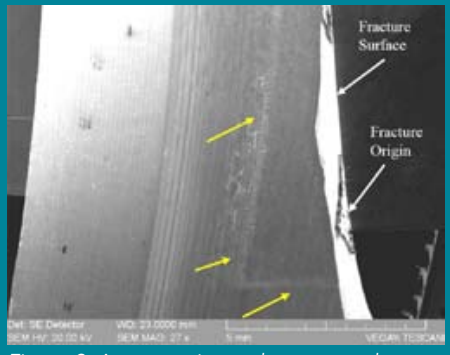


Figure 3: Arrows point to damage on the shaft filet radius surface

Characterisation of Metallurgical Slags

"Make a good slag and the matte looks after itself"

This old adage is as true today as it was 100 years ago, but modern operations run using relevant data on what constitutes a "good" slag.

The physical properties of metallurgical slag liquidus, viscosity, density and conductivity in particular need to be carefully controlled if pyrometallurgical operations are to achieve optimum metallurgical performance.

Measurement of these properties can be challenging, but the Extractive Metallurgy group at XPS has decades of experience in the precise measurement of these properties under carefully controlled laboratory conditions producing reliable and reproducible data. Smelters and metallurgical plants can use our facilities not only to optimise their target slag chemistry, but also to monitor their existing operational performance by submitting production samples to XPS for characterisation.

The lab results are supported and extended by modelling of properties using the extensive FactSage thermochemical database and XPS's database to extrapolate or interpolate data in combination with the appropriate amount of lab testing.

Key Capabilities:

Viscosity

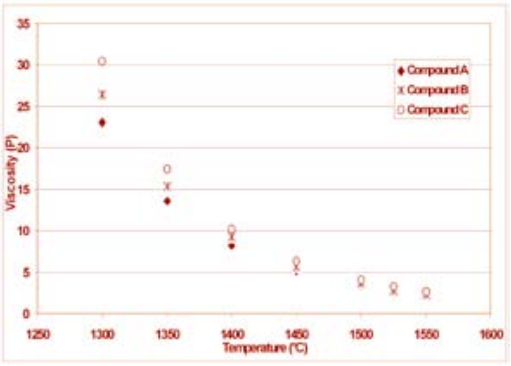
Measurement of slag viscosity is sometimes challenging, time consuming and expensive, as many research pyrometallurgists can confirm. While viscosity measurements at room temperature are difficult enough, measurements of an aggressive and corrosive fluid at temperatures exceeding 1500°C and requiring gas-tight conditions, are not for the faint hearted!

XPS have retained the expertise gleaned over decades of tough testing, and built up an impressive library of viscosity data which permits a cost effective determination of your slag viscosity.

Electrical Conductivity

For electric furnaces, the correct range of electrical conductivity of the slag is vitally important to ensure furnace productivity and efficiency. Too high a conductivity can result in over-current, and too low a conductivity may require high transformer tap settings. Both of these conditions can limit power input.

In order to measure conductivity, XPS has a dedicated high temperature furnace, equipped with controlled atmosphere seals and electrodes carefully calibrated against known standards for accurate determination of actual conductivity.



Slag viscosity vs. temperature

XPS CM Furnace

Liquidus

Slag liquidus temperatures are well publicized for slags with simple chemistries, but unfortunately few pyrometallurgical smelting operations function with the simple slag compositions published in literature. Small amounts of additional components can have a dramatic effect on viscosity. In addition, relatively small changes in pO_2 levels in the slag can also effect slag viscosity.

Besides well-equipped lab facilities, XPS has an extensive database of actual plant slag measurements which in combination with reference materials, have been used to populate liquidus-prediction models. This is particularly useful for smelters needing an estimation of the likely effect of a new feed material on slag tapping temperatures.

Optimisation of these parameters can be performed from the largest of industrial base metal furnaces to the bullion furnace used in most gold refineries today.

Contact Arthur Barnes for a slag optimisation study.

Arthur Barnes
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Dynamic. Decisive. Different.

XPS is a provider of independent metallurgical test work
and consultancy services to the global minerals industry

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Let our diverse mix of disciplinary expertise, flow sheet development, plant operating skills and knowledge of milling and metallurgical operations add value to your projects and processes.

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