OptimOre

this issue

Welcome to the Fourth OptimOre Consortium and Advisory Board Newsletter

This quarterly newsletter is published by the Consortium and Advisory Board of the OptimOre project. The project runs from December 2014 to the end of December 2017.

The main objective of OptimOre is to optimize the crushing, milling and separation ore processing technologies for Tungsten and Tantalum mineral processing.

The aim of the newsletter to date has been to communicate project information and progress between the Consortium Partners and the Advisory Board. This remit has now been extended to include a wide range of interested parties.

The newsletter forms part of work package 10 (Dissemination) led by Consortium Partner INTERKONSULT LTD based in the UK.

To contribute to future issues or for further information, please contact the Marketing and Communications Manager, Gemma King at : gking@interkonsult.co.uk

Editorial

How time flies! This newsletter marks the completion of Q4 and the first year of OptimOre to the end of 2015.

To bring this publication into synchronisation with the calendar year we are actually covering four months in this edition. It is also the first version of the newsletter that we are circulating publically beyond the Consortium Partners and the Advisory Board. This is prompted by the incorporation of the newsletter into our formal dissemination plan and because the project is beginning to generate outputs that can make an impact on industry.

The last few months have seen a flurry of activity as partners have prepared to issue deliverables on all work packages in December and also dissemination actions have been realised at several events.

By the time you read this issue the festive season will be past and we hope it has been a joyous one. For the OptimOre project 2015 has been a year of preparation and understanding. We are confident that 2016 will be one of innovation and impact followed by a year of validation and implementation in 2017.

We ended the year with our 3rd General Assembly meeting held in Freiberg, Germany. The conclusions are being compiled and will be reported in full in the next issue.

Partner News

INTERKONSULT LTD

Now that the initial material characterisation from a number of European industrial sites has been completed we are in a position to be able to begin validation of efficiency measures being developed by the project as they emerge. Given the scarcity of both operating and potentially operating installations within the EU, reliance on accurate simulators will be key to maximising the benefit derived from in-situ validation.

Since the last General Assembly meeting research partners have each invested in developing new predictive models for their area of interest whilst INTERKONSULT has focused on preparing dynamic models that will predict the impact of OptimOre actions on the tungsten and tantalum industry at global, regional and local level. These simulators will be the benchmark against which pilot and industrial test work is measured.

Our Advisory Board member Wardell Armstrong has generously offered the use of their test plant facilities in the UK and it is planned to commence baseline test work using conventional processing methods early in 2016 with the remainder of the samples collected for the characterisation work. This will serve

to calibrate the simulators and provide a dataset against which the impact of proposed modifications is measured. We are currently in the process of designing a test flow sheet at the test plant. In parallel, we have reached agreement on the proposed industrial sites for validation of the component processes for OptimOre and will commence baseline testing in the next quarter.

In terms of dissemination it has been an increasingly busier time. In November, INTERKONSULT attended the UK ABMEC conference and exhibition along with approximately 100 other delegates which included mine operators, consultants and equipment suppliers as well representatives from international trade organisations and government departments. Most of these visited our stand to see a short video and receive further information as well as to sign up to our information database which now holds a total of 890 contacts. In consultation with the Project Officer it has been agreed that the Consortium will become an ABMEC member to benefit from representation at around 20 trade shows over the next 2 years.

At the same time OptimOre participated in the Mineral Processing and Extractive Metallurgy for Mining and Recycling Innovation Association (PROMETIA) Scientific Seminar celebrated during the 17th and 18th of November in Seville. Originally Chalmers had planned to give a full presentation of the project but due to circumstances beyond their control Dr. Josep Oliva from UPC and Mauricio Zapateiro from EDMA stepped in at short notice to deliver an overview. As a result of this event, OptimOre has been invited to join the PROMETIA EU commitment ENCRAM.

Dr Peter Graham, Executive Director

Technische Universität Bergakademie Freiberg)

In addition to our technical activities, this quarter has seen us planning, organizing and hosting key project meetings. The first saw OptimOre meet with the Horizon 2020 project FAME. The FAME project (Flexible and Mobile Economic Processing Technologies) project focuses on addressing a number of economic and environmental challenges to improve processing technologies and to recover valuable materials from low grade and / or complex feedstock ore by increasing the range of yields of recovered raw materials with lower energy consumption and minimising mine waste. In turn this will reduce the environmental fingerprint whilst increasing the utilisation of residues. In the first get together, participants agreed the importance of finding synergies between the two projects in an effort to plan future work together. In addition, we also planned and facilitated the third General Assembly together with work package 7 leaders.

The experimental work has also advanced. Further samples have been comminuted and representative samples have been split and prepared for the susceptibility measurements on a small rotary divider which made it possible to receive samples of down to 40 mg. A first measurement has been done of Penouta tailings. Further susceptibility measurement samples have been prepared for Penouta tailings, Barruecopardo and Mittersill and also for the feed, magnetic, middling and non-magnetic fraction of a first separation trial using Penouta tailings material with all machine parameters set at their highest level.

A plan for the parametric study is being made. Due to the large number of parameters in the magnetic separation process design of experiments (DOE) will be used for the variation of parameters in the trials. Then the variation of individual parameters will be tested especially. Resulting samples from the first magnetic separation trials are being prepared for Mineral Liberation Analysis (MLA). Also Mittersill, Penouta tailings and Barrue-copardo are being prepared and will be assessed by mineralogical analysis in the institutes own mineralogical laboratory.

We would also like to remind partners of the importance of sample material. In terms of magnetic separation, Wolframite ores are the most important and we hope to source more material in the next few weeks.

Photo: Filtered wet magnetic (MP), middle (ZP), nonmagnetic (UP) and rest (R) fraction taken after first separation trial.

M.Sc. Annemarie Falke
TU Bergakademie Freiberg

Consortium News

OptimOre planning to participate in ENCRAM network
ENCRAM (European Network on Critical Raw Materials) is a new network aiming to: develop an EU expert structure of networks covering all CRMs; to include the stakeholders covering as much of the value chains as possible; and to enable a flexible and reactive arena which can adapt as the CRM list is updated.

OptimOre to join ABMEC
The Association of British Mining Equipment (ABMEC) has a history dating back almost 100 years. Its role as an Association is to provide a service to its members in order to help promote sales, growth and gather market intelligence. OptimOre will benefit from membership over the rest of the life of the project.

University of Exeter - Camborne School of Mines

Research continues at the University of Exeter - Camborne School of Mines (CSM) on improving the modelling of gravity separation systems for the separation of tungsten and tantalum. Dr Richard Pascoe has successfully led this work until now but leaves the University of Exeter at the end of the year. We would like to thank and congratulate him on behalf of OptimOre project for his considerable work on the project. Furthermore, we wish him the very best in his new endeavours. Dr Yousef Ghorbani and Dr Rob Fitzpatrick will now jointly lead the project.

During this period work package 5 has been busy making progress in the laboratory. Work continued with characterization of the mineralogical and chemical composition of the Penouta Balsa Grande tailings sample using QEMSCAN and XRF. Gravity separation tests were conducted on the Penouta sample using Mozley separator, Knelson and Heavy Liquid Separation (HLS). The gravity concentrate obtained through these tests was further analyzed using QEMSCAN and EMPA and have shown interesting results.

In order to model the gravity separation process we have put together a synthetic ore sample to investigate process variables with a shaking table. Currently we are conducting shaking table tests on this sample aiming to obtain effective parameters for the modelling of gravity separation systems. We are also assessing the potential for automated control equipment for grade control with the shaking table.
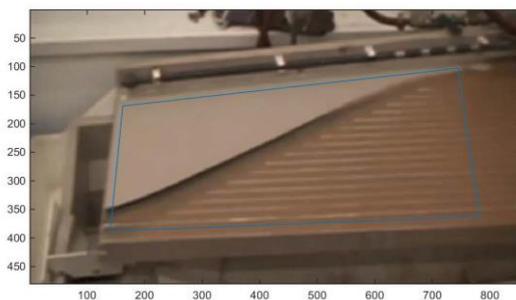

Photo: Separation of wolframite from quartz on the Wilfley model 800 shaking table. The blue region indicates the area used for image analysis.

On the 10th November 2015 we visited the Wolf Minerals Tungsten plant at Drakelands, Plymouth. During the visit we took representative samples from different parts of the spiral separator circuit. In our future work the elemental and mineralogical composition of these samples at different size fractions will be characterised using XRF, QEMSCAN and EMPA. We are aiming to conduct a full circuit assessment in order to produce a mass balance to help optimise the process at Drakelands tungsten plant. This is already forming part of the project validation work.

University of Oviedo

The University of Oviedo has continued to work on work package 2 by providing the annual update of the Technology Watch. Around 100 relevant publications were identified and synthesized for tungsten and tantalum and resulted in report D2.1 being issued.

Under UPC coordination, we started working on grinding kinetic models for work package 4. The main laboratory work was devoted to the preparation of mineral samples to carry out ball mill standard Bond tests.

These characterisation tests form the basis on which future energy modelling can take place.

Juan Maria Menendez Aguado

Universitat Politècnica de Catalunya

During the last months we have spent considerable time in the mineral processing laboratory completing several milling experiments to develop the main body of the deliverable: "High pressure grinding rolls Modelling".

The tested samples come from the OptimOre raw materials provided by the Penouta mine, Mittersill mine and Panasqueira mine.

The first stage is preparation, especially those oversized particles. A pre-crushing step was needed and in this case a pilot scale jaw crusher was used. After that, size classification by screening was performed, and different size class samples were obtained.

Mono-size samples were introduced in the controlled grinding rolls device. For monitoring the process, a special transparent box was built for covering the rolls and at the same time was possible to record with a slow motion camera which was installed just in front of the contact of the rolls. Other operative parameters were also controlled: process time, throughput, roll gap, force of the rolls, etc.
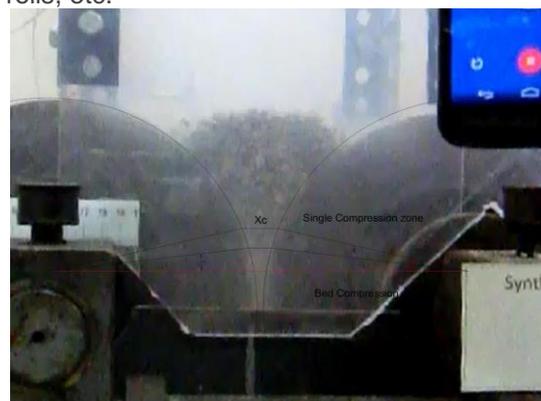

Photo: Monitoring the process by means of a special transparent box and a slow motion camera

On November the 4th the team participated in the OptimOre and FAME meeting along with EDMA, INTERKONSULT and TU Bergakademie Freiberg where we exchanged information and explored ways to cooperate with members of the FAME project, another Horizon 2020 project devoted to developing flexible technologies for mining activities.


Photo: UPC Mining Team (Left to right: Dr Josep Oliva, Sr Sarbast Ahmad, Dra Pura Alfonso, Dr Lluis Sanmiquel, Dr David Parcerisa, Sr Eduard Guasch, Sr Hernan Anticoi)

Dr David Parcerisa UPC

Industry News

Whilst Wolf Mineral's Drakelands Mine has been in the news consistently over the last quarter as it commences production as the UK's first new hard rock mine in 45 years, the mining industry has increasingly focused on developments that are relevant to the OptimOre project.

In October, Mining Journal magazine ran a special feature on tungsten which indicated that the future was looking brighter.
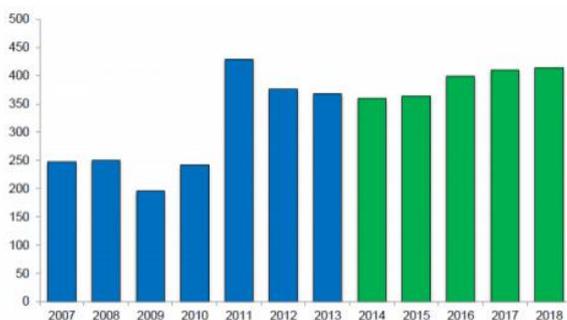
Historic and forecast APT pricing according to Roskill

Overall there is a queue of projects globally waiting to secure finance. According to the article prices were expected to rebound slightly this year but have continued to decline as slow growth in China prolongs forecast oversupply. APT prices were recently $180-$190/mtu but logic suggests that the metal may be poised to turn a corner. It is estimated some 25% of tungsten operations were loss making on an operating cost basis at an APT price of $200/mtu. Current forecasts based on 3.5% CAGR through to 2018 indicated a supply-demand imbalance tightening into 2017-2018, as new capacity continues to lag consumption, according to Edison, while Roskill has previously forecast prices to reach $415-$445/mtu by 2018. According to the Mining Journal, for producers and developers who completed feasibility studies on prices comfortably north of $300/mtu, seeing the price move back over the $200/mtu mark would be a welcome start. Clearly for OptimOre to empower European producers to reduce costs will be an added bonus.

Tantalum has been less in the news with the only major reference to Pilbara Minerals being on the way to starting commercial shipments of tantalum from its Tabba Tabba asset by the end of 2015 after mining its first ore at the project in Western Australia.

Looking Ahead

Q5 is expected to be an exciting one. Discussions with owners of European tungsten and tantalum deposits will begin to convince them that OptimOre can make a real difference to realising the potential of their mineral assets.

Today – one year into the project – the industry collaboration we have enjoyed has already provided a better understanding of the mineral processing technologies involved. We already have ideas on how these processes can be improved and have developed a tiered validation approach to be executed.

OptimOre aims to prevent the closure of operations that are struggling in today's economic climate, make viable identified resources for exploitation and to enable operations that are contributing to Europe's natural resource recovery to become ever more competitive on the world stage.

OptimOre Project Website:

For all background and latest information visit

http://www.optim-ore.eu/