



Welcome to the Fifth 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



This issue

INTERKONSULT Ltd	P.1
Technische Universität Bergakademie Freiberg	P.2
Camborne School of Mines	P.3
Universitat Politècnica de Catalunya, UPC	P.3
EDMA Innova SL	P.4
Industry News	P.4
Looking Ahead	P.4

Cover image – Penouta Mine

Editorial

Another three months have flown by since the last newsletter. It has been a busy time especially in terms of interacting with industry. With the project now approaching the half-way stage the lengthy process of material characterization is more or less complete and has provided a better understanding of how the target minerals of tungsten and tantalum are hosted in the respective ores.

This edition highlights the last of the material characterization work being carried out on the basis of which new mathematical models are being defined for the control system development. Details of industry visits made to Austria, Portugal and Spain are also reported and kick-start the demonstration work that will gather momentum over the remainder of the project.

We are pleased to welcome Wolfram Bergbau and Hütten AG of Austria to the Advisory Board. Wolfram joins Wolf Minerals and Strategic Minerals Spain as our primary industrial partners who will participate at the validation stage. Wolfram's participation follows on from a site visit made to the Mittersill Mine in Austria. More details under Partner News.

Finally, you don't have to wait until the next newsletter for up to date information on the project.

You can find us on most social media including Facebook, Twitter, You Tube and LinkedIn.

Partner News

INTERKONSULT LTD

The project aims to involve as much industrial collaboration as possible and as early as possible. Collection of baseline information from existing tungsten producers is a priority and will form the benchmark against which OptimOre technology enhancements will be measured.

Publicity has also been at the forefront. Information on OptimOre is now accessible via a variety of social media including Facebook, Twitter, LinkedIn and You Tube. We have also started to give the website a makeover and will transform this into a rich repository of information to include published articles and reports, webcasts and industry links/news as well as more details of the project activities.

We are now supporting the PROMETIA activities through the ENCRAM commitment to the European Innovation Partnership for Raw Materials and hope that this will enrich the direction of the project.

We continue to engage in collaborative communication with the FAME project also funded under Horizon 2020.

During this period we have arranged a series of visits with companies producing tungsten and tantalum. The aim was to raise the awareness of the project with as many producers as possible and invite collaboration in the project potentially at the validation stage.

In late February, staff from INTERKONSULT visited the Mittersill mine operated by Wolfram Bergbau and Hütten AG of Austria. The visit enabled a comprehensive exchange of information and ideas as well as an in-depth tour of the processing facilities. At the same time, other team members from UPC and INTERKONSULT visited Strategic Minerals Spain's Penouta Tantalum Project to enable future assistance on the project.



Specialist from UPC and INTERKONSULT in discussion with Strategic Minerals Spain on the Penouta Tantalum Project

The same team went on to visit Beralt Tin and Wolfram Portugal SA in Lisbon which now operates the Panasqueira Mine as part of the Almonty Group.

In the coming weeks it is planned to visit other active and planned producing sites to align the OptimOre project as closely as possible with the needs of industry. This objective forms part of the Interim Exploitation Plan which was developed by INTERKONSULT as part of Work Package 10 during this period along with the Communication and dissemination plan that were delivered at the end of March.

Dr Peter Graham, Executive Director

Helmholtz-Institute Freiberg for Resource 6 Technology (HZDR)

The HZDR welcomed a new member of the team in February, RJ Compañero (pictured below). RJ is looking at the options for floating scheelite and producing an acceptable pre-concentrate.

He will also be providing data for process modelling, through the measurement of contact angles of the collectors with scheelite, apatite and quartz as well as the measurement of energy dissipation in a lab flotation cell.

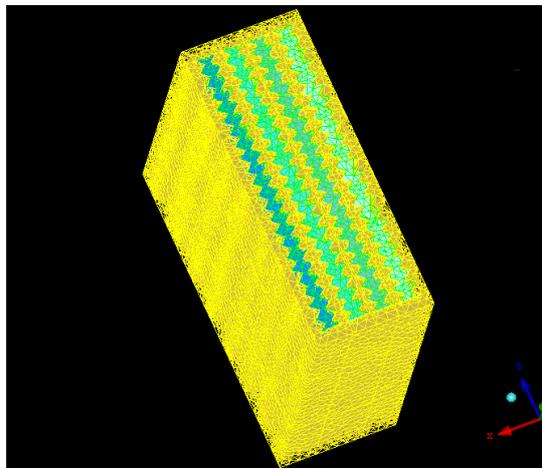


*MSc. Nathalie Sterbik
Helmholtz-Institut Freiberg for Resource Technology*

Technische Universität Bergakademie Freiberg

This period has seen WP6 work on the material provided by the Panasqueira mine. The material has been divided and comminuted to be worked with throughout the parametric study on the WHIMS. Further samples have been sent to the MLA for analysis.

Simulation work has also commenced. We are looking into simulating the impact of magnetic particles falling through the matrix on the magnetic field. This has an impact on the forces acting on the material and therefore the actual separation process.



Meshed geometry of matrix and air gaps (1.5 mm)

As in all the past quarters the collaboration between WP7 and WP6 has been very close and ideas are being shared.

*MSc. Annemarie Falke
TU Bergakademie Freiberg*

Partners

OptimOre Consortium

Universitat Politècnica de Catalunya (UPC), Spain

Chalmers University of Technology, Sweden

University of Exeter, Camborne School of Mines, UK

Universidad de Oviedo, Spain

Technische Universität Bergakademie Freiberg, Germany

INTERKONSULT Ltd, UK

EDMA Innova S.L, Spain

Helmoltz-Zentrum Dresden Rossendorf, Germany

OptimOre Advisory Board

METSO

Wolf Minerals Limited

Holman-Wilfley Ltd

FEI

Wardell Armstrong Ltd

OHL Industrial

Strategic Minerals Spain S.L.

Wolfram Bergbau and Hütten AG

Three project deliverables successfully completed and submitted to the EU

D10.2 Communication and dissemination plan

D10.3 Intermediate Exploitation plan

D10.5 Workshops plan (Month 16)

Workshops Plan will be executed in month 24 (November, 2016) and month 36 (November, 2017).

University of Exeter - Camborne School of Mines

In this quarter, research at the University of Exeter – Camborne School of Mines has continued on the use of synthetic ores to assist in modelling of a shaking table. We have also completed quantitative mineralogical and geochemical analyses for all streams in the Spiral circuit of the Wolf Minerals Tungsten plant at Drakelands. This data has been used to create a mass balance for the spiral circuit and led to a greater understanding of the altered nature of the ore minerals which vary in Fe:W ratio, with associated changes in response to separation. Mineralogical analyses has been undertaken on other processing streams from the plant and multi-gravity separation is currently being undertaken to potentially improve the flowsheet.

An abstract for a paper entitled 'A process mineralogy approach to gravity concentration of Tantalum bearing minerals' has been accepted for the Procemin 2016 conference to be held in Santiago, Chile on the 26th-28th October.

As well as our research, we have had a busy quarter. We have been successful in obtaining a EUR 6000 Impact Development bursary from the University specifically to explore the 'techno-economic impact of the OptimOre project'. Two post graduate students have been employed for three months to complete this work. The students will combine visits to relevant industry partners with economic modelling software to further the understanding of the OptimOre project impact.

We have also recruited a technician to support our research experimentation for the Gravity separation work package. We will also be welcoming two postgraduate students over the summer months for project work to further investigate the mineralogy of the Drakelands deposit and to undertake modelling work for a Mozley Multi-gravity separator.

*Rob Fitzpatrick PhD, FHEA
Experimental Officer for Mineral Processing
University of Exeter*

Universitat Politècnica de Catalunya

During the last months, the UPC team has preceded with the coordination activities of OptimOre, keeping actively in contact with all the partners and the Project Officer. In this role, the UPC has updated new deliverables for Work Package 10 in terms of the Communication and Dissemination Plan (D10.2), the Intermediate Exploitation Plan (D10.3) and the Workshops Plan Execution (D10.5).

In terms of the research role, our PhD students Hernán and Eduard have spent a lot of time in the mineral processing laboratory continuing the experiments on high pressure grinding rolls, because in month 19 there is an update of the deliverable 4.3 "High Pressure Grinding Rolls Modelling".

We continued the mechanical characterization for all the samples available developing Bond ball mill tests, Bond rod mill tests and Bond abrasion tests (Figure 1). These tests are to complete the deliverable 4.2 "Mineral characterization for milling" that we have an update in month 19.



Preparing Bond rod mill test and Bond abrasion test.

Finally we also started to perform tests with a continuous laboratory scale ball mill with a removable cover in order to control what is happening inside the mill at any time (See Figure).

Different papers have been presented in two conferences, Comminution '16 in Cape Town and IMPC '16 in Quebec City, regarding the experiments performed with high pressure grinding rolls and ball mill.



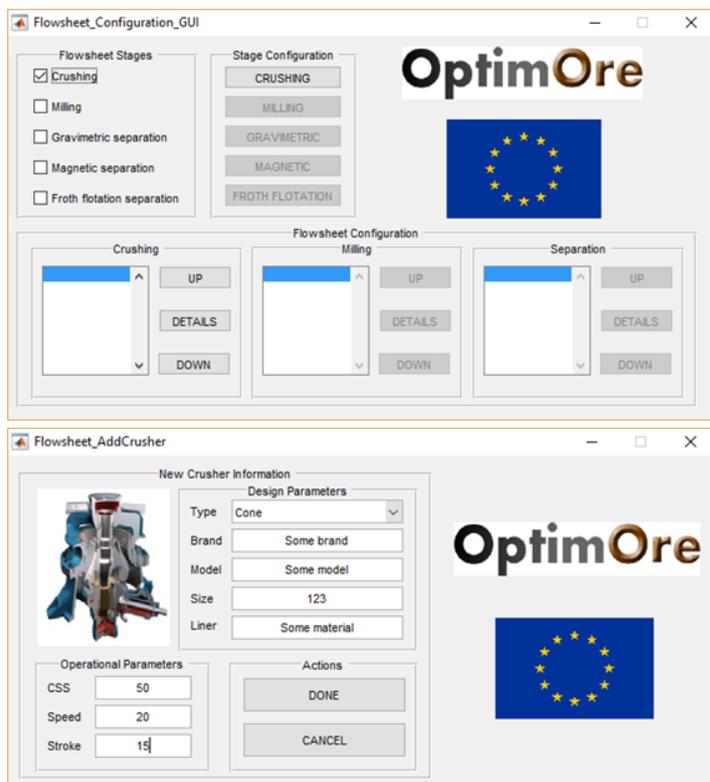
Interior of the ball mill without the cover.

Dr David Parcerisa UPC

EDMA Innova

EDMA is currently working on the construction of the ore processing simulation library. This simulation library contains the different elements of the ore processing system (i.e. crushing, milling and separation). The goal of this library is to easily simulate different flow sheets that allow for decision making. A graphical user interface is also being designed that will further ease the creation of flow sheets for simulation purposes.

In addition to the simulation library, EDMA is working on the design of a camera-based system that will allow measuring the size of the ore particles at lower costs when compared to traditional systems. More specifically, the cameras will be installed in the input and the output of the mill and thanks to sophisticated image analysis algorithms, a measure of the particles will be provided online. Below you will see two images from the graphical user interface that's being designed at EDMA. These are not the final design but a draft of what it will be.



OptimOre Simulation Library

Mauricio Zapateiro de la Hoz, Ph.D.
R&D Control Engineer
EDMA Innova

Industry News

There was plenty of news for Wolf Minerals Drakelands Mine in this period. According to a number of press reports the Drakelands mine is "taking shape" with the processing plant gradually ramping up and which should run at full speed by the middle of the year.

Almonty, through its indirect wholly-owned subsidiary, Beralt Tin and Wolfram (Portugal) SA ("Beralt"), owns a 100% interest in the Panasqueira Tin Tungsten mine located in Covilha Portugal. Beralt is the oldest Portuguese mining Company. The first prospecting license was granted in 1886 and the first reference to wolframite mineralization in the Panasqueira are a reportedly dated to 1888.



View of Panasqueira Mine (SIC News)

Tantalum was also in the news. The April issue of Materials World presented a fresh review of tantalum mining in central Africa. Once a major cause of the wars in Africa's Great Lakes region it is now accepted as secure supplier of tantalum concentrates. The article is based on one published by the Tantalum-Niobium International Study Center (TIC) called *Much Ado about Tantalum, again* – see www.tanb.org

Looking Ahead

In the next issue we will be reporting on engagement with more operating companies including the San Finx tungsten project in Spain.

Also we will be holding the next general assembly meeting and the first Advisory Board review meeting in early June so there should be plenty of new information available.

OptimOre Project Website:

For all background and latest information visit

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