Launching Outotec Smelting News

Dear reader,

Dear reader, you are currently looking at the newly revised smelting newsletter from Outotec. In 2009 we launched Flash News for the operators of the Flash Smelters. This was done in order to be able to share information and communicate more frequently and faster to the smelting community about new developments, start-ups and technology improvements.

During these last few years we have noticed that there is a large smelting community around the world applying different technologies and operation principles. Smelters are not restricted to the one primary smelting furnace. They make decisions and modernizations concerning the slag treatment, fire refining, anode casting, secondary treatment, variety of raw materials; e-scrap, nickel, lead, tin, zinc/lead residues, precious metals etc. Thus, there is a huge network of plants and people, who are hungry for know-how and want to know about applications available and already in-use. Cross-utilization of the knowledge in the fine art of smelting and also from other industries can create more sustainable and more efficient processes that can benefit all countries and economies on a global scale.
This crossover can also create a more favorable political and environmental atmosphere while the smelting community actively participates and takes into consideration latest developments in the area and looks after the social responsibility that comes from operating metallurgical plants.

Outotec has the unique opportunity to work with smelters in every continent and in many countries at the same time. All of these operations have different features, however, everybody has something in common – safety, the environment, the use of energy and efficiency in operations defines the future for generations to come. By combining our global smelting expertise in Flash, TSL, Kaldo and Auburn, Outotec can provide a new approach and make suggestions for both existing and new operations. Recently we have noticed this combination to be favorably accepted by the industry as our active projects globally have significantly increased.

Outotec wants to be able to provide some insight into the various activities that are either happening already or under development in smelting. The Outotec Smelting News will cover, but will not be limited to, at least the following: experiences from around the world in new commissionings/shut-downs, technology innovations, new developments, market information, new products, global smelting network and much more in years to come.

We hope that you will find this newsletter useful, interesting and relevant to your operations. We continuously aim to improve the content, thus feedback is welcomed and can be send to smeltingnews@outotec.com.

» Kim Fagerlund
Vice President– Smelting
COPPER MARKET AND TC/RCS

Copper performance in recent market turbulence

In all the macroeconomic swings which tend to drive the day to day copper price, it is easy to forget why copper is used as a barometer of market conditions - it is an extremely strategic industrial metal which the world has not had suitable supply of for a prolonged period. Fundamentally, the world would still like more copper, and this pent-up demand is why copper continues to trade at a level which incentivises every available metal unit to market. For this reason, it is likely to trade at a premium out into the medium term, while it also looks to be the best positioned metal of the base metal group.

Concentrate market and TC/RCs

In June 2012, midyear contracts for copper TC/RCs were largely unchanged from the beginning of 2012. Copper concentrate supply/demand have therefore remained largely unaltered from 12 months ago, leaving refining fees at $63.50/t. In late July, spot TC/RCs for copper concentrates were inching higher, due to improving output at large mines and closures and cutbacks among smelters. Smelters were reportedly bidding $45-$50/t and $0.45-$0.05/lb for clean concentrates, with traders securing material from miners at $30/t and $0.03/lb. Spot TC/RCs had been dropping throughout the first half of 2012, as trader demand and weak mine output created tight supply conditions, even though demand from smelters was falling. Certain clean concentrates were changing hands at about $10/mt and $0.011/lb in June. However, with demand from smelters weighed down by capacity closures and slower end-use demand, and supply increasing through some mine ramp-ups, an overhang of concentrate stock is beginning to emerge.

Mine production

An underperforming mine supply has been the persistent feature of the copper market for the past decade, and despite the market’s strong expectations for 2012 mine supply growth, it has proved a disappointment with all major producers underperforming so far relative to plan. Factors such as power shortages, labour disputes, grade degradation and cost inflation have all impacted 2012 production. The availability of copper concentrate remains extremely tight.

World copper mine production in 2012 (adjusted for unanticipated disruptions) is projected to increase by around 5.1% (810,000 t) to 16.9 million metric tonnes (Mt). Growth in mine output will mainly be from the restoration of production in existing operations rather than from new projects. While some expansions and startups will occur in 2013 will help boost mine production by 7.6% up to 18.1 Mt, deferrals and delays in projects have postponed most of anticipated new supply till 2014 or later.

Given the sizeable range of terms achieved to reflect the varying quality of material available for tender, the mid-point of $48/t and 4.8c/lb has been taken as the representative spot selling terms achieved by miners in September.

Concentrate supply has continued to fall short of expectations and production has been marked down further. TC/RC negotiations during the annual LME week meetings are likely to be challenging again this year reflecting the ongoing issue of mine production disruptions as well as potential scrap availability.
According to estimates, the net increase in copper in concentrate production in 2013 relative to this year’s expectations will be almost 1.9Mt. This figure takes no account of disruptions, which when factored in reduces the uplift to 1.1Mt.

As might be expected, China will contribute the lion’s share of additional primary smelting capacity of concentrates (Dongyang, Huixing, Jinchuan Guangdong, Tongling, Zhongtiaoshan, Zijin etc.), accounting for 87% of the expected next year’s 670kt increase.

**Copper prices and TC/RCs**

Going into 2013 and further it is expected that copper will continue to be the bellwether metal for market development. Copper prices are seen to take a slight hike through 2013 up to 8200 $US/t level and then dropping in the medium term to 7100 US$/t. Further on the current consensus is that the long-term price is set to be around 6600 US$/t which still quite clearly gives an incentive to invest in new capacity despite ever increasing operating costs.

The already long-term depressed mining production has improved step by step and despite estimates of quite large production disruptions will expectedly lead to copper concentrate balance equilibrium for the ongoing year 2012 and then further on in mid-term to achieving a positive concentrate market balance. This change can already be seen having a positive effect on TC/RCs and leading to TCs of 70-80 US$/t and RCs of 7-8 USc/lb in 2013-14.

» Heikki Puustjärvi
VP – Strategy and Market Intelligence
Market Operations
IN NEW FLASH SMELTER FOR RTB-BOR IN CENTRAL SERBIA (UNDER CONSTRUCTION)

In January 2011 Outotec signed a contract with S.N.C. Lavalin International to design, supply and install a new copper flash smelting furnace and related services for RTB Bor in Central Serbia. The following photos and text describe the current situation on site, and greetings from our Outotec project team.

The RTB mine and operation go back around 100 years and the work currently being carried out by Outotec and S.N.C. Lavalin is the first significant step in modernizing the production facilities and reducing the environmental impact of the operation.

RTB Bor are currently operating an old reverb type copper smelter and this will be replaced with the new Outotec® Flash Smelting Furnace, which will significantly improve the environmental performance of the plant.

Outotec’s turn-key delivery for the new Flash Smelting Furnace includes the plant license and engineering, procurement, equipment supplies, construction and commissioning services.

The project is scheduled for completion in December 2013.

The new Flash Furnace has a capacity of 80,000 tonnes per year of copper anode while reducing liquid and gaseous emission levels to European standards. In 2008 the sulphur recovery was only about 35 % and the sulphur emissions into the environment were about 41,000 tons. Whereas, modern copper flash smelting process captures more than 99 % of the incoming sulphur, significantly reducing the environmental impact.

Outotec Engineering and Procurement

Outotec Basic engineering delivered in February 2011 and construction work on site started in December 2011.

Outotec detail engineering for the plant is complete.

The supply of equipment by Outotec is well ahead of schedule and the majority of equipment is on site and ready for installation as the construction of the plant progresses.
FSF Site Construction

Site construction work has had its fair share of setbacks, mostly caused by underground tunnels and other obstacles that can happen in a 100 year old plant and we are hampered by the ever present SO2 gas from the old processing plant, which continues to operate during the construction of the new plant. However, the SO2 problem will soon be fixed, but unfortunately not until we have completed the new FSF and left site.

Civil works are largely complete with all the concrete now in the ground.

Work is now focused on the erection of steel buildings and the installation of equipment with all efforts centered on getting enough building cladding installed to minimize construction disruption during the rapidly approaching winter months.

We still have many challenges ahead of us to make this another successful Outotec project.

The Outotec Project Team

The project team is headed up by Kirsi Kaasinen, Project Director, Mika Pirttinen, Engineering Manager, Tony Corkran, Site Manager and Aaron Ward, Construction Manager.
SUMMARY OF THE CONFERENCE PRESENTATION FOR FLASH NEWS

The SAIMM 5th Platinum conference was held in September in Sun City, South Africa. Outotec participated in the conference and held a presentation titled ‘Outotec Smelting Solutions for the PGM industry’.

The general focus of the conference was naturally on platinum, but also platinum group metals (PGMs) in general. Platinum and palladium are the most significant elements of these in terms of market value, followed by rhodium, iridium, ruthenium and osmium.

As known to many, South Africa holds the flag in global platinum mining supply, producing annually around 75-80% of the platinum mined. For the other major PGM element, palladium, RSA’s share is also large at 35%. However, it may be argued that palladium production is heavily concentrated, as the Russian production share of Pd is around 45%. Major demand for Pt and Pd arises from their use in auto catalysts.

PGM production shares many similarities with traditional Cu/Ni concentrate treatment. Concentrates may be divided into two categories; Cu/Ni concentrates, which produce PGMs as a by-product and PGM concentrates, which produce Cu/Ni as a by-product. Currently, Outotec Flash and Ausmelt processes contribute to over 60% of the primary nickel concentrates smelting.

PGM concentrates are typically characterized by significantly higher operating temperatures due to slag properties, and hence electric furnaces are widely used in primary smelting for these metals. However, given the scarcity of electricity and the need for continuous improvement in sulphur capture, increased interest is being generated in utilizing the Outotec Flash or Ausmelt process as means of primary PGM concentrate smelting.

Further treatment of PGM concentrates requires converting (except in the Outotec Direct Nickel solution) and hydrometallurgical treatment. PS converters are typically used, though the demand towards continuous and sealed process is increasing in converting too. A great example of this is in Outotec Ausmelt converting, utilized at Anglo Platinum’s Rustenburg smelter (known as Anglo Platinum Converting Process – ACP), which treats granulated, dried (PGM) matte from three smelters with two Outotec Ausmelt Furnaces. Outotec also provides hydro processes for high grade Ni treatment, hence having exceptional coverage of the technologies required for the whole PGM concentrates production chain.

» Lauri Aspola
Sales Manager - Smelting
THE AUSMELT TSL ZINC STORY - RECOVERING VALUE FROM WASTES

Outotec’s Ausmelt TSL technology is widely recognized as a benchmark process throughout the zinc industry for the sustainable processing of zinc residue to recover valuable metals from waste.

Zinc residues are a waste by-product from the purification and refining of zinc and are classified as hazardous wastes. They have traditionally been stockpiled in hazardous waste facilities or tailings dams because of their high level of contained heavy metals, including cadmium, arsenic and lead.

The processing of zinc residues using Ausmelt TSL Technology was first commercialized at Korea Zinc’s zinc production facilities in Onsan, South Korea in the mid 1990’s. Korea Zinc has three Ausmelt zinc fuming plants and Young Poong Corporation (a sister company to Korea Zinc) has one Ausmelt plant, with each plant processing around 120,000 tpa of zinc residue. Korea Zinc prides itself on maximum recovery of valuable metals from concentrates by reprocessing its own wastes, while not discharging any toxic waste.

The Ausmelt TSL zinc fuming technology is able to maximize the recovery of valuable metals from the zinc residue and protect the environment by producing an environmentally acceptable slag product which is clean and safe for disposal or use as construction materials.

Zinc residue processing in an Ausmelt furnace involves the smelting of residues with reductant coal to produce an oxide fume and slag containing <3% zinc and <1% lead. The process achieves very high recoveries of lead and zinc plus other high value metallic species, such as silver and indium to the fume product. Fuel, air and oxygen are injected into the molten bath via a vertically suspended lance. The process is extremely efficient due to the intense agitation and flushing effect in the vessel.

Feed materials, reductant coal and fluxes are added through a feed port in the furnace roof. The feed decomposes in the bath and lead and zinc are reduced and volatise as metallic species. The zinc and lead and other volatilised components are then post-combusted in the freeboard zone of the furnace and the waste heat boiler with the addition of post combustion air.

Depending on the throughput and feed grade, the Ausmelt TSL fuming technology can operate as either a continuous process in a single furnace, as a two stage batch process in a single furnace or as a continuous process with two furnaces in series.

Ausmelt TSL Technology has also been commercially adopted for fuming of zinc from materials other than zinc residues, including QSL furnace slag (Korea Zinc, Korea), ISF slag (Mitsui, Japan) and high zinc lead smelter slag (Yunnan Tin, China).

Prior to its acquisition by Outotec, Ausmelt had granted the exclusive marketing rights of the Ausmelt TSL zinc
fuming technology to Korea Zinc under a 15 year marketing agreement, which restricted industry wide adoption of Ausmelt TSL Technology for zinc residue treatment.

Outotec is pleased to advise that this marketing agreement is no longer in operation and that the marketing rights have been returned to Outotec. Outotec can now offer its clients the Ausmelt Top Submerged Lance (TSL) technology for the fuming of zinc bearing residues.

Outotec will combine Ausmelt TSL zinc fuming technology with its proprietary hydrometallurgical and gas cleaning technologies to offer its clients the Outotec Zinc Residue Process (ZRP), a whole of plant technology solution for recovering value from zinc residues and other zinc bearing wastes.

The Outotec Zinc Residue Process will provide significant benefits to the world zinc industry, not only economically but also environmentally.

For further information on Outotec’s Zinc Residue Process, please call Stephen Hughes, Manager Sales TSL Smelting on +61 3 9566 5910.

Stephen Hughes
Manager Sales TSL Smelting

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<tr>
<th>Client</th>
<th>Process Application</th>
<th>Annual Throughput (t/y)</th>
<th>Annual Throughput (t/y)</th>
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List of Existing Ausmelt Zinc Fuming References
SHUTDOWN SERVICES

Brazil Market Area

New Brazilian Work Center Being Established for Shutdown Services Projects

Shutdown Services Service Product Center (SPC) has people and equipment stationed around the world in facilities referred to as “work functions”. Brazil was identified as a large market for shutdown services projects, especially in the ferrous sector. And with the 2012 Outotec acquisition of Demil Services Company of Brazil, Outotec has decided to establish a shutdown services work center in Brazil.

The new work center will start out with state-of-the-art remote-controlled demolition equipment and people who are dedicated and experienced in shutdown services projects associated with major furnace rebuild projects. In addition to customers who operate non-ferrous smelters, the new work center will seek to expand Outotec Shutdown Services’ footprint in the Brazilian market for pellet plant maintenance and repairs.

Timing for the new work center is establishment by YE 2012 with ramp-up to full capacity within two years. For more information contact Andre Batista, Service Manager, Outotec Brazil Market Area. (andre.batista@outotec.com)

Southeast Asia Pacific (SEAP) Market Area

Outotec Already Integrating TME, Kiln and ELE Personnel to satisfy Australian Customers

In July 2012 Outotec Shutdown Services managed and executed a partial rebuild of an Australian customer’s molten sulfur melting pit. A sulfur melting pit is used to create molten sulfur, which is used to produce sulfuric acid. Outotec Shutdown Services’ task was to clean part of the melting pit to enable the plant to operate until the next planned shutdown in October 2013 when the entire pit would be refurbished.

The Outotec Shutdown team consisted of members from recently acquired businesses including; Kiln Services for demolition, and TME Group for mechanical work. Colleagues from Australian shutdown and ELE services helped with the overall shutdown supervision. As a result of Outotec team work, execution of the job was more efficient and completed three days ahead of plan, and Outotec’s in-house induction training prior to mobilization to site was acknowledged as a benchmark for contractor induction management.

The next major maintenance outage for the customer is planned for late 2013 and its execution requires significant Outotec cross-functional expertise. If Outotec is privileged to be awarded the business, it will mean several million euros’ of orders from the customer, both immediately and as a steady stream from the sale of spares. The Australian team will be relying on the support of its German and Canadian Outotec colleagues who specialize in acid plants and shutdown services, respectively.

For more information, contact Peter Cunningham (peter.cunningham@outotec.com).

Indonesia Work Center Being Established

Approval was received earlier in 2012 for the establishment of a Shutdown Services work center in Indonesia. The idea is to station remote-controlled
Bobcat and other proprietary Outotec machines in Indonesia, along with two permanent resources, for efficient deployment to smelter operations and other customers’ facilities requiring refractory demolition and removal.

Outotec has had several years’ experience providing demolition services to the Indonesian smelters of PT Inco (now PT Vale) and PT Smelting. The latest project involved a successful demolition project in March of this year at PT Smelting. However the distance from Indonesia to Canada and even, Australia, where the nearest equipment is stored, meant that shipping times were three months just to do a three-week job.

The establishment of a Shutdown Services work center in Indonesia will allow Outotec to increase customer intimacy, accept more projects in Indonesia, and serve as a second platform from which to launch shutdown services into the SEAP market area.

For more information, contact Peter Cunningham (peter.cunningham@outotec.com).

**Mexico Market Area**

**Shutdown Services and Smelting Combine With Mexico Market Area to Sign Order for New Flash Smelting Furnace**

After years of discussions and planning, Grupo Mexico chose Outotec to construct a latest generation Outotec flash furnace to replace the existing Outotec flash furnace at its Mexican de Cobre facility at La Caridad, Mexico.

The existing furnace, which has been in place since 1984, and which has served Grupo Mexico very well, will be replaced by a state-of-the-art and larger capacity Outotec FSF next year. Outotec Shutdown Services will perform the demolition and removal of the old furnace, and will erect the new furnace.

By handling both the engineering and construction aspects of the project, Outotec will be able to execute it more efficiently and quickly. The advantage to Grupo Mexico will be minimal downtime and a better final product.

For more information contact Sergio Olalde (sergio.olalde@outotec.com).

**Shutdown Services at Grupo Mexico, IMMSA Roaster Rebuild**

Shutdown Services, in conjunction with our Mexico market area, executed a roaster modification and repair at Grupo Mexico’s IMMSA facility at San Luis Potosi this summer. The project, which was completed in two weeks, involved a critical modification which will allow for a more effective and efficient complete rebuild of the roaster in 2013.