



## Less is More

Outotec helps its customers to get more with less – and has scaled up its grinding mill, flotation cell, thickener and filter products to ensure they can get even more.

Ore grades are declining at the same time demand for metals is growing, so more advanced technologies are vital to process the greater quantities required in order to meet this demand. In addition, mines and plants are expanding and, due to tightening legislation and general ecological attitudes towards waste handling, the request for more efficient processes at greater capacity has increased. All the while, these ore bodies need to be transferred to the end user faster.

Outotec provides a solution to this market demand by offering its same well reputed technologies at larger capacity. This means less equipment is needed to do more work. A smaller plant footprint translates into reduced capital and civil investment and lower operating costs from reduced power and maintenance needs. With these solutions, Outotec customers get more for less – less energy, less use of natural resources, less waste and less lifetime operating costs.

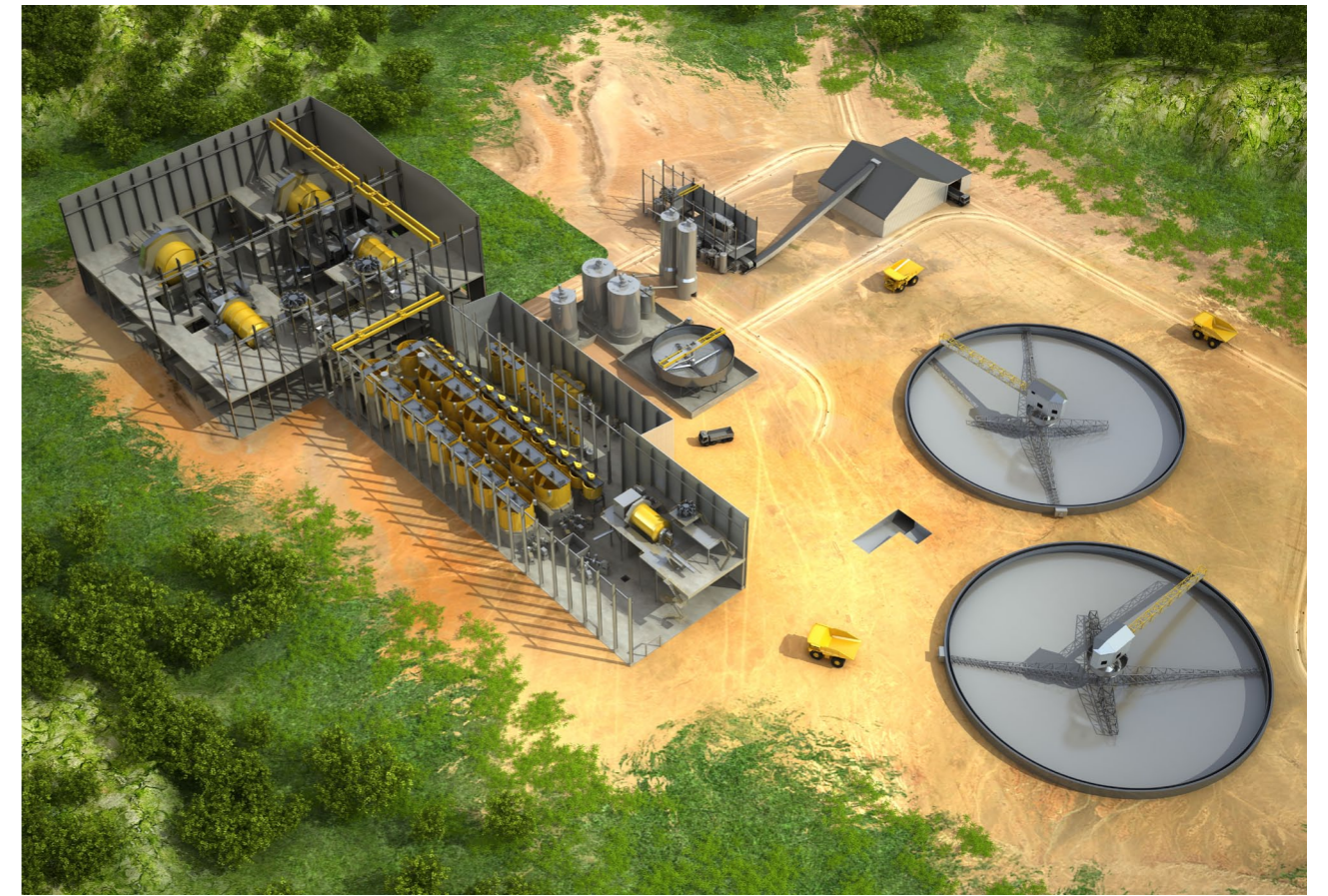
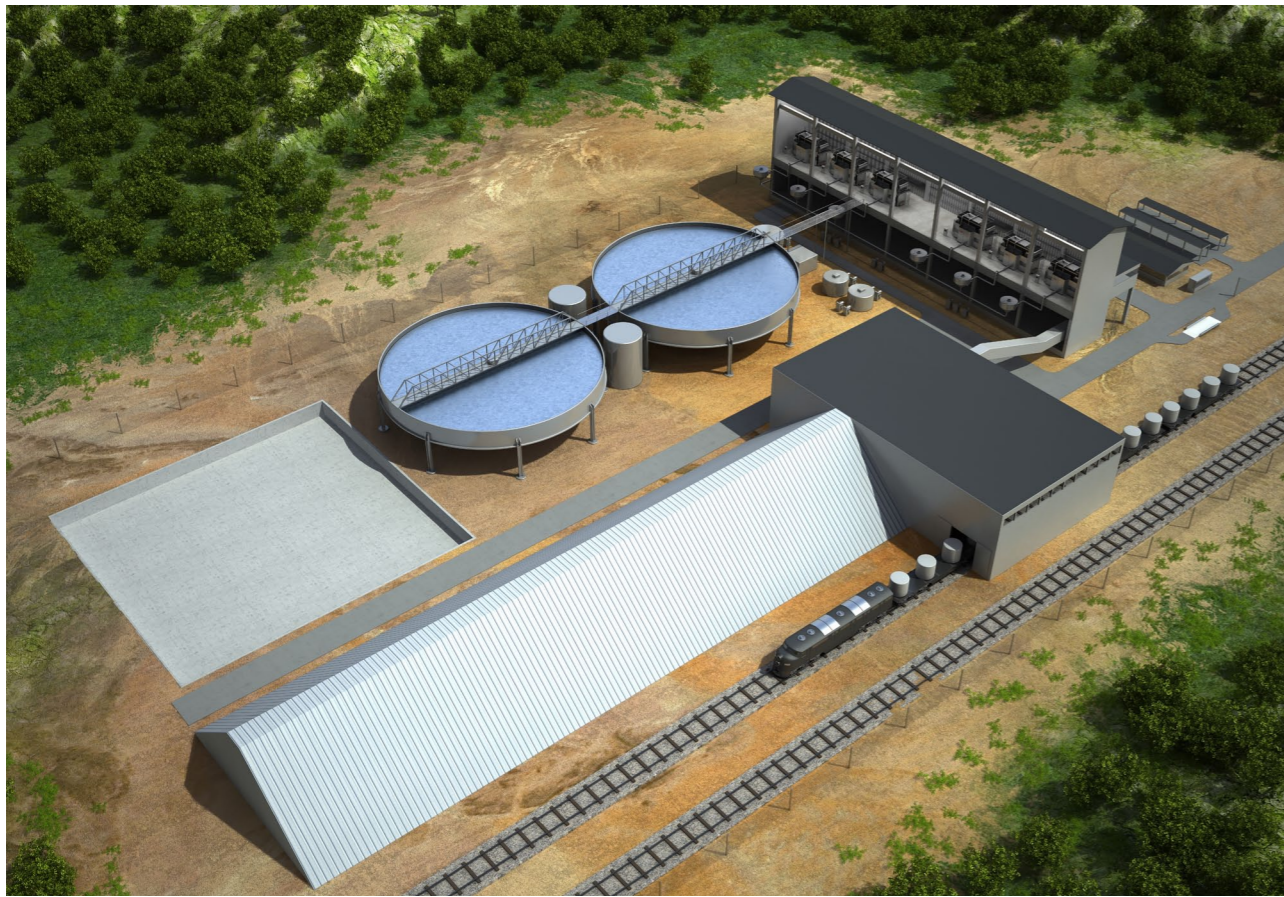
Outotec grinding mills are now available in larger sizes, and combined with the Turbo Pulp Lifter™ (TPL) technology, ensure efficient grinding over a wide range of ore characteristics and

operating conditions. The Outotec TankCell® e500 is now available with the proven FloatForce® mixing mechanism. Outotec Thickeners are available in bigger size and are provided with the proven Outotec Vane Feedwell™ technology. Outotec Larox® PF filters have been expanded into the 180 series, meaning that the available individual equipment size and capacity has grown by over 50%.

### Benefits

- Higher capacity
- Lower cost per ton
- Less energy consumption
- Less service and maintenance
- Reduced plant footprint
- Less civil and installation work, smaller buildings

# Outotec



## Is Less really More?

With Outotec concentrator equipment, LESS IS MORE since one big unit vs. several smaller units means less maintenance, lower costs and less downtime with more throughput and a more optimized operation. Outotec's proven technologies are now even bigger, allowing concentrators to be taken to a new level. In addition to advanced technological design, Outotec is experienced in grinding, flotation, solid-liquid separation,

dewatering and automation processes. Global expertise covers the breadth of metallurgical and mineralogical engineering as well as mechanical and design engineering, so Outotec can supply more than just single units of equipment. Outotec can provide turn-key processing operations to mining and industrial minerals plants and is truly a single source partner.

### Iron ore

The correct sizing of concentrator plant requires in-depth knowledge and experience in crushing and beneficiation processes. In addition, solid-liquid separation is a vital processing step that can help determine the competitiveness of the concentrate producer and the quality of the end product. In a typical iron ore concentrate plant, the feed rate is around 100 000 -200 000 tons per day, so robust, large scale equipment is required. Outotec Larox PF 180 series filters can produce 280 tons per hour. Combined with Outotec TankCell and Outotec thickeners, the plant can produce more ore with less equipment. Efficient solid-liquid separation has environmental benefits and with Outotec large scale equipment, iron ore customer is able to produce the same tonnage, while generating savings in the plant footprint, maintenance costs and energy consumption.

### Tailings disposal

Recent environmental and cost reduction trends have operators focusing a lot more attention on tailings, the waste product of process plants. Alternatives for tailings disposal, filtration and storage are under consideration. For typical iron ore concentrate, tailings waste has environmental impacts. By using filtration for tailings disposal-, recycling is faster, more efficient and safer for the customer. For typical iron ore tailings, filtration can be handled and dry stacked or rehabilitated after processing using Outotec thickeners and Outotec Larox filters.

### Copper concentrate

In typical copper concentrate, the plant feed rate is between 100 000 - 200 000 tons per day, with a head grade of approximately 0.35% copper. These higher tonnage operations at lower grades than past practice, mean much higher demands on the process equipment. Outotec's more advanced line of proven technologies answers the needs of these modern copper concentration facilities.

### Demand for efficiency

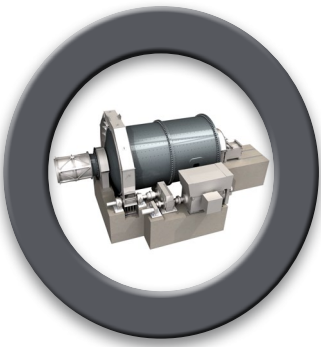
Outotec's grinding expertise is now available for large mills. The most advanced design, analysis and testing technologies are combined with the patented Turbo Pulp Lifter (TPL) mill upgrade to allow new mills to operate at maximum capacity with significantly improved grinding efficiency at lower specific energy.

Larger scale operations translate into increased demand for bigger equipment, especially for flotation and thickeners. By selecting Outotec's TankCell e500 with Float Force technology and Outotec's large-scale thickeners with Vane Feedwell technology and combining them with the Outotec Larox 180 series PF filter, the copper customer is able to save through reduced installation work, smaller buildings and a smaller plant footprint. Increased capacity also means a lower cost per ton.

For example, the feed rate for a typical copper circuit achieving the same tonnage would require 20 TankCell e300 flotation units, whereas now only 12 e500 units can do the same job.

Overall, Outotec's advancements create savings for the customer amounting to a 1/3 smaller footprint and 40% less equipment.

Less really is More.



## GRINDING

With Outotec's large-scale grinding mills (w/TPL), concentrator customers benefit from:

- Increased mill capacity up to 15%
- Reduced energy consumption
- Efficient operation at all mill speeds
- Minimized excessive fines generation

**Less is more:** Less energy is consumed at more capacity with the curved, Turbo Pulp Lifter discharge system. Efficiency increases and effective grinding conditions are ensured.

## FLOTATION

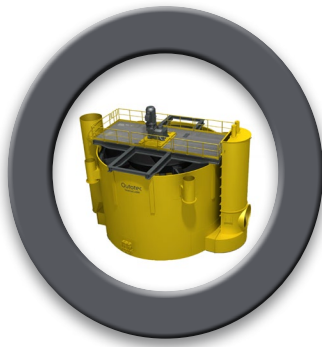
With Outotec Flotation cells, the large copper and gold sulphide ore process customers that have a high material throughput, benefit from:

- Lower capital expenditures due to lower equipment costs
- Savings in plant footprint
- Less installation work
- Less need for auxiliary equipment
- Lower energy consumption
- Less units per installation – less components and spare parts
- Less maintenance work

### All Outotec TankCells:

- Provide superior metallurgy at the lowest energy consumption compared to competing products on the market
- Are easy to operate and enable a flexible layout
- Enable the most economic lifecycle costs

**Less is more:** Less cells, with a combined lower equipment cost, now provide the same superior metallurgy but at lower operating costs..



## THICKENING

With Outotec large scale thickeners, minerals processing customers with tailings treatment benefit from:

- Increased water recovery
- Increased slurry yield stress (tailings disposal)
- Large throughput per unit operation
- Lower cost

**Less is more:** Fewer thickeners do the same job at a lower cost, plus fewer units means a lower carbon footprint compared to multiple smaller units.

## FILTRATION

With the large scale Outotec Larox PF filter, iron and other metallurgical, mining and minerals companies processing mine tailings and waste slurry applications benefit from:

- >50% bigger unit and capacity
- Low total energy and water consumption
- Less total costs
- Confirmed reliability
- No more tailings ponds
- Bigger unit means less parts and consumables

**Less is more:** Size can be up to 50 % bigger when compared to the previous largest PF type, meaning more capacity with a smaller plant footprint. Total costs – including spare parts, wear parts, energy and water consumption, and work man hours – are lower per ton of product than those for smaller size PFs.

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*Outotec develops and provides technology solutions for the sustainable use of Earth's natural resources. As the global leader in minerals and metals processing technology, Outotec has developed over decades several breakthrough technologies. The company also offers innovative solutions for the chemical industry, industrial water treatment and the utilization of alternative energy sources. Outotec shares are listed on the NASDAQ OMX Helsinki.*

info@outotec.com

www.outotec.com

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