The Metso Way –
Making the big difference to our customers.

Everything we do is based on deep industry knowledge and expertise that makes the big difference to our customers. Decades of close customer collaboration and adapting to our customers’ ever-changing needs have transformed us into a knowledge company.

Through our knowledge and experience, we work with our customers to create solutions that enable them to attain their objectives. We call this The Metso Way, which focuses on creating value to our customers. The Metso Way is built upon knowledge, people and solutions.

In-the-pit Solutions

Conveying the Future

Metso Inc.,
To produce metals, minerals, aggregates and energy for today’s global needs, the mining industry must handle huge volumes of material, sometimes moving entire mountains. Today, mines are being challenged to rethink how they both remain profitable and be socially and environmentally responsible moving into the future. With high-grade ore deposits depleting, mines of the future have to extract more, requiring the movement and processing of even larger volumes, which is much more expensive and energy intensive. The industry is seeking solutions that result in lower operating costs than conventional truck haulage, use less water, consume less energy and address stricter occupational health and safety laws. Metso customers are also looking for more intelligent solutions that can be automated, monitored and controlled, to reduce the need to put people in higher-risk circumstances.

Using an in-pit crushing and conveying (IPCC) system to reduce or replace conventional truck haulage to the plant or waste dump brings significant savings in operating costs and lowers energy usage, water consumption, dust, emissions and noise. IPCC systems also open up the future of mining and processing technology by implementing pre-concentration of ore in the pit, greater automation, condition monitoring and remote control.

Metso In-the-pit Solutions (ITPS) bring together our years of expertise and knowledge with a full range of offerings and capabilities that deliver the right equipment, services and technology for our customers.

Sustainable Mining at the core

Conventional transportation of ore & waste can account for 50-60% of mining operating costs.

Environmental challenges caused by emissions of gases & particulates continue to rise.

A typical mine needs 2-4 litres of water per m² of haul road everyday to keep the dust down.
System Implementation
Commitment to managing costs and schedules for every project is paramount to us. Our industry leading Project Execution model ensures successful delivery and start-up. We can not only deliver the system to the site, but also supervise installation and commissioning while managing the entire process. Our comprehensive implementation services include documentation, automation, commissioning, training, supervision and coordination.

Automation
Metso solutions come with standard safety features that can be automated to your requirements by our automation and control experts. An example of one of our off-the-shelf systems is the advanced ICr™ wireless information process control system, which enables the crushing process to be monitored and controlled remotely from the excavator cabin.

Performance-Based Maintenance Contracts
Metso leads the industry in offering services, tailored to your needs, under Life Cycle Services (LCS) contracts. An LCS contract can include maintenance planning, maintenance services, spare and wear parts, consignment stock and more.

Dedicated Local Service
Our local services teams are always close to you to ensure the highest standards of quality, productivity and cost efficiency. Well equipped with the knowledge of local conditions and regulations, our local services include any or all of the following:
- Training programs
- Maintenance services
- Spare and wear parts
- Diagnostics support
Fully-Mobile Crushing Solutions

A fully-mobile crushing system removes the reliance on truck haulage. Excavators, shovels or front-end loaders are used to feed a Lokotrack® mobile crushing unit, which is typically followed by a Lokolink system that allows the crusher to move over a wide range, and ensures that the excavator can work at maximum capacity. Operated by remote control, Lokotrack are often moved on a daily basis inside a continuous mining process, where the material being mined is homogeneous, such as for waste rock, quarries, coal and shale, industrial minerals, or for massive ore bodies.

Fully-mobile jaw crusher Lokotrack typically operate up to 3000 mtph or higher, depending on the model and feed material characteristics. Crusher options include: jaws, impactors & sizers.

Semi-Mobile Crushing Solutions

A semi-mobile crushing unit is installed in the pit, reducing the truck haulage distance. Metso semi-mobile systems are designed to be moved as a single unit or disassembled into 4-6 smaller modules mounted on skids for easy transport. Typically, these crushing systems are moved every few years. This method leverages on the flexibility of trucking operations while reducing the cost of long-distance haulage. The main applications are in operations where the mining is selective, where the ore body is heterogeneous or for capacities above 3000 mtph for hard rock.

Semi-mobile gyratory crushing stations typically operate up to 9000 mtph, depending on the model and feed material characteristics. Crusher options include: jaws, gyratory, impactors and sizers.

Conveying & Material Handling Solutions and Services

Conveying is by far the most dominant method of transporting crushed material in a minerals processing operation. The energy requirement for conveying is only a fraction of that for truck haulage. Based on more than 100 years of experience in development, manufacture and applications know-how, our systems are designed to meet specific end-user requirements for high performance and cost efficiency.

Metso offers the optimum solution, whether your requirement is for ore or waste, in horizontal, inclined or vertical applications. We also offer the world’s most complete range of wear protection for feed chutes, transfer points, hoppers and bins.
Future of In-Pit Operations

Pre-concentration improves profitability

As ore grades deposits are reducing, increasing volumes of material have to be mined to meet market demands. This is leading to increased costs, energy and water consumption in mining, transportation and processing. We can work with you to sort the ore early in the process and minimise re-handling, mixing & transportation costs.

Pre-concentration is the rejection of gangue (barren material) from coarse ore feed. It increases the grade of the ore early in the mining process, and avoids feeding the plant with material that will cost more to process than its worth. Hence, less tonnes of ore are treated per tonne of product. This has a number of downstream benefits, such as less energy in grinding low-value, larger size material, reduced tailings and improved recovery, all of which ultimately reduce costs, energy and water consumption.

Pre-concentration significantly improves the value of the resource by upgrading below cut-off grade material and/or increasing production rates per tonne of material treated. There are several technologies, that may be applicable for pre-concentration, including: gravity processes, magnetic separation, sensor-based ore sorting (SBOS) and screening. The suitability of each case depends on the properties of the ore.

Screening

Valuable minerals are often softer or more friable than gangue minerals, and are hence, concentrated in the fine size fractions after initial breakage stages. If the ore exhibits a grade-by-size relationship, screening can be an effective method of pre-concentration. Screening is a simple, high capacity, low cost and low technical risk solution.

Sensor Based Bulk Ore Sorting

Where the grade-by-size relationship does not allow effective separation, it may be possible to achieve an upgrade using sensor-based ore sorting (SBOS). SBOS relies on one or more sensors measuring the ore on a Conveyor.

A mechanism at the end of the conveyor diverts the ore stream to one of two directions depending on the grade of the ore and based on a cut-off value. A variety of sensors are available that measure different properties of the ore, the most common being photometric, electromagnetic, radiometric and x-ray. To be practical in pre-concentration applications for large-scale mining operations, the measurement process needs to penetrate the entire bulk of the ore and be almost instantaneous.

Ore sorting benefits from the natural heterogeneity of deposits and should be implemented as early in the process as possible, where the variability is greatest, to maximize the benefits.

Gravity Separation

Pre-concentration with gravity processes requires a distinct density difference between the ore and gangue minerals at fairly coarse sizes. Finely disseminated ores are generally not suitable, as the density difference only becomes apparent when the particles are finely ground. Dense or heavy medium separation (DMS or HMS) is the most efficient gravity concentration option available that is suitable for a wide variety of ores at a relatively low capital and operating cost, and should be considered during the design phase for new concentrators. However, many low-grade ore bodies may not have a sufficient density difference at coarse sizes for effective separation.

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Boral Peppertree Quarry, Australia

The Australian quarry industry’s demands for greater efficiencies and throughput, as well as higher safety and sustainability standards led Boral to choose Metso’s Lokotrack® LT160E™ and patented Lokolink® mobile conveyor system for its new Peppertree quarry. The quarry will supply Sydney and the region with up to 3.5 million tonnes of aggregate products per year.

Challenge

Boral was looking into optimizing its quarrying process, to move away from traditional load and haul operations and reduce costs. A risk assessment of the crushing process led to the selection of in-pit crushing as the safest and most efficient option for the new plant.

Solution

Extensive design consultation between Boral’s technical staff and Metso’s design team prior to design finalization and manufacture produced the most sophisticated machine of its own kind, with a number of safety and environmental innovations that were never seen before.

"One result in the safety aspect – it reduces our mobile fleet, so we get less traffic movement on the site, which is much safer. From an environmental perspective, it reduces fuel consumption and the environmental impact of dust emissions. From a health, safety and environmental perspective, it’s a really great solution; but, most importantly, from an operational perspective, it does everything we need it to do.” – Boral Sydney Aggregates Project’s Senior OHS Adviser, Natalie Constantine.

"We believe that the outcome of the design process will result in overall lower costs of operation. One of Boral’s key lessons from this project is that when importing a plant and equipment, there are a number of opportunities to adjust the design and capability of the equipment.” – Boral’s Sydney Aggregates Project Executive Manager, David Bolton.

With a new in-pit solution coming into operation, hauling costs and emissions have been reduced. With special attention to design and the arctic conditions, ease of maintenance and safety have also been improved.

Severstal Olkon Iron Ore Mine, Russia

Located 200 km north of the Arctic Circle in Murmansk, Olkon is a major Russian producer of iron ore concentrate. The mine produces around 4.4 million tonnes of product per year. Severstal is one of the world’s largest, vertically integrated steel and mining companies.

Challenge

In 2012, Olkon had to face the challenge of lowering operating costs and emissions at a unique site that combines open pit and underground operations in arctic conditions with limited space.

Solution

Working closely with Olkon and their technical representative, SPb Giproshakht, Metso mobilized cross-national teams to design and implement a crushing and conveying solution in the pit, including:

- A Metso primary crushing station: Nordberg® C200™ jaw crusher and apron feeder, secondary stage Nordberg® HP800™ cone crusher, screens and conveyors
- Custom-made electrics and automation systems
- On-site assistance from Metso’s experts

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"Olkon placed their confidence in Metso for our process expertise and project implementation capabilities, as well as in our machines. In return, Metso has provided a showcase in-pit solution.” – Frédéric Barou (Senior Project Manager), Metso.

The successful start-up of the crushing and screening equipment and the belt conveyor in our mine gave many other mining companies reason to have confidence in the solution. In fact, we were the first company to implement such a system in Russia.” – Alexander Popov, General Director of Olkon.

In-the-pit Solutions

Key Benefits

Environment

- Energy efficient equipment
- Electric driven
- Reduced water consumption
- Lower emission of gases & particulates

Safety

- Designed for safety and ease of use
- Automation & remote controlled operation

Reliability

- Over 6000 systems sold
- Operating in the toughest conditions
- Maintenance planning and service support

Performance

- Performance-based contracts
- Proven technology
- Local service and support

Cost

- Improved NPV for the life of mine
- Lower operating costs
- Minimal production downtime