Metso in minerals processing

Your success is the secret of our success
We help you achieve the most efficient results – sustainably

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Right where you need us
We supply competitiveness

At Metso, we know that the only real measure of our worth is in the results we deliver to our customers. With a presence in over 100 countries, and with more than 30 manufacturing plants, over 70 service centers, 10 distribution centers and 20 warehouses. Metso has the resources to bring you a full range of capabilities. Right where you need us, whenever you need us.

Rock-solid dedication
Our expertise is rooted in more than a century of experience that today provides our customers with an unparalleled knowledge base, rock-solid financial resources plus the engineering know-how, innovative technologies and worldwide locations to ensure that your mining operations will profit. We also offer a comprehensive range of services, from installation, commissioning and preventative maintenance to full operational support, process optimization and training, as well as reliable, OEM wear and spare parts to help maximize your plant availability.

One goal: your bottom line
Our mining customers range from coal mines, precious and non-precious metal mines, to copper, iron ore, gold processing and industrial minerals.

For every customer we serve, we bring a hands-on commitment to making the solutions work while minimizing your costs through efficiency and expertise. In fact, everything we do, everywhere in the world, is done with just one goal: to make a real and sustainable impact on the quality of your bottom line.

Our comprehensive systems approach is designed to provide you with the process capabilities and technology know-how to meet all your mining related needs. Deep technological competence and industrial knowledge combine to deliver cutting-edge solutions and services – from initial development through the lifetime support of your operations.

Proven Metso achievements in mining

- Over 8,000 grinding mills and over 30,000 crushers delivered.
- Metso VERTIMILL™ is the market leader in energy efficient vertical mills.
- The unique Megaliner™ mill lining concept leads the way in safe maintenance.
- Metso is the manufacturer of HRC3000™, the world’s largest high pressure grinding roll.
- Metso introduces the world’s largest cone crusher, MP2500, to respond to the mining industry’s efficiency challenge.
1. Metso’s SUPERIOR® primary gyratory crushers feature crushing chambers that deliver the greatest possible throughput while placing the least stress on critical components. This means higher capacities, lower power requirements and more even wear – all helping to decrease operating cost per ton.

2. Metso’s MP series cone crushers process more ore than any competitive unit for the same product size and can deliver up to twice the capacity per crushing station.

3. Metso’s mining screen range is specifically designed and manufactured for the mining industry and includes the following models:
   - MF (Multi Flo), Linear Motion, Curved Decks
   - RF (Ripl – Flo), Circular Motion, Curved Decks
   - LH (Low – Head) Linear Motion, Horizontal Decks

4. Metso’s SAG / AG mills have been the industry benchmark for primary grinding applications. Our state-of-the-art engineering and manufacturing know-how have set us apart and have enabled us to deliver the largest SAG / AG mills in the world. With our customers’ needs and operational risk at the center of our design philosophy, Metso’s SAG / AG mills have provided the highest reliability and availability. Metso’s SAG / AG mills range from small hydrodynamic bearing mills to the largest hydrostatic pad bearing supported mills.

5. Metso HRC™ high pressure grinding roll is one of the most energy efficient and modern comminution methods available, and can replace traditional tumbling mills in certain applications.

6. Metso supplies a complete range of ball mills from small roller bearing mills to the largest hydrostatic pad bearing supported mills. Metso’s ball mills have been relied upon in the industry for its reliability and proven design. By incorporating state-of-the-art engineering methods, Metso’s intelligent designs deliver mills with the lowest cost of ownership and the highest availability.

7. The VERTIMILL® is Metso’s gravity-induced, vertical stirred mill. Its vertical configuration allows for large throughputs while maintaining a small footprint in your circuit. The VERTIMILL® can bring up to 40% savings in energy consumption in some cases, and also helps in reaching excellent recovery rates by producing a sharper particle size distribution.

8. We provide both wet and dry Low Intensity Magnetic Separators (LIMS) including initial stage dry coarse sorting and cobbers for early gangue rejection and highly efficient wet separators to yield optimum grade and recovery at each of the following stages. Metso’s High Gradient Magnetic Separators (HGMS) are used for weakly magnetic minerals such as Hematite, Limonite, Chromite REE-minerals providing unsurpassed fines recovery.

9. Metso’s inclined plate principle uses several parallel inclined plates to maximize the available floor area, minimizing the size and cost of the gravity settler by more closely matching the thickening and clarifying requirements.
Latest technology – from the primary comminution stage to the port

At Metso, we know your entire minerals process and are dedicated to making it even more efficient. Take a look at some of the ways in which our technology helps you save both energy and money.

10 The RCS flotation machine is the latest design to use the circular tank concept. It combines the benefits of circular cells with unique features of the mechanism to create conditions that maximize flotation performance for all roughing, cleaning and scavenging duties. Also, Metso’s Column Flotation cells utilizing our patented high efficiency Microcel sparger systems are proven to provide exceptional recovery of your valued product.

11 The SETL® system is a further development of compact sedimentation and dewatering using lamella clarification technology. The SETL® system is a modularized system for treating silts and effluents. The SETL® system is easy to install and operate giving maximum customer return on investment.

12 As particles get finer, the resistance against removing water increases and gravity de-watering can no longer be used; at this point, pressure is required. Metso’s vertical plate pressure filter (VPA) was engineered for such applications, using compressed air to de-water the filter cake.

13 Metso’s Pyro processing equipment and services will increase the economic value of your ores and minerals. Our equipment portfolio covers the entire thermal process, including drying and cooling, materials handling and combustion.

14 Metso’s expertise in bulk materials handling technology encompasses rail car and barge unloading and loading, stockpiling and reclaiming, feeding and conveying.
Health, safety and environment
The essential Metso element

At Metso, we are committed to taking responsibility for our own safety and for the safety of others, and we believe that all injuries and incidents can be prevented. We continuously and consistently strive towards zero harm. We view compliance with applicable laws and regulations only as a minimum requirement, not the standard for our own performance.

Our commitment
For Metso, sustainability is the core of our strategy. Our goal is an environmentally and socially sustainable business. Health, safety and environmental issues are at the top of the agenda for us and form an integral part of our operations.

Environment
We focus on developing environmental friendly technologies and offers eco-efficient solutions to our customers. Our environmentally emphasis consists of products and services that reduce the environmental load and improve the quality of our customers’ operations.

Health and safety
Safety is essential and applies to everything we do. Our equipment is safe to produce, to operate and to maintain.

Social responsibility management
Metso prides itself on social responsibility, and we are consistently growing our efforts to make a positive impact. Throughout every level of the company, we emphasize four particular areas of social interest:

**Human rights:** No matter where in the world Metso is working, the basic tenets of human rights determine how we operate and how we treat every employee, customer and partner.

**Personnel:** We focus on excellent human resources management, seeking out diversity and working hard to ensure that every Metso workplace embodies the highest level of safety and wellness for our personnel.

**Business networks:** We aim to improve the quality of our relationships all over the world, approaching each new and existing relationship with open communication, respect and integrity.

**Society:** All of our offices, service centers and regional teams are known for cooperation with authorities, governments and local/regional residents. We aim to add value to the communities where we live and work.

To fulfill our HSE Policy we

- Require good HSE behavior and follow the rules and instructions that we have set in all our daily activities
- Continuously improve our processes, practices and work environment
- Design our solutions, products, innovations and services to help our customers improve their safety and environmental performance
- Strive for efficient and sustainable use of energy, natural resources and materials in all our operations

Metso’s patented Megaliner™ Poly-Met shell liner was developed to improve worker safety while also maximizing mill availability.
We offer real solutions to some of your biggest environmental challenges
With over 100 years of experience in the industry and thousands of continuous working applications across the globe, Metso service experts work tirelessly round the clock to keep your equipment and process running. Harnessing global knowledge we bundle industry’s most comprehensive service offering.

Whether it is spare and wear parts support, field services, preventive maintenance, plant diagnostics, equipment refurbishment, process technology solutions or life cycle services, you can always count on having a skilled Metso service person near you whenever and wherever you need one. Today, Metso expertise is available to our customers worldwide through a service network consisting of more than 70 service centers, 10 distribution centers and 20 regional warehouses.

Spares and wears part solutions
With optimal performance and high equipment availability, Metso spare and wear parts are designed to stringent technical specifications and manufactured to the highest quality standards. The use of OEM parts guarantees the reliable performance of your equipment for years to come, contributing to a lower cost per ton of production. As the availability of spares and wears is critical to timely maintenance and machine availability, our network of distribution centers is strategically located across the globe to ensure you have access to the right parts when you need them.

At Metso, the continuous improvement of our materials technology is an ongoing process. Since the characteristics of the ore, or the process itself, varies from mine to mine, standard crusher chambers can be optimized by customizing them to your process. Depending on your needs, we can set goals such as longer wear life, higher capacity throughput, finer material, or shorter downtime on liner changes. Our patented Chamber Optimi solution is a tailored service for customers who look for ways to change, optimize or enhance the utilization ratio of their size reduction processes.

Mill lining solutions
With its wide-ranging experience, continual product development, global production and support network, Metso is the world’s largest manufacturer of mill linings. Our state-of-the-art linings and discharge systems are available for virtually all types of grinding mills. Metso is the market’s most comprehensive supplier of mill linings. In order to ensure optimum performance of your equipment, we offer linings of rubber, metallic, and combinations of both to best utilize the unique properties of these materials. With an experience of over 50 years, we are constantly developing new products to enhance grinding processes to ensure improved availability, lower maintenance costs and more efficient production.
Screening, conveyor and wear lining solutions
Metso’s Trellex range of polymer screening media optimizes your mining process with lowest total cost. Our unique use of various materials coupled with modern and efficient production technologies creates solutions and opportunities to deliver your high expectations on capacity, accuracy and uptime. Our range of products cover primary to fine screening in both wet and dry applications.

Installed in chutes, spouts, hoppers and transfer points, Metso wear lining solutions minimize wear on equipment and reduce noise while increasing service life. The product range includes products and concepts designed to best support higher volume processing with minimal interruptions while improving the working environment.

A comprehensive range of conveyor solutions with a history of over 100 years in development, manufacturing and applications know-how, Trellex conveyor belts, accessories and components are designed to meet specific end-user requirements for high performance, cost-efficiency and safety of your conveyor operation.

Maximizing availability: Widest range of service products ensuring lowest cost per ton
Repairs and retrofits
Metso offers extensive repair and rebuilding services as a cost-effective alternative to purchasing new equipment. These services are available through our experienced aftermarket engineering staff and customer service representatives, at our manufacturing facilities worldwide. Metso’s repair centers combine skilled personnel, global industry experience and the latest technology. Our extensive range of services includes equipment modification and repair; equipment rebuilds and upgrades; and in-depth failure analysis and trouble-shooting. From bearing replacement to complete machine refurbishment, Metso’s repair centers are committed to keeping your equipment in peak operating condition.

Metso also supports equipment previously sold under a variety of trade names, where we own and maintain the drawings, specifications, manuals and design calculations:
• Allis Mineral Systems
• Allis-Chalmers
• Boliden Allis
• Cable Belt
• Denver Equipment
• Dominion Engineering
• Dravo Wellman
• Hardinge
• Kennedy Van Saun (KVS)
• Marcy
• McDowell Wellman
• McNally Pittsburg
• McNally Wellman
• Mead Morrison
• Metso
• MKT Corporation
• MPSI
• NEI
• NICO
• Orion
• PECO, Nolan HCM
• Pyrotherm
• Sala
• Stansteel
• Stephens-Adamson
• Strachan & Henshaw (BMH)
• Svedala
• Thomas

Based on original specifications and by incorporating the most recent innovations, our custom-engineered solutions fit seamlessly with your existing equipment and processes.

Field services support and supervision
Being a global service provider, we have a comprehensive understanding of operations and can provide better process operation, improved productivity, maximum plant availability, reliable equipment performance, effective preventive maintenance and better safety. Count on Metso’s certified customer service team to help get the best from your operation.

Regular inspection and maintenance of your equipment is essential to achieving production goals. Let Metso’s professional service team help. Armed with the latest product developments, technical specifications and detailed OEM work procedures, our skilled technicians can ensure the safe, efficient replacement of wear and spare parts; provide valuable feedback on equipment conditions; and propose appropriate maintenance solutions. In addition, customer training seminars are organized by our service experts in a wide variety of
languages and locations worldwide. The focus is on OEM recommended operation and maintenance procedures because skilled equipment operators and maintenance crews keep plants working profitably.

**Process optimization solutions**

Metso is the world leader in providing integrated solutions for the entire operation of our customers – from the mine to the processing plant. We offer global consulting services and products (advanced software and hardware) for the mining and construction industries. Our team of highly motivated and specialized engineers (mining, metallurgical, chemical and software/electrical) have a strong R&D background and extensive mining and metallurgical plant production and consulting experience.

Our proven Process Integration and Optimization (PIO) services include optimization of the mining (drill and blast), comminution, flotation/leaching and dewatering processes for both Greenfield and existing operations. Across hundreds of projects globally, we have delivered considerable increases in profitability of our customers operations through significant increases in production (5 to 30%) and metal recovery, cost and energy reduction, as well as overall process efficiency. We have extensive experience in throughput forecasting and more recently geometallurgical modeling (GeoMetso™).

Metso also offers crushing, grinding and flotation tests using state-of-the-art laboratory and pilot scale equipment. Results can be supplied directly to customers or alternatively interpreted and used by our engineers as part of design, expansions or optimization projects. Our innovative products include SmartTag™ ore tracking system, SmartEar™ acoustic measurement system for grinding mills, and other advanced soft-sensors and instruments. Through our internal and collaborative R&D programs, we continuously develop more efficient and sustainable solutions that have won international recognition and awards. Our team of recognized specialists has published over 350 technical papers and presentations at international conferences and congresses.

**Life cycle services**

Metso life cycle solutions represent the next step in service offerings. We share the same objectives and incentives as our customers – increased production. Therefore, we incorporate our global knowledge in develop customized service levels. Together we maximize our competencies while allowing you to focus on your primary business. The Metso life cycle service contract that best suits your application is always a combined effort. Our experts are available to meet with you to learn your specific needs and to understand your strategic drivers, constraints and bottlenecks to offer the best possible solutions.

Metso Performance Solutions help implement industry best practices for each step of your operation to achieve optimum, sustainable performance throughout the lifecycle of your equipment. Our offerings range from new installations, maintenance services, process improvements, as well as upgrades and rebuilds. Together with our team of experts working onsite, all key performance indicators are monitored and addressed through a well-planned management program. By jointly setting targets and monitoring your operations, we can meet your needs by assisting in forecasting productivity or boosting profitability.
Comminution
World-leading efficiency in crushing and grinding

Metso technology: designed to deliver lowest total costs
Ensuring the accuracy and consistency of product size directly affects the profitability of your operation. Metso is the global leader in comminution technology. You can count on our equipment to deliver efficiency, consistency and high availability during this vital process.

Metso has a tradition of leading the industry in developing and producing larger and more powerful mills and crushers.
Crushing and screening
Proven solutions

Efficiently reducing ore size requires the optimum mix of world class equipment. As the world’s leading supplier of crushing and screening equipment for the mining industry, Metso can ensure that you’ve selected the very best equipment, systems and solutions for your mining application.

From large primary jaws and gyratories to cone crushers for tertiary and quaternary finishing, Metso equipment is engineered to meet your material reduction requirements.

Primary gyratory crushers
Metso’s line of SUPERIOR® primary gyratory crushers offers exceptionally high capacity and maximum liner life. Our engineers, through their extensive process knowledge, have designed crushing chambers that deliver the greatest possible throughput while placing the least stress on critical components. This means higher capacities, lower power requirements and more even wear – all helping to decrease operating cost per ton.

C series jaw crushers
Metso’s C series jaw crushers are designed as primary or secondary crushing for surface or underground operations. A revolutionary modular, non-welded frame provides the highest possible fatigue strength and reliability, as well as multiple mounting configurations. And we’ve combined easy, economical installation with durable wear parts for exceptional availability and cost-efficient crushing.

MP™ cone crushers
At the lowest possible cost per ton, Metso’s MP™ series cone crushers deliver maximum crushing performance. They process more ore than any competitive unit for the same product size and can deliver up to twice the capacity per crushing station. The MP™ series is well suited for secondary and tertiary crushing in feeding grinding mills and leach pads, as well as critical-size pebble crushing to optimize AG/SAG productivity.

HP™ cone crushers
Our HP™ cone crushers are engineered for secondary, tertiary or quaternary crushing applications in both stationary and mobile installations. Nordberg HP™ cone crushers offer a unique combination of crusher speed, throw and cavity design – all backed by reliable construction and high capacity and yield.
Crushing and screening

Proven solutions

For optimum end product quality, complement your equipment with Trellex screening media.

Multi-Flo™ screen
This line of curved-deck banana screens delivers the largest sizes in the industry (up to 4.2 meters wide and 8.5 meters long). It produces linear motion, and two exciter models to cover all sizes, with a deck slope configuration that can be set at various angles.

Low Head™ screen
The low head screen is particularly effective for SAG Mill discharge where space is at a premium.

Ripl-Flo™ screen
This inclined screen performs its duties with a circular motion. Available with one or two decks, it features superior abrasion-resistant wear protection.

Ellipti-Flo™ screen
A result of its high acceleration and elliptical motion, Ellipti-Flo™ delivers valuable anti-blinding characteristics. This banana screen also features variable speeds and throw angles as well as bronze bushings.

Ellipti-Flo™ screens provide 20% to 30% greater capacity than the largest banana screens on the market.

Vibrating feeders and grizzlies
Heavy duty construction, designed for continuous use with any hard and abrasive ores.

Thanks to our extensive experience in supporting our customers throughout the entire life cycle of the equipment, Metso technology is always designed with maximum safety and ease of maintenance in mind.

For optimum end product quality, complement your equipment with Trellex screening media.
Grinding
Bringing energy efficiency to a new level

Metso designs and manufactures the most comprehensive line of grinding mills and entire grinding systems for the global mining industry. Wet or dry, horizontal grinding or vertical stirred milling, we make sure you’ll get precisely the equipment that is most effective and most energy efficient – and that your operations are backed up with all needed services over the long haul.

AG/SAG mills
Autogenous grinding (AG) uses the feed material itself as grinding media. Semiautogenous grinding (SAG) uses the feed plus supplementary grinding media (usually steel balls). Metso’s AG/SAG mills are ideal for grinding run-of-mine rock or primary crusher discharge and are available in a complete range of sizes and capacities.
- Geared
- Gearless
- Sleeve/pad bearing supported
- Trunnion/shell supported

Due to their ability to handle sticky feed, SAG mills are frequently used to prepare feed for ball mills.

Ball/pebble mills
Ball mills use metallic media to grind material. Pebble mills use ceramic or natural rock for grinding. Pebble mills are most often used for single stage fine grinding.

Rod mills
These mills, which use rods as grinding media, produce a uniform-sized product while minimizing the production of tramp oversize and unwanted fines. They are typically used to prepare feed for ball or pebble mills, and to grind ores, coal/coke and other materials for both wet and dry applications. Materials too wet for fine crushing and dry screening may be wet ground in a rod mill.

Stirred mills
There are two basic types of stirred mills – gravity induced and fluidized. Metso engineers and manufactures both types of stirred mills, delivering industry-leading efficiency and availability to fine and ultrafine grinding applications:
- VERTIMILL® is Metso’s gravity-induced, vertical stirred mill. Its high energy efficiency, low media consumption, fast installation, and great operational safety provides the lowest total cost solution for many processes. The VERTIMILL® is capable of handling feed sizes up to 6 mm and grinding to a product size of less than 20 microns.
- The Stirred Media Detritor (SMD) is Metso’s vertically configured, fluidized stirred mill for optimum fine and ultrafine grinding efficiency. With its simplistic design and long maintenance intervals, the SMD series provides the highest level of availability on the market. It has unparalleled efficiency when grinding to a product size of less than 20 microns. Coupled with the mill’s low media cost and consumption rates, it will provide the lowest total cost solution for your ultrafine process.

HRC™ high pressure grinding rolls
The HRC™ HPGR utilizes two counter-rotating rolls to crush the ore via inter-particle comminution. The unit is designed specifically for heavy-duty mining and aggregate applications in order to maximize availability, reliability and increased energy efficiency. High pressure is applied to a bed of material in a controlled manner, setting the stage for energy efficiency. Metso’s unique concepts, such as the patented anti-skewing Arch-frame and patent pending flanges further increase the machine’s efficiency. In a pilot scale operation, these features have been shown to decrease energy demands of the circuit by 10%.
Comminution accounts for the largest portion of energy consumption at a mine site, and high energy consumption translates into high operational costs. Therefore, investing in energy efficient solutions makes a real difference in your bottom line.

Energy efficient circuits – solving the puzzle

To be energy efficient, a circuit needs not only to have the right equipment but have that equipment optimized. Even the most efficient equipment installed on the wrong application will not be energy efficient. Our expertise extends the supply of single unit equipment with our ability to provide total flowsheet solutions.

Metso has an extensive history of technological development and is recognized as the world leader in the supply of grinding mills. Metso is constantly investing in both the improvement of existing technology through the reduction in energy, water and media consumption and development of new technology to meet and exceed customer demands. Below are presented examples of energy efficient flowsheets recommended by Metso.

**AG mill, HRC™ and Pebble mill**
AG mill is followed by a single deck screen with the oversize being recirculated through a HRC™ before returning to the AG mill. The undersize from the screen is fed to cyclones with the underflow fed to pebble mill circuit sump. AG mill can be replaceable for a SAG mill, however special care should be used to detect and remove balls from the HRC™ feed.

**AG mill, Magnetic separation and VERTIMILL®**
When the ore competency proves to be ideal, autogenous milling can offer significant operational cost savings through the exclusion of grinding media. Metso has installed this circuit configuration in an Iron Ore plant adding a magnetic separator after the AG milling.

**MP Cone crusher, HRC™, and VERTIMILL®**
In this scenario, the product from the primary crusher is fed to the MP cone to reduce its top size to acceptable feed for the HRC™ which produces the required reduction for enrichment with the VERTIMILL® processing the regrind. When applicable, this type of circuit can offer significant energy savings.
Decreasing ore grades and complex ore bodies set new challenges for the mining industry. Metso’s flexible range of solutions will deliver results, overcome any minerals processing challenge and help you reach maximum recovery rates.

Metso’s offering is rounded out by a comprehensive range of products and services as process design, plant layout, detail engineering, complete plant supply, electrical and automation as well as on a selected basis installation.

“We are committed to remaining at the forefront of minerals processing technology. Our engineers are ahead of the curve in developing the most efficient equipment available on the market.”
We help our customers achieve the most efficient results – consistently and sustainably
Whether your process requires classifying by magnetic separators, dewatering or pressure filtering, you need the most efficient and reliable process equipment available. Metso is at the forefront of developing separation technology that offers both high efficiency and low operating costs.

**RCS™ flotation machines**
The RCS™ flotation machine is the latest design to use the circular tank concept. It combines the benefits of circular cells with unique features of the mechanism to create conditions that maximize flotation performance for all roughing, cleaning and scavenging duties.

The new improved DV™ (Deep Vane) flotation mechanism design improves air dispersion and bubble size distribution. The patent-protected DV™ mechanism impeller consists of a unique arrangement of vertical vanes with shaped lower edges and air dispersion shelf. The mechanism design produces powerful radial slurry pumping to the cell wall and gives strong return flows to the underside of the impeller to minimize sanding.

**DR flotation machines**
DR flotation machines are perfect for use in small concentrators and industrial mineral applications. Their design – a reflection of the transition from cell-to-cell configuration to open flow flotation machines – increases effective aeration through supercharging, maintains solids in suspension through vertical recirculation, and breaks up any concentration of sands from the bottom of the cell.

**Flotation columns**
Metso’s high-recovery flotation columns deliver results via its unique sparger system that effectively reduces bubble size: Finer bubbles maximize surface area flux, thereby increasing carrying capacity.

**Magnetic separators**
Metso has a long tradition in magnetic separation technology and manufactures separators of various types and sizes for any application.
- High gradient magnetic separators (HGMS)
  - Cyclic design with process vessel diameters from 220 mm to 3050 mm
  - Continuous design with matrix ring mean diameters of 1200 mm, 1850 mm, 2500 mm and 3500 mm
- Low intensity magnetic separators (LIMS): Wet magnetic separators for dense media recovery available with 1200 mm drum diameter in lengths up to 3.6 m
Dewatering

Minimize environmental impact

Avoiding the wasting of water is a goal we share with you. Metso provides clarifying and dewatering technology to help you reduce the environmental impact on site. We offer a number of classification and filtration solutions to achieve this goal.

**Vertical plate pressure filters**
Development in filtration and dewatering technology has advanced rapidly in the last years. Environmental awareness has been a major driving force and increase in cost of energy and personnel has made tougher demands on efficiency and automation.
Metso developed the VPA pressure filters for the mineral industries which brought together high performance, simple maintenance and high degree of reliable automatic operation into lowest total cost. The result is an automatic pressure filter with unique features such as:
- Light weight construction with machined polypropylene filter chambers.
- Compact design with pulling hydraulic cylinders for reduced space requirement.
- Filter cloth change, a one minute operation.
- Available in several pressure ratings for different applications.
- Few moving parts for low maintenance and high availability.

**Spiral dewaterers**
Metso spiral dewaterer model SDC is a robust evolution of the spiral classifier for reliable operations in mill scale handling.

The spiral dewaterer with special designed spiral and enlarge pool area is able to handle large flows of effluents, offering a well dewatered mill scale product and a clear overflow (typically 100 ppm).

**Spiral Dewaterers are suitable for:**
- Mill scale treatment in continuous casting, hot rolling and scarfing
- Coarse material dewatering

**Tube presses**
Metso’s tube press is a fully automatic cylinder press that is hydraulically operated at pressures up to 140 bar. Designed to filter extremely fine particle slurries, tube presses produce a filter cake of very low moisture content compared to other commercially available mechanical dewatering equipment. The use of high pressures enables a higher degree of separation of the liquid and solid phases.

**Inclined plate settlers**
Metso’s lamella principle uses several parallel inclined plates to maximise the available area for any available floor area. In this way, the size and cost of the gravity settler can be minimized by matching the thickening and clarifying requirements more closely.
The two basic criteria for gravity settling equipment are good clarity of the overflow liquid and maximum density of the underflow solids discharge. The area needed to clarify a suspension is often greater than that needed for thickening. This means that in a cylindrical thickening tank, the lower section with rakes and drive mechanism can be oversized. Last years there has been an increased interest for using the Metso IPS in the Potash Industry.
Reliable slurry transportation is the heartbeat of your plant, ensuring smooth flow of the process. Metso’s robust centrifugal pumps are capable of handling the toughest conditions and most abrasive duties. They are designed to deliver top performance, low energy consumption, long wear life and easy maintenance.

**Horizontal slurry pumps**
- The X range is a group of large slurry pumps made for handling heavy-duty solids. Available in hard metal and rubber lined versions.
- VASA HD is a traditional range of pumps with slide base, which reduces maintenance time.
- The Orion series of heavy (HM, HR) and mining duty (MR, MM) duty pumps offers a wide range of world class rubber lined and hard metal slurry pumps for abrasive pumping applications. The modular design and the optional back pull-out feature provides easy access for inspection and maintenance.
- Our new MD range specifically designed for mill circuit applications, available in hard metal and rubber lined versions offers sustained performance and back pull-out option for ease of maintenance.

**Vertical sump pumps**
Metso’s vertical sump pumps are used in floor cleaning and process applications. A number of different impeller and agitation options are available. The VS line’s robust cantilever design has been engineered without any submerged bearing or shaft seals. And our VSH and VSM series provide larger diameter impellers that operate at slower speeds – resulting in lower wear rates and higher head capability.

**Dredge pumps**
Our heavy duty dredge pumps are designed specifically for the dredging of large materials. Its design features enable maximum particle size passage while maintaining high efficiency, and wear parts are available with both abrasion resistance and high-impact materials.

**Vertical tank pumps**
Designed with no shaft seal, our VT pumps are easy to service and install while delivering reliable abrasive slurry service. The line’s flexibility in both layout and application provides a versatile solution for permanent, mobile or semi-mobile installations in industrial applications, sewage applications and more.

**Vertical froth pumps**
The froth pump, VF, has been designed to increase the pump ability of frothy slurries. The principle of operation is similar to hydrocyclone separation. It results in a more efficient pumping and a smooth operation, free from pulsation caused by air blocking.
Metso offers the widest range of loading and unloading, storage and handling equipment of bulk materials in the marketplace. Whether you need to move coal, iron ores, bauxite, copper ore or potash, Metso has the technology that suits your operations precisely.

**Apron feeders**
Apron feeders function as primary feeders in applications where the maximum feed size does not exceed 2 meters. With over a century of combined experience with heavy-duty apron feeders, Metso is a worldwide leader in the engineering and manufacture of this equipment.

**Wobbler feeders**
The unique action of Metso’s wobbler feeder enables the feeding and scalping of materials in a single machine. With their specially designed self-cleaning, non-clogging elliptical bars, wobbler feeders are even capable of effectively handling wet, sticky materials.

**Railcar dumpers**
Metso offers single, tandem and triple dumpers to service random and unit trains of any length, style or size. Our railcar dumpers are engineered to provide long life and low maintenance in dumping most any bulk materials.

**Railcar positioners**
Metso employs a multi-product range of railcar positioners that can handle anywhere from 5 to 90 cars per hour. Our ancillary equipment, such as wheel clamps and holding arms can simplify your unloading operations.

**Cable Belt® conveyors**
Metso’s MRC Cable Belt® is a unique design ideal for long-distance conveyor applications requiring vertical and horizontal curves. Often, a single-fight MRC can eliminate the need for multiple transfers, reducing material degradation, transfer maintenance and decreasing power usage.

**Conveying**
Metso long distance, overland conveyor systems negotiate difficult terrain and tight curves. Our Cable Belt conveyors systems are an economical and environmentally friendly method of transport.

Our conveyors can be quickly installed, provide high availability and adaptability and require minimum maintenance.

**Stacking and reclaiming**
Two styles of bucket wheel stacker-reclaimers offer three different configurations of trailing tripper structures. Typically, one of these configurations will meet the storage requirements for bulk ports, terminals, electric power stations and other facilities.

- **Trench-type**: Ideal for installations with low-volume, high-active storage pile capacities
- **Slewing-type**: Typically used when large quantities of material must be readily available, when blending of material grades is required, or where yard length is limited
- **Portal (bridge type) scraper reclaimers**: Are excellent for blending materials and many times incorporate covered storage to keep material dry
- **Barrel reclaimers**: Blending and reclaiming material from a stockpile
Pyro processing
Adding value in environmental protection

Metso designs, engineers and supplies equipment and systems that increase the economic value of ores, minerals, waste and related materials – while also protecting the environment.

Iron ore pelletizing
Iron ore must be pelletized in order to be fed into a blast furnace or DRI plant, where it is “upgraded” to a higher iron content. Metso straight grate and grate kiln technologies produce low cost, high quality pellets for your plant specific requirements.

With strengths and expertise in both technologies, we have designed and supplied some of the largest and most modern systems in the world. Metso’s line of pelletizing equipment is built to withstand both the severe process heat and highly abrasive environments in which they operate, delivering long-term savings in the creation of pellets.

Lime calcining
Lime calcining is the conversion of limestone to lime, and because this sedimentary rock is comprised of so many different characteristics and impurities, vastly different equipment can be required for the calcining process. Metso provides the equipment and expertise necessary to design the right solution for all types of limestone.

Coke calcining
Metso is the world leader in coke calcining systems and equipment, representing around 70 percent of the world market. Effective in petrochemical and independent coke production applications, our plants range in capacity from 50,000 TPY to over 400,000 TPY.

Laboratory equipment
Laboratories require tight specifications to achieve reliable and repeatable testing. Having high quality equipment that can be maintained for many years is what Metso has achieved with our line of Laboratory / Pilot plant equipment. We stock the most complete line of high quality laboratory and pilot-plant products for sample preparation and size reduction.

Metso supplies bench scale jaw crushers, and cone crushers under the Marcy® and Morse® brand names. These units come in a variety of sizes to provide operators with laboratory mineral processing circuits.

Rotary kilns, dryers, and coolers
Rotary kilns are used to heat solids to the point at which a required chemical reaction takes place. Metso designs and supplies both direct and indirect rotary kilns and coolers for a wide variety of applications. Metso has delivered units sized up to 76 m in diameter and 190 m in length.

Fluidized bed technology
Fluid beds are excellent for drying and calcining fine powders and granular materials, whereas particles react with fluid like properties floating on a cushion of air or gas. Metso’s experience is extensive, having supplied over 100 fluid bed systems in many applications.

Holo-Flite®
Metso’s Holo-Flite® thermal processor is an indirect heat exchanger utilizing a hollow screw for heating, cooling or drying bulk solids, filter cakes, pastes or sludges. It is a proven and efficient thermal processor with over 3,000 installations worldwide.
Welcome to our showroom

www.metso.com
Maximizing jaw crusher availability with a performance contract
Olcon iron ore mine, Russia

Performance contract secures non-stop crushing with giant jaw in Russia
It makes for an impressive sight and sound when a full railway wagon of iron ore is being skipped into the feeder of Metso’s giant Nordberg C200 jaw crusher. Thanks to the performance contract, the jaw crushes non-stop, 24/7, at the Olcon iron ore mine in north-western Russia. The second C200 order guarantees the mine’s expansion targets of producing up to 5 million tons of iron ore concentrate per year.

“The performance contract signed with Metso’s dealer marked a serious improvement for us. We were able to get operational costs related to our jaw crusher down while availability went up,” says Oleg Samarskiy, director of purchases at Olcon mine. “Now we pay according to tons crushed, not for a single wear part. In addition, we always know the level of our future costs. This is a big help in the planning of our mine economy,” Samarskiy notes.

“Actually, we are so pleased with the results we have achieved with the C200 service contract that we recently signed a maintenance and repair contract to cover all of Olcon’s crushers along the 3rd processing line,” he adds.

The biggest jaw crushers in Russia
The Nordberg C200 jaw crusher, with an operational weight of over 130 metric tons, is currently the biggest jaw in Russia. At Olcon, 60 to 70% of the total production passes the Metso jaw, meaning about 600,000 tons of crushed ore every month.

The second C200 was assembled in early 2011 on another primary crushing line. The new jaw replaced the old Russian-made crusher. In total, the mine has three different crushing process lines.
Boosting pellet production capacity by 15%
Wuhan Iron and Steel Corporation, China

Pelletizing perfection
The pelletizing of iron ore is a critical process in securing high quality in steel mills. The Chinese steel giant Wuhan Iron and Steel Corporation (WISCO) runs the biggest pellet plant delivered by Metso in Asia, producing in the Hubei province over 5 million tons of pellets every year. Thanks to a recent service break conducted with Metso at the end of 2010, the plant has recently boosted its production by as much as 15%.

WISCO’s pelletizing plant is a complex, grate-kiln type process plant that runs on a continuous 24/7 basis. It consists of a balling system, where the pellets are being shaped round, and a drying/pre-heating system called travelling grate that heat up the iron ore before dosing to the long rotating kiln where the pellets are being indurated and become durable for feed to blast furnaces or direct reduction processes.

The process itself requires process temperatures up to a temperature between 1290°C to 1340°C degrees Celsius. Natural gas is used for heating of the burners.

An efficient cooling system is required to lower the pellet temperature for further conveying. All of the air used to cool the pellets is recovered and used either in the kiln or the traveling grate as a heat source.

Metso provided fast project timing
“Metso provided us with a very fast plant delivery compared to the local Chinese manufacturers. We also noticed that Metso’s pelletizing process is well planned and engineered,” says Plant Director of WISCO’s Ezhou pelletizing plant.

“I really appreciate our close cooperation. With our mutual exchange of knowledge, we have been able to improve the technical level of our plant. I also firmly believe that Metso has learned many things from us,” he notes.

“And in addition to equipment, our cooperation continues with spare or retrofitted parts deliveries and services,” he adds.
The process optimization project also includes studying of the blasting techniques used.

Getting more out of your mine through process optimization
Newmont Ahafo mine, Ghana

Increased mill throughput by mine optimization
Metso Process Technology and Innovation (PTI) conducted a process integration and optimization (PIO) project at the Newmont Ahafo mine in Ghana. Plant trials showed a significant increase in mill throughput compared to the benchmark surveys on similar material conducted previously. This was achieved at a considerably lower amount of soft, oxide feed and at a finer grind size.

Ahafo operates a number of open pits with the majority of ore coming from the Apensu and Awonsu working areas. A blend of both primary and oxide ore is fed to the mill to balance the head grade and recovery in the leach circuit.

A similar project is normally comprised of a number of site visits spaced over a few months. The first site visit is to establish current operating practices, initiate rock characterization and collect measurements of blast fragmentation and mill performance during a series of plant trials or surveys.

This is followed by modeling and simulation studies to determine how to best expose hidden inefficiencies. These recommendations are then followed by further site visits to implement the changes, monitor the results and ensure the improvements are maintained over time.

Blast patterns designed to provide more fines
The blast patterns were designed to increase the amount of fines generated in the blast as this cannot be created through conventional crushing. These fines are beneficial to both semi-autogenous and fully autogenous milling as they pass through the mill and onto the second stage, ball mill circuit. As well as blast design changes, the performance of the primary crusher was reviewed. It was recommended that Ahafo measure the actual closed-side setting once a week during the maintenance shutdown.

Additionally, it was suggested that Ahafo maintain a tighter pebble crusher gap setting and not target maximum SAG mill power but rather maintain a stable total load by running the mill at different speeds.

Completion of Metso PTI’s mine-to-mill project at Ahafo has resulted in sustained improvements in drill and blasting practices and the process plant throughput, measured over a twelve month period.
Saving time makes money
Aguas Teñidas mine, Spain

The best wear material in grinding found with Metso
"Thanks to the wide material selection and know-how, Metso provides us with the best solutions and wear materials. A good example is the solution to the SAG mill liners, a combination of rubber and metal (polymer)," says Manuel Acosta Fernández, Plant Technical Director at the Aguas Teñidas mine in Spain.

"We believe that Metso designs products that are both solid and reliable during use. In grinding and filtration, our equipment availability is as high as 97%," he adds.

The modern mineral processing system, installed mainly in 2007, includes SAG and ball mills, stirred media detritors (SMD), filtration equipment (VPA’s) and a good deal of pumps from Metso.

Aguas Teñidas mine uses longhole open stoping method with paste backfill in its underground operations. The mine processes yearly a total of 2.2 million tons of ore. Approximately half of the production consists of copper ore (2% copper with a little zinc and silver), and half polymetallic ore (1% copper, 6% zinc and 2.5% lead, plus recoverable silver).

Depending on the ore type, Aguas Teñidas runs two parallel grinding, flotation and filtration circuits, both capable of processing 140 tons per hour.

Grinding over 500,000 tons of ore as a target
"At present, we can grind about 400,000 tons of ore with the same linings because of the ore’s abrasiveness. Based on the cooperation with Metso, our target is to increase the lifetime of the mill linings to 550,000 tons. Then we would only need to change the liners twice a year," says Manuel Picón, Maintenance Planner.

"With this change interval, we could improve our grinding circuit machine availability significantly because changing the liners in one grinding mill takes us about 72 hours," he adds.

With the wear material cooperation concerning grinding mills, the mine has been able to extend the wear lifetime for more than 100,000 tons.
Saving time makes money

Aguas Teñidas mine, Spain
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.

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