

OVAKO

OPTIMIZED STEEL FOR PROFITABLE PERFORMANCE

OVAKO MINING AND CONSTRUCTION STEEL



Drilling operations in the Ovako Hofors iron ore mine utilizing a drilling method innovated and developed in Sweden. Pictured from left (1955): Birger Björklund, Edvin Jonsson and Valle Reinholdsson.

OUR HISTORY IN MINING RUNS DEEP

Deep mines. Hard rock. Excavation pits. There's nothing ordinary about the mining and construction business. In this challenging environment, we are proud to be the number-one independent partner to the world's most demanding equipment suppliers and manufacturers – with a long history of developing superior quality engineering steel that provides a competitive edge.

With origins dating back 300 years, we are deeply rooted in the Nordic mining cluster. In fact, until 1977, we operated our own iron ore mine in Hofors, Sweden, an operation that had seen ongoing production since the 1300s. In the 1940s and 1950s, we even developed and manufactured our own rock drilling tools, and have continuously specialized in steels with exceptional fatigue strength and wear resistance ever since. So you could say we've learned every aspect of the world's toughest applications – the hard way.

World leaders in metallurgy for mining & construction

Today we are the independent world leader in specialized steels for mining equipment, demolition and other construction applications. Our in-house R&D is responsible for a long line of industry firsts – whether it's the world's first active in-production steel hardenability controls or the first conventional steels with inclusion levels on par with single remelts. In addition to pioneering entirely new, cost-efficient materials, we continue to partner with top universities and research institutes to develop new tests that raise industry standards and better meet your future challenges.

Three mills for seamless productivity

Of course, your profitability depends on more than just the right materials and metallurgical expertise. This is why, over several decades, we've optimized our network of three mills to deliver the most cost-efficient formats and value-added services for the specific needs of manufacturers like you. Besides guaranteeing short lead times and optimal tolerances, fatigue strength and wear resistance, our unique production capabilities ensure that we can tailor the most cost- and capital-efficient logistics for your production and automation needs.

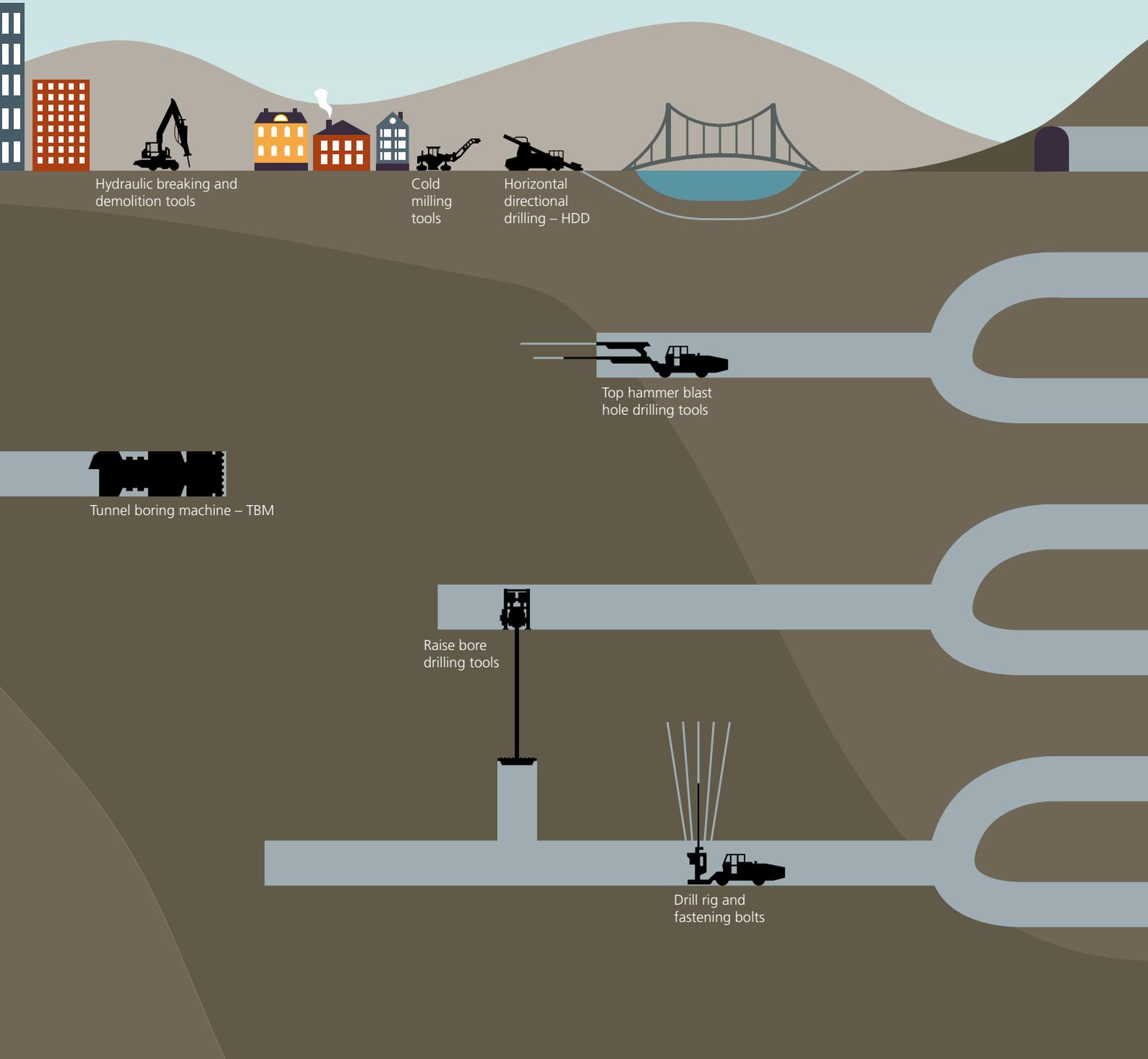


At our R&D center in Hofors, Sweden, we constantly test our products and develop steels to meet your future demands.



RELIABLE PERFORMANCE WHERE YOU NEED IT MOST

From top hammer shank to drill bit, DTH drilling components, hydraulic breakers and grinding media, you'll find Ovako steel at construction and mining sites across the globe. Always delivering the highest level of performance, day in and day out.



Hydraulic breaking and demolition tools



Cold milling tools



Horizontal directional drilling – HDD



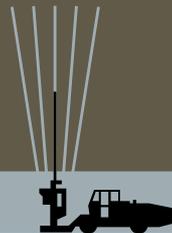
Top hammer blast hole drilling tools



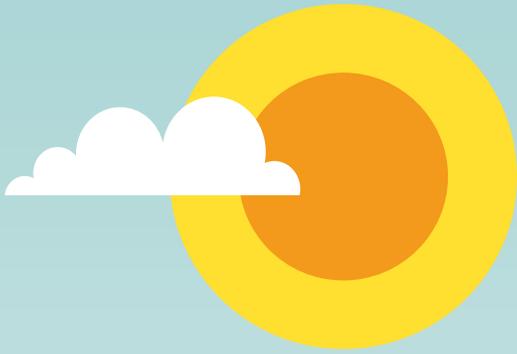
Tunnel boring machine – TBM



Raise bore drilling tools



Drill rig and fastening bolts



Exploration drilling;
Diamond core /
RC drilling



DTH drilling – drill tubes, end
pieces, top sub/back heads,
pistons, piston casings, chucks,
drill bits and air distributors



Grinding media
for grinding mills



Rotary blast
hole drilling



Wear parts in crushers
and screens



Continuous mining/
long wall mining

PRODUCTIVITY AND PERFORMANCE TAILORED TO YOUR NEEDS

Having manufactured our own components and operated our own mines, we understand that no two processing routes or load cases are exactly alike. This is why we've optimized our entire supply chain – from initial melt to finished product – to give you the precise combination of performance and processing economy for your needs.

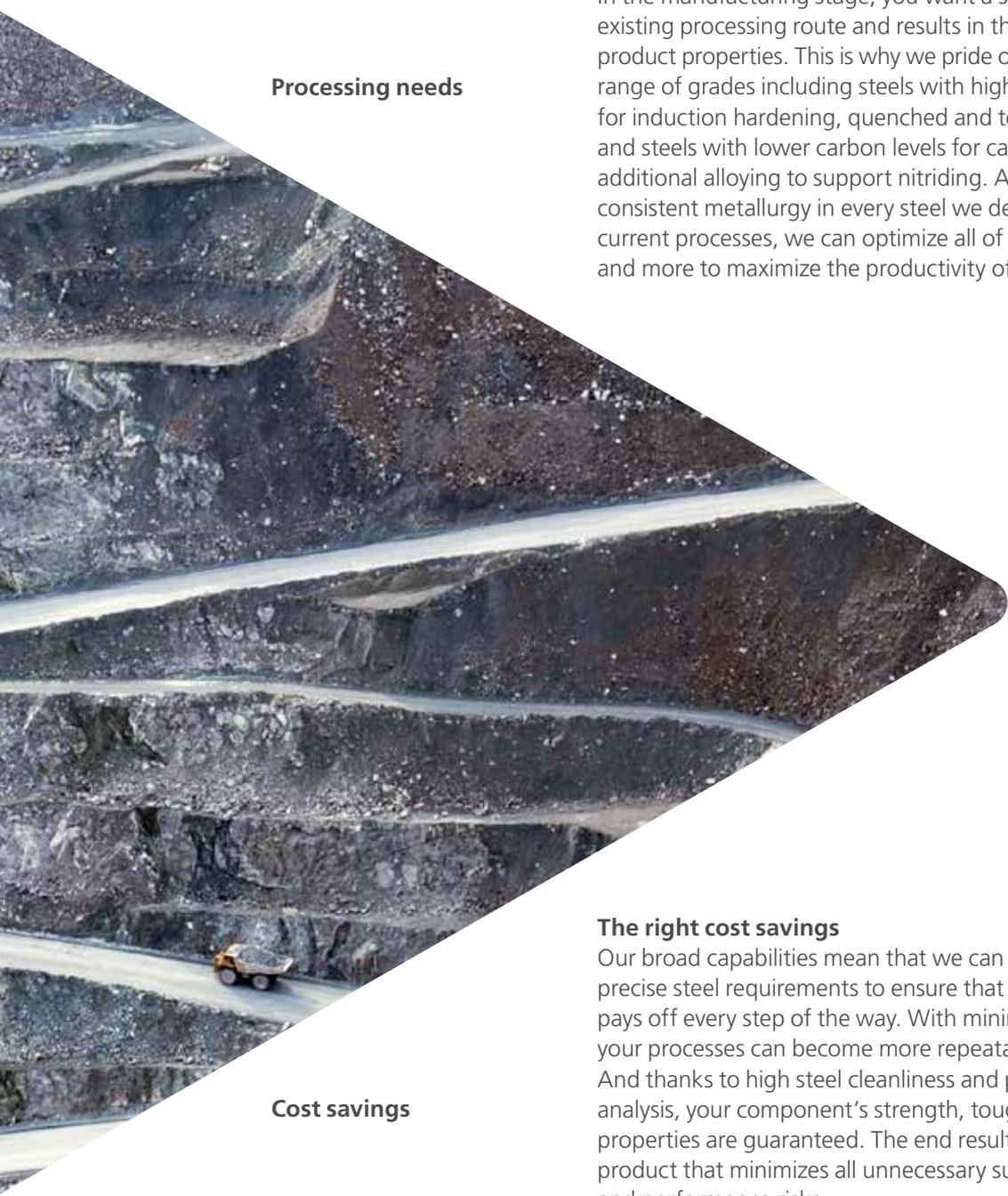
Everything begins with a careful analysis of your components' specific load case, processing requirements and cost profile. Once the ideal material properties for your end product are defined, we then help to select everything from the right steel grade, format and tolerance to heat treating, pre-machining and stocking solutions. The result of this close collaboration is a superior end product with the most cost-effective value chain.

Load case

The right material properties for every load case

Ovako offers a wide variety of grades engineered for the specific load cases of each individual rock drilling component. In addition to precisely controlling fatigue properties in our metallurgy, we simulate the load case by various testing methods to learn how our steel performs. These methods can include traditional RBF (Rotating Bending Fatigue) testing, along with methods that test the combination of impact and wear loads. This means you get the right wear resistance and the right fatigue strength for high-frequency impact. For several grades, we also offer the option of dual sourcing from both ingot cast and conticast routes. All to give you a wider range of price and performance choices tailored exactly to the load requirements of your components.





Processing needs

The right grade for your processing needs

In the manufacturing stage, you want a steel that suits your existing processing route and results in the optimal end-product properties. This is why we pride ourselves on our wide range of grades including steels with higher carbon content for induction hardening, quenched and tempered steels, and steels with lower carbon levels for case carburizing and additional alloying to support nitriding. All with extremely consistent metallurgy in every steel we deliver. Based on your current processes, we can optimize all of these properties and more to maximize the productivity of your operations.

Cost savings

The right cost savings

Our broad capabilities mean that we can go beyond your precise steel requirements to ensure that your investment pays off every step of the way. With minimal alloy variation, your processes can become more repeatable and automated. And thanks to high steel cleanliness and precise load case analysis, your component's strength, toughness and fatigue properties are guaranteed. The end result is a superior end product that minimizes all unnecessary supply chain costs and performance risks.

HOW OUR CAPABILITIES STRENGTHEN YOUR BUSINESS

At Ovako, our ambition is to give you total control over every aspect of your production process – from specific steel properties and near-net-shape deliveries to optimized lead times, easy process automation and a superior end product tailored for your load case.

SUPERIOR COMPONENTS OPTIMIZED FOR YOUR LOAD CASE

Thanks to the right steel grade, engineered for your specific load case, your end components can achieve:

- Superior tool life
- Predictable life span optimized for load case, automated drilling and more
- The optimal cost/performance balance

MATERIALS ENGINEERED TO MINIMIZE PROCESSING TIME AND COSTS

The right combination of steel grade properties and customized services gives your processing operations the benefits of:

- Easy automation due to consistent chemical composition
- Repeatable heat treatment performance thanks to highly controlled alloy content
- Efficient machining with M-Steel® and other optimized machining steels
- Near-net-shape products to reduce machining and processing
- Easy production planning due to a range of customized services

CUSTOMIZED SERVICES FOR SEAMLESS LOGISTICS

With warehousing and sales operations worldwide, we can assist with everything from production planning to customized batch sizes and stocking solutions:

- Capacity allocation for guaranteed volumes, even at peak demand
- EDI interface for efficient forecasting and order handling
- Optimized lead times with production and pre-production forecasts
- Comprehensive integrated stocking solutions at mills, sales companies and near you
- OvaTrack extranet functions give you a full overview with order tracking, real-time stock levels and more
- Additional back-up stocks to ensure delivery in most cases from any of our three mills

TAILORED PRODUCT GEOMETRIES AND PRE-PRODUCED COMPONENTS

Whether you need heat-treated steels, cut blanks or finished parts, we supply and customize a wide range of product geometries and machining/cutting options with minimal lead times, including:

- Near-net-shape products to reduce unnecessary machining and processing
- Tight tolerances to help reduce waste and processing tool wear
- Pre-machined components, controlled and ready for assembly
- The right heat treatments to support your production requirements

A WIDE SELECTION OF OPTIMIZED STEEL GRADES

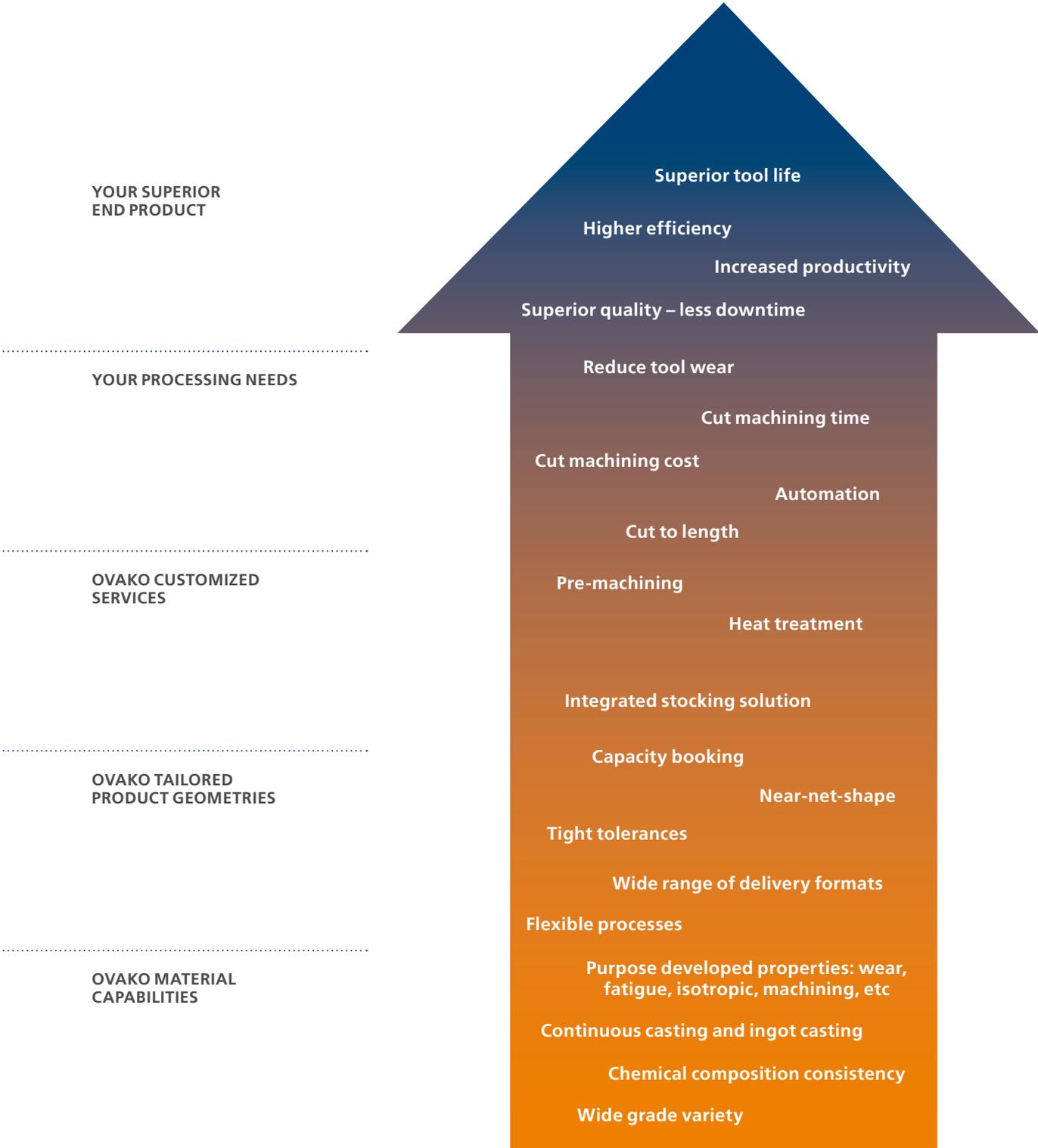
As the world's largest independent supplier of high-performance mining and construction steels, we offer a superior range of steel grades that add value through your entire value chain:

- Tight chemical consistency across all grades enables reliable performance and automation
- Material properties tailored for your heat-treating requirements
- IQ-Steel® for complex loads and fatigue strength on par with single remelt steels
- BQ-Steel® for demanding applications requiring longer performance and higher loads
- WR-Steel® for use in highly abrasive wear loads
- M-Steel combining superior machinability with exceptional toughness and fatigue strength
- Availability of both continuous casting and ingot casting for a wide range of steel grades

DRILL DOWN DEEPER:

For more information on Ovako steel grades, formats and capabilities within your application, take a deeper look into our mining and construction application brochures:

- Rock Drilling Steel
- Rock and Ore Processing Steel
- Steel for Mining and Construction Systems



YOUR SUPERIOR
END PRODUCT

Superior tool life

Higher efficiency

Increased productivity

Superior quality – less downtime

YOUR PROCESSING NEEDS

Reduce tool wear

Cut machining time

Cut machining cost

Automation

Cut to length

OVAKO CUSTOMIZED
SERVICES

Pre-machining

Heat treatment

Integrated stocking solution

OVAKO TAILORED
PRODUCT GEOMETRIES

Capacity booking

Near-net-shape

Tight tolerances

Wide range of delivery formats

OVAKO MATERIAL
CAPABILITIES

Flexible processes

Purpose developed properties: wear,
fatigue, isotropic, machining, etc

Continuous casting and ingot casting

Chemical composition consistency

Wide grade variety

MORE CHOICES MORE POSSIBILITIES

In the mining and construction business, everything starts with the right steel – delivered in the right shape and dimensions. From material properties to delivery formats and service options, we've always got you covered.



HEAT TREATMENTS FOR OPTIMIZED MATERIAL PROPERTIES

Depending on your application needs, we can support you with all the heat treatment options necessary to achieve your desired material properties. Our bars, tubes and rings can be supplied in the following heat treated conditions or combinations thereof:

- Normalized
- Soft annealed
- Isothermal annealing
- Stress relief annealed
- Quenched and tempered
- Annealing in protective atmosphere to avoid decarburization



HOT-ROLLED BAR AND FORGED BAR

Rolled bar characterized by close tolerances and excellent dimensional properties and surfaces. Forged bars for larger sizes.

HOT-ROLLED ROUND BAR

Standard size range: OD from 13 to 200 mm.

HOT-ROLLED FLAT BAR AND ROUND-CORNER SQUARE BAR

Broad dimension range of hot-rolled flat bar. The round-corner square bars have a uniform internal structure and very good surface quality.

SPECIAL PROPERTIES (SP) BAR

Extremely tight tolerances. Scale thickness is generally reduced on size range: 13 to 50 mm.

SPECIAL PROFILES

Tailored hot-rolled special profiles. Available in symmetrical and asymmetrical shapes. Widths: 15 to 300 mm. Thickness: 5 to 60 mm.

FORGED BAR

Forgings of round bars are made with forging tools to achieve a uniform size and smooth surface, in dimensions 220 to 360 mm. Round bars outside these ranges are available upon request. Also square bars upon request. Ultrasonic testing of internal microstructure is an option.



BRIGHT BAR

Available in a wide range of shapes. Eliminates processing steps and unnecessary stock build-up. Diameters: from 10 to 127 mm, with tolerances down to IT6.

PEELED BAR

Precision manufactured. Saves on material, tools, machines and production time. Supplied in a polished and straightened condition. Optional sizes from OD 17 to 127 mm.

DRAWN BAR

Size range: 11 to 55 mm diameter.

GROUND BAR

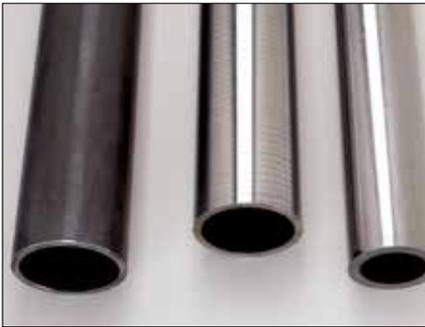
Cost-effective and productive alternative to grinding internally.

There are three main groups:

- Rough ground bar (IT9)
- Fine ground bar, standard execution (IT8)
- Fine ground bar, special execution (IT6)

SR-100 WIRE

Surface removed and 100 % tested and inspected to improve quality. Available in any size within OD range 11 to 26.5 mm.



SEAMLESS TUBES

Our tube products are characterized by uniform properties, close tolerances and small machining allowances.

HOT-ROLLED TUBES

OD range is 50 to 245 mm with wall thickness from 6 to 48 mm.

COLD-WORKED TUBES

Drawn or cold-rolled in sizes ranging from 25 to 125 mm OD.

SURFACE MACHINED TUBES

To further reduce the OD tolerance and surface finish we offer peeled or ground tubes.

MACHINING ALLOWANCES

In most cases, we sell a tube for a specific application. To support this, all tubes are delivered with a guaranteed finish machined size.

STANDARD ITEMS AND STOCK PROGRAM

As a service to our customers, we have a standard tube program offering smaller order quantities and shorter lead time than we normally require for a production batch. Ovako has two such standard programs; both with the tubes stocked at our mill as well as at some of our sales companies and selected distributors.



PRE-COMPONENTS

Pre-machined components allow you to minimize stockholding, crosscutting and machining.

PRECISION CUTS

Eliminate your non-core processes and improve profitability with Ovako precision cuts. Our precision-cut offering includes just-in-time, or flexible, delivery and provides "greener" processes.

CHAMFERED OR BLANKS WITH RADIUS

Sawn off and chamfered according to your specifications. Standard chamfer angle is 45°. Customized chamfering and radius according to agreement.

CENTER-HOLE DRILLED BLANKS

Blanks with sawn end surfaces, center-drilled to your specifications.

MACHINING

See rolled and forged rings.

GRINDING MEDIA

Ovako grinding balls are delivered as-rolled or in the quenched and tempered condition. They are available in grade A810, or other grades upon request. Sizes from 20 to 70 mm. Grinding rods are delivered in the as-rolled condition in dimensions of 40 to 120 mm.



ROLLED AND FORGED RINGS

Cylindrical, profiled or machined rings with a geometry close to the final shape. Full dimensional range from diameters 170–4,000 mm and weights up to 5,000 kg.

HOT-ROLLED RINGS

Small allowances and tight tolerances. Profiles offer interesting solutions for many manufacturing challenges. Near-net-shaped rings can be up to 50 % lighter than cylindrical equivalents. Rings are manufactured in five different ring mills and one forging press:

| | Ring diameter (mm) | Ring weight (kg) |
|--------------|-----------------------|---------------------|
| Ring Mill 8 | 170–380 | 7–20 |
| Ring Mill 4 | 200–750 | 20–85 |
| Ring Mill 10 | 300–1,200 | 55–250 |
| Press 6 | 350–2,200 | 70–3,400 |
| Ring Mill 9 | 400–2,500 | 80–2,500 |
| Ring Mill 11 | 500–4,000 | 300–5,000 |

MACHINED RINGS

Ovako offers subcontractor-based machining for semi-finished and finished machined rings. Single ring types or complete assortments can be supplied in these executions, according to individual customer requirements, with full traceability and, if desired, US testing.

Ovako develops high-tech steel solutions for, and in cooperation with, its customers in the bearing, transport and manufacturing industries. Our steel makes our customers' end products more resilient and extends their useful life, ultimately resulting in smarter, more energy-efficient and more environmentally-friendly products.

Our production is based on recycled scrap and includes steel in the form of bar, tube, rings and pre-components. Ovako has around 2,700 employees in more than 30 countries. Ovako is a subsidiary of Sanyo Special Steel and a member of Nippon Steel Corporation group, one of the largest steel producers in the world with more than 100,000 employees globally.

For more information, please visit us at www.ovako.com, www.sanyo-steel.co.jp and www.nipponsteel.com.

CONTACT US

www.ovako.com/en/contact/

