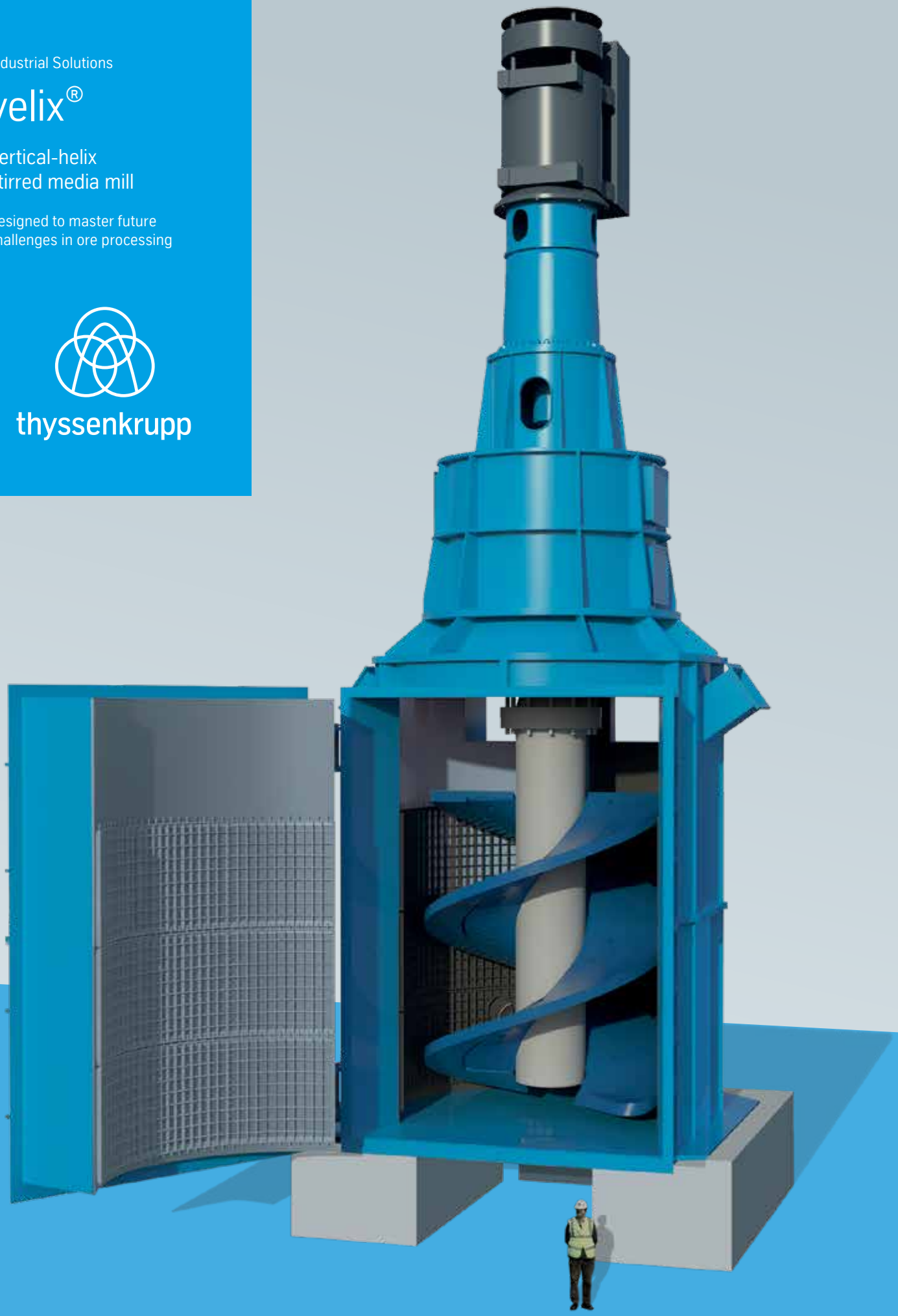
Industrial Solutions

velix®

Vertical-helix stirred media mill

Designed to master future challenges in ore processing

thyssenkrupp



Our solutions for the hardest jobs

When it comes to the crunch, grinding systems from thyssenkrupp Industrial Solutions offer the ultimate in performance, reliability and cost-effectiveness. With us as your partner, you can expect the best possible customized solution for even the most demanding of jobs.

Call on our services and you can count on a wealth of experience and ongoing innovative drive. As a leading manufacturer of machines and plants for the aggregates and mining industry, we supply well-engineered grinding systems that have stood the test of time in the toughest service conditions. At the same time, we invest in intensive research and development work to make proven solutions even better and adapt to changing demands.

At thyssenkrupp Industrial Solutions we can provide the optimum solution to meet your needs through a standard or special design. Flexibility is one of our key strengths. We always act on your specific requirements and adapt our systems to suit the material to be ground and product size required, optimizing our proven technology to suit your specifications. Our systems offer numerous benefits: high throughput coupled with low costs, minimum maintenance, ease of operation, and maximum reliability.

Our passion – your success

Make sure you're fit for the future.

When we began work on the velix®, we considered every element that defines a stirred media mill – grinding screw, liner, screw shaft, housing, drive systems, services, and plant processing. And we challenged ourselves to find the best way to engineer each one of them. When we put it all together, the result was something entirely different: the velix®.

The velix® is designed to meet the future challenges in ore processing. Challenges such as increasing energy costs, lower ore grades and fine grained ores require an energy-efficient solution offering high capacity and an optimized comminution process for fine grind ores. The thyssenkrupp grinding equipment has been developed to master all these challenges and offers the additional benefits of optimized wear lifetime, easy maintenance and ease of operation.

Designed to master future challenges in ore processing

When we began work on the velix®, we considered every element that defines a stirred media mill.

How you benefit

Maintenance-free grid liner

- Autogenous grid liner for reduced wear and long operating life

Grinding screw

- Optimized tip speed for longer operating life with reduced maintenance costs
- Newly designed tip liner for low maintenance costs through less wear and a long operating life
- Reinforced tip liner for a longer operating life and fewer maintenance stops
- Easy and familiar disassembly concept with a screw liner exchange involving only a few steps

Segmented mill housing

- Simplified housing transportation to site
- Easy and safe handling during assembly
- Less crane capacity required

Screw shaft design

- FEA optimized screw shaft design resulting in less weight and lower CAPEX
- Hollow shaft reduces weight and saves time during maintenance
- Unique shaft wear protection prolongs shaft lifetime

Drive system

- Fixed speed motor
- Various soft-start systems for better start-up procedure optionally available

velix®

Technical data

General			
Materials	Copper, gold, iron ore, etc.		
Typical maximum feed size	< 1–2 mm		
Product size	Down to 15–20 µm		
velix®	**3500**	**4500**	**6000**
Length L (m)	6.10	6.10	7.10*
Width W (m)	6.40	6.40	7.10*
Height H (m)	17.10	19.20	24.20*
Mill mass (t)	260	295	490*

* preliminary

Drive	
Drive concept	Fixed speed motor
Motor power	velix® 3500: 3,500 hp (2,610 kW) velix® 4500: 4,500 hp (3,356 kW) velix® 6000: 6,000 hp (4,474 kW)
Motor speed	1,000 rpm (1,200 rpm at 60 Hz)

The velix® screw – less maintenance

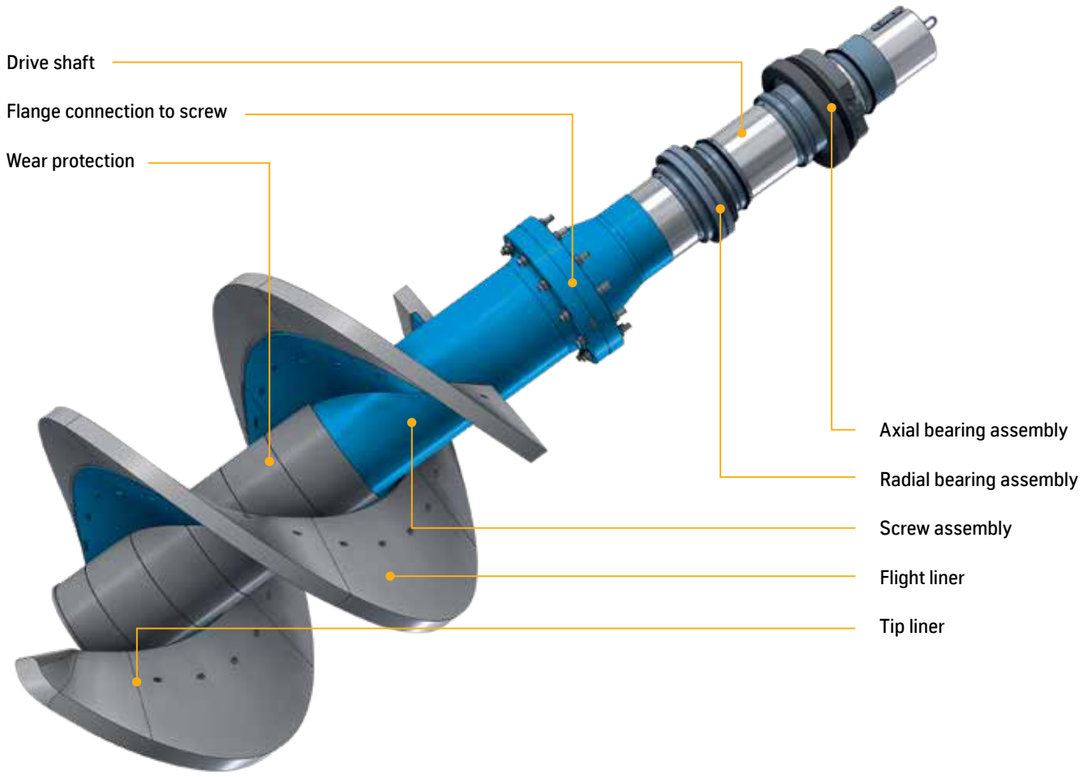
Profit from the next generation in mineral processing equipment.

Optimized tip speed for longer operating life and lower maintenance costs

Wear is generally related to the interaction of two different surfaces and the deformation of the surface material through mechanical action. Tip speed is one of the main wear parameters in a screw. The challenge was to find the optimum screw geometry that combines the lowest possible tip speed with the highest possible throughput. The outcome has been a unique screw design featuring the right balance between throughput and wear that maximizes the benefits for our customers.

New tip liner design for low maintenance costs through less wear and long operating life

The maximum wear rate on a tip liner is where the screw dips into the material flow. With conventional screw designs wear is directly related to material processing. Wear, i.e. loss of screw length, in a conventional design results in a larger non-grinding area at the bottom of the mill. So we challenged ourselves to develop a new tip liner concept. With our newly designed tip liner horizontal part of the tip liner extends wearing in a way that has no technical impact on the process yet massively increases the operating life.



Our features – your benefits

Key features developed for more successful grinding

Maintenance-free grid liner

Autogenous grid liner for reduced wear and long operating life.

The autogenous grid liners make use of the grinding balls and the material inside the grids. The forces inside the mill result in several layers being built up, which eliminates wear on the inside surfaces of the mill chamber.

How you benefit:

- Less maintenance time
- Long operating time
- High reliability

Segmented mill housing

Segmented mill housing simplifies transportation to site and saves on delivery costs.

The velix® uses segmented mill housing to simplify transportation to site and make handling during assembly simpler and safer.

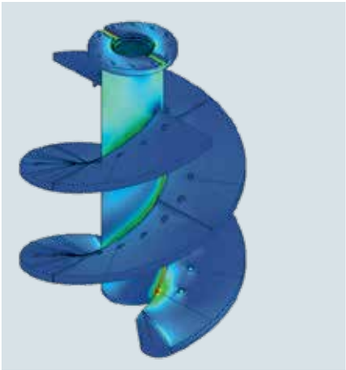
How you benefit:

- Reduced transport costs
- Low-cost assembly
- Lower crane costs

Screw shaft design

FEA optimized screw shaft design results in less weight and lower CAPEX.

All critical parts are analyzed and optimized by means of a computerized finite elements analysis (FEA). The result is less weight, easy manufacturing and short delivery times.



How you benefit:

- Lower CAPEX costs
- Reduced risk of operating failure

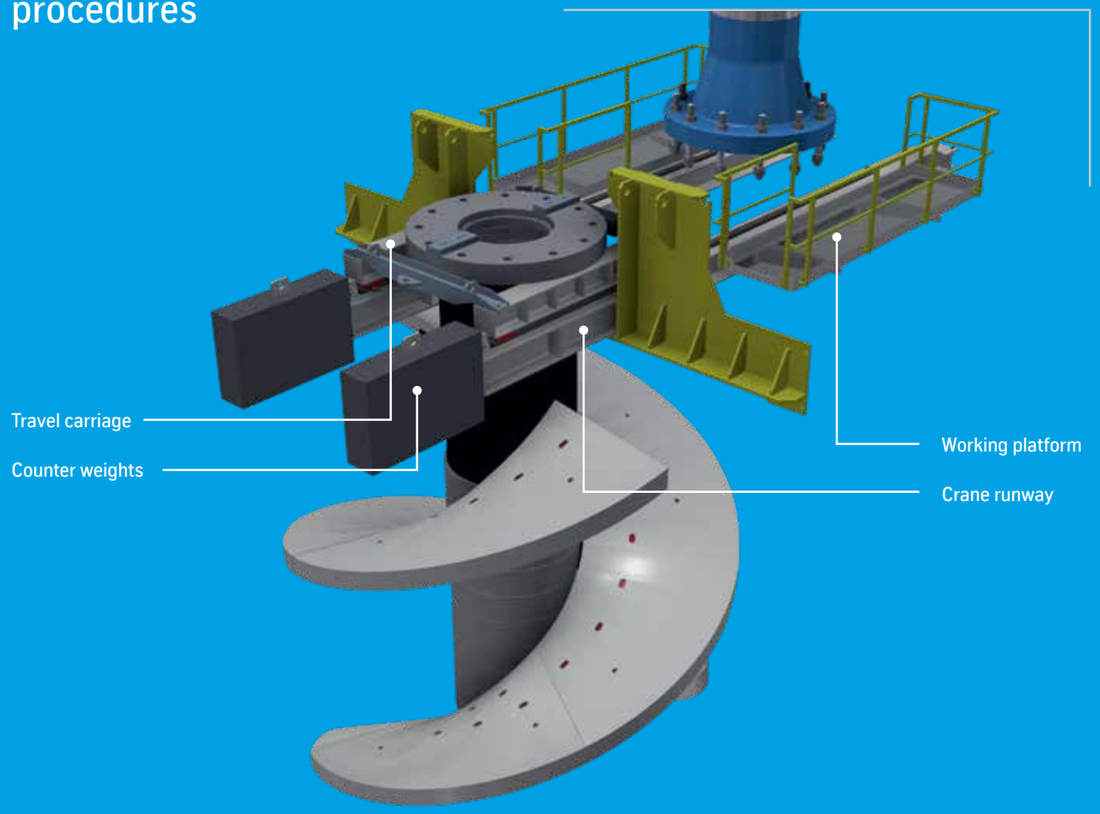
One tool – two features

New service tool simplifies assembly and disassembly procedures

Service tool and working platform

The new service tool from thyssenkrupp has been developed to simplify assembly and disassembly procedures and save assembly time. With a working platform integrated into the crane system, the additional time previously needed for scaffolding is no longer required. The integrated working platform also solves several safety-related issues, which results in shorter assembly and maintenance times.

Besides the integrated working platform, the crane system also offers some unique features that simplify assembly even further. The beam, for example, is counter-weighted on one side in order to move the crane connection nearer to the mill door, which simplifies access to and assembly of the beams. The travel carriage, which guides the screw during assembly, can move in two dimensions (longitudinal and transversal) to allow easy and exact positioning of the screw flange.

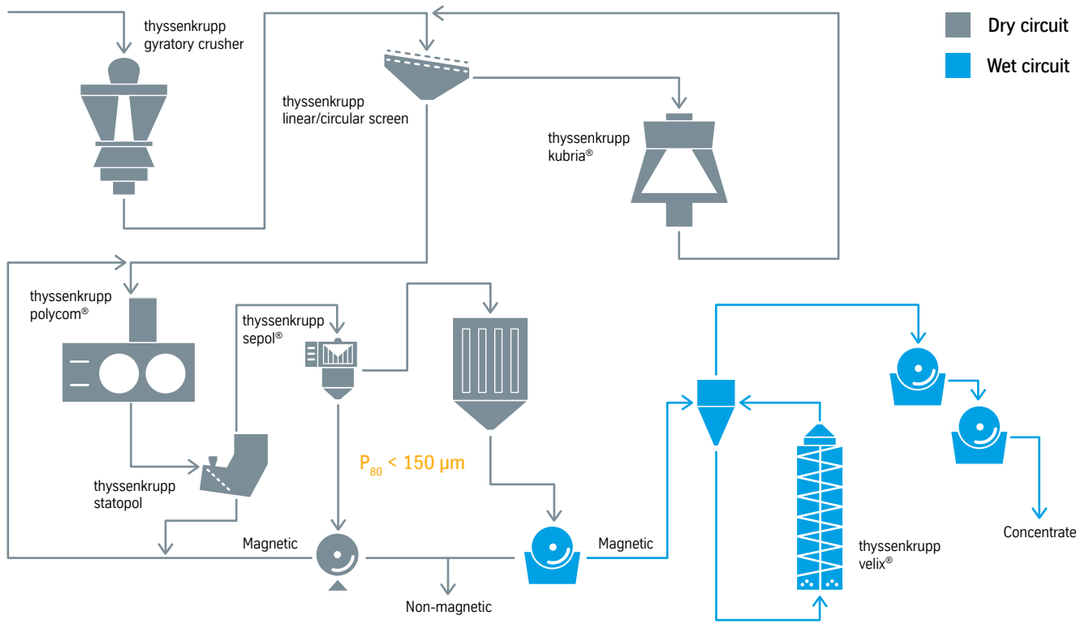


The iron ore revolution

polycom® HPGR & velix®

Declining ore grades, fine grade ores and the environmentally sustainable use of water are major challenges facing not just the iron ore industry but, increasingly, the entire mining industry as well. It needs energy-efficient grinding circuits to offset increasing costs. The polycom® dry finish grinding concept in combination with the ultra-energy-efficient velix® stirred media mill will lower your operating costs.

Clean, safe drinking water is rare. Today, nearly 1 billion people around the world have no access to clean water. Far too many people spend their entire day looking for water. Yet water is wasted, and we even pay too much to drink a resource our lives depend on. This situation is impacting the mining industry as well and our response has been to develop new water-saving technology. The polycom® HPGR finish grinding concept with our velix® stirred media mill saves thousands of cubic meters of process water per day compared to conventional grinding circuits.



The velix® in operation

How to turn fines into ultra-fines

The velix® is most commonly placed downstream of either a traditional horizontal ball mill or, more recently, polycom® high-pressure grinding rolls (HPGRs). The product exiting these mills is first fed into a slurry tank 1.

The fresh material is pumped to a hydro cyclone cluster 2 to separate the coarse and fine particles. Fines are directed downstream 10 while coarse particles are sent to the cyclone underflow tank by gravity 3.

The cyclone underflow tank material is pumped into the velix® inlet 4.

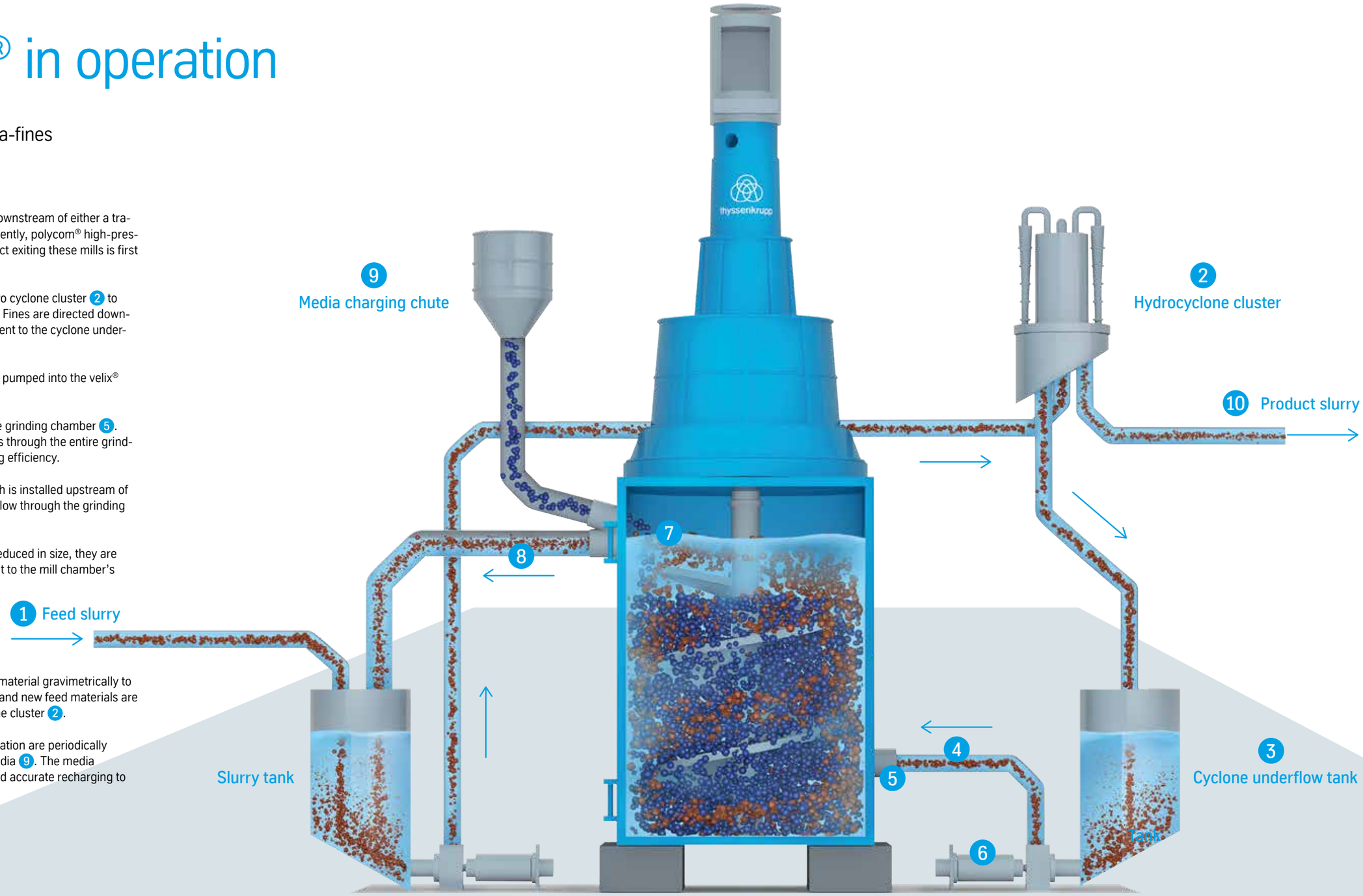
The inlet is located at the bottom of the grinding chamber 5. The material is therefore forced to pass through the entire grinding chamber, which maximizes grinding efficiency.

The cyclone underflow pump 6, which is installed upstream of the mill, ensures a steady and proper flow through the grinding chamber.

Once the coarse particles have been reduced in size, they are carried by the upward slurry movement to the mill chamber's overflow outlet flange 7.

A connecting pipe 8 brings overflow material gravimetrically to the slurry tank 1, where mill product and new feed materials are mixed and directed to the hydro cyclone cluster 2.

Grinding media consumed during operation are periodically refilled to compensate for the worn media 9. The media charging equipment allows for easy and accurate recharging to maintain optimum performance.



Reasuring lab tests

From laboratory to industrial-scale reality

The modern test facilities of our cooperation partner EIRICH in both Japan and Germany offer material analysis, pilot plant grinding test capabilities and accurate scale-up procedures for state-of-the-art industrial scale-up plant designs. Only a minimum of amount of sample material is required by the test labs to measure energy consumption, throughput, and particle size distribution for any grinding task within the velix®/Towermill performance range. Moreover, a full technical report is made available after each test.

Following the material analysis, the ores are compared with the comprehensive thyssenkrupp Industrial Solutions material database to quickly and reliably obtain the grindability, hardness, abrasiveness and agglomeration behavior data required for designing the plant configuration.

High-performance simulation programs support the selection of machines and systems as well as forecasting energy requirements, mill circuit material balances, wear rates, etc. This ensures future-proof, customized plant solutions with the lowest possible operating expenses – no matter whether we're talking about a new plant, upgrading existing facilities or opening up new fields of application for proven technologies and services.

High-performance simulation programs support customized plant solutions with lowest possible operating expenses.

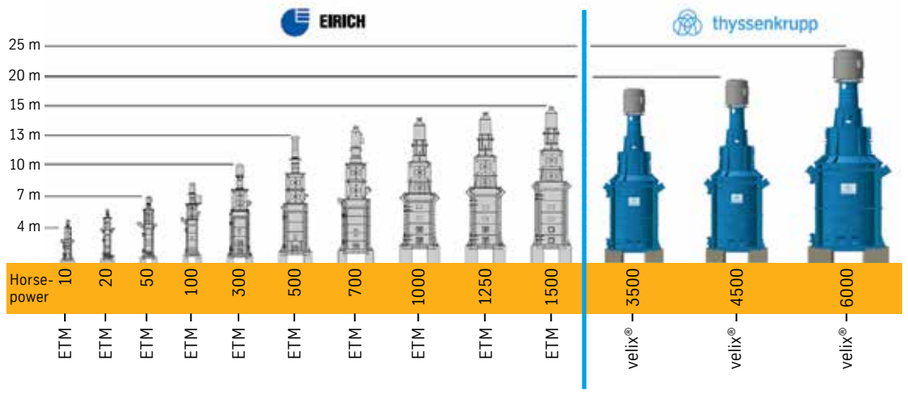
Cooperating with a strong partner

How you can get fit for the future.

All over the world, thyssenkrupp Industrial Solutions and EIRICH are well known for their comprehensive range of products and services in the field of mining and mineral processing technology. Both companies have been operating in the market for grinding equipment for more then 150 years and cooperating closely with industrial users, universities and research institutions.

Linked by close cooperation and the same philosophy of operating globally to ensure close proximity to each and every customer, thyssenkrupp and the EIRICH Group have strengthened their presence in all the world's key economic regions. Together, they form a one-stop innovative technology shop for machinery and systems engineering designed to offer solutions for high-standard preparation tasks.

Applications and process technology with in-company test centers, a wide product portfolio and comprehensive after-sales service form the ideal basis for the development of modern, economical processes for a multitude of industries.



The full-range grinding equipment supplier

For you as a customer the benefits are clear. It is much easier to work with just one partner during the different phases of your project. With a partner who overviews the entire grinding process the different flowsheet options can be optimally matched to your requirements. Yet this is only possible if you know all the different product characteristics and the requirements of each and every process step within the grinding circuit.

At thyssenkrupp Industrial Solutions we are convinced that we can understand the needs of each and every customer better than any other company, simply because of our vast experience in mineral processing.

Complementary mill types

Mill types	Main application
HPGR	• Hard ore grinding • Pebble crushing • Iron ore grinding • Kimberlite ore
AG /SAG mill	• Soft and medium hard ore • Sticky material
Ball mill	• Wet & dry grinding
Vertical roller mill	• Grinding of coal • Grinding of additives • Grinding of burnt lime
Rod mill	• Replacement of quaternary crushers • Steep product particle size distribution

One world – great service

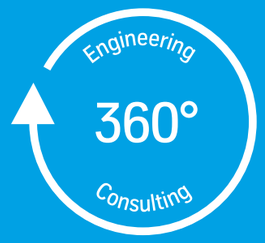
Highest quality standards, high-end technology and security from our one-stop shop – that's our 360° Service.

An essential element of our global service philosophy is being close to our customers. To achieve this objective, thyssenkrupp has set up Service Centers all over the world.

thyssenkrupp Industrial Solutions are one of the world's leading manufacturers of machines and plants for the processing industry. Based on decades of experience, our engineers are engaged in research and development, with the results having become an integral part of processing technology. As a result, customers worldwide benefit from our innovations. Whether standard or customized designs, at thyssenkrupp Industrial Solutions we always offer complete solutions in close cooperation with the customer. Solutions that are reliable, safe, innovative – and profitable for you.

Our Service Center in Chile

One-stop-shop service



- Asset Management
- Spare Parts Supply & Management
- Service Center & Field Services
- Revamps

Industrial Solutions

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