

ZOLLERN

Solid metals. Fine solutions.

Steel Profiles
Economic
and
versatile



The ZOLLERN-Group

With first-class products and customized solutions in the sectors drive technology, investment casting, sand casting and forging as well as steel profiles we are one of the leading manufacturers – worldwide.

As one of the oldest family-run businesses in Germany we are proud to look back on an impressive 300-year history during which we have merged tradition with innovation. Our main focus is on excellent quality and service.

Welcome to the world of ZOLLERN, where experience and progress go hand in hand to offer our customers the best solutions and products for their requirements in various industrial sectors.

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Steel profiles

Optimal forming precision

In its modern, 20,000 metre-square production facility, ZOLLERN makes high-quality, economic steel profiles for sophisticated applications. Automated production processes ensure top-class quality and accurate reproduction of the more than six million metres of steel profile which leave the factory annually. 8,000 individually adapted designs provide efficient processing options for users in linear technology, mechanical engineering, automotive engineering and other industries. There are virtually no limits to the possible profile structures and materials. The experienced specialists at ZOLLERN select the ideal material from among 200 different steels and steel alloys to create custom-fit, hardwearing profiles. ZOLLERN produces hot-rolled, cold-rolled, cold-drawn, inductive-hardened and processed steel profiles using flexible, state-of-the-art plant technology.



Steel profiles

Customised design.

Economic solutions.

ZOLLERN steel profiles are used for cutting, moving, guiding, transferring and driving. The precision pre-formed profiles are ideal for components with complex shapes which have to withstand high loads.

Steel profiles boast an exceptional component and fatigue strength. They reduce processing times and material consumption.

Their excellent surface quality and high dimensional accuracy – even in applications with very close tolerances – feed directly into the end product. That way expenditure on finishing is minimised and material costs can be cut by up to 60 percent.

Features and advantages of ZOLLERN steel profiles

- More than 200 materials, selected to suit your application
- Steel profiles represent a 60 percent material saving by comparison with metal-cutting techniques
- Excellent surface quality
- Outstanding properties thanks to hot rolling, cold forming and heat treatment
- Exceptional wear resistance thanks to optional inductive hardening with a penetration depth of 0.5 to five millimetres
- 1200 MPa after cold drawing
- Perfect dimensional accuracy and reproducibility
- Conservative use of available resources throughout the entire production chain
- Cost-cutting potential

ZOLLERN steel profiles are produced in close collaboration with the customer. Thanks to the wide-ranging design options for steel profiles, there are virtually no limits to the construction possibilities. Steel profiles make cost-effective solutions possible, even in the case of customised designs.





Steel profiles

Automotive engineering

ZOLLERN steel profiles are used in virtually every field of automotive engineering, serving as profiles for

- injection systems
- connecting components
- adjusting systems
- steering systems
- safety systems
- in transmission technology and
- pump technology, e.g. for vane pumps

ZOLLERN steel profiles are individually configured and custom-made for a wide variety of applications. Thanks to a high degree of automation plus quality assurance procedures throughout the production process, the profiles are also accurately reproducible even in applications with close tolerances. The specially selected materials and heat treatments facilitate subsequent machining, however complex the profile geometry. Eddy current and ultrasonic testing guarantee the pressure tightness of the resulting components even in the case of free-cutting steels. Deliveries at short notice and customer-specific product requirements are no problem for the specialists at ZOLLERN.



Steel profiles

Recycling/shredding

ZOLLERN steel profiles are used in shredding technology in the form of:

- blade holders
- harrow blades
- clamping strips
- cutting sticks or
- chip deflectors

They can be used in a variety of industrial sectors, e.g.:

- agriculture and forestry
- the paper industry and
- the recycling industry

ZOLLERN meets exacting standards in terms of geometrical tolerances, however complex the profile contours. The partially and fully inductively hardened profiles are especially wear-resistant. ZOLLERN steel profiles are safe, high-strength, weight-saving components.



Steel profiles

Textile machinery

ZOLLERN steel profiles are employed in flat and circular knitting machines, spinning and weaving machines, knitting looms and carders.

Serving variously as

- take-off rollers
- yard guides
- deflection aids
- needle bars
- guide rails and
- apron bridge elements,

their job is to ensure fast, precise movements.

The surface quality of the profiles has to meet very high standards in terms of functionality and appearance.

Perfect dimensional accuracy and reproducibility are guaranteed by state-of-the-art processes and ZOLLERN expertise.





Steel profiles

Power engineering

In generator construction, steel profiles serve as

- key bars
- press fingers
- dovetail bars
- I-webs

In electric motors, they are used as

- pole-shoe profiles

and in waste water treatment and power plants they find application as

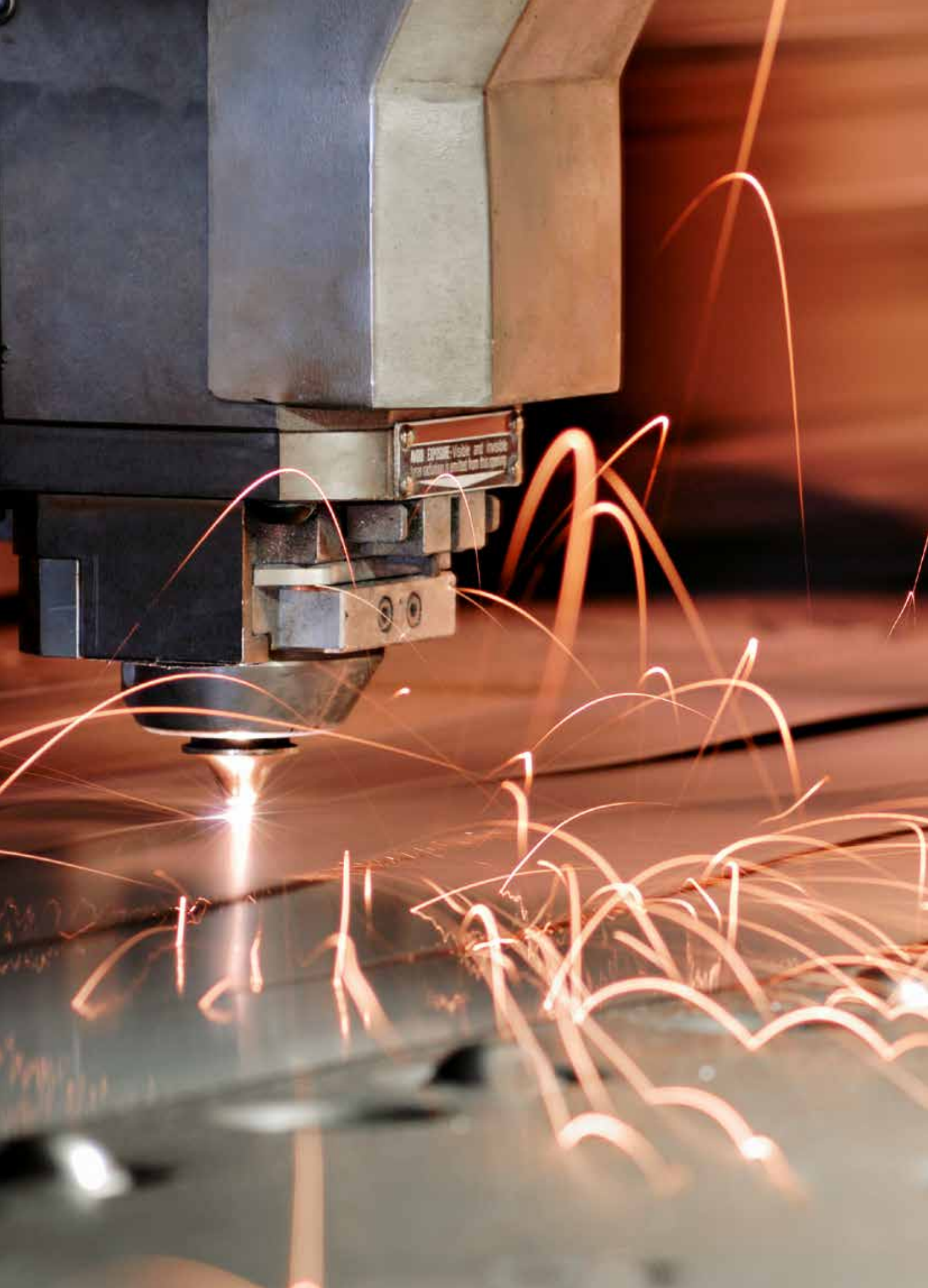
- rake profiles.

The profiles are characterised by flawless surfaces and outstanding mechanical properties.

These features are essential for ensuring functional reliability and long-lasting service.

ZOLLERN has the right technology for all kinds of customer requirements.





WAVE EXPOSURE - Visible and invisible
force catalysis is essential for biochemistry

Steel profiles

General mechanical engineering

In machine tools, printing presses and pumps, ZOLLERN steel profiles are used e.g. as:

- clamping jaws
- sliding blocks
- sprags for freewheel clutches
- gear wheel profiles
- folded sections
- guide rails
- gripper profiles
- clamping bars
- rotary pistons

Narrow radii, undercuts and minimal dimensional tolerances are implemented at ZOLLERN on a daily basis.

Cog wheels can be produced with a variety of toothing types. Asymmetrical components with custom toothing have special advantages. The required technological properties are tailored specifically to the customer's application. Thanks to near-net shape production, a final machining process is often unnecessary, resulting in short throughput times from the profile to the prefinished product.





Steel profiles

Building and construction machinery

- In drilling technology
- in the form of profiles for door locking systems,
- as spline shafts
- in scaffold construction
- in facade construction or
- for locks and fittings

the possible applications and materials are virtually endless.

ZOLLERN uses special manufacturing processes to increase the strength, wear resistance and sub-zero toughness of the profiles. Moreover, suitably adapted profile shapes and special surface finishing provide excellent conditions for subsequent welding. In whatever shape and from whatever material ZOLLERN profiles are made, they are always notable for their durability and high quality.





Steel profiles

Linear technology

- ZOLLERN makes ball and roller guides
- miniature rails
- heavy-duty rails
- telescopic slides and guides
- shaft supports and
- linear axes

from a wide range of steel materials.

For profiles in linear technology, modified steel types of maximum purity are used. This results in linear guides with outstanding properties such as:

- excellent hardenability
- high wear resistance
- high load ratings
- minimal twist during subsequent processing

Through inductive hardening, ZOLLERN achieves partially high surface hardness values of up to 64 HRC at the edges. The unhardened areas retain their positive characteristics from the cold forming process and can be processed very economically.





Steel profiles

Weapons technology

- locking pieces
- triggers
- block locks
- profiles for gas pressure loader
- lock carrier
- and other products

made from ZOLLERN steel profiles have long been used for hunting and sports weapons.

The uninterrupted grain structure and perfect homogeneity of the hot and cold-formed steel profiles allow a high fatigue strength to be achieved. Through specially selected combinations of materials and heat treatments, ZOLLERN produces profiles with strengths of up to 1200 MPa, which are thus capable of withstanding even extreme dynamic stresses. ZOLLERN steel profiles are an economic alternative to traditional manufacturing technologies in the hunting and sports weapons industry.



ZOLLERN steel forming

State-of-the-art manufacturing and generations of know-how



Hot rolling

In hot rolling, the raw material is heated inductively and rolled into a raw profile in several automated etching sequences.



Heat treatment

All heat treatment systems are operated under inert gas. The various heat treatment processes, such as soft annealing, spheroidising annealing, normal annealing, stress-relief annealing and tempering treatments, are performed to customer specifications.



Surface finishing

In preparation for cold forming, the profiles are cleaned by an eco-friendly blasting technique and then coated with a drawing agent substrate.



Cold drawing

In cold drawing, the preformed hot-rolled profile is drawn through a carbide die one or more times and shaped accordingly. Any induced stresses are neutralised by heat treatment between the forming stages.



Cold rolling

In cold rolling, a wire rod is shaped into the predefined final contours by rolling at room temperature. Multiple rolling machines perform this procedure automatically in a production line, giving the profiles a high surface quality. This procedure is particularly suitable for the manufacture of small profile geometries which are required in larger quantities.



Inductive hardening

ZOLLERN uses inductive hardening to increase the wear resistance of the profile surfaces. Hardening depths of 0.5 to five millimetres and hardnesses of up to 64 HRC are achieved.



Straightening

After the forming processes, the profile bars undergo a final straightening procedure. This is performed by manual straightening presses, fully automatic straightening presses or automatic tension levelling lines.



Processing of finished parts

The steel profiles subsequently undergo precision processing, from mechanical machining to surface finishing. ZOLLERN supplies customised products at different stages of production right through to ready-to-fit finished parts.

The unique induction surface hardening technique



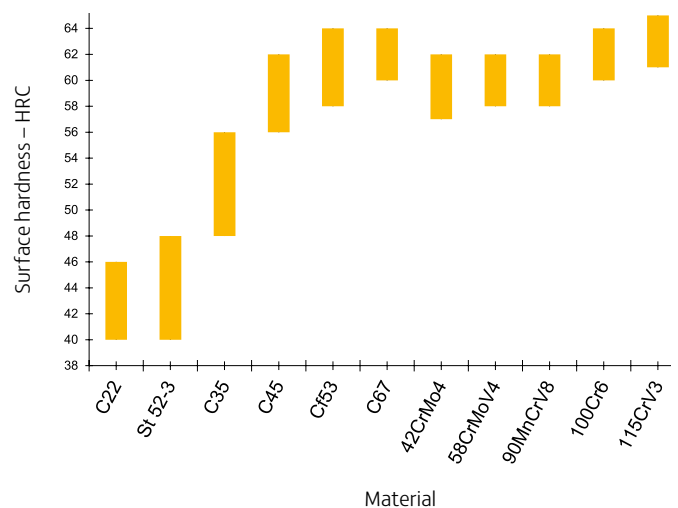
The etching process makes the surface-hardened area (dark zones) visible.

Through induction hardening, ZOLLERN is able to achieve hard, wear-resistant profile surfaces and special physical properties. In the non-hardened areas, all positive properties of cold forming are retained, allowing low-cost subsequent machining in these areas. Hardening distortion is reduced to a minimum, so that any necessary grinding allowances are kept extremely low, and the risk of straightening and grinding cracks is avoided. Short heating and austenitization times prevent scale, surface decarburisation, residual austenite and grain growth, thus preventing premature wear of the components.

Application examples are:

- Linear guides
- Drive elements
- Rails
- Torsion bars
- Spline shafts
- Shredding tools
- Spring elements
- and much more

Surface hardness values achievable with induction-hardened steels



Certified processes. First-class quality.

High quality is a hallmark of ZOLLERN products. In addition to stringent quality assurance of the individual products, ZOLLERN's management system is also certified according to the international standards ISO 9001 and IATF 16949. The ISO 14001 and ISO 50001-certified environmental and energy management systems are also implemented on a daily basis.

- At ZOLLERN, error prevention has priority over error correction. The aim is to achieve a zero error rate, meaning that the customer's requirements are fully satisfied.
- ZOLLERN's operations are accompanied by continuous improvements to its processes, its organisational structure and ultimately its products and services. In addition to ongoing improvements in the relevant areas, the employee suggestion scheme also makes a major contribution in this respect.
- Employee orientation, training and development and optimal working conditions are important elements of ZOLLERN's corporate policy. In this way, it aims to achieve excellence both today and in future on national and international markets, while at the same time conserving resources and the environment.



Quality assurance and material testing

ZOLLERN uses a wide range of methods and instruments to ensure product quality. Material tests are certified according to DIN EN 10204 and conducted throughout the entire manufacturing process.

Testing of mechanical and technological properties

- Tensile testing machines
- Hardness testers for all standards
- Fully automatic low-load hardness testers
- Notched-bar impact testing

Metallographic testing

- Laboratory for sample preparation, e.g. hot mounting and specimen preparation
- Various macroscopes and microscopes allow precise material analysis

Determination of chemical composition

- Spectral analysis
- Chemical analysis

Geometry and surface roughness tests

- Measuring machines – optical, tactile and digital
- Roughness measuring devices

Linearity and torsion tests

- Measuring tables, measuring bridges of various lengths and angle measuring devices

Refinement of heat treatments, determination of tempering temperatures

- Laboratory furnaces

Non-destructive test procedures

- Crack detection tests based on the eddy current and magnetic powder principles
- Ultrasonic tests
- Positive material identification

Product portfolio and technical data



Profile types

hot-rolled, cold-rolled, cold-drawn,
induction-hardened

Cross sections

Profile cross-sections 5 to 7,650 mm²
(40 g/m to 60 kg/m)

Availability

Bars up to 12 m, rings up to 2 t

Dimensional tolerances

from 20 µm

Surface roughness

from Rz 5 µm

Materials

Structural steels, free-machining steels, case-hardened
steels, quenched and tempered steels, rolling-bearing
steels, tool steels, stainless steels

Processing

Heat treatment, induction hardening with achievable
surface hardnesses of up to 64 HRC, ready-to-fit
components including mechanical processing and
surface finishing

International material comparison

For more materials and detailed material data, see www.zollern-steel-profiles.com

Workpiece category	Material No.	Description DIN EN ISO	ASTM/AISI	JIS/SUS
Structural steels	1.0038	S235JR	1015	SS330
	1.0577	S355J2	A738	-
	1.0050	E295	-	SS490
	1.0060	E335	-	SM570
Free-cutting steels	1.0715	11SMn30	1213, 1215	SUM22
	1.0718	11SMnPb30	12L13	SUM22L
	1.0726	35S20	1140	-
	1.0727	46S20	1146	-
Heat-treatable steels	1.0503	C45	1043, 1045	S45CM, S45C
	1.0601	C60	1060	S60CM, S60C
	1.7218	25CrMo4	4130	SCM 430
	1.7225	42CrMo4	4140	SCM440
Roller bearing steels and tool steels	1.7792	58CrMoV4	-	-
	1.3505	100Cr6	E52100	SUJ2
	1.1213	C53G	1050, 1055	S50CM, S50C
	1.2842	90MnCrV8	A681	-
	1.7177	60Cr3	-	-
	1.8159	51CrV4	6145	SUP10
Case-hardening steels and nitriding steels	1.0401	C15	1015, 1017	S15C
	1.7131	16MnCr5	5115	-
	1.5918	17CrNi6-6	-	-
	1.5920	18CrNi8	-	-
	1.6523	20NiCrMo2-2	8617, 8620	SNCM220
	1.2764	X19NiCrMo4	-	-
	1.5752	15NiCr13	3310	SNC815
	1.8519	31CrMoV9	-	-

Stainless steels:				
Austenitic	1.4301	X5CrNi18-10	304	SUS304
	1.4305	X8CrNiS18-9	303	SUS303
	1.4404	X2CrNiMo17-12-2	316L	SUS316L
	1.4541	X6CrNiTi18-10	321	SUS321
Martensitic	1.4028	X30Cr13	420	SUS420L
	1.4034	X46Cr13	A176 (420)	-
	1.4037	X65Cr13	-	-
Ferritic	1.4003	X2CrNi12	A240	-
	1.4016	X6Cr17	430	SUS430
Duplex	1.4462	X2CrNiMoN22-5-3	2205	SUS329
Heat-resistant	1.4923	X22CrMoV12-1	-	-

ZOLLERN Group

Product areas

Metals and shaping

// Investment casting parts



- Turbine components
 - Vanes / Blades / Shrouds / Heat Shields
- Structural Castings
 - Gas Turbines / Aero / Engines Defense / Medical / Industrial Components
- Automotive
 - Turbine Wheels / Waste gates / Vanes / Pins / Planet carriers
- Implants
 - Knees (Femur, Tibia) / Hipps
- Alloys
 - Super alloys / Cobalt Chrome alloys

// Sand casting parts



- Sand casting
- Croningguss / Maskenguss
- Ceramic casting
- Continuous casting
- Centrifugal casting

// Forgings



- Forgings made of pure copper and copper alloys
- Semi-finished products, open die forged, flat bars, round bar
- Drop forged parts
- Rings, seamlessly rolled
- Bushings, seamlessly forged
- Individual pieces, small series, large series

// Special profiles and finished parts



- Special profiles, coils, bars
- Customer-specific finished parts
- Profile types hot-rolled, cold-rolled, cold-drawn, induction-hardened

Drive technology and automation

// Gearboxes



- Travel drives
- Slewing gearboxes
- Winch gearboxes
- Industrial gear units
- Gearboxes for tunnel boring machines
- Sugar mill gearboxes
- Electric drive systems
- Condition Monitoring and Predictive Maintenance

// Winches



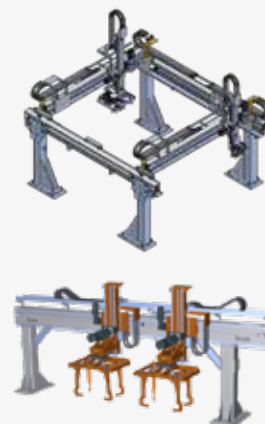
- Hoisting winches
- Free fall winches
- Pull winches
- Rescue boat winches
- Winch systems
- Winch gearboxes

// Electric motors



- Torque motors kits
- Synchronous motor kits
- Synchronous motor modules

// Automation, special systems



- Linear units, linear modules, gantry axes, portal units
- Telescoping axes
- Rotary modules, rotary tables
- Line gantries, area gantries
- Robot traverse axes, jig axes
- Storey lifter and lifting columns
- Fast conveyor
- Framing tenter handling / overhead systems
- Storage systems
- Complete systems with steel construction and control
- Special solutions
- Gripper

// Hydrostatic systems



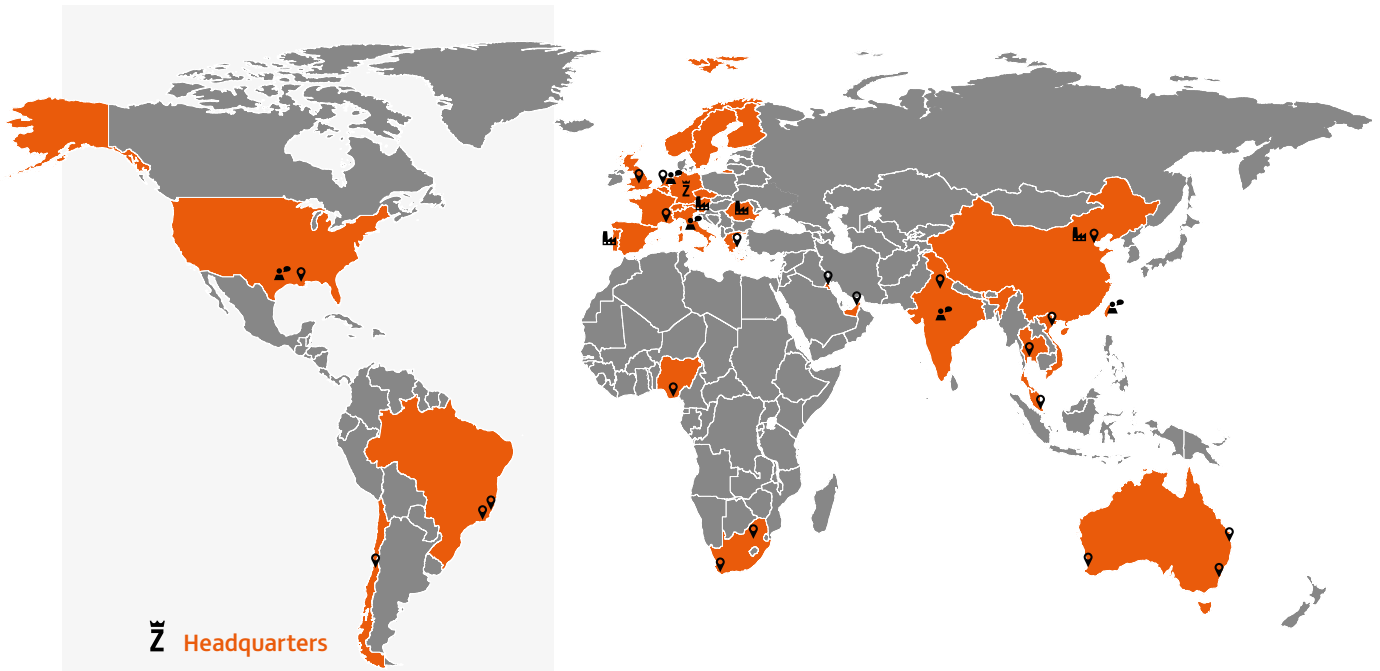
- Hydrostatic spindle units
- Hydrostatic rotary tables
- Aerostatic rotary tables
- Hydrostatic linear guides
- Hydrostatic center drive spindles
- Hydrostatic bearing components
- Hydrostatic special applications and test benches

// Rotary tables systems



- Roller bearing rotary tables
- Hydrostatic rotary tables
- Automatic pallet changing systems and linear axes
- Swiveling tables
- After sales service for products of ZOLLERN, RÜCKLE and EIMELDINGEN

ZOLLERN



Headquarters

Subsidiaries

Italy and southern Europe
Netherlands and Northern Europe
USA
India and Southeast Asia
Taiwan, China

Factories

Germany
Portugal
Romania
Slovenia
China

Service partner

Australia
Brazil
Chile
Greece
Great Britain
Kuwait
Singapore
South Africa
Thailand
Dubai
USA
Vietnam



ZOLLERN-worldwide



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