



Schunk Group

Technology leader through competence
in materials and engineering

Welcome to the **Schunk Group**

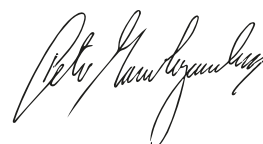
Dear Readers,

With its four divisions, the Schunk Group is a technologically differentiated provider serving its customers in a host of highly specialized markets across the globe by providing them with high-tech solutions. Our material and engineering expertise, as well as the professional knowledge of our 8,200 employees all around the world, make us a technology leader in our markets. We place

great importance on the long-term orientation of our company, our entrepreneurial spirit and our customer orientation.

In this company brochure, we would like to show you what Schunk stands for and what makes us tick. Get to know us!

Sincerely,



Our **management team**



Peter R. Manolopoulos

Member of the
Executive Board

Dr. Arno Roth

Chief
Executive Officer

Schunk Group

The Schunk Group is an international technology group employing more than 8,200 people in 29 countries. The company offers a broad spectrum of products and services in the fields of carbon technology and ceramics, environmental simulation and air conditioning technology, sintered metal and ultrasonic welding.

Schunk Divisions

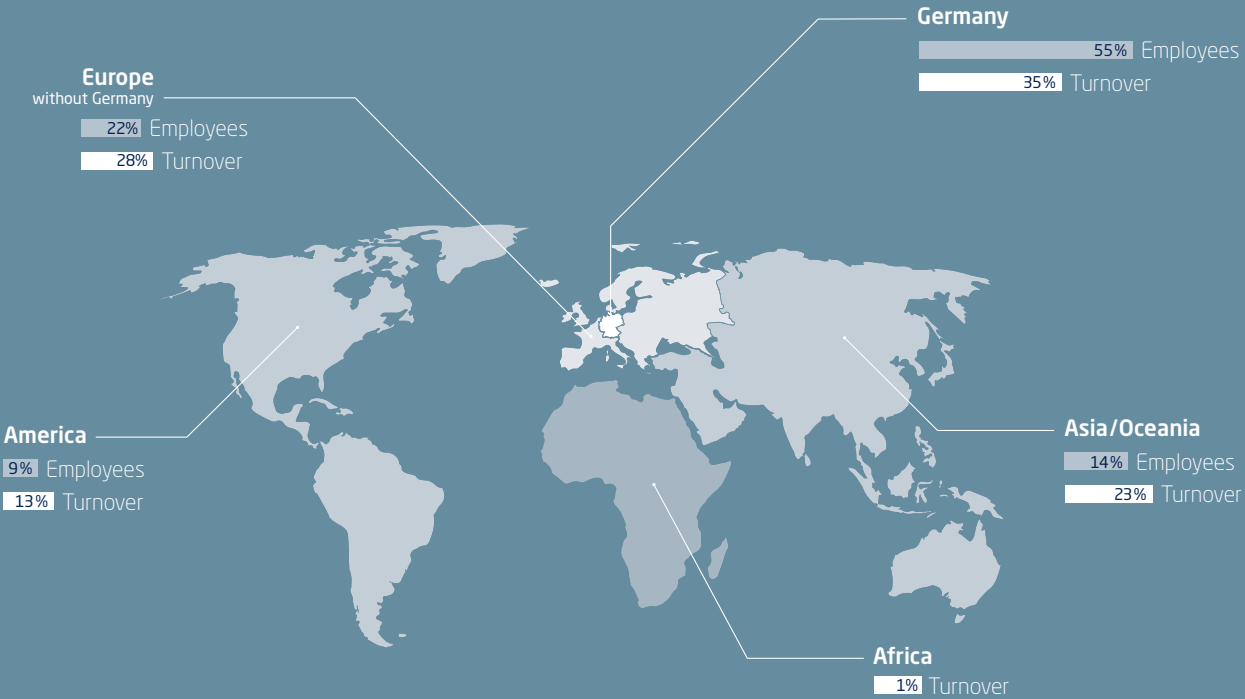
Schunk Carbon Technology
Weiss Technik
Schunk Sinter Metals
Schunk Sonosystems

Schunk markets

Automotive
General industry
Railway
Life sciences
Semiconductors
Electrical industry
Household appliances
Power supply
Power tools
Defence industry
Solar power industry
Aerospace
Wind power

Our team

Percentage distribution of employees and turnover figures for 2017 on different continents



Our values

Enabling

Our materials and engineering expertise make us technology leaders. This, together with our pragmatic action, paves the way to identify new growth potential and goals for and with our customers, to reach them and to exceed our customers' expectations.

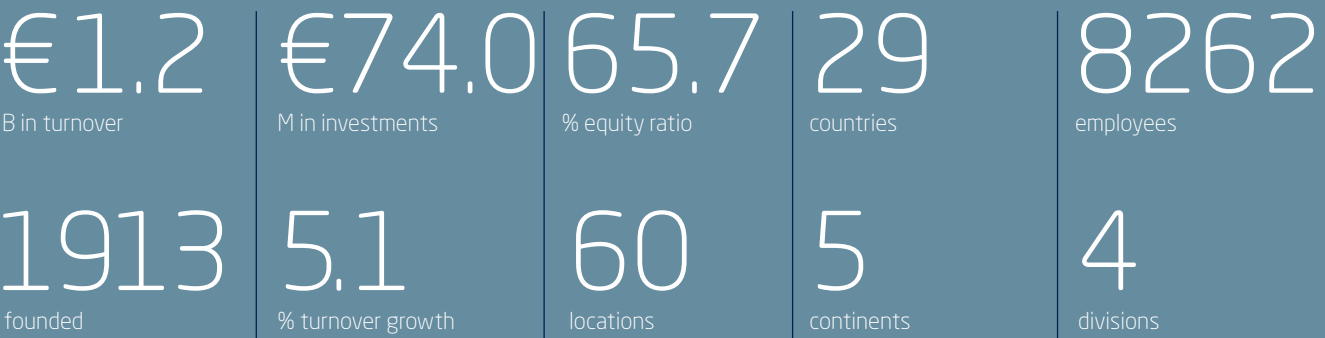
Idea-driven

We continuously develop and improve ourselves and are innovative. This is what motivates us to advise our customers, give them new ideas and impulses and guarantee that they have early competitive advantages in future markets.

Cooperative

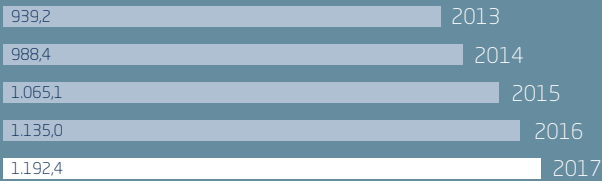
Entrepreneurial spirit and personal commitment in customer relationships rather than anonymous corporate structures: this makes us a reliable partner for successfully implementing objectives.

Schunk by the numbers

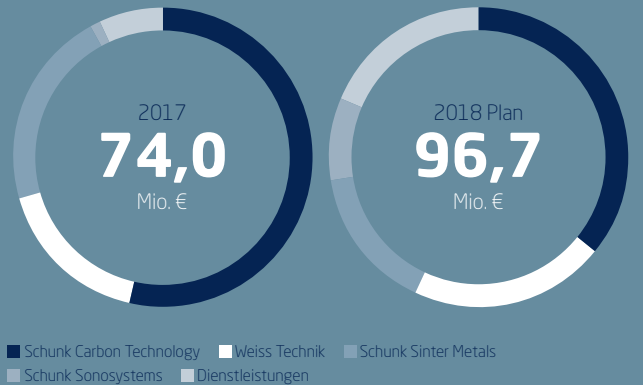


Our success

Turnover figures in €M



Our investments





Left side:
Chemical vapor deposition
(CVD) and infiltration (CVI)
under clean room conditions

Right:
Climate chamber
with sun simulation

Below:
Corporate headquarters in
Heuchelheim, Germany



The Schunk Group stands for excellent material and engineering expertise.

As a global technology company, we are a leader in our core markets of carbon technology and ceramics, environmental simulation and air conditioning technology, sintered metals and ultrasonic welding. With more than 8,200 employees, we are available to customers locally in 29 countries.

Future-oriented technologies for all key industries

With innovative products and future-oriented technologies, Schunk is represented in every key industry. From automobiles, rail-based vehicles and electronic components to the pharmaceutical industry, electrical devices and wind power plants to light-emitting diodes, Schunk products ensure reliable quality, proven safety and great convenience. Our material specialists in carbon, ceramics and sintered metal and our engineers in environmental simulation systems, air conditioning and clean room technology, heat technology and ultrasonic welding technology have been setting technological milestones for over 100 years.

Technology leader through **expertise in materials and engineering**





Customer-oriented company with an entrepreneurial spirit

The goals and wishes of our customers are our top priority. We want to inspire our customers with great commitment, understanding of their applications and technical expertise. Our company spirit and personal involvement make us a reliable partner here. They enable us to give our customers clear competitive advantages in the form of pragmatism, speed and the capability of taking action.

Remain independent and grow sustainably

The foundation of our success is the long-term orientation of the company. Many years ago, company founder Ludwig Schunk strove "to maintain the management of the company in such a way, that its healthy growth and the preservation of its independence comes to the fore." Our strategic orientation still follows the maxims of remaining independent and growing sustainably.



Company founder
Ludwig Schunk

Passion for what we do

“It’s a lot of fun
to work at a high-tech
company like the
Schunk Group.”

Mohammad Karimi,
mechanical engineer



More than 8,200 employees all over the world are the basis for our success.

Every day, their motivation and service help us, as a leading technology company, to inspire customers all around the world. This is why we are always on the lookout for employees who are fully committed, think in an entrepreneurial

way and have the courage to strike out in new directions. We promote innovative approaches in a targeted way and offer a working environment in which employees can make their ideas a reality. Good ideas will continue to be a decisive factor in inspiring our customers with pioneering products in the future.

**Individual perspectives for
common success**

Our solid foundation culture and sustainable growth-oriented company strategy make the Schunk Group a reliable employer. With a broad offering of opportunities for continuing education and qualification, we open up prospects for individual development for our employees, whether they are skilled workers or management personnel, in Germany or at one of our international locations.

Diversity makes us tick

Diversity is a fixed component of the Schunk culture, just like the sites, regions and areas of business we call home. By promoting interculturality, increasing female technical and management personnel and through cross-generational work and offerings for improved compatibility of family and career, we strengthen the diversity of our workforce in a very targeted way.

“Schunk offers me
ideal conditions for
balancing family
and career.”

Kira Benner-Müller,
process engineer



The Schunk Group – A global technology company

High-tech products and systems in the area of carbon technology and ceramics, environmental simulation and air conditioning, sintered metals, and ultrasonic welding.

Schunk
Group

Schunk
Carbon Technology

Development, manufacture
and application of carbon
and ceramic solutions

Weiss
Technik

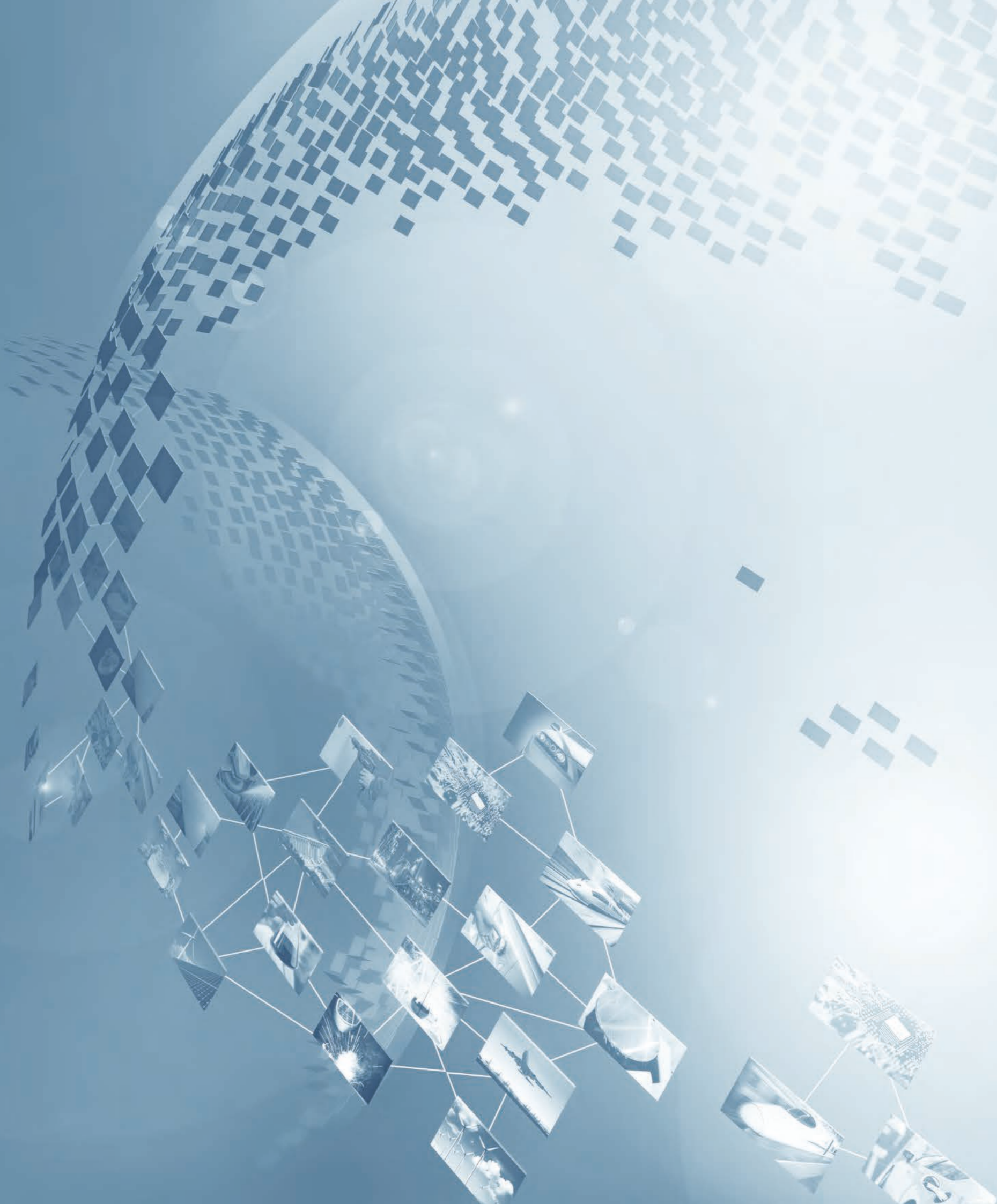
Systems for environmental simulation,
air conditioning, heat technology and
clean room and containment systems

Schunk
Sinter Metals

High-precision sintered parts using
axial pressing technology and metal
powder injection molding

Schunk
Sonosystems

System solutions and
modular system concepts for
ultrasonic welding



Schunk Carbon Technology

A global leader in the development, manufacture and application of carbon and ceramic solutions



Every part, every component and every system is faced with technical limitations which are often the result of the material chosen for the job.

With our carbon, graphite, carbon-composite, silicon carbide, aluminum oxide and quartz materials, we develop innovative products that transcend the limitations of conventional materials in many different areas. Thanks to their special chemical, mechanical, electrical and thermal properties, our solutions are used in some of the most demanding applications. In addition to sound material expertise, this requires a deep understanding of the requirements and goals of our customers.

Always close to the customer

Thanks to our highly specialized technology portfolio covering mechanical carbon, electrical carbon, thermal carbon and technical ceramics, Schunk Carbon Technology is able to offer solutions employing these technologies to every relevant industry. From automotive, rail, aviation and marine technologies to solar and wind energy to the process industry, medical and electrical technologies and the semiconductor industry,

we've got you covered. Schunk Carbon Technology combines its capacity for innovation and technological expertise with exceptional customer service here. Thanks to its decentralized and flexible structure, the division is precisely aligned with the markets and applications of our customers. Fast, uncomplicated and featuring flat hierarchies, we are always close to the customer, from development to the start of production.

Outstanding quality from raw material to shaping

In developing and manufacturing materials, Schunk Carbon Technology follows a consistent quality strategy from raw material acquisition to material preparation through to shaping and processing. Using sophisticated production and refinement processes, such as the high-temperature chemical vapor deposition of graphite, we achieve a market-leading level of quality. This puts us in a position to continually optimize the performance and process reliability of the systems of our customers.

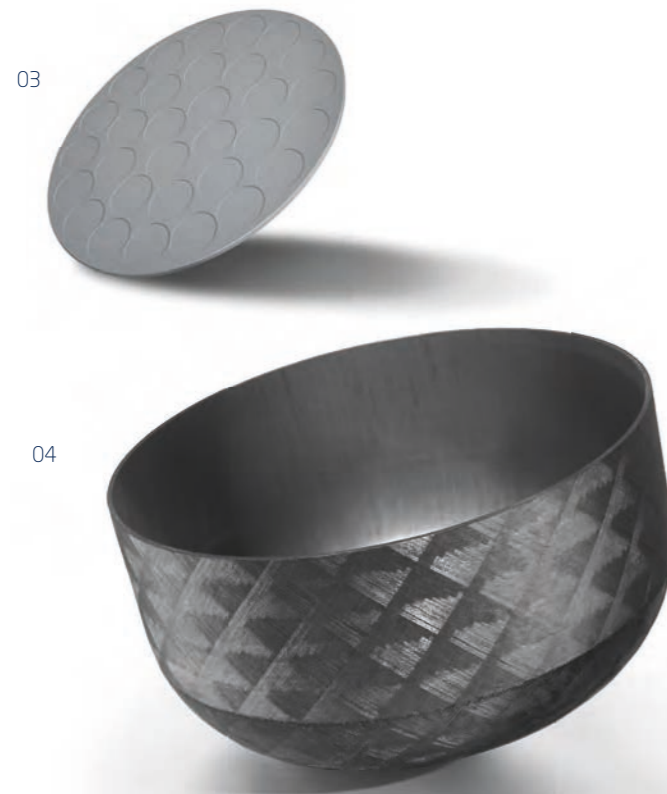
Mechanical carbon

Schunk Carbon Technology combines comprehensive expertise in development, production and processing of carbon and silicon carbide materials (SiC) and their tribological behaviors. Sealing rings, bearings and pump components made of our graphite and carbon materials, as well as SiC, are characterized by low friction coefficients and high wear resistance. The mechanical carbon products are used in sealing technology, as well as in machines, assemblies and systems in many industrial areas, such as the chemical and petrochemical industries, energy and supply engineering, the pharmaceutical and foodstuff industries, aviation and shipping and many more.



Thermal Carbon

Wherever high temperatures place extreme requirements on material properties, our carbon and ceramic products for high-temperature applications are the first choice, whether it's in furnace construction, heat treatment, glass processing, the manufacture of semiconductors and solar cells or in analytical technology. In addition to graphite, we produce components made of carbon fiber-reinforced carbons (C/C). A leader in the cleaning and coating (SiC, pyrocarbon etc.) of graphites and C/C, we are also able to offer extremely pure and high-resistance products. In addition, we offer our customers specialized solutions using quartz, graphite and high-performance ceramic for the semiconductor, solar and LED industries.



Mechanical carbon

- 01 Gas seal ring out of high performance carbon graphite
- 02 Bearing out of a unique SiC-C-composite material

Thermal Carbon

- 03 LED conductive heated wafer carrier
- 04 C/C crucible for CZ-pulling

Electrical carbon

Products from Schunk Carbon Technology for efficient power transmission can be found in automobiles, trains, almost all industrial applications and a large number of consumer goods, whether they're carbon brushes, brush holders, slip rings and strips, contacts, conductor bands, pantographs or any of our many other products. Our ability to develop materials and components which suit a wide variety of precise needs and areas of use makes us the ideal technology partner for power transmission.



Technical ceramics

Heat resistant, media resistant, non-wearing, extremely hard and bulletproof—no other material combines as many valuable features for industrial use as technical ceramics from Schunk Carbon Technology. Schunk Carbon Technology is the innovative specialist for ceramic materials and components made of silicon carbide (SiC) and aluminum oxide (Al_2O_3) used in thermal processing technology, furnace and system construction and process engineering, among other things in burners for direct and indirect heating and for burning aids. Thanks to its outstanding features, our SiC is also used in ballistic protection.



Electrical carbon

- 05 Carbon brushes for electrical motors
- 06 Current collector for electrical buses

Technical ceramics

- 07 Burner components, e.g. for heat-treatment furnaces
- 08 Kiln furniture for the ceramics industry

Weiss Technik

Test it. Heat it. Cool it.



Test it. Heat it. Cool it.

The Weiss Technik division, with its **weisstechnik**, **vötschtechnik** and Climats brands, is a major developer and manufacturer of systems for environmental simulation, air conditioning technology, heat technology and clean room and containment systems. Our solutions are used across the globe in all key industries in research and development, as well as in production and quality assurance. A strong sales and service organization on the regional and global levels ensures ideal customer care and the high operating reliability of the systems.



Above:
Emissions testing chamber with sunlight
simulation and integrated roller dynamometer

Below:
OT clean-air canopy from **weisstechnik**
for protecting patients and surgical staff

Environmental simulation

weisstechnik, **vötschtechnik** and Climats environmental simulation systems simulate a wide variety of different environmental effects at an accelerated pace. Whether it's temperature, climate, corrosion, dust or combined stress testing, we have the right solution. We develop, produce and install systems of every size, from standard designs to customer-specific, process-integrated systems for high reproducibility and precise test results. With our Fitotron range of products, we offer our customers additional innovative solutions which were specially developed for scientific examinations in biological applications such as plant-growth experiments or insect cultures.



01



02

Environmental simulation

Heat technology

01
Temperature and climate testing chambers for environment-simulation tests

02
Heating and drying cabinet HeatEvent

Heat technology

Under the **vötsch**technik brand, we also offer a broad spectrum of products in the field of heat technology. Our experienced team of engineers and designers develop high-quality, reliable heating systems for just about every area of application. This includes heat cabinets and drying ovens, clean room driers, hot-air sterilizers, microwave systems and industrial furnaces. Our products range from technologically sophisticated standard equipment to customer-specific solutions for individual production processes.

Air conditioning technology

Air conditioning technology from **weisstechnik** is used wherever ideal climatic conditions are required for people and machines for industrial manufacturing processes, in hospitals, in mobile operating tents and in the information and telecommunication technology fields. As a leading provider of professional clean room, air conditioning and dehumidification systems, we supply effective and energy-saving solutions and accompany our customers with our deep expert knowledge from planning through to the implementation of projects.



03



04

Air conditioning technology

Clean air and containment

03
CoolW@ll for energy-efficient air conditioning at computer centers

04
WIBObarrier Economy Safety Work Station

Clean air and containment

Our sophisticated clean air and containment solutions are especially appreciated by customers in the life science, pharmaceutical, chemical, cosmetics, foodstuff, electronics and medical technology industries. The product range of **weisstechnik** includes, among other things, systems for sampling, weighing and decanting tasks, barrier systems, laminar flow systems, safety workbenches, isolators and air-lock room systems.

Schunk Sinter Metals

Precision and reliability
for demanding systems

01
Helically cut output gear for
electric parking brake

02
Stator with chain wheel for
camshaft adjuster

Precision and reliability for demanding systems

Schunk Sinter Metals is a leading technology and development partner in the production of sintered metal parts. With more than 90 years in powder metallurgy, we develop and produce sintered parts with weights measured in tenths of grams up to complex structural parts weighing several kilograms today. Schunk Sinter Metals specializes in two processes here, axial pressing technology and metal powder injection-molding technology. Sintered metal parts produced with high precision are the ideal solution for demanding systems in many areas of industry.

In the automotive industry in particular, sintered parts from Schunk Sinter Metals bring both speed and safety to the road. After all, cars don't move at all without sintered parts. This is why the components

are primarily found in the engine and its peripheral parts, like turbo chargers, injection systems, pumps, valve controllers and in brake and safety systems, seat adjustment mechanisms and in steering systems and actuators.

Outstanding process reliability, from the first part to the last

Sintered structural parts and bearings as well as metal-injection molding parts made by Schunk Sinter Metals stand for reliability and confidence, for we live by the zero-defect philosophy. From the development stage, through production and all the way to quality assurance, we meet the highest standards of the automotive industry. Continuous development of our lean and stable processes ensures an outstanding level of process reliability for our customers—from the first part through the last.



01



02

Schunk Sonosystems

Perfection in connection

01
LS-C Universal Welding Machine

02
Minic-III Wire Welding Machine

Perfection in connection

Thanks to intensive fundamental research and a large number of innovations in the area of ultrasonic metal welding, Schunk Sonosystems has become a global technology and market leader. In particular in the electrical “nervous system” of vehicles, the wiring harness, Schunk Sonosystems has ensured millions of perfect connections around the world.

Ultrasonic welding joins metals together using ultrasound. In addition to copper and aluminum connections, metal and glass can be joined together. In this process, the materials are placed on top of one another and moved against one another under low pressure and high-frequency mechanical vibrations. In just a fraction of a second, a permanent, solid and metallurgically pure joint with outstanding physical properties is created without thermally stressing the components.

Complete system solutions from a single source

Schunk Sonosystems products are complete system solutions from a single source. They fulfill the most stringent requirements of the

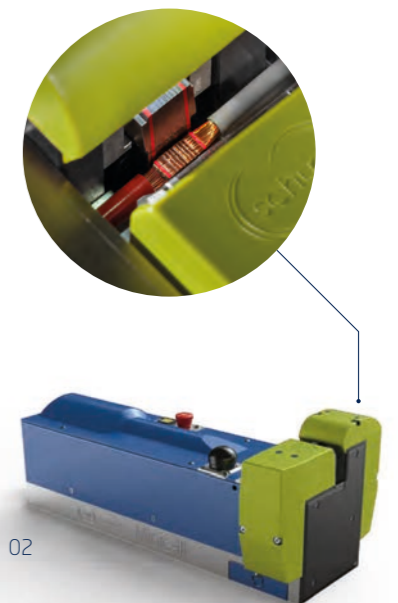
automotive industry. Beyond the standard machine range, Schunk Sonosystems also offers a modular system concept. This enables the integration of ultrasonic systems into complex assembly lines. The range spans from welding systems for the wiring harness industry to ultrasonic pipe welding tongs to gas-tight sealing of cooling systems to complex special systems for the solar, electronics and semiconductor industries, as well as for the manufacture of batteries. All the systems are characterized by their flexibility in use, ease of connection, minimal operating costs and comprehensive process monitoring.

Comprehensive global service

We offer our customers comprehensive global service for all system solutions from Schunk Sonosystems, from conventional ultrasonic welding machines to complex automation with and without ultrasound. Our services include training centers and machine inspection centers for the effective handling of devices and customer-friendly online diagnostics, for example for the optimization of welding parameters.



01



02

A Schunk timeline

At Schunk, innovation is a tradition. Over 100 years of progress have made the company into a global player and, in many areas of business, a technology and global market leader. Over the decades, we have developed an infallible instinct for strong market trends and pioneering product innovation. Discover a selection of our most important milestones on this path.

1913

Schunk & Ebe is founded

On October 27, 1913, businessman Ludwig Schunk and machine builder Karl Ebe found Schunk & Ebe OHG in Fulda, Germany. The company produces and sells carbon brushes for dynamos and motors used primarily in industry, as well as in streetcars and long-distance trains.

1928

Supplier of the automotive industry

In 1928, Schunk produces its first metallic carbon brushes for starters and alternators. With this new branch of production, Schunk expands its areas of business to include the automotive industry.

1932

Sintered bearing production – An innovation on the German market

In 1932, Schunk begins production of sintered bearings, so-called oil-less bearings. These oil-less bearings have the advantage of not needing to be oiled anymore after installation. This is an innovation on the German market and the cornerstone of today's Sinter Metals division.

1933

Production of carbon sliding brushes for rail systems

The first extruded carbon contact strips for current collectors of electric trains, streetcars and overhead contact wire busses are the starting point of one of Schunk's areas of business that has remained successful to this day.

1961

High-purity graphite and future-oriented coatings

Since 1961, Schunk has been in a position to create very pure graphite through high-temperature cleaning. In the same year, coatings made of pyrolytic carbon (PyC) are deposited on graphite for the first time. Both processes are the basis for today's products for the semiconductor and solar markets.

1990

International breakthrough – Ultrasonic welding

At the beginning of the 1990s, Schunk Ultraschalltechnik introduces the ultrasonic metal welding of wiring harnesses in automobiles. The outstanding properties of the connections made using this technique help ultrasonic welding become an international breakthrough in the automotive industry.

1984

Entry into the production of fiber composites

In 1984, Schunk begins producing fiber composites. The most important role is played by carbon fiber-reinforced carbons (C/C). Thanks to their high strength, low weight and high heat resistance, these materials are used especially in high temperature applications.

1980

Entry into ultrasonic welding

In 1980, Schunk acquires Niebuhr Ultraschalltechnik GmbH, today's Schunk Sonosystems division. This lays the cornerstone for the company's success in the automotive, cooling unit and solar technology fields, for example.

1978

Diversification begins: Entry into environmental simulation and air conditioning technology

Acquisition of Karl Weiss GmbH, today's Weiss Technik division, marks a milestone in the company's development. With it, Schunk takes a large step toward diversification into other technological fields and industries.

1970

Supplier of the semiconductor industry

In the early 1970s, Schunk enters a promising business with high-purity graphite components for the production of semiconductor products.

1968

Mass production with new materials

In 1968, Schunk develops an entirely new family of materials, the so-called "L carbons," which form the cornerstone for the large-scale usage of carbon brushes in small motors and are predestined for the booming household electrical appliance and power tool markets.

1990

The metal powder-injection molding (MIM) production process

In addition to axial pressing technology, Schunk introduces a new production process for sintered metal parts: powder-metallurgical injection molding. This combines the known advantages of the sintered materials with the options of shaping via plastic injection molding technology.

2003

Success with solar energy

In 2003, Schunk supplies high-precision components for the production of solar cells, such as crucibles for the production of silicon crystals, for the first time. The extremely high purity exhibited by these components is an important requirement for the fault-free production of semiconductors and solar cells.

2004

Power transmission system for wind power plants

In 2004, Schunk develops a complete power transmission system for wind generators comprised of carbon brushes, brush rockers and a slip ring. Today, Schunk offers solutions for the toughest of requirements: high altitudes, cold climates and off-shore setups.

2007

Market maturity in new territory – Environment simulation for lithium-ion batteries and solar modules

In 2007, the Division Weiss Technik introduces both test cabinets for lithium-ion batteries as well as test cabinets for solar modules, in which a variety of different climatic conditions can be simulated.

2008

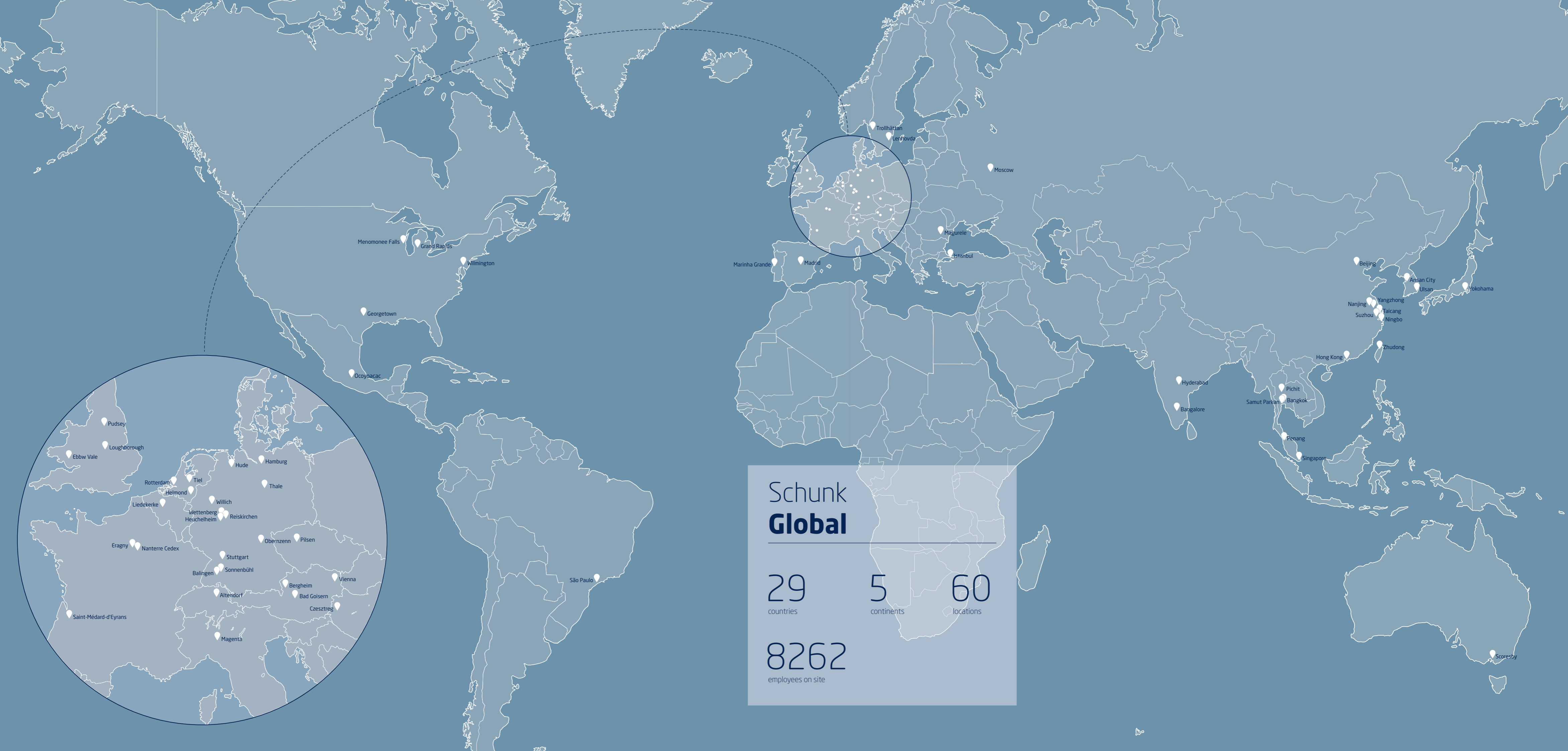
Supplier for LED production

Under the Xycarb Ceramics brand, Schunk has been supplying high-precision and high-purity components for the production of LEDs since 2008. During production, they are used in a coating process where the functional semiconductor connections of the LEDs are produced.

Today

International technology company

With around 60 sites and 8,200 employees in 29 countries, Schunk is local to its customers around the world. In 2017, Schunk generated a turnover of €1.2B through its four divisions: Schunk Carbon Technology, Weiss Technik, Schunk Sinter Metals and Schunk Sonosystems.



Schunk Global

29

countries

5

continents

60

locations

8262

employees on site



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