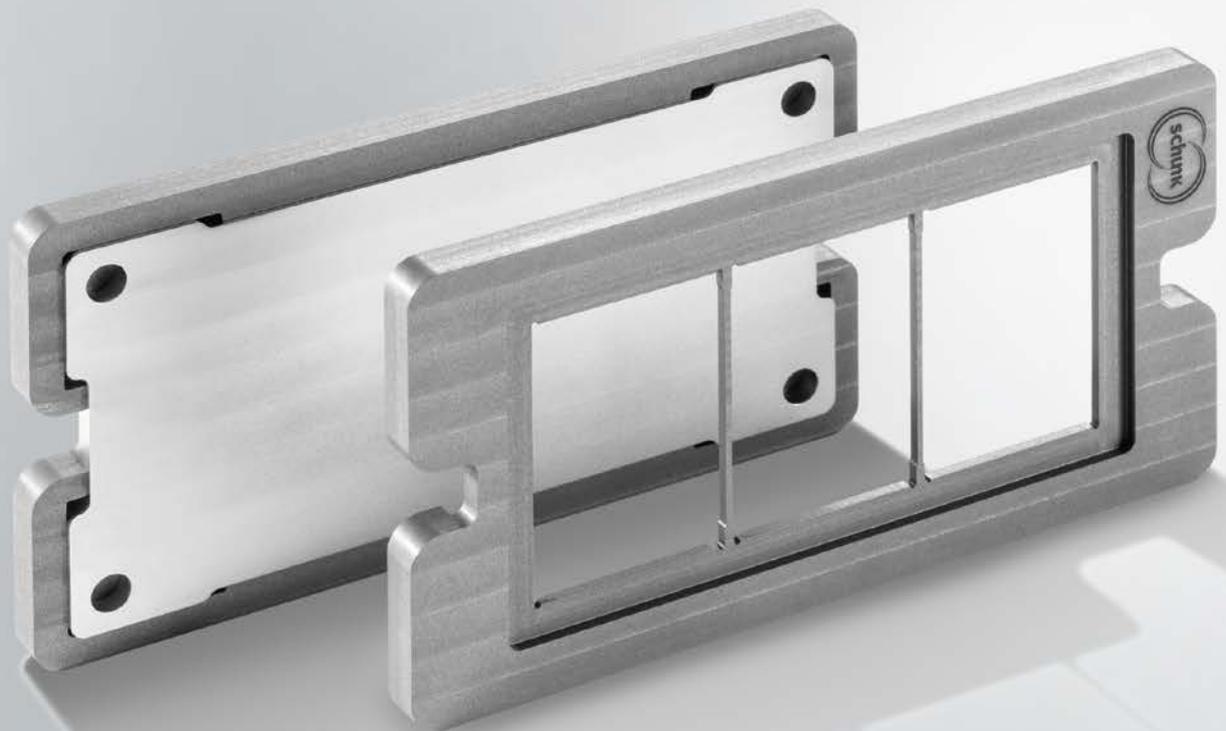




Aluminium Graphite Composites

High-performance thermal management materials



Aluminium Graphite

Outperforming the competition

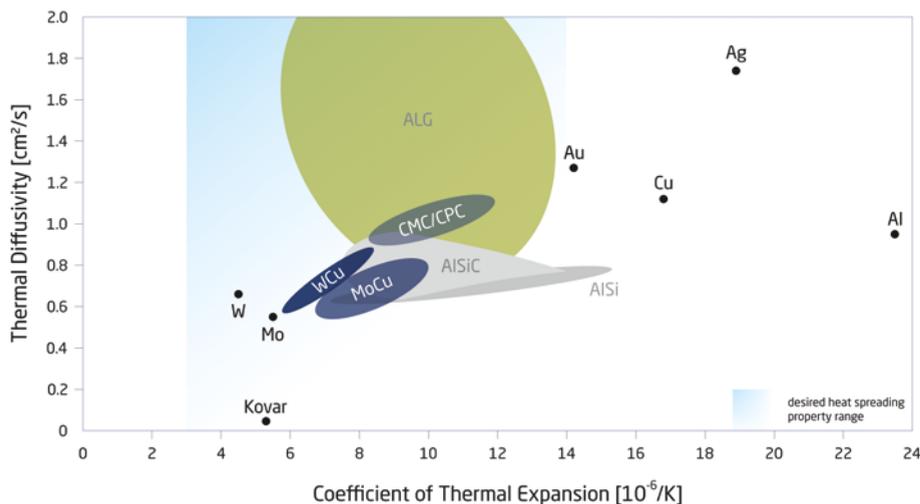
Aluminium Graphite is a metal matrix composite (MMC) that presents a unique set of properties. These closely mirror the sharp rise in interest in the design of thermal management materials exhibiting specific properties that must accommodate the ever-increasing requirements on reliability in a wide range of industries.

You benefit from these advantages:

- Rapid heat transport
- Customized expansion behaviour
- Lightweight solutions
- Customer-specific designs
- Functional surfaces
- Extended lifetime

Parts made of Aluminium Graphite effectively remove heat from hot-spots and reduce mechanical tension within the assemblies. This leads to an improvement in the overall reliability of the electronic system.

Schunk Aluminium Graphite products can be used in various markets, including transportation, industry, and communications technology.



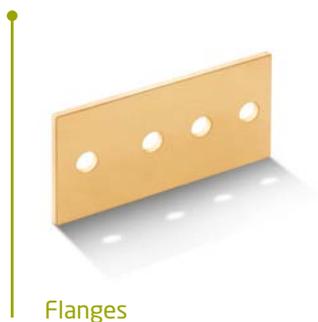


Building tomorrow's communications technology

Reliable electronics are a must in modern communications technologies. There is a need for a proper thermal management in signal transmission devices where Schunk's Aluminium Graphite can contribute to a performance boost. Stay connected.

Our Aluminium Graphite metal matrix composites were designed to minimize stress in electronic packages whilst operating reliably in the desired manner. Many microelectronic and optoelectronic packages suffer from thermally induced stress that arises during assembly processes or operation. Aluminium Graphite's coefficient of thermal expansion (CTE) is well-aligned to semiconductor materials and eliminates strain in these systems. The excellent thermal conductivity facilitates an efficient heat dissipation. Schunk produces customized lightweight components, beginning with sample parts for initial tests, for numerous applications.

- Microelectronic carrier plates and housings
- Flanges for RF power amplifiers
- Heat sinks and heat spreaders





Ensuring the transport of tomorrow is ready today

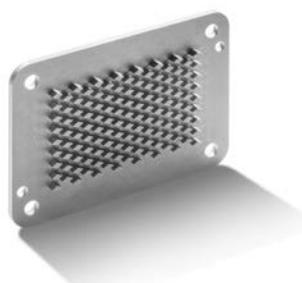
Electrification is driving the development in transportation worldwide. Whether in automotive, railway or aeronautics - efficient power conversion systems are needed everywhere. Using Schunk's lightweight Aluminium Graphite materials strongly impacts the reliability and lifetime of modules and systems.

Power electronic modules consist of several semiconductor dies that are mounted on ceramic substrates and generate heat during operation. This heat must be managed properly by using an adequate active or passive cooling concept. Aluminium Graphite (ALG) can support both solutions. Whether it is in the design of spacers for double-sided cooled modules, the base plates for conventional modules, or as pin fin coolers for automotive power modules - ALG is the ideal thermal management material for power module packaging. This is not only due to its low coefficient of thermal expansion and high thermal conductivity, but also its notably low density, resulting in a 75% weight saving compared to copper components. Schunk supplies Aluminium Graphite parts in customized designs.

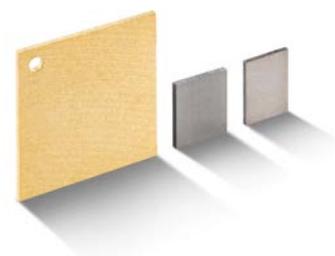
- Spacers and interposers
- Base plates and coolers
- Heat sinks and heat spreaders



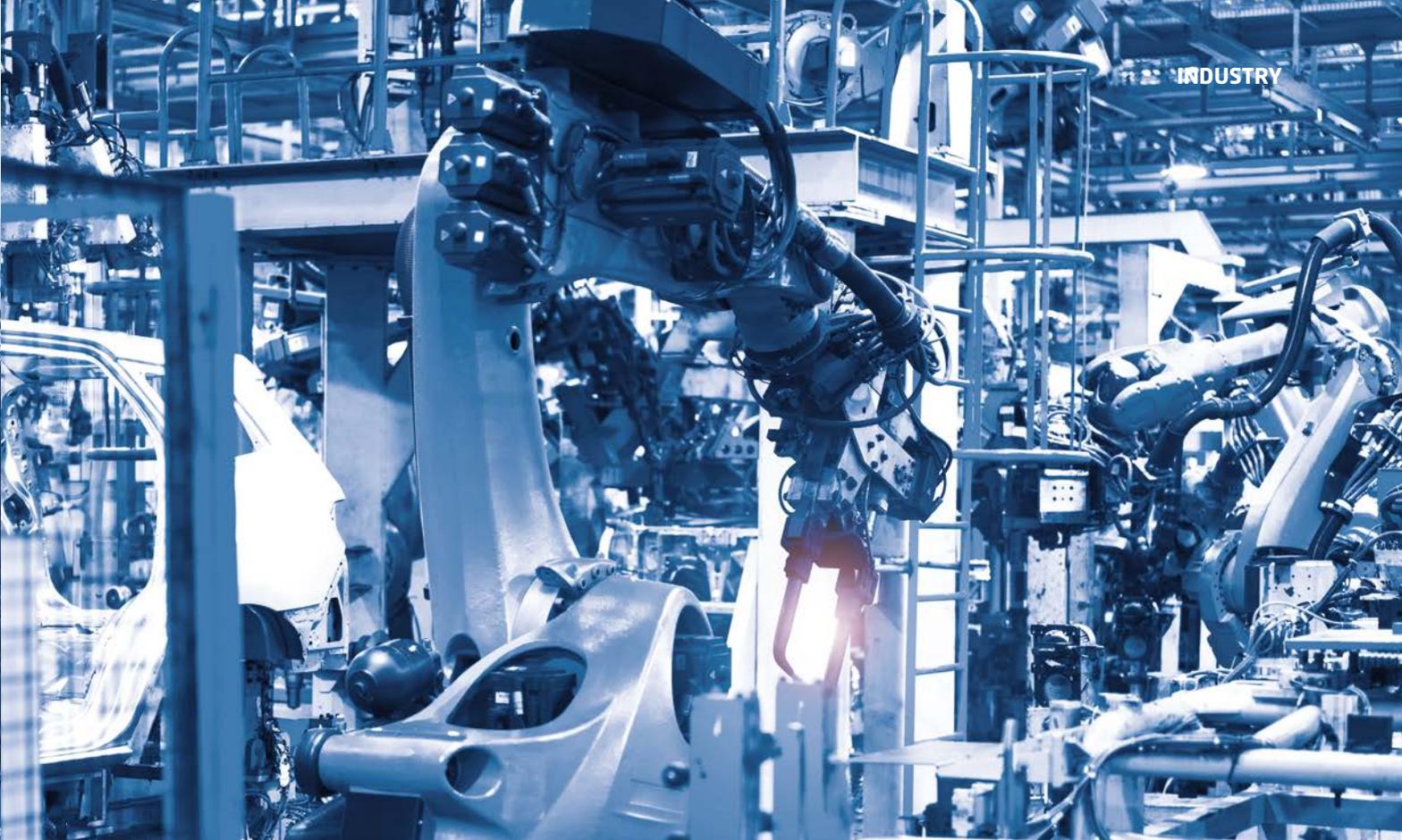
Base plates and coolers



Pin-fin coolers



Spacers and interposers



One material. Countless industrial solutions

Keep stress and tension in your systems at high temperatures to a minimum. The unique combination of material properties makes Schunk's Aluminium Graphite an ideal choice for numerous applications in a wide range of demanding environments.

The thermal expansion behaviour of Aluminium Graphite (ALG) is well matched to that of semiconductor materials. This makes it an ideal candidate for applications where heat sinks are in close contact with chips and substrates. The additional benefits of a high thermal conductivity, good mechanical strength, and the possibility to produce parts with narrow dimensional tolerances provide an added value for customers.

For instance, ALG soldering jigs and fixtures can be produced with far more sophisticated features compared to conventional graphite jigs and offer the advantage of higher durability. ALG is also a suitable contact material in semiconductor devices in place of molybdenum in disc- and module-type packages. Convince yourself and get in touch with us for possible applications, such as

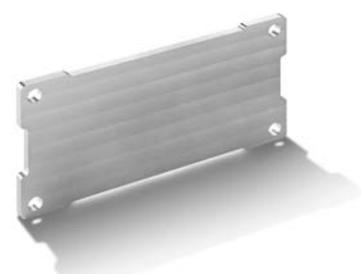
- Shims and interposers for rectifier diodes or thyristors
- Base plates for power modules
- Soldering jigs and fixtures



Soldering jigs and fixtures



Shims and interposers



Base plates

Schunk - A worldwide success

Always at your side

Schunk focuses on the development, manufacture and application of carbon and ceramic solutions. It combines an innovative spirit and technological expertise with exceptional customer service to provide a range of products and services unparalleled in the market.

With Schunk, you have a partner who can offer all the technological possibilities of an international company and implement ideas tailor-made for your needs, both for high-volume industrial markets and highly specialized niche markets.

The Schunk Group

Empowering, idea-driven, collaborative - this is how the Schunk Group has made a name for itself as a globally-active technology group since 1913.

Empowering, because we build bridges for our customers to help them develop better products and conquer new markets with innovative technologies. Idea-driven, because innovations are a significant aspect of our company culture. Collaborative, because every employee of the Schunk Group is focused on the customer.

The Schunk Group is a globally operating technology company with a global business unit structure. The company is a leading supplier of products made of high-tech materials - such as carbon, technical ceramics and sintered metal - as well as machines and systems - from environmental simulation and air conditioning to ultrasonic welding and optical machines. The Schunk Group has more than 9,500 employees in 29 countries and achieved sales of € 1.28 billion in 2018.

Schunk Carbon Technology GmbH

Au 62

4822 Bad Goisern am Hallstättersee ▸ Austria

Phone +43 6135 400 0

Fax +43 6135 400 10

E-Mail office@at.schunk-group.com

schunk-carbontechnology.com



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