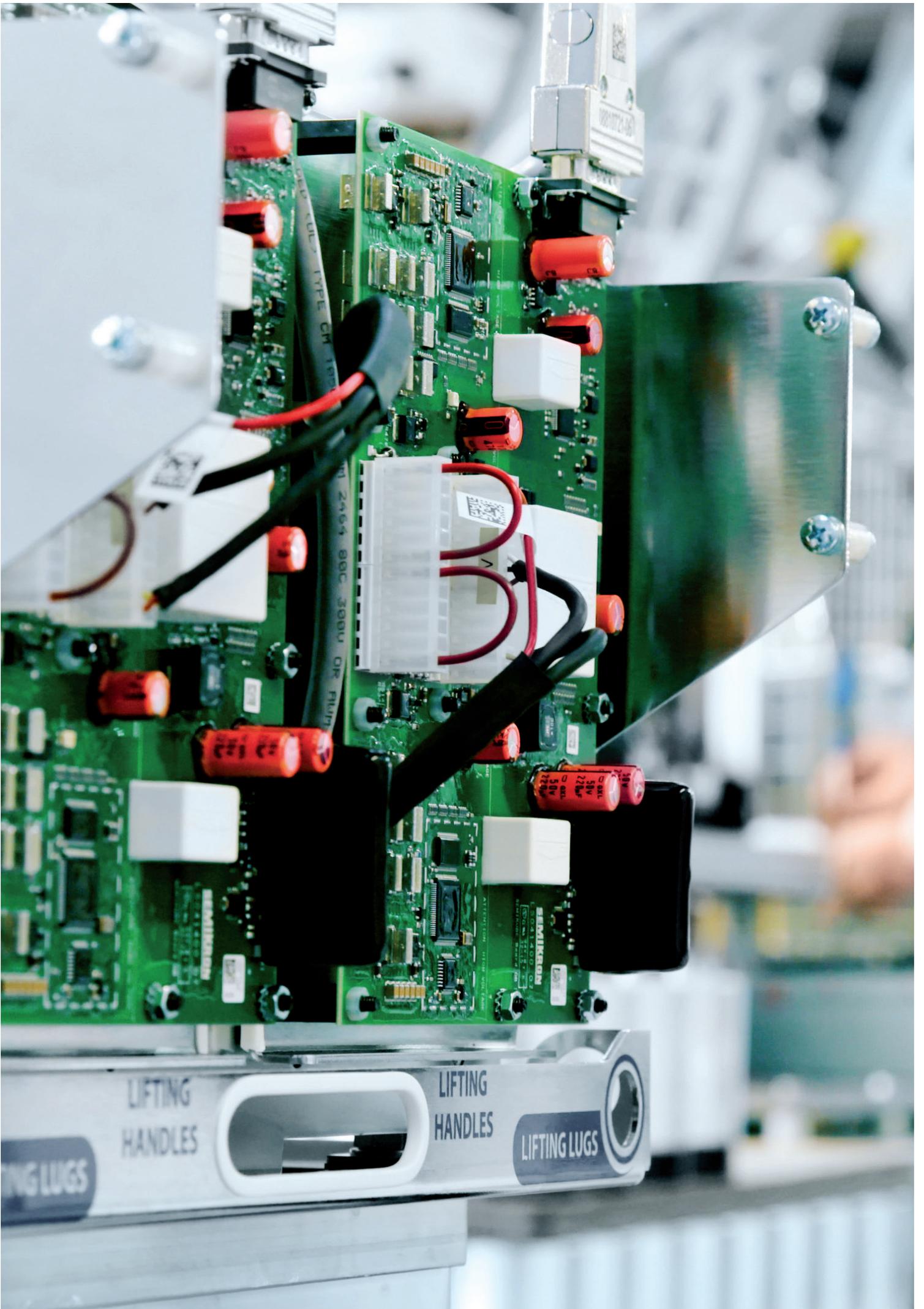


# Power Electronic Stacks

Four key factors for your success



# When Time to Market Counts



We live in highly dynamic times, in which markets evolve rapidly and competition is global. SEMIKRON's Power Electronic Stacks enable our customers to prosper in these markets and meet any challenge.

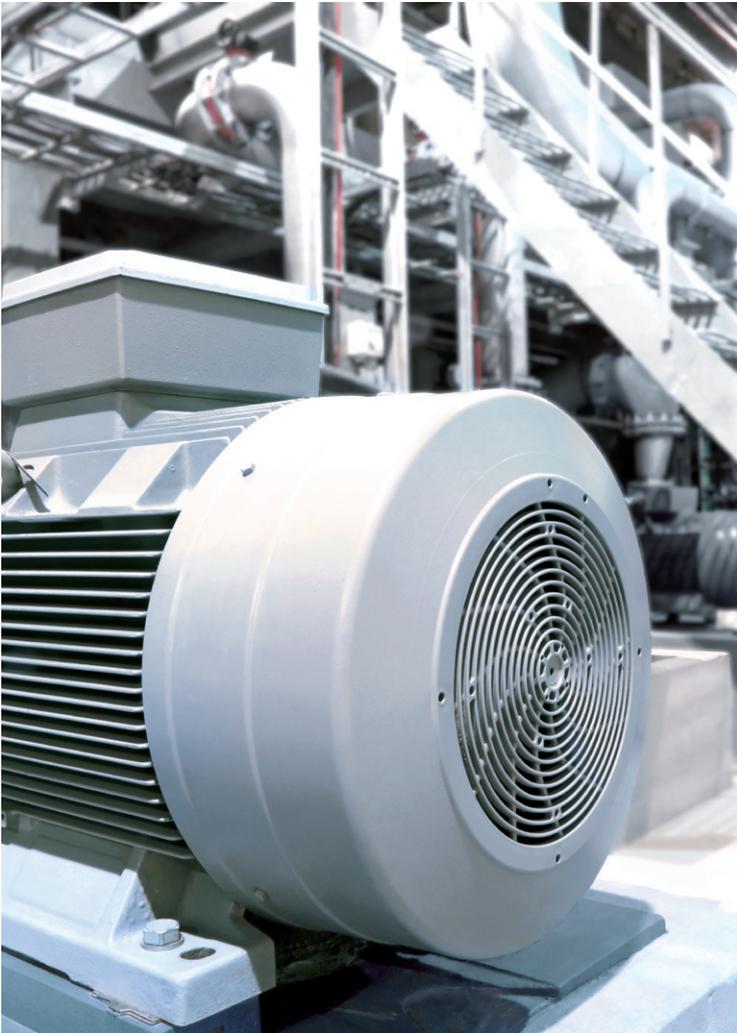
I am proud to present our comprehensive portfolio of power electronic assemblies that include the outstanding innovations we have achieved over a period of 40 years of successful stack design.

Our services are as multifaceted as our customers, highlighted by these four distinctive attributes: time to market, cost savings, global production and engineering experience. Our passion for power electronics and our commitment to high-performance design are the factors that make us your ultimate partner for value creation in the dynamic power electronics market.



“When time to market counts our customers use our state-of-the-art power converters and engineering expertise to be a step ahead of the competition when introducing new products to competitive markets...”

**Timo Gassauer**  
Product Marketing Manager



# Experience in Different Markets



With more than 100,000 stacks in the field, SEMIKRON is the global market leader for power electronic stacks. We provide stacks to the world's leading electrical industries and over the years have gained vast experience in all relevant applications, each with their own specific constraints. Our expertise ranges from mature applications, like motor drives and renewable energy, to new markets, such as energy storage and DC grids.

On account of the high rate of product innovation, these markets are highly dynamic and involve a high level of risk. SEMIKRON's all-around services for power electronic stacks enable companies to participate in these markets on time and with less risk.

SEMIKRON products are instrumental in providing energy savings through the efficient use of electrical energy.



## Motor drives

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Converters for all types of electric motors utilized in industry. SEMIKRON power electronic stacks help to maximize the efficiency in any 2- or 4-quadrant drive.



## Wind energy

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Power stacks are used in converters and in the drives controlling the blade pitch. Almost one in two wind turbines in the world is equipped with SEMIKRON power modules and stacks.



## Solar energy

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With the focus on cost and efficiency in photovoltaic systems, SEMIKRON supplies products ranging from medium power multi-string inverters to megawatt central inverters.



## Car charger stations

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EV charging based on DC transmission to the electric vehicle requires extremely powerful semiconductors. Reliable and efficient SEMIKRON power stacks are boosting the distance expansion of e-mobility.



## Energy storage

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High-performance energy storage systems are essential to ensure permanent grid stability, providing smoother integration of renewable energy sources into the grid. SEMIKRON supplies a variety of power stacks that are highly suitable for this application.



## Urban transport equipment

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Electrical transportation applications – with their cyclic operating profile and continuous auxiliary supply for several years of operation – require a high degree of reliability of the drive systems.



# Solutions for all Requirements



Power electronic stacks are assemblies that include the power semiconductor modules, gate driver, snubber capacitors, protection, DC-link capacitors and cooling.

Our product portfolio ranges from off-the-shelf platforms – with short lead times and delivered ready to install – to customized stacks with different levels of integration, from modules on heat sinks to fully integrated cabinets.



**Intelligent power modules**  
**SKiIP**



**Power electronic stacks**  
**SKiIP stack**

- Assemblies incl. power semiconductors, cooling, DC-link capacitors and protection functions
- Pre-qualified and tested stacks
- Off-the shelf and customized stacks



**Customized designs up to cabinet level**  
**SKiIP stack based cabinet**

- Assemblies incl. power semiconductors, cooling, DC-link capacitors and protection functions
- Pre-qualified and tested products
- Off-the shelf and customized stacks
- Cabinet integration
- Filter, switchgear & protection
- Precharge circuit
- If required, we recommend control hardware from partners

LEVEL OF INTEGRATION



# Product Lines



The SEMIKRON philosophy is to use proven standard platforms wherever possible, both for standardized products and customized designs. Costs and delivery times are reduced to a minimum.

Through the use of state-of-the-art technology we guarantee the highest possible performance of our power electronic stacks. The latest materials are available – such as wide-bandgap semiconductors and aluminum nitride DBC substrates – as well as special topologies, e.g. three-level or five-level inverters. SEMIKRON supplies a full range of power stacks designed to match – thanks to our dedicated engineering competency – the level of innovation that the application permits. Some of the latest examples of our stacks are based on the most recent advances in technology, enabling us to deliver the best results to our customers.

## Diode & thyristor rectifier stacks



SEMISTACK CLASSIC B6U  
SEMISTACK CLASSIC B6HK  
SEMISTACK CLASSIC B6C

## Air-cooled IGBT stacks



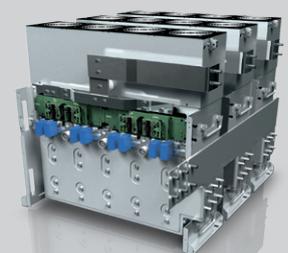
SEMIKUBE  
SEMIKUBE Slimline  
SEMIKUBE 1500V

## Water-cooled IGBT stacks



SEMISTACK RE  
SKiiPRACK

## Application-specific and customized stacks



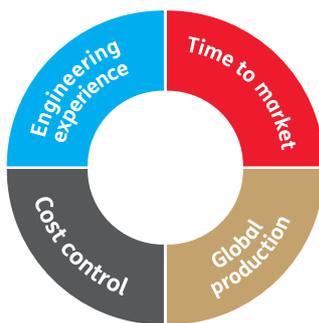
SEMISTACK application



# Four Key Factors for Your Success



The experience we have gained in over 40 years of high-performance stack design has reinforced the four essential ingredients needed for your success. In emerging markets, where new product innovation is essential, companies need to be nimble and have a fast time to market. In global markets, multiple production locations play a vital role in ensuring rapid deployment to more than one country, while also meeting local demand and building customer relationships. Quality and cost control are crucial factors in the long-term success of any project. Finally, success in highly competitive markets is underpinned by superior technical capability. All of these four prerequisites are addressed by SEMIKRON's power electronic stacks.



## Time to market

### Reduced time to market

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Quick production ramp-up

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Off-the-shelf stacks

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1,500 customized designs available

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Global after-sales service

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## Global production

### Flexible production capacity

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Global support with local service

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Five global stack production centres

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Production & test capacity for more than 50,000 stacks per year

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Contract manufacturing capability

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Quality management in accordance with ISO 9001:2008 certification

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## Cost control

### Reduced investment & costs

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Easily transferable production thanks to common testing & production processes

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Lean processes

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Certified and qualified standard stacks

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Centrally coordinated supply chain management and vendor qualification

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Standardized qualification processes and tools

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## Engineering experience

### Quality & efficiency

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State-of-the-art technology

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SEMIKRON power modules

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More than 40 years of stack design and manufacturing experience

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Experienced applications engineering team

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Customization in accordance with customers' requirements

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# Time to Market



Success in today's dynamic and fluid markets requires a fast time-to-market approach. Being late for a new product launch diminishes your impact and reduces your return on investment. SEMIKRON accompanies its clients through the entire life cycle of their products, optimizing their business model and maximizing their results.

## Reduce time

We have a huge portfolio of products consisting of more than 1,500 different stack designs that can be supplied either from stock or modified to meet your requirements.

## Maximize profit

With an annual production capacity of more than 50,000 stacks and flexible production lines we are able to ramp up production very quickly. Fast deployment and quick ramp-up are available when the market demands a quick reaction.

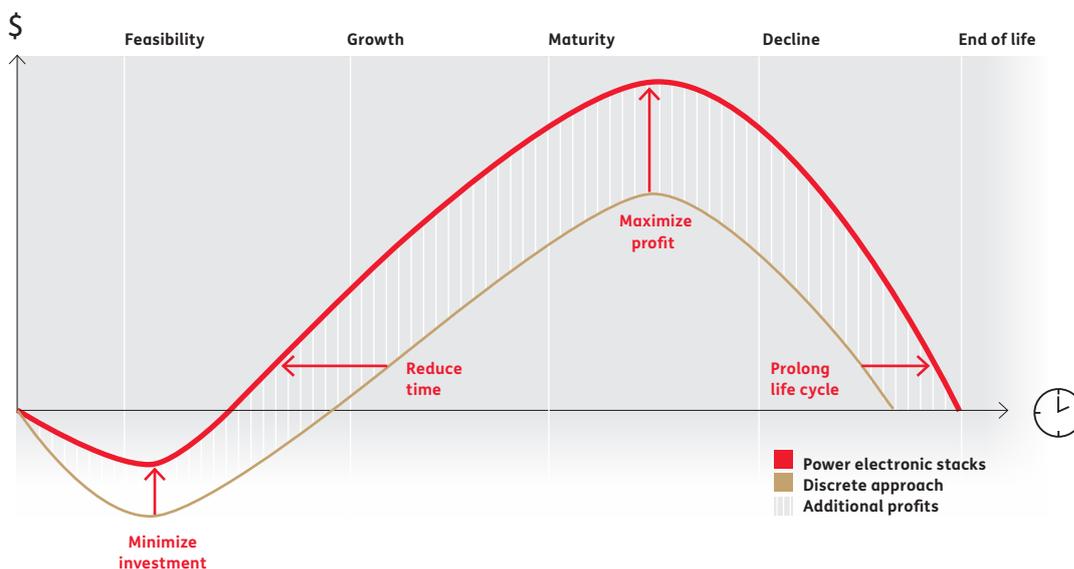
## Minimize investment & risk

Market uncertainties, production peaks and high R&D costs can diminish the attractiveness of projects. SEMIKRON helps to lower your risk with its standard products and flexible production lines while reducing the initial investment.

## Prolong life cycle

In increasingly competitive markets, we work closely with our customers on continuously optimizing the product while reducing costs to get more out of the product and prolong the product life cycle.

Impact of a fast time to market in the product life cycle



# Global Production



SEMİKRON's global stack centres were set up in order to provide our customers with local added value for the purpose of fast development, rapid deployment and reliable mass production. This unique network of stack centres, spread across four continents, provides on-site development and production support for both platforms and customized stacks.

## Production & service

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### France Sartrouville

since 1959: 6,000 m<sup>2</sup>

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### Brazil Sao Paulo

since 1963: 2,500 m<sup>2</sup>

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### USA Hudson

since 1975: 2,800 m<sup>2</sup>

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### Korea Bucheon

since 1986: 2,500 m<sup>2</sup>

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### India Mumbai

since 2001: 3,000 m<sup>2</sup>

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## Service

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### Germany Nuremberg

since 1951

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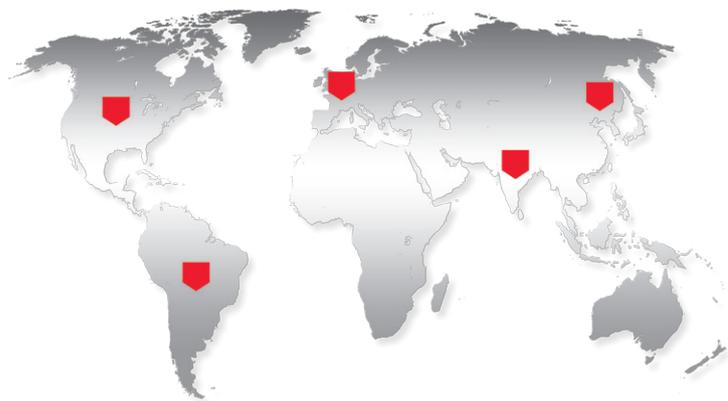
### China Zhuhai

since 2005

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We regularly exchange and transfer know-how between our stack centres and transpose local expertise into global competence. Thanks to this internal exchange of information and products, optimized, pre-qualified and field-tested stacks are available with very short lead times. Our customers profit from this exceptional experience our teams have acquired in developing our power stacks for the world-class leaders of industry.

Our contract manufacturing service supply customers who have quick ramp-up requirements for a large local or global market demand for which those customers do not have their own production resources or sufficient capacity.



# Cost Control



By purchasing power electronic stacks, companies can limit their costs and investment in resources while still maintaining full control of their system. Our lean processes and operational reliability, coupled with a globally coordinated supply chain, ensure time and cost savings with power electronic stacks throughout the life cycle of our customer's products.

## Quality

Standardized production processes and our continuous improvement policy reduce material and administrative costs. We use a centralized and validated parts database with proven and qualified vendors.

## Make or buy

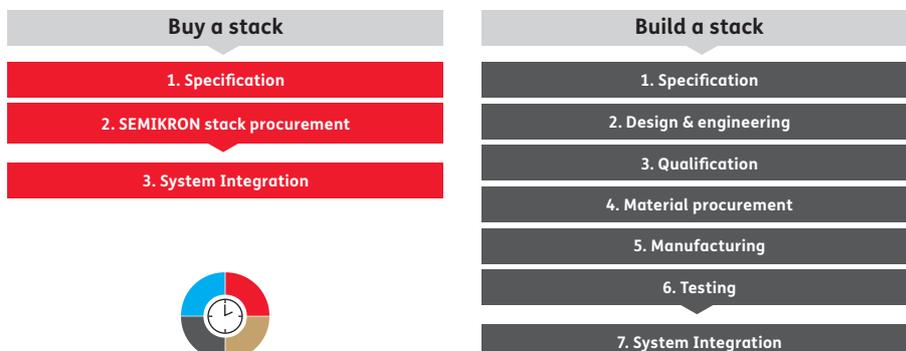
Buying a stack can reduce your investment and overhead costs through the entire life cycle of your products from the development and manufacturing phase through to testing and after-sales service. Our qualified and standardized products reduce field failures and save costs.

## Operational reliability

Every SEMISTACK design undergoes an arduous test regime in our quest for zero defect rates. A standardized qualification process guarantees a reliable product design. In addition our stack centres offer burn-in capability and custom-defined tests for enhanced levels of assurance.

## Local production

Our global stack centres comply with standardized production processes, facilitating rapid knowledge exchange between centres, while enhancing the customer's global reach and fulfilling compliance with any "local content" manufacturing requirements, eliminating the need for expensive production transfers.



# Engineering Experience



Our unparalleled experience in the stack business, coupled with direct access to our core semiconductor and driver technology, provide the most efficient and cost-effective designs to meet any requirements. Our applications engineers offer specific power solutions by adapting existing platforms or designing fully customized converters from new.

## Practical expertise

SEMIKRON has outstanding expertise in all relevant applications. SEMIKRON brings know-how in semiconductor module development and power electronic stack manufacturing together with in-depth applications know-how, making us your ultimate partner in power electronics.

## Technology

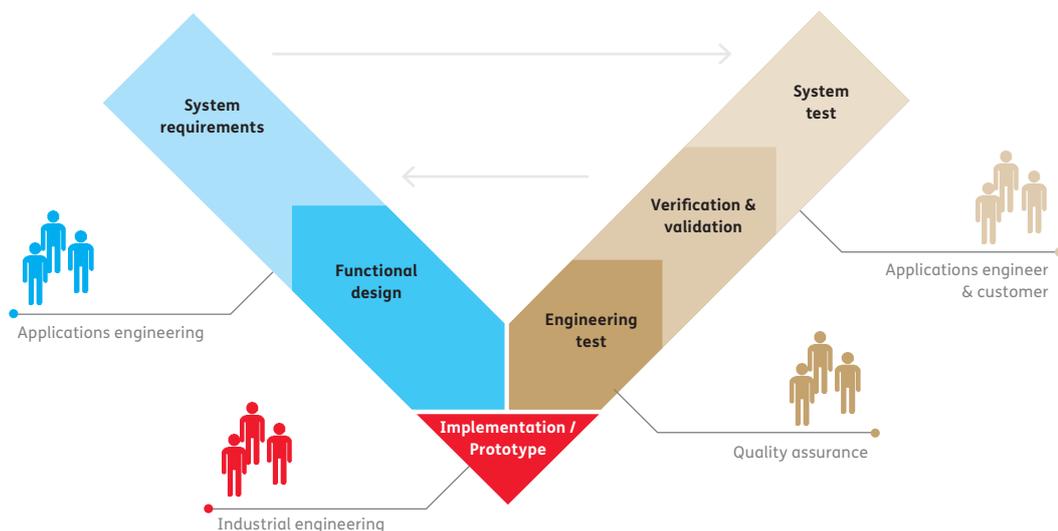
Our engineers use power stacks to evaluate new technologies, such as wide-bandgap materials and multilevel circuit topologies. This on-going experience intrinsically flows into our customer designs, contributing further to optimized design efficiency and cost. To date, we have 1,500 different designs worldwide based on the latest technologies.

## Custom designs

In addition to our range of qualified platforms, SEMIKRON also supplies custom stack designs that range from a device mounted on a heat sink through to a fully integrated stack. Starting from a basic idea or from a detailed specification, we design prototypes and series products to meet the most arduous requirements and quality standards.

## Communication

Our team of industrial and applications engineers remain in close contact with customers not only during the development process but also throughout the product life cycle to guarantee a continuous exchange of information. We are committed to delivering first-class performance in every phase of our customer relationship.



## Our global stack centres

**France Sartrouville**

since 1959: 6,000m<sup>2</sup>

**Brazil Sao Paulo**

since 1963: 2,500m<sup>2</sup>

**USA Hudson**

since 1975: 2,800m<sup>2</sup>

**Korea Bucheon**

since 1986: 2,500m<sup>2</sup>

**India Mumbai**

since 2001: 3,000m<sup>2</sup>



Welcome to the world of power electronics

[www.semikron.com/video/power-electronic-stacks](http://www.semikron.com/video/power-electronic-stacks)



### SEMIKRON INTERNATIONAL GmbH

Sigmundstrasse 200  
90431 Nuremberg, Germany  
Tel: +49 911 6559 6663  
Fax: +49 911 6559 262  
[sales@semikron.com](mailto:sales@semikron.com)

[www.semikron.com](http://www.semikron.com)  
[shop.semikron.com](http://shop.semikron.com)

