



# ENGINE SYSTEMS

FROM VISION TO SUCCESS

HIGH-END PERFORMANCE  
MADE IN AUSTRIA



As a tier-1 supplier, Pankl develops and manufactures high quality engine components and turbochargers for motorsport applications, high performance vehicles and the aerospace industry.



## 01. COMPETENCE AND CREATIVITY

Pankl Engine Systems is a global player in the challenging markets of motorsports and high performance vehicles, specializing in developing, designing, manufacturing and testing of pistons, connecting rods, crankshafts and turbocharger applications. The racing business faces challenges every day and our team meets these challenges with enthusiasm and passion. Pankl is known and appreciated for its competencies in design, development and manufacturing of lightweight engine components that are designed to operate under extreme conditions.

Our strength lies in the offer of a comprehensive package comprising of sophisticated products and extensive support. In-house R&D, engineering, production, and testing departments are available for the development of speciality products.

It is the declared goal of Pankl Racing to come up with an intelligent and complete system to suit all customer requirements. From a kick-off, through development process until the finished products, our partners have one contact person at their disposal who is in charge of the whole project, supported by a team of experts.

The result: direct, efficient project management for the benefit of the customer.



## 02. TECHNICAL SUPERIORITY

State-of-the-art equipment for production paired with the expertise of our engineers ensure to be able to comply with customers stringent quality requirements. The ongoing development of all our processes contributes to continuous product improvements and ensures our ability to provide our partners with individual, innovative solutions at all times.

## 03. PRECISION RE-DEFINED

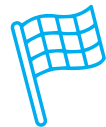


Our high-tech machine pool with its innovative manufacturing machines is the basis for premium products. State-of-the-art testing facilities for materials and our dedicated testing division ensure unsurpassed precision.





## 04. MOTORSPORT TECHNOLOGY IN ALL APPLICATION AREAS



Pankl Engine Systems specializes in connecting rods, piston assemblies and crankshafts, available as single components or as complete systems. The engineering of every component occurs in-house, from the first sketch to the FEA of the whole system.

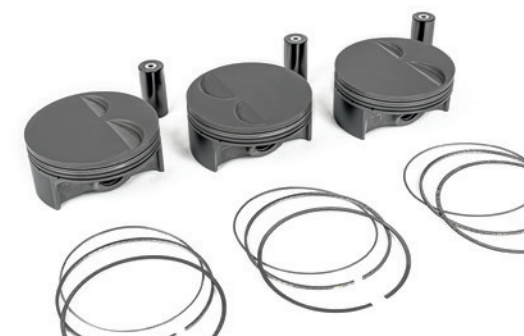
Racing components are made of high strength alloys, especially developed at Pankl Engine Systems. Racing experiences are also used for the series production of vehicles in the high performance sector.

## COMPETENCIES

TECHNOLOGY	Machining, Additive Manufacturing
PRODUCTS	Piston assemblies, Connecting Rods, Crankshafts, bolts
CERTIFICATIONS	ISO 9001, ISO 14001, IATF 16949

### Piston assemblies

Motorsport pistons out of high strength aluminum alloy.



### Connecting rods

Connecting rods out of titanium or high strength steel alloys.



### Crank mechanisms

Crank mechanism development and manufacturing as optimized product group.



### Lightweight bolts

Engine- and lightweight chassis bolts





### Electric-Assisted-Turbocharger Integrated SiC Inverter

Reducing emissions and improving performance for state of the art hybrid powertrains.



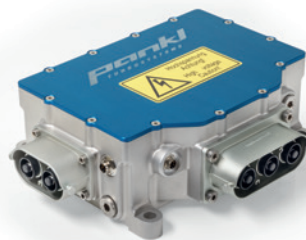
### Fuel-Cell-Air-Supply (FCAS)

FCAS for next generation high performance fuel cells from 30kW to 300kW are recognized for their weight/size ratio and are optimized for transient response and start-stop operation.



### SiC Powerelectronics for ultra high speed PMSM

Applied wide-bandgap technology improves power density and power conversion efficiency.



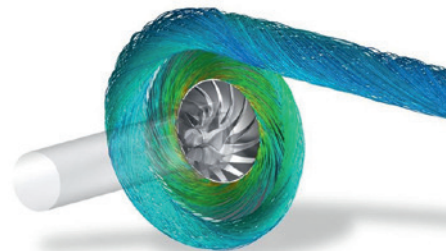
### High Performance Turbocharger

Customized high performance turbochargers for global niche markets deliver high power and less fuel consumption for gasoline, diesel and H<sub>2</sub> -ICE.



### High Efficiency Compressor and Turbine Stages Development

Increasing system efficiency of our turbomachinery.



## 08. TURBO SYSTEMS

Pankl Turbosystems GmbH is a system development partner for high-performance turbomachinery. We support the global transportation industry with our innovative charging technologies in their endeavours for sustainability and reduction of emissions.

Our highly experienced team crafts customized products which help our customers deliver more efficient and more powerful propulsion systems. Our core products are high-performance turbochargers, state of the art electric turbochargers and fuel cell air supply systems for automotive, on- and off-highway vehicles, aviation, aerospace, marine, railway and stationary applications. We are utilizing our expertise to contribute to the transition from mechanical to electrical powertrains, and we deliver our customers products from the production of first prototypes to the assembly of certified serial systems.

## COMPETENCIES

TECHNOLOGY	Ultra-high-speed electric motors, SiC Inverters, Oil-free aerodynamic bearings Low inertia rotating assemblies, Customized aerodynamic development
PRODUCTS	Electrically assisted turbochargers, high-performance turbochargers, turbo compound systems and fuel cell air supply systems
CERTIFICATIONS	ISO 9001
SERVICES	Development, Testing, Prototypes and Serial Production





## 07. QUALITY PERFORMANCE PRODUCTS

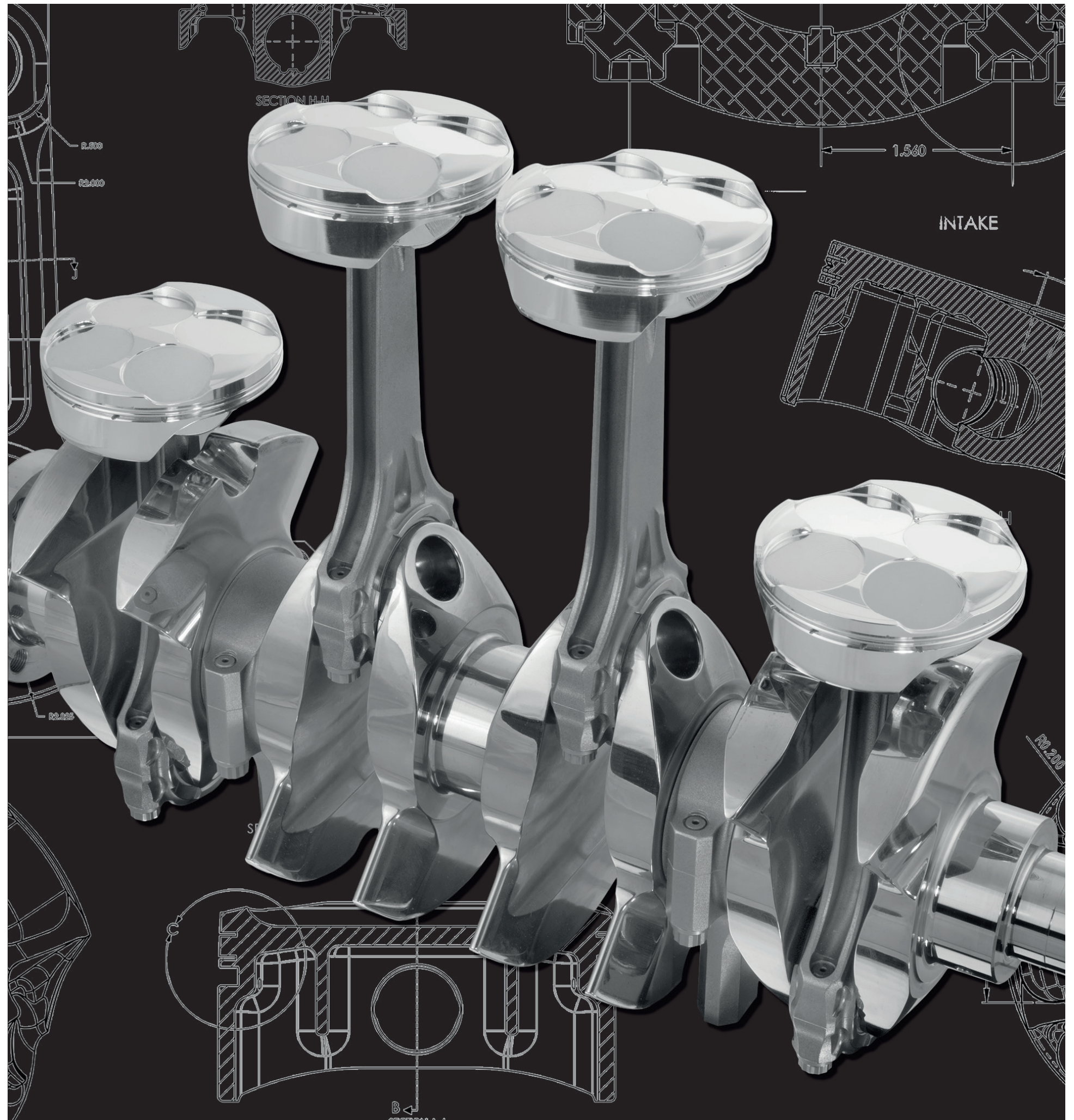
An additional focus with the goal of creating a competitive edge for our customers lies on aftermarket and tuning.

CP-Carrillo offers high quality performance products with excellent customer service. Offering both – pistons and connecting rods – is a tremendous added value for the customers.

These two pinnacle products are crafted at the headquarters and manufacturing plant in Irvine (California, USA) where cutting edge technology and traditional craftsmanship skills come together.

All products are race proven and are developed to meet the same high performance criteria and exacting tolerances that customers require of the pistons and connecting rods. CP offers the latest in quality materials and innovative technologies to maximize the performance and durability of the engine.

Another brand of CP-Carrillo is ARIAS Pistons which was founded in 1969 as a manufacturer and supplier of high performance, high quality pistons and related hardware.







## 05. LEADING INTELLIGENCE



Design,  
Construction



Calculation,  
Simulation



Materials,  
Metallurgy



Manufacturing,  
Prototype



Laboratory, Test

Apart from high strength steel and titanium alloys, other materials are also engineered, tested and manufactured for a wide range of racing series including two and four wheeled vehicles, on race tracks or off-road, as well as boats. Along with the connecting rod assemblies (including bolts), top quality piston assemblies are developed, tested and manufactured for a wide range of racing series at Pankl Engine Systems.

Production occurs completely in-house, from forging to the coating of pistons. For exclusive high-performance vehicles – cars and motorbikes – Pankl develops, tests and manufactures pistons and connecting rods made of various alloys.

## 06. TESTED QUALITY

By fine-tuning the individual components, we are able to guarantee an optimised result with regard to performance characteristics and reliability. High-tech testing and manufacturing facilities ensure the highest quality for all our products and systems, from the first sketch all the way to construction and FEA (Finite Element Analysis) of the complete system, and finally to the toughest test of all – real-life racing applications.



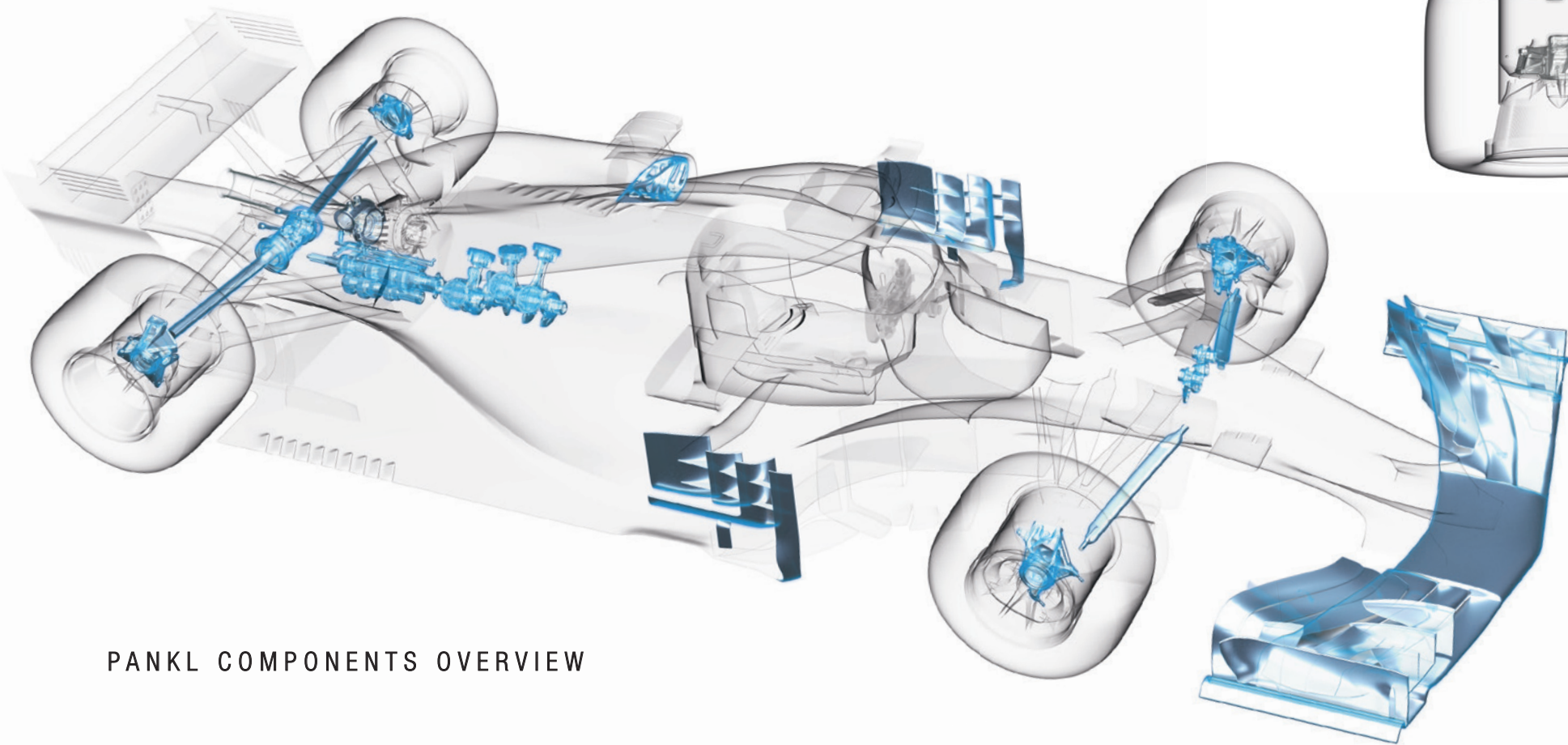
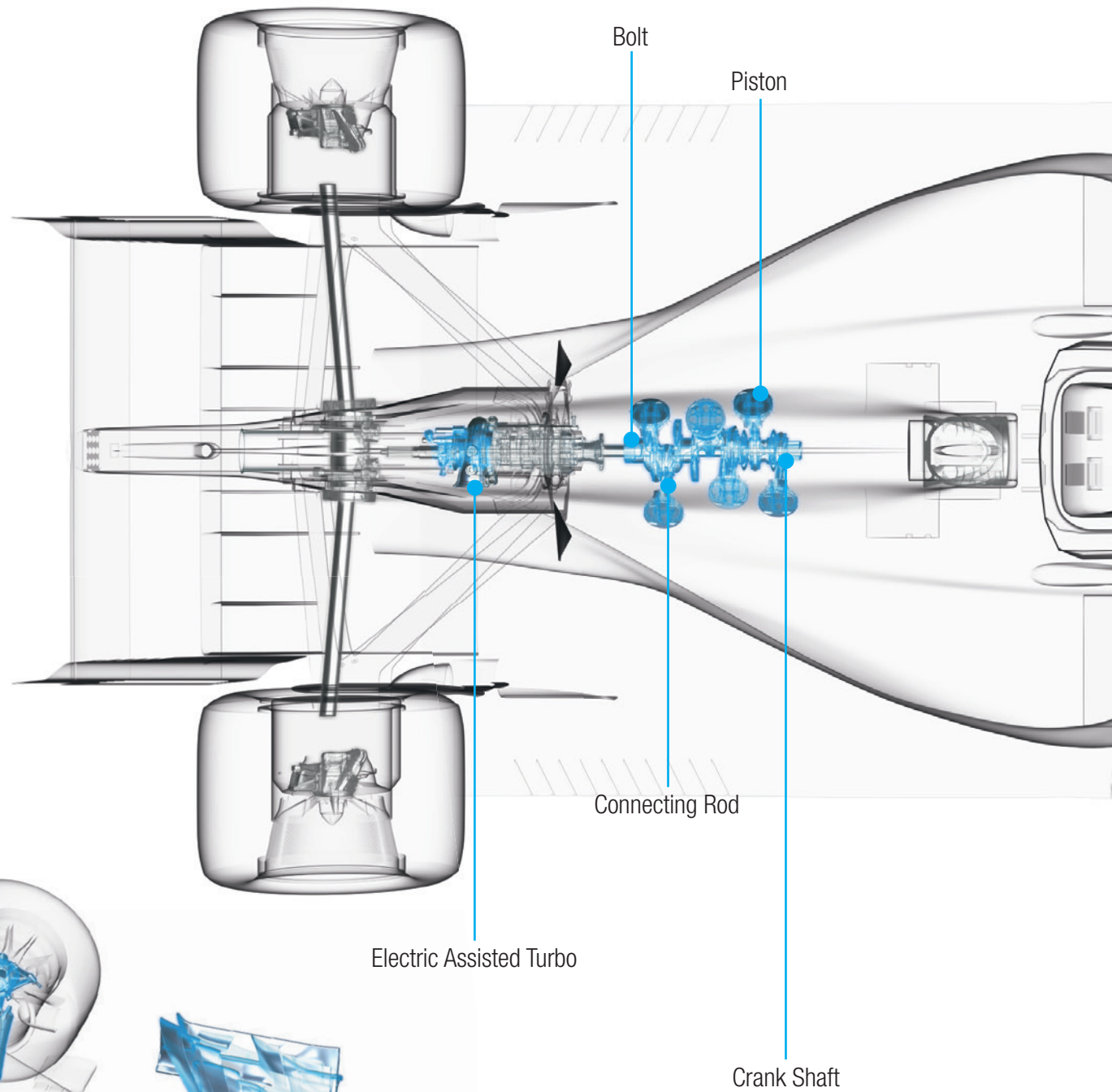


Ready to race components

Weight-optimized components

Problem-solving skills

Short delivery times



PANKL COMPONENTS OVERVIEW

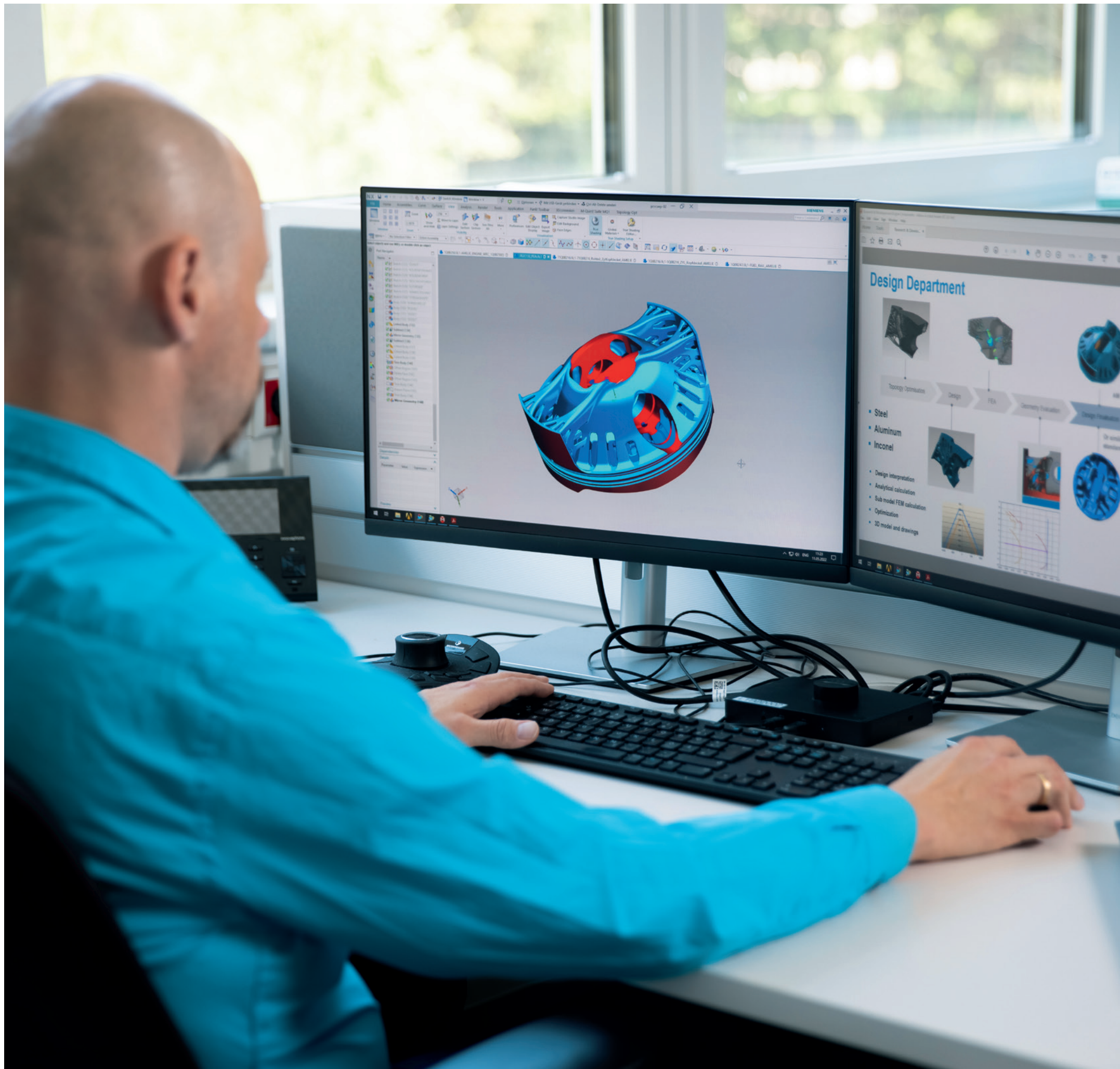




Pankl combines customer specifications, legal requirements and material characteristics creatively in order to create the perfect part design.

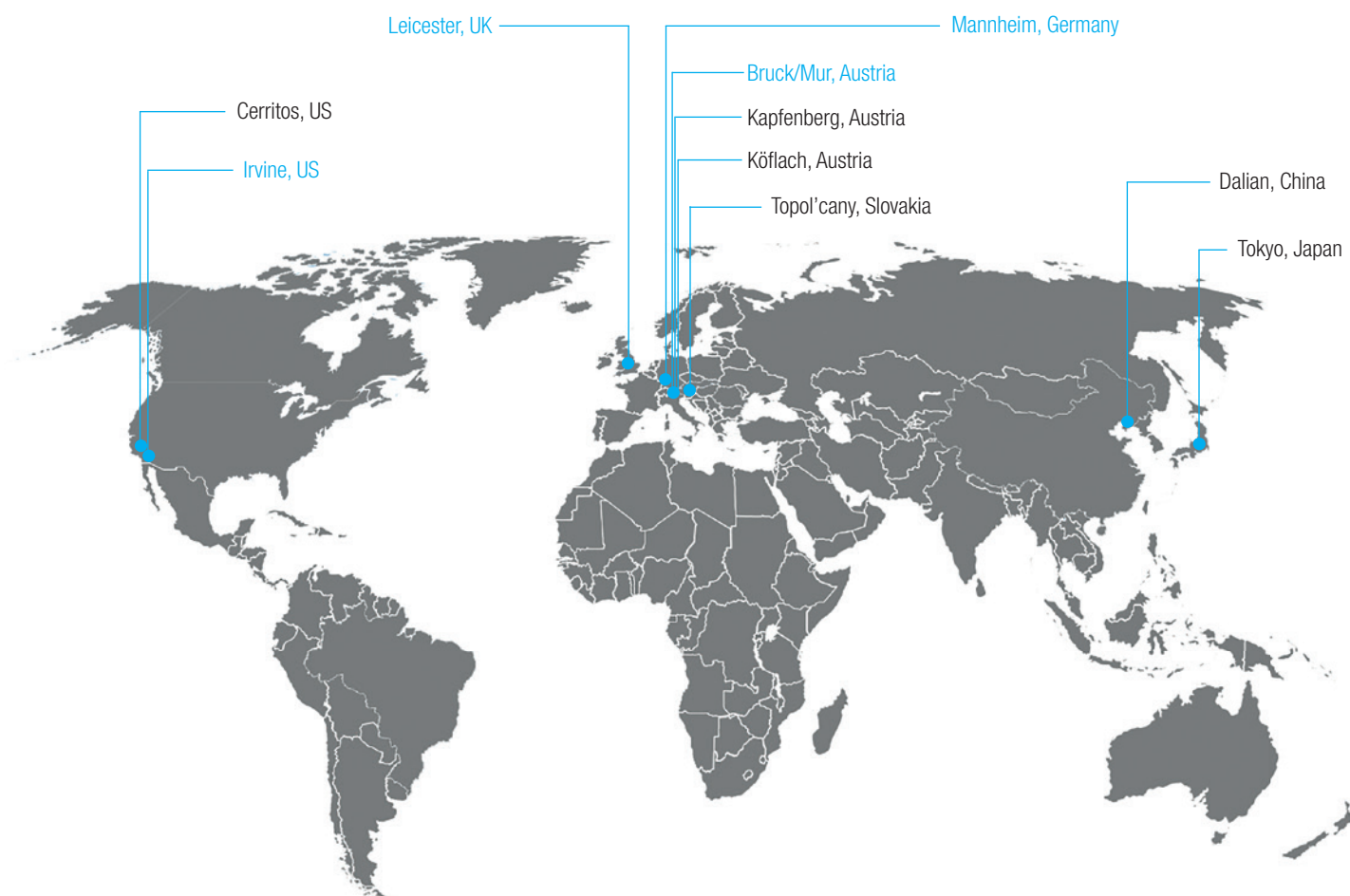
## MATURE PERFECTION

Simulation tools became more and more effective over the last years. They do not replace testing of components under real conditions, but the development time can be reduced significantly as theory and practice were becoming closer over the years. Design and choosing the best material, structural analysis for durability, Elastohydrodynamic (EHD) calculations to design parts with minimum friction power losses, Computational Fluid Dynamics (CFD) calculations to evaluate the best possible water and oil flow situation for cooling and lubrication as well as engine combustion simulation with fuel injection became more and more a standard process in the components development phase.





## PANKL LOCATIONS



A Member of the Pankl Group

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