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Pankl Research and Development

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SERVICES RESEARCH & DEVELOPMENT

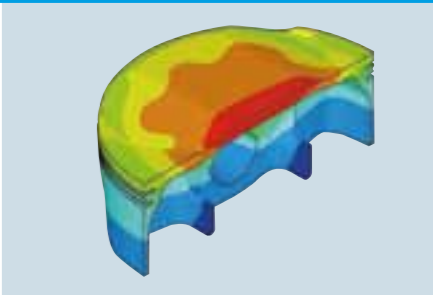
DESIGN

Many years of design experience for car industry enables Pankl to offer exceptional solutions for single components as well as for complete systems.



FEA

An essential part of the development process is the virtual simulation of the components. Internally tested methods allow the precise analysis of complete systems.



MATERIAL

Pankl offers a broad range of services from fracture investigation to surface engineering and material development.



TESTING

Pankl's portfolio of testing facilities includes the possibility to complete the development cycle and simulate realistic operating conditions.



RESEARCH & DEVELOPMENT

Driven by Performance

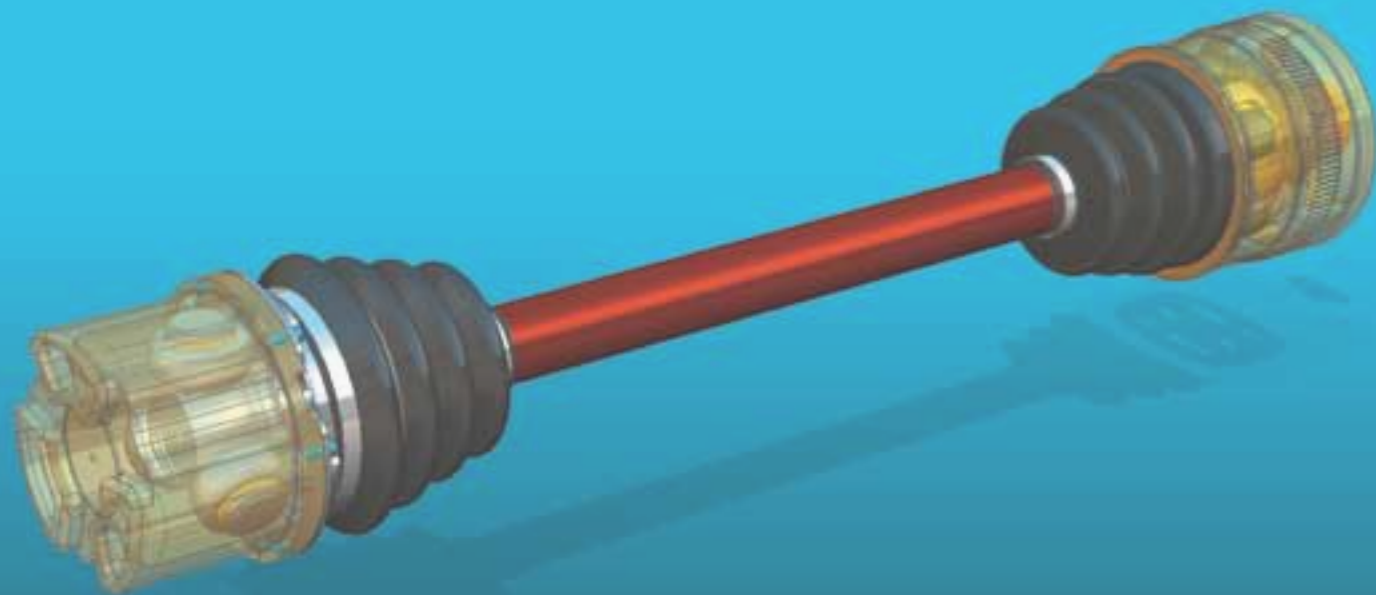
The Research & Development of every component is performed in-house, from the first sketch, FEA and material development to the testing of the complete system. Pankl's technical expertise is based on a strong team of engineers and many years of experience.

Advanced equipment combined with a highly trained and dedicated staff, enables Pankl to meet the highest standards in design, simulation and testing and to face any challenge.

Pankl is your partner for design and development of the complete crank train, charging systems, power train and suspension systems for race cars and high performance series vehicles as well as aerospace applications.



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DESIGN

FEA

DESIGN

All in One

Advanced software tools combined with a highly trained and dedicated staff, enables Pankl to meet any customer demands in terms of lightweight, low friction and reliability requirements. With sophisticated software for research and development Pankl is able to offer innovative design solutions for many products. This guarantees innovative design solutions for a huge variety of applications – from aerospace to the automotive industry.



CALCULATION

Virtual Superiority

An important part of Pankl's computer-aided engineering tools are the in-house developed simulation methods, covering various fields from FEA to CFD.

A close link between testing and virtual reality ensures a constant refinement of the complete R&D cycle in order to ensure "development very close to reality".

MATERIAL

ANALYSIS METHODS:

- NONLINEAR STATIC ANALYSIS
 - With opening contacts and friction using realistic temperature fields and elastic-plastic material behaviour
- TRANSIENT DYNAMIC ANALYSIS
 - With nonlinear contacts
- FATIGUE ANALYSIS
- MODAL ANALYSIS
- BUCKLING ANALYSIS
- EHD PISTON SKIRT ANALYSIS
- EHD BEARING ANALYSIS
- MULTI BODY ANALYSIS
- COMPUTER FLUID DYNAMIC
- METAL FORMING PROCESS
- THERMAL ANALYSIS
- FRETTING ANALYSIS
- TURBOCHARGER (TC) AERODYNAMICS
- TC STRUCTURAL
- TC ROTORDYNAMICS
- ENGINE PROCESS SIMULATION

TESTING

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MATERIAL

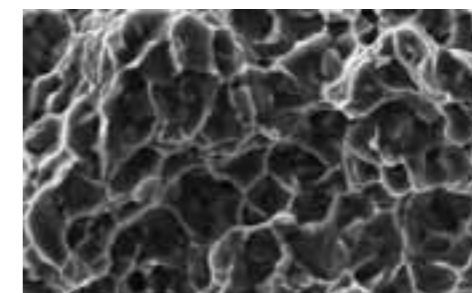
Optimized Innovation

Pankl offers a wide range of development activities. From the selection and development of innovative material solutions over tailor-made heat treatment specifications to surface improvement processes – Pankl covers all relevant techniques.

Pankl's laboratories are state-of-the-art equipped and together with the experience of the highly qualified material specialists Pankl offers detailed investigations of materials and processes.

MATERIALS & PROCESSES:

- MATERIAL DEVELOPMENT
 - Optimum choice of material out of a variety of optimized steel, titanium, aluminium alloys or CFRP
- SURFACE ENGINEERING
 - Coating developments for wear reduction, corrosion resistance and efficiency improvement
 - Shot peening processes
- HEAT TREATMENT
 - Through hardening and case hardening specifications tailor made for application
 - Heat treatment developments for steel, aluminium and titanium
- FAILURE ANALYSIS
 - Evaluation of fracture origin, diversification of ultimate vs. fatigue failure
 - Interpretation and development of corrective actions
- BOLTS
 - Compiling of bolt specifications and mounting specifications
- JOINING TECHNOLOGY
 - Development of welding processes (EBW, laser, TIG, friction welding)
 - Bonding technology (EAS – European Adhesive Specialists)
 - Riveting
- DYNAMIC BALANCING
 - Development of balancing processes for rigid and flexible rotors



LABORATORY:

- EXPERIMENTAL EQUIPMENT
 - Scanning electron microscope with EDX-analysis stereomicroscopes incl. digital documentation
 - XRF-spectrometer – detailed analysis of the chemical composition of alloys
 - Particle analyzer – counting and measuring of particles
 - Hardness test device (HB/HRC/HV incl. micro hardness)
- SPECIMEN PREPARATION AND DOCUMENTATION
 - Grinding device
 - Precision cutting saw
 - Polishing device
 - Hot mounting press
- FATIGUE TESTING MACHINES
 - High frequency pulsing machine
 - Rotating bending fatigue test bench
 - Tensile testing machines



TESTING

Better than real

Some additional important development tools are Pankl's broad range of test rigs that offer the possibility to perform very realistic verifications of drivetrain, suspension and engine components.

This enables Pankl and its customers. to further push the boundaries in regards to performance optimization, friction reduction as well as endurance behaviour in their field of expertise.

TEST STANDS:

ENGINE TEST STANDS

- Full load curve, part load map, engine characteristic map, exhaust measuring system (AMS)
- CO₂ measurement at air inlet for EGR
- Pressure indication (cylinder, air inlet/outlet)
- Durability test, circle simulation
- LCF, HCF (low, high cycle fatigue)
- Smoke meter
- Acoustical and vibration, shaft motion
- Special test set-ups (e.g. air inlet with air box)



GAS STANDS

- Thermodynamic measurement (compressor-, turbine-map, surge-, choke-line)
- Oil flow measurement internal, external
- Durability test, circle simulation
- Special test set-ups (e.g. air inlet with air box)
- Closed loop system
- Battery simulator
- T3-upgrade



TEST STANDS:

FULLY DYNAMIC DRIVETRAIN RIG

- Replay real track data
- Speed
- Torque
- Wheel Travel
- Steering angle/camber
- Grease development and comparisons
- Endurance testing identical to racetrack
- IR-heat monitoring and efficiency testing



PROPSHAFT TEST RIG

- Temperature controlled dynamic load test
- Bonding tests at elevated temperatures
- Fatigue tests on couplings



SWIVEL TEST RIG

- Gearbox lubrication tests
- Run-in tests on bearing units
- Efficiency testing on wheel bearings

HIGH-FREQUENCY TORSIONAL PULSE RIG

- Pre-stressing of components to increase UTS
- Rainflow based pulsing with alternating mid-load levels
- Mechanical property analysis of materials
- Pulsing of complete assemblies

HIGH FREQUENCY AXIAL PULSE-RIG

- Mechanical property analysis of materials
- Axial fatigue tests



PANKL RACING

PANKL HIGH PERFORMANCE

PANKL AEROSPACE

ENGINE



Pankl Engine Systems specialises in developing, designing, manufacturing and testing crank mechanisms, pistons, pins, conrods and crankshafts for racing engines.

engine@pankl.com

DRIVETRAIN



Pankl Drivetrain Systems specialises in developing, designing, manufacturing and testing drivetrain components and offers its customers complete drivetrain and suspension systems.

drivetrain@pankl.com

HIGH PERFORMANCE



Pankl develops and manufactures drivetrain and engine components for exclusive vehicles, engine parts for the aftermarket as well as high performance aluminium forged parts.

highperformance@pankl.com

AEROSPACE



Pankl Aerospace serves the global aerospace market as a Tier One Supplier for drivetrain components, refuelling tubes and landing gear components for helicopters and fixed wing aircraft.

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PANKL WORLDWIDE

World of Perfection

Pankl Racing Systems, based in Bruck/Mur, Austria, specialises in developing and manufacturing engine and drivetrain components for racing cars, high performance vehicles and the aerospace industry. Pankl scores with lightweight components made from high-grade innovative materials designed to withstand extreme mechanical stress. Pankl is a global niche player with worldwide subsidiaries in Austria, Germany, UK, USA, Slovakia and Japan.

