

## ENGINEERING SERVICES

**PUNCH Powerglide Technical Center employs more than hundred experts, project managers, engineers and technicians experienced in transmission research and development, product integration and technical services.**

**Located in the immediate vicinity of the production plant in Strasbourg, it takes advantage of maximized synergies between multidisciplinary resources and maintains a close engineering relationship with Automotive manufacturers and suppliers around the world.**

### YOUR NEEDS

- **Consulting and assistance** (project management, problem solving, quality support)
- Technical support for **mechanical and hydraulic** systems
- **Innovating new concepts**
- **Design, calculation and simulation**
- **Software and calibration** methods
- **Engineering requirements** and **test system services**
- Expertise in **noise and vibration**
- **Materials** characterization
- Three-dimensional **measurements**
- Selection and optimization of **manufacturing processes**

#### **PUNCH Powerglide Strasbourg SAS**

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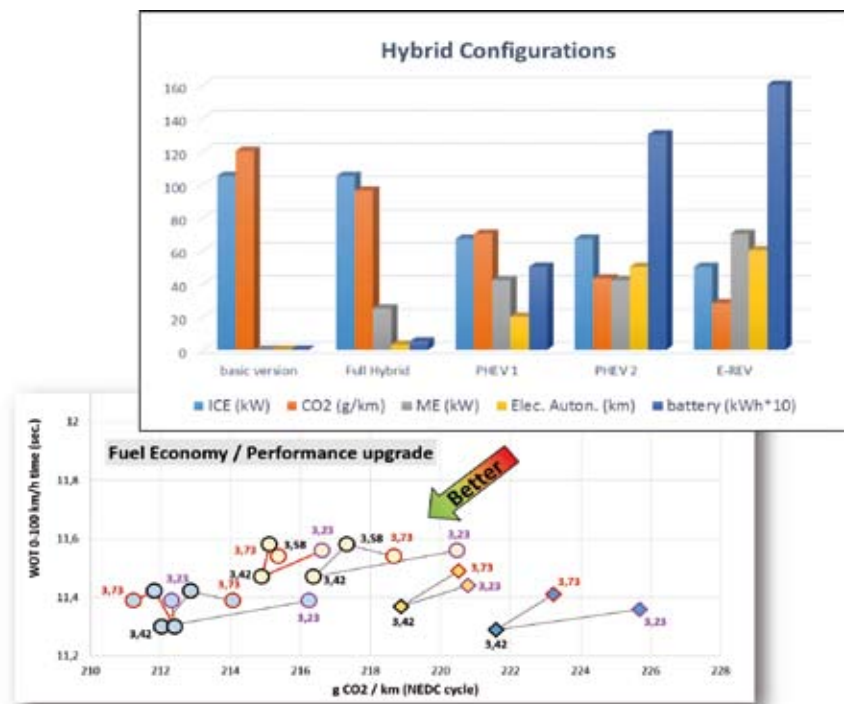
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## CONSULTING AND PROJECT MANAGEMENT

Our engineers can support your projects as project managers or consultants throughout the development cycle by providing their expertise:

*“We support your Projects and Innovations”*

- Technical support in design and innovation
- Project management, multi-expertise coordination, design of experiments, trade-off studies, product engineering quality support
- Failure modes analysis (FMEA)
- Duty cycle analysis based on reliability assessment
- Validation plan definition



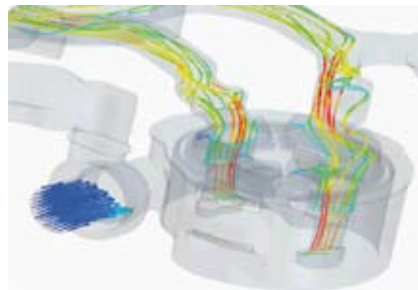
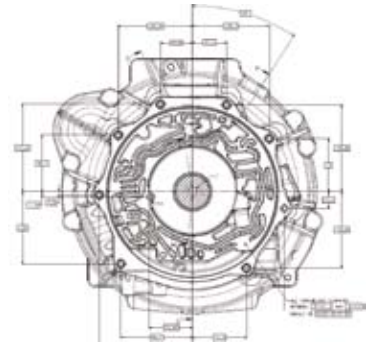
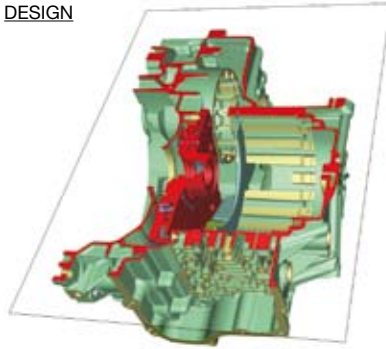
## DESIGN AND ANALYSIS

In close cooperation with our customers and suppliers, PUNCH Powerglide develops and optimizes parts and systems using modern CAE-supported approaches. Our quality and cost-oriented engineering is supported by a wide range of simulation tools:

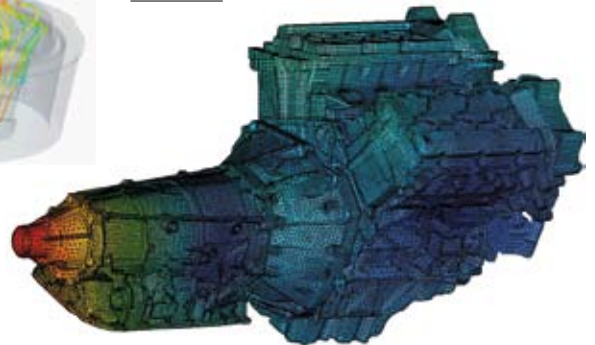
*“We optimize and design your Systems”*

- Design and optimization of mechanical parts (machined, forged, stamped, aluminum die cast) and assemblies – Thermal analysis – Dynamic conditions – Fatigue life prediction
- Dimensioning, design and manufacturing of gears and splines
- Hydraulic system, mechatronic, pump dimensioning, sealing analysis

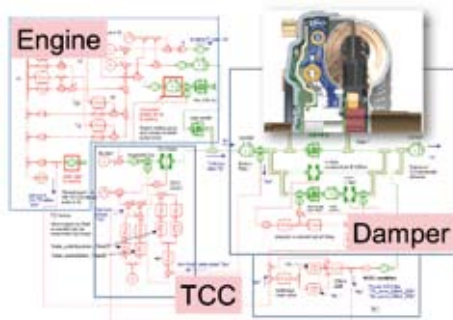
DESIGN



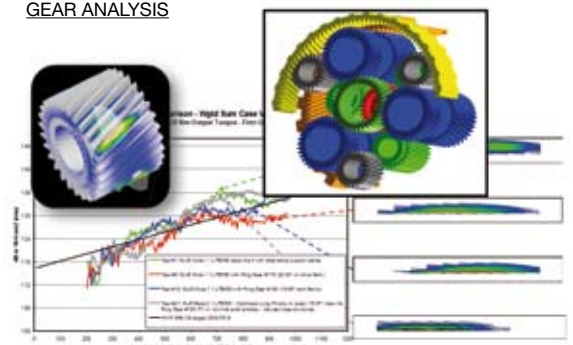
FEM / CFD



1D-SYSTEM SIMULATIONS



GEAR ANALYSIS



## SOFTWARE AND CALIBRATION

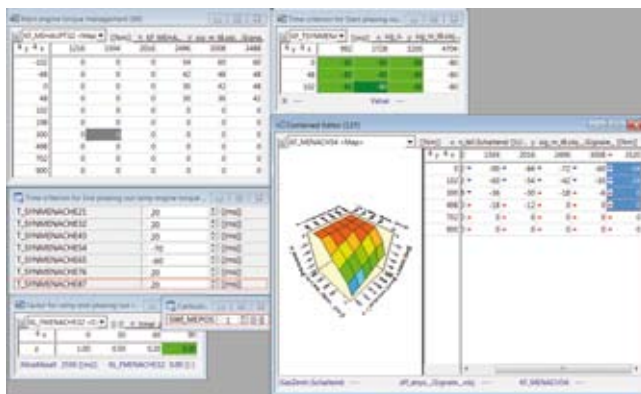
In the specific area of automatic transmission, our calibration expertise consists in setting the parameters of the electronic control unit.

The targets are to:

- Find the best driveability compromise for each driving mode: Economy, Sport & Manual Mode.
- Ensure optimal shift quality.
- Provide the optimal vehicle performance by finding the best match between the engine and the gearbox.
- Reduce fuel consumption and test emissions.

***“We find the best Driveability (Calibration audit)”***

Our “Electronic, Controls & Software” group plays a key role in the Automotive Innovation Sector where performance, real time and functional safety requirements can be very challenging. This group is in charge of the embedded software development for automatic transmissions, throughout the complete software life cycle, from the customer requirements to the final customer software delivery, covering the complete range of software specialties:



- Platform experts for the On-Vehicle communication: CAN, KWP, AUTOSAR, ...
- Experts for the Off-Vehicle communication: Flash Programming, UDS, ...
- Algorithm development for the transmission control using C code, Matlab/Simulink, ...
- Diagnostics (DSPACE / HIL benches in use)
- Functional Safety : ISO 26262





## TEST FACILITIES

We propose a wide range of universal benches and testing procedures for development activities, functional and validation tests.



### Component Test Benches

- 3 spin rigs (without load)
- 2 hydraulic test bench (cycling with pressure regulation, heat and cold chamber)
- 1 Hydraulic pump test bench
- 1 Transmission climate chamber
- 1 Valve body cycling bench
- 1 Torsional test bench

*“We test and validate your Prototypes”*

In addition, we have one climate chamber (54m<sup>3</sup> from -40°C to +50°C) for testing a complete vehicle system and one roller test bench dedicated to diagnostic tests on RWD vehicles.

### Garage and Tool Rooms

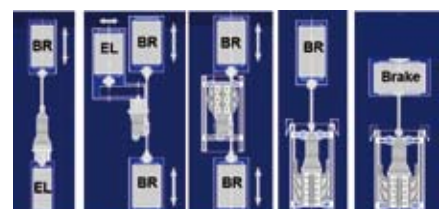
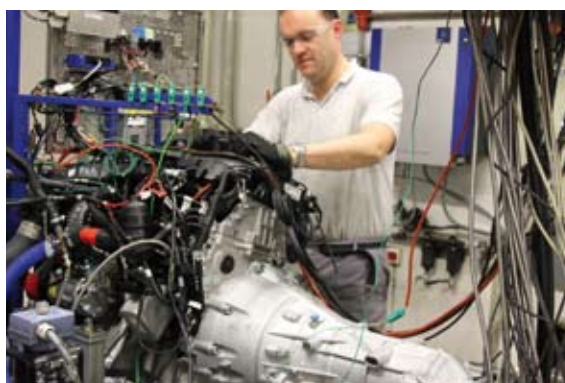
- 15 hoists ( 3.5 T and 4 T)
- 4 private bays
- About 30 work stations for: prototype assembling, tear-down and upgrading, end of test analysis



### 8 Dynamometer Test Benches:

- Two electrical dynamometer test benches, one for FWD and one for RWD transmissions. These benches have also manual transmission test capabilities.
- Two dynamometer test benches equipped with two electrical engines for **FWD transmission testing (gas/diesel engine)**.
- Four dynamometer test benches equipped with a single electrical engine, used for **RWD transmission and gas/diesel engine testing**.

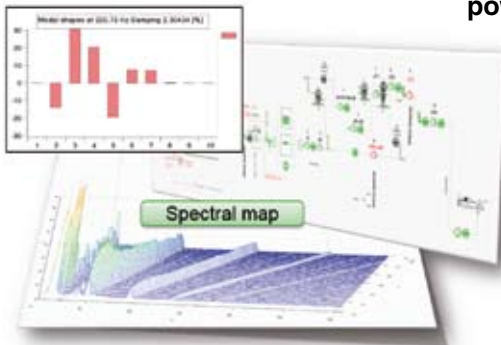
These benches are also fitted with fuel consumption measuring systems. All test benches are driven by the PUMA software, equipped with a vibration analysis tool (Reilhofer) and a communication software (INCA).



## LABORATORIES

### Noise and Vibration Laboratory

Our scope of work includes from N&V benchmark and measurements, on vehicles, on benches (electric/dynamometric), frequency domain analysis, experimental modal analysis, rotary machine expertise, torsional vibration analysis, sound intensity measurement, sound power calculation,...



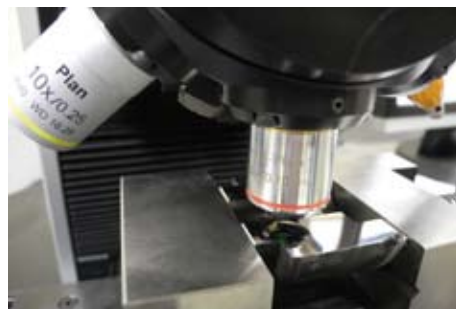
**NVH facilities include:**

- 5 NVH dedicated acquisition systems from LMS & Müller-BBM suppliers (up to 34 measurement channels, high frequency speed acquisition,..)
- More than 150 sensors: accelerometers, microphones, intensity probe, optical & magnetic speed sensors, acoustic head, shaker, impact hammer, pressure sensors, CAN reader,...

*“We measure and analyse your Products”*

### Instrumentation Laboratory

- The instrumentation group is responsible for all activities and tasks dedicated to the periodic control of all measuring equipment (temperature, pressure, flow, voltage, frequency...).

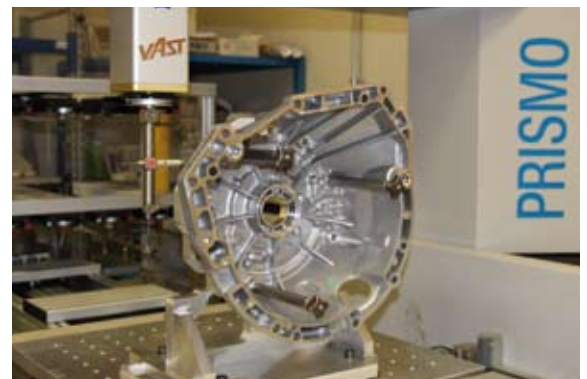
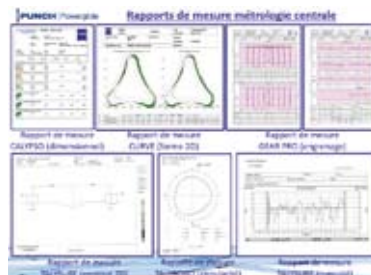


### Material Laboratory

- Hardness measurements, tensile tests
- Metallurgical spark spectrometer
- Chemical Analysis: ICP spectrophotometry

### Metrology Laboratory

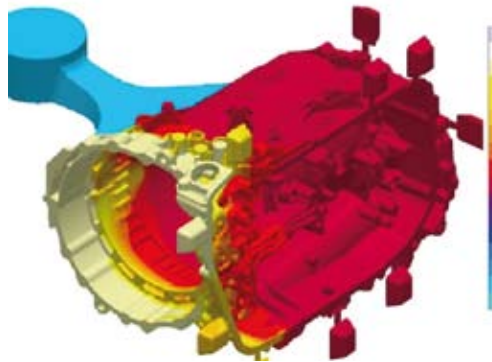
- Dimensional measurements, measure of shape, contour, roughness
- Use of 4 Zeiss 3D machine and a modern range of equipment.



## MANUFACTURING ENGINEERING PROCESS

### Aluminum Die Cast Process

We can help to improve your aluminum die cast process by performing simulations of injection using Magmasoft®.



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***“We support your Manufacturing Integration”***

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### Lean Manufacturing

**Manufacturing implementation requires experience and realistic expectation. Based on success stories with simultaneous engineering and lean, our manufacturing process engineers can support your own manufacturing integration:**

- Perform an audit to identify opportunities for improvement.
- Improve / redesign your processes using Lean tools.
- Accompany in your change (autonomous teams, Team Leader, performance facilitation...).
- Provide visible spot performance improvements thanks to Lean workshops.



**Durability** **Design for Six Sigma**  
Finite Element Modeling **Efficiency**  
**System Dynamics** Validation Tests  
Die Cast Injection Noise Vibration Harshness  
Software and Calibration **DFMEA** Duty Cycle Definition  
Hybrids **Design Optimization**  
**Research & Development** Fluid Dynamics  
**Test Facilities** Gear Design Fuel Economy  
**Powertrain** **Lean Manufacturing**  
Manufacturing Process **Product Engineering**

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***You can take advantage of our expertise!  
With Punch Powerglide...***

***“Boost your power”***

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