



# Project Engineering Group Engineering Services 2017

**Quality Engineering**

Light Metal Casting

Industrial Engineering

Quality Planing

**Process Engineering**

Casting suited component geometry

IATF 16949

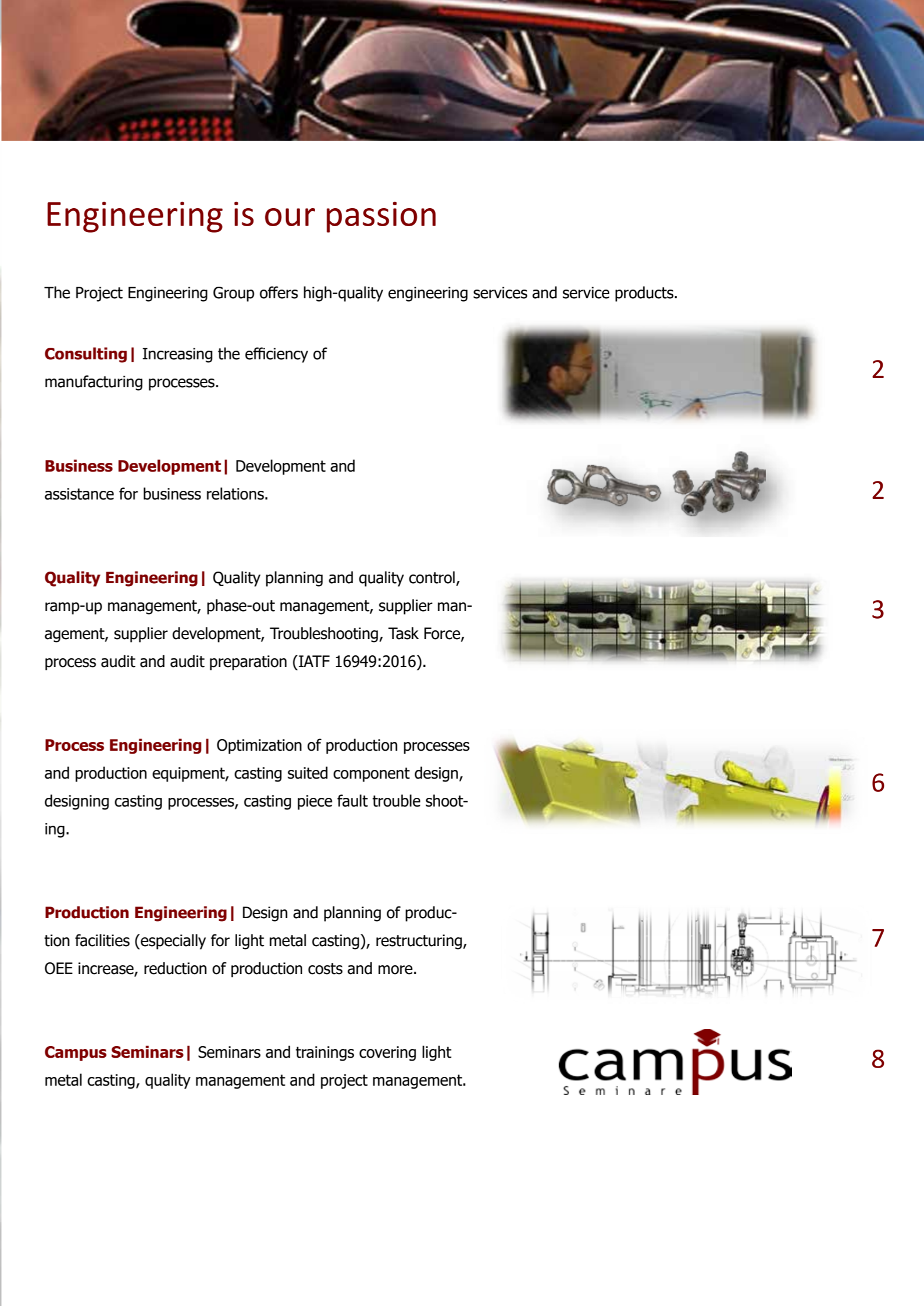
**Production Engineering**

Supplier Management

QM-System

Proces Audit

**Seminars & Workshops**



## Engineering is our passion

The Project Engineering Group offers high-quality engineering services and service products.

**Consulting** | Increasing the efficiency of manufacturing processes.



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**Business Development** | Development and assistance for business relations.



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**Quality Engineering** | Quality planning and quality control, ramp-up management, phase-out management, supplier management, supplier development, Troubleshooting, Task Force, process audit and audit preparation (IATF 16949:2016).



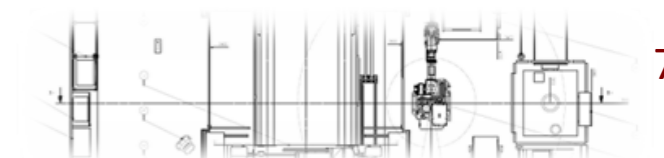
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**Process Engineering** | Optimization of production processes and production equipment, casting suited component design, designing casting processes, casting piece fault troubleshooting.



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**Production Engineering** | Design and planning of production facilities (especially for light metal casting), restructuring, OEE increase, reduction of production costs and more.



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**Campus Seminars** | Seminars and trainings covering light metal casting, quality management and project management.

**campus**  
Seminare

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## Consulting

**Productivity focused consulting** | Analyzing your structure of production and / or production processes with the intent to develop activities for productivity increase.

**Light metal casting related consulting** | Use our light metal casting know-how for your project. We identify the best casting process for your component under consideration of producibility and production costs.

**Verifying your project** | We are available as a „sounding board“ for your project team and perform project reviews as an independent partner. This can lead to important additional information or be a confirmation of the actual project plan.

**Workshops** | Workshops are an efficient way to support projects such as workshops considering OEE-increase, reduction of cycle time, restructuring of production lines, reduction of production costs, increase efficiency of the QM-System, reduction of scrap rates and casting suited component design.

## Business Development



Are you aiming to attract German and European OEM as customers for your products?  
We know the culture and rules of OEM's and can support you efficiently!

- We act as your German or European representative,
- establish and maintain contacts with potential customers,
- act as local contact for your customers,
- support you and your employees in the various project phases,
- train your employees in the customer processes and behaviors,
- support you in qualifying your company as an approved supplier.

## Quality Engineering

Designing your quality management system as well as supporting you by operative quality management is our business. Especially for casted parts we offer extensive know-how.

**Quality planning, ramp-up management and phase-out management** | Operative quality management during product development process, serial production up to EOP (End-Of-Production).

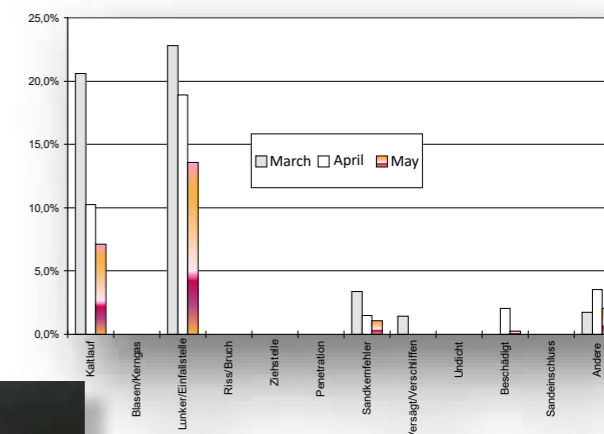
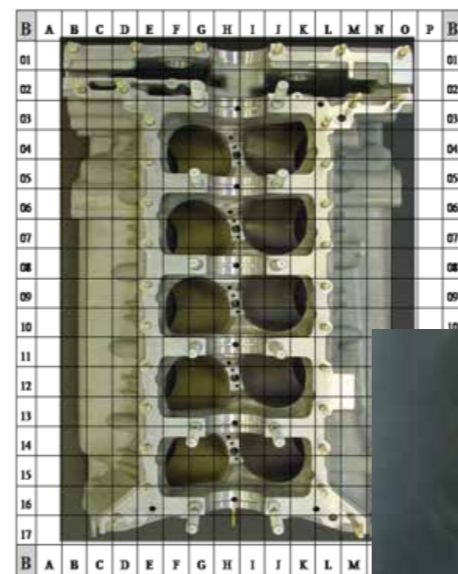
**Supplier management and supplier development** | Supporting your supplier to effectively close quality gaps and reach satisfying shipment rates.

**Task force** | Intensive on site project management to overcome critical technical situations.

**Audit** | Execution of process audits and audit-preparation (ISO TS 16949:2009 & IATF 16949:2016).

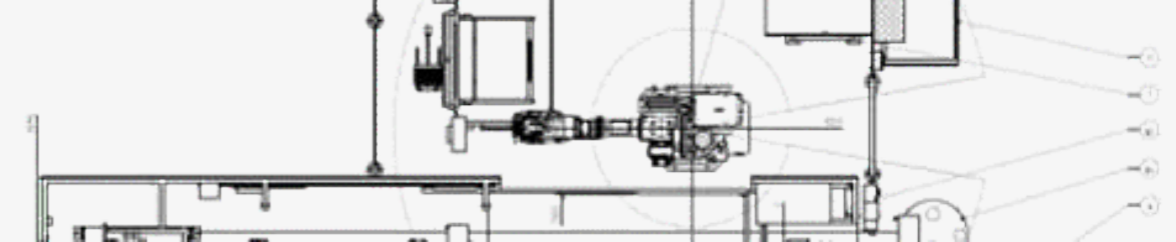
**Quality management system** | Consulting, designing and optimization of QM-systems regarding international revisions in particular ISO 9001:2015 and IATF 16949:2016.

**Training** | Seminars focusing on Quality Engineering.





Experience the fascination of die casting  
at our seminar „Light Metal Die Casting - in practice“.



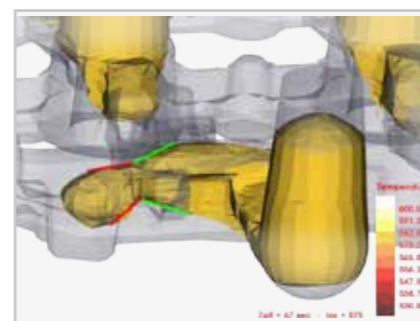
## Process Engineering

We support you in projects related to improvement of production processes. Our focus is on light metal casting and subsequent processes.

**Optimization of production processes and production equipment** | Increasing output, improvement of product quality, reduction of scrap rates, improvement of process repeatability, reduction of production costs, the increase of plant OEE and related topics.

**Casting suited component design** | We support your component development by early reviews of the component geometry with consideration of casting suitability, such as:

- Temperature field analysis
- Determine the casting position (position of the component in the mold)
- Development of the casting system (mold filling and feeding)
- Casting suitable optimization of the component geometry by carrying out mold filling and solidification simulation
- Reporting



**Developing casting processes** | We plan your casting process, beginning by checking the geometry of the component up to supporting your production staff during implementation and ramp up.

- Temperature field analysis
- Determine the casting position (position of the component in the mold)
- Development of the casting system (mold filling and feeding)
- Conceptual design of the mold and consulting the mold manufacturer under consideration of casting suitable design
- Supporting your production staff during ramp up

**Casting defect trouble-shooting** | We analyze casting processes and casting defects with special tools and high grade expertise to define adequate countermeasures. PE effectively manages this topic by running own casting simulation software. It allows us to perform in house temperature field, mold filling and solidification analysis.

## Production Engineering

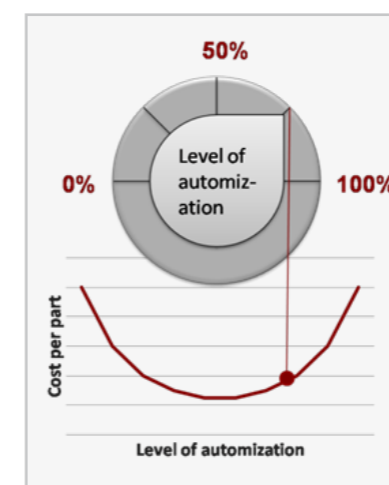
**Planning and design of production facilities** | With focus on automotive light metal casting and subsequent processes. We have extensive knowledge of tools, industrial processes and furthermore a wealth of manufacturing experience. The lowest possible manufacturing costs while maintaining the required component properties is a priority.

**Optimization of production structures** | Productivity gain, overall plant efficiency (OEE), reduction of manufacturing costs, capacity extension, restructuring.

**Relocations** | Planning of relocations with a sound of industrial engineering and QM expertise.

**Workshops** | Workshops are a very efficient kind of support projects such as workshops considering OEE-increase, reduction of cycle time, restructuring of production lines, reduction of production costs, increase efficiency of the production-system, reduction of scrap rates and casting suited component design.

**Sounding Board** | We are available as a „sounding board“ for your project team such as for project reviews. The customer identifies - short term - important additional information and/or gets a second opinion provided by an independent partner.



### Reduced production cost

- Cost effective foundry planning (with real world figures)
- Cost calculation based on existing system



- High-quality seminar papers
- in German and English - other languages on request
- bound as a technical book



Project Engineering offers practice-oriented seminars in the field of:

**Light Metal Casting** | Seminars imparting the casting methods gravity, low pressure and die casting as well as seminars on casting simulations and casting defects.

**Quality management** | Seminars on „PPF procedures“, „special features“, 8D, FMEA and Q methods.

**Project management** | Seminar topics are failure management, leadership and personality, conflict management, self-organization of executives, systemic project management.

We collated in 2014 our seminar offering by establishing **Project Engineering Campus**. The Seminars are available in German or English.

They can be located in Heidelberg or take place as in-house seminars at the customers site. Those seminars allow to be tailored individually to the customers requirements.

Seminar capacities are limited to 15 people. Employees and managers in quality- and supplier management, purchasing, development, production and industrial engineering are the most typical participants.

The seminar program can be found at [www.projectengineering.de](http://www.projectengineering.de).



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**Picture 22**  
Morphology of solidification front due to direction of heat flow

Positive temperature gradient stabilising planar solidification front (directional solidification)

Negative temperature gradient destabilising planar solidification front (diverse solidification)

The local increase of concentration in front of the solidification front leads to a reduction of the liquidus temperature compared to the phase diagram: The melting undercools (constitutional undercooling). The higher the undercooling, the higher the instability of the crystal growth front. The actual temperature in front of the solidification front depends on the temperature gradient.

- Steep temperature gradient = no, or only slight constitutional undercooling = planar growth front
- Decreasing temperature gradient = increasing constitutional undercooling = Roughening of the solidification front = dendritic growth up to the creation of globular crystals.

In picture 23 a dendrite in stalky form is shown, while picture 24 shows an actual aluminum – mixed crystal in form of a globular dendrite with a 40x magnification.

**Picture 23**  
Stalked dendrite

**Picture 24**  
Globular dendrite (primary Al – mixed crystal)

This is a cavity!!!

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# Worldwide operation



- Quality planning, quality control, start-up management, supplier management, supplier development
- Designing of production facilities and factories
- Production experience, particularly in light metal casting
- Planning of casting process, casting suited component geometry, planning of casting process
- Training and seminars
- Business development and support partner



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