

Automotive Lightweight Procurement Symposium 2014 Oct 5 th – 7 th In Duesseldorf



SYMPOSIUM FOCUS

- MAGNESIUM
- ALUMINIUM
- CARBON FIBER
- HIGH STRENGTH STEEL
- COMPOSITES

AluMag®

Europe ■ India ■ Americas ■ Asia
THE MARKET DEVELOPER

Sponsored by Reed Exhibitions Deutschland GmbH

ALUMINIUM 2014
7-9 Oct 2014 | Messe Düsseldorf
10th World Trade Fair & Conference
www.aluminium-messe.com

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 European Aluminium Association

AluMag®

Europe ■ India ■ Americas ■ Asia
THE MARKET DEVELOPER

AluMag is "The Market Developer" that successfully penetrates new markets, creates business and localize leading supplier for your company. AluMag access any promising markets and open doors for your business – regardless of region, market, application, material, process or product. AluMag makes you successful – worldwide!

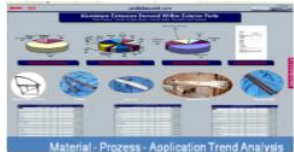
AluMag® offers the four following services - worldwide:



Market Research

- Aluminium Extrusion Customer database
- Foundry & Tool Maker Database
- Automotive Application, Material & Process Analyses
- Various Industrial Application Research & Analyses

AluMag as your provider of automotive research and forecasting studies, offers you and your business, the market intelligence you need to realize the best strategic decisions



Material - Process - Application Trend Analysis

Large variety of market access, local & global:

- business database with 6,970+ companies and 18.700+ contacts
- 150+ satisfied customers worldwide
- Arranged 20+ roadshows/events since 2008



Extrusion Application

Your Benefits:

- Learn about your [potential] clients and competitors
- Obtain an inside view of the market
- Identify opportunities and threats
- Minimize risk and optimize profits
- Position your company successfully
- Based on data off the shelf, secondary re-search and interviews, AluMag generates validated researches

Are you:

- looking for specific data, information and outlook about product, material, customer, supplier, technologies, ...
- want to discuss your project, increase sales, access new markets, ...
- interested to participate in one of our roadshows / events or organize your customized showcase ...
- looking to localize, expand into new markets, countries, tie-up targets, ...

please contact your AluMag Team to receive a quote or proposal

CONTACTS & PROJECT TEAM



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Market Development

- Analysis & Development of Market Opportunities
- Accelerate Market Penetration
- Manage New Product Launches
- Establish a Sales Force
- Sales on Demand

AluMag guides and supports your organization globally through the different market development phases until we have successfully launched, implemented or executed your project.



Map of activity - SAMPLES

Manage and integrate each aspect of your organization by initiating, planning, controlling, executing and closing out a new project. AluMag offers liaison management services as an addition to our customer's staff by bringing in the resources that define us.



JATCO - Head Quarters - Mending in Japan

Your Benefits

- Analysis and development of Markets
- Realize opportunities
- Accelerate market penetration
- Establish a Sales Force
- Provide Warehousing and distribution services
- Manage New Product Launches
- Sales on Demand



Roadshows / Events

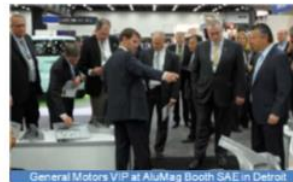
- Organization of Technical & Commercial Roadshows
- Oversea Commercial & Technical Events
- Host In-House Events & Presentation
- Common Technology Booth at Leading Exhibitions

AluMag roadshows, tech-meetings and symposia are the first class events used by exhibitors and guest as a unique benchmark platform.



Daimler Sinterfingen as Roadshow Location

The AluMag think tank events are bringing in decision makers and executives in EUROPE, ASIA and NAFTA.



General Motors VIP at AluMag booth SAE in Detroit

Upcoming Events:

- 2014 Nov. Five OEM Tech-Meetings in Japan and optional one day in S.Korea
- 2015 Mar. Multi Material Lightweight Technology Roadshow across Europe
- 2015 Apr. Common Tech-Booth at the SAE World Congress in Detroit, USA
- 2015 Jul. Automotive Lightweight Procurement Symposium in Beijing, China



Strategic Localization

- Warehousing & Distribution Service
- Supplier & Tie-up Localization
- Identification & Trade-off of new Technology
- Foreign Market Business Cases and whose Realization

AluMag has the global expertise to search, identify, evaluate and validate potential strategic business opportunities for expansions and partnerships that will assist your business growth plans regionally and globally



On-Site Greenfield Planning Meeting

Services for:

- Search, develop and present potential acquisition candidates for regional and global business expansions
- Localization of new manufacturing / service sites for business expansions
- Identification of new technology supplier development related to products, processes and materials
- Search, develop and present potential business partners / suppliers to support regional and/or global supply programs
- Evaluate potential competitor profiles for new or existing business in non-presence geographies
- Evaluate new emerging technologies and processes for business expansions





**Automotive Lightweight Procurement Symposium
2014 Oct 5 th – 7 th In Duesseldorf**



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Introduction

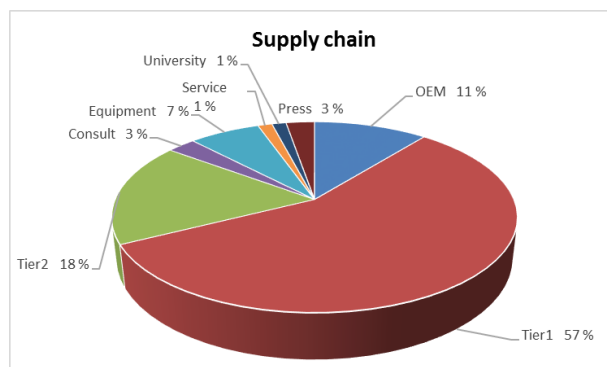
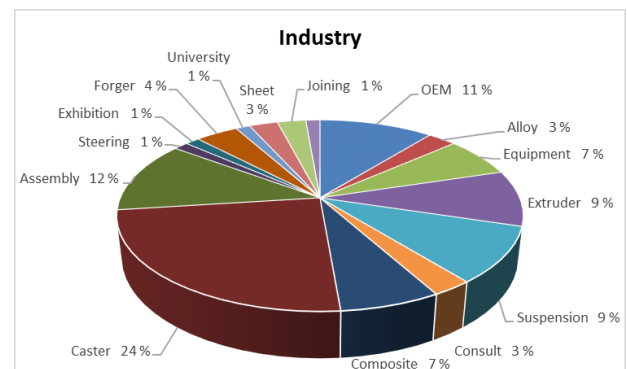
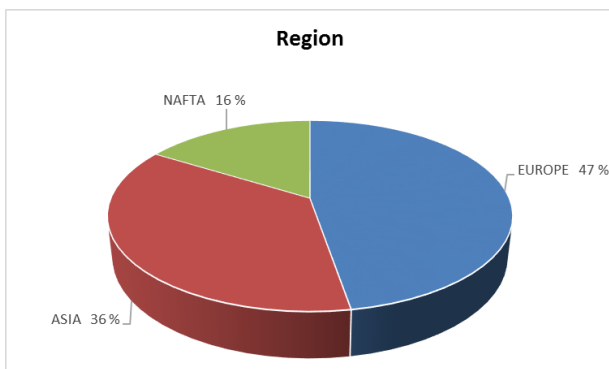
The 'Automotive Lightweight Procurement Symposium' in 2014 from October the 5th – 7th at the Hilton Hotel in Duesseldorf, Germany is the first unique and cutting edge event that brings together the procurement and supply side of lightweight materials and their advanced processes (aluminium, carbon, composites, high strength steel, magnesium as well as thermoplastics) in accompany with cost balance or reduction. Localization, material technology and cost benchmarking as well as 2025 market outlook are some of the topics to be presented at the AluMag symposium.

Designed is the event for executives who are part of the lightweight supply chain and engineering as well as technical sales managers seeking an understanding of the synergy of cost- / weight reduction programs.

The symposium is limited to 120 visitors to ensure a friendly executive atmosphere for knowledge development and exchange of experience.

For 2015, the "Automotive Lightweight Procurement Symposium" China, Beijing is planned in July from 6th to 7th.

Registration statistics:



Company Speechs by:

<u>AluMag Automotive GmbH</u>	<u>9</u>
<u>Audi AG</u>	<u>16,17</u>
<u>Berylls Strategy Advisors GmbH</u>	<u>20</u>
<u>Beijing Antaike Information Development Co. Ltd.</u>	<u>30</u>
<u>Grunewald GmbH & Co.KG</u>	<u>46</u>
<u>MITSUBISHI RAYON CO. LTD.</u>	<u>66</u>
<u>RIFTEC GmbH</u>	<u>86</u>
<u>Daimler AG</u>	<u>94</u>
<u>ThyssenKrupp System Engineering GmbH</u>	<u>110</u>
<u>Citius Capital S.A. de C.V.</u>	<u>124</u>
<u>Georg Fischer Automotive AG</u>	<u>142</u>
<u>MAGNA STEYR Fahrzeugtechnik AG & Co.KG</u>	<u>158</u>
<u>F.tech R&D North America Inc.</u>	<u>174</u>
<u>Rheinfelden Alloys GmbH & Co. KG</u>	<u>196</u>

Agenda

Sunday The 5th Of October In The Hilton Hotel Duesseldorf

06:00pm - 10:00pm Pre-registration & Reception

Monday The 6th Of October In The Hilton Hotel Duesseldorf

08:30am – 09:15am Registration and morning coffee / tea

09:15am – 09:30am **Welcome: Mr. Jost Gaertner** – Managing Partner – AluMag Automotive GmbH

09:30am – 10:25am **Opening Keynote: Mr. Arne Lakeit** – I/PG Vice President Manufacturing Engineering & Process Planning – Audi AG

Mr. Thomas Heußer – I/PG-A3W Head of Technology Development
Production – Materials – Processes – Audi AG

Structural Light weighting – New Materials & Advanced Processes

10:25am – 11:00am Break for Refreshments – Coffee – Tea – Networking – Technology Exhibition

11:00am – 11:40am **Paper 1: Mr. Christian Kleinhans** – Managing Partner – Berylls Strategy Advisors GmbH

Outlook Of The Global BIW Lightweighting 2025: Needs – Markets - Collaboration

11:45am – 12:25pm **Paper 2: Ms. Hui Xiong** – Chief Analyst – Beijing Antaika Information

Market Trends & Development Of Aluminium In China: Production – Price Building – Products

12:25pm – 01:45pm Break for Refreshments – Coffee – Tea – Networking – Technology Exhibition

01:45pm – 02:25pm **Paper 3: Dr. Joachim Gundlach** – Sales Manager
Grunewald GmbH & Co.KG

International Foundry Challenge – Suitable Production Of Thin Walled Aluminum Prototype & Small Series Castings For Body In White Applications

02:30pm – 03:10pm **Paper 4: Mr. Kouichi Akiyama** – Research Director Composite Materials Dev. Center Mitsubishi Rayon Co., LTD

Development Of PCM (Prepreg Compression Molding) Technology

03:15pm – 03:45pm **Paper 5: Dr. Axel Meyer** – CEO – Riftec GmbH

Light weighting Technology Selection Based On A Material And Process Benchmark - An Aluminium Extrusion Case Study Successfully Transferred Into Series Production

03:45pm – 04:15pm Break for Refreshments – Coffee – Tea – Networking – Technology Exhibition

04:15pm – 04:55pm **Paper 6: Dr. Markus Hermle** – Manager CAE Interior Safety &

Durability at Mercedes-Benz Cars – Daimler AG

Lightweight Design – Challenges in Development Process

05:00pm – 05:55pm **Closing Keynote: Dr. Achim Agostini** – Head of Division Lightweight Solutions
ThyssenKrupp System Engineering GmbH

Lightweight Solutions by ThyssenKrupp System Engineering: Process & Equipment – parts production for aluminum – magnesium –composites – steel hybrid material

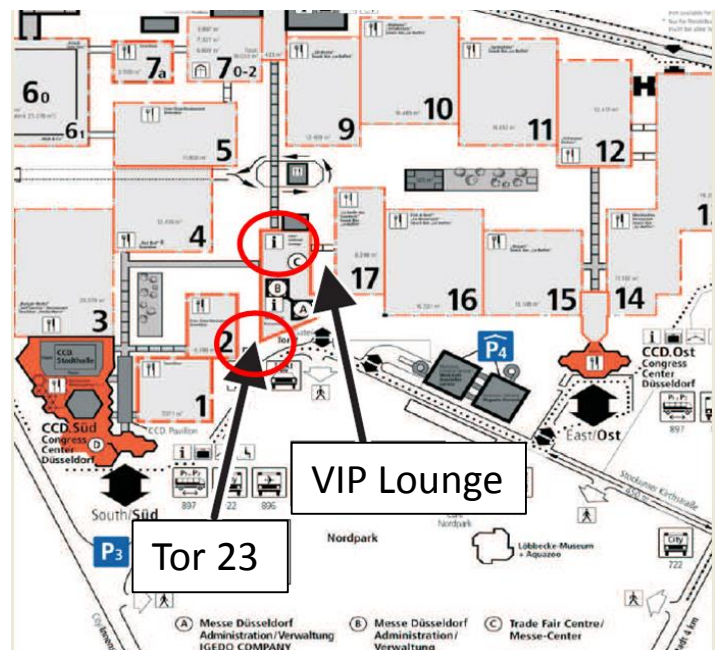
05:55pm – 06:00pm Summary: Mr. Jost Gaertner – Managing Partner – AluMag Automotive GmbH

06:00pm - 10:00pm Reception

Agenda

Tuesday The 7th Of October In Hilton Hotel Duesseldorf / Aluminium & Composite Europe Exhibitions

- 08:15am – 08:55am **Paper 1: Mr. Dario Villarreal** – Managing Partner – Citius Capital S.A. de C.V.
Site Selection in Mexico: Doing it right!
- 09:00am – 09:40am **Mr. Klaus Decking** – Head Of Market Communication Sales Support & Business Development & New Markets Sales – both Georg Fischer AG
Cost Comparison Of Iron, Aluminium, Magnesium vs. Composite Solutions
- 09:45am – 10:25am **Paper 3: Dr. Wolfgang Zitz** – Vice President Magna Steyr Operation – Magna Steyr Fahrzeugtechnik AG & Co KG
Lightweight Body Solutions By Magna Steyr
- 10:25am – 11:00am Break for Refreshments – Coffee – Tea – Networking – Technology Exhibition
- 11:00am – 11:40am **Paper 4: Dr. Bing Liu** – Director & COO – F.tech R&D North America Inc.
Dr. Xin Zhang – Assistant Manager of Design Group – F.tech R&D North America Inc..
Competitive Development Based On Lightweight & Cost Balance
- 11:45am – 12:25pm **Paper 5: Dr. Claudio Mus** – President – Rheinfelden Alloys GmbH & Co. KG
Design Approach & Process Methodologies: How To Improve Aluminum Alloys Advantages In High Performance Components
- 12:30pm – 12:35pm **Summary: Mr. Jost Gaertner** – Managing Partner – AluMag Automotive GmbH
- 12:45pm – 01:00pm Shuttle Transfer to the Exit 23 / Tor 23 of the Exhibition Duesseldorf. 150 meters walk to the VIP Area
- 01:00pm – 01:40pm Reception With Snacks & Finger Food
- 01:40pm – 05:30pm Individual Or Guided Visit At The 2014 Aluminium 2014 & Composite Europe Exhibitions In Duesseldorf
- 05:45pm – 06:15pm Shuttle Transfer from Exit 23 / Tor 23 to :
**Hilton Hotel
Duesseldorf Main Station
Duesseldorf Airport**



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TITLE

International Foundry Challenge – Suitable Production Of Thin Walled Aluminum Prototype & Small Series Castings For Body In White Applications

ABSTRACT

Complete Solutions from a Concept to Small Series Production

Bodies in white concepts take more and more castings into account. Casting joints and other structural castings are used in all areas of a car body. Those castings have to be light as well as stiff and stable. Certain series like mechanical properties as well as surface qualities have to be achieved.

In order to realize the defined properties the low pressure casting technique and an integrated casting product and process development are mandatory. Grunewald provides complete solutions from a concept to small series production.

The whole process chain of design, tooling, casting process, heat treatment, straightening and NC-finished part processing needs to be carefully adjusted in order to increase the efficiency in cast aluminium prototyping and to reach a higher grade of validation regarding weight and mechanical properties.

Practical approach in the development and production of body in white castings

By means of practical examples the process chain is been illustrated and explained. Simultaneous development and innovative technologies of tooling, prototyping, pre-series and series production are shown regarding:

- Thin walled casting design
- Intelligent tooling
- Raw part precision with low pressure casting
- Adjustment of shrinkage and distortion
- Reproducible process development
- Specific mechanical properties
- Lead times and costs



Grunewald ²

International Foundry Challenge –
Suitable Production of thin walled
Aluminum Prototype and Small Series Castings
for Body in White Applications

Joachim Gundlach, Jörg Detering

Contents

Grunewald ³

- Company Information
- Starting Point - Requirements
- Integrated Casting Product and Process Development
- Moulding and Casting Process
- Competitive Factors
- Summary and Perspectives

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Contents

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Company Information

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Locations

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Grunewald
 Founded **1963**
 Employees **250**
 Production Sites **5**
 Locations **5**

4 main Business Units

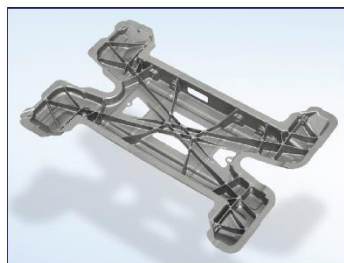
- Casting Production (diverse Industries)
- Tooling (Automotive, Aerospace, Energy)
- NC-Machining (diverse Industries)
- Assembly (Automotive, Aerospace, Semiconductor)

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Company Profile

Grunewald

The Grunewald Business Model is based on 4 main Business Areas.
 Know How Transfer and synergetic Effects create Innovations.



Casting



NC-Processing



Aerospace Tooling and Assembly



Automotive Tooling

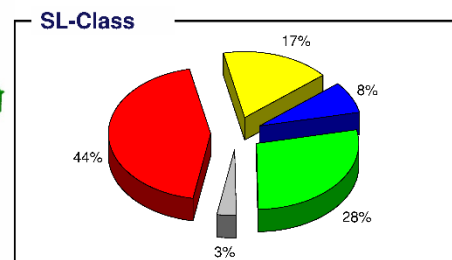
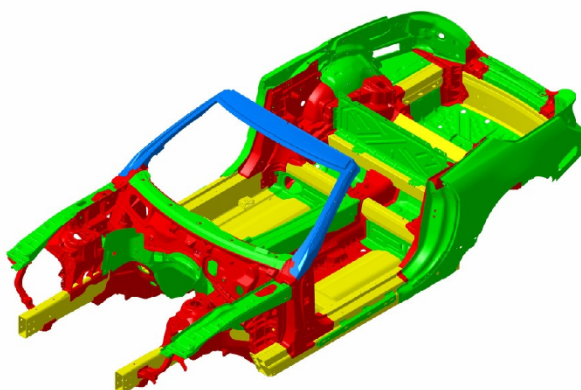
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Starting Point - Requirements

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Body in White Concept

Body in White Structures contain significant portions of Castings, in order to integrate Components and to realize functional lightweight Geometries.



- Aluminium Castings
- Aluminium Metal Sheets
- Aluminium Profiles
- Steel
- Others

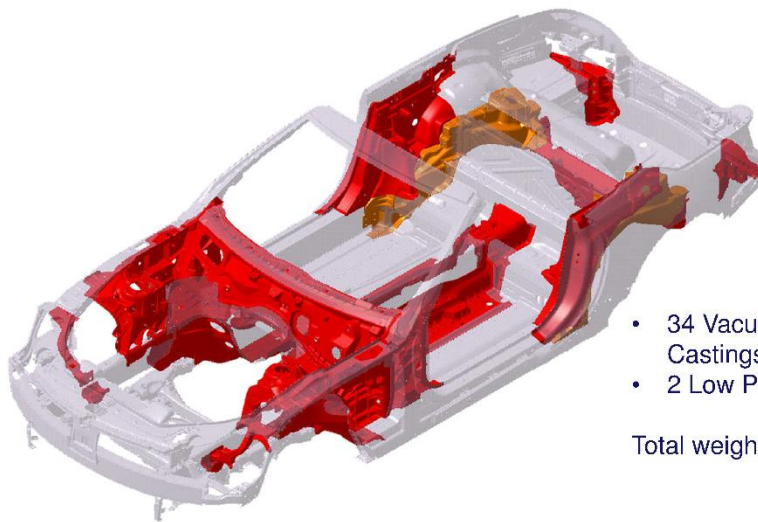
Daimler AG, SL-Class: Percentage of Materials

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Body in White Concept

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Grunewald offers Casting Capabilities for Prototypes and Small Volume Productions.



- 34 Vacuum High Pressure Die Castings
- 2 Low Pressure Die Castings

Total weight of Castings: 110kg

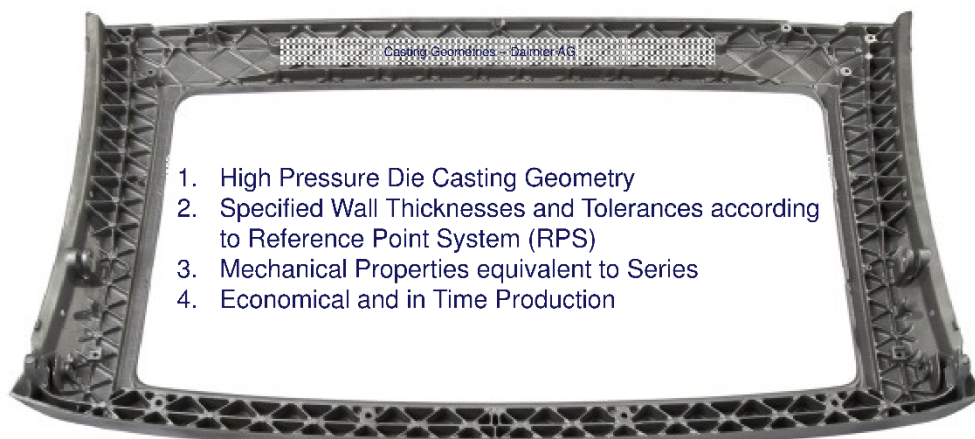
Daimler AG, SL-Class: Castings

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Starting Point - Requirements

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Series Production Design and specified Mechanical Properties are realized with Low Pressure Sand Casting + Heat Treatment.



1. High Pressure Die Casting Geometry
2. Specified Wall Thicknesses and Tolerances according to Reference Point System (RPS)
3. Mechanical Properties equivalent to Series
4. Economical and in Time Production

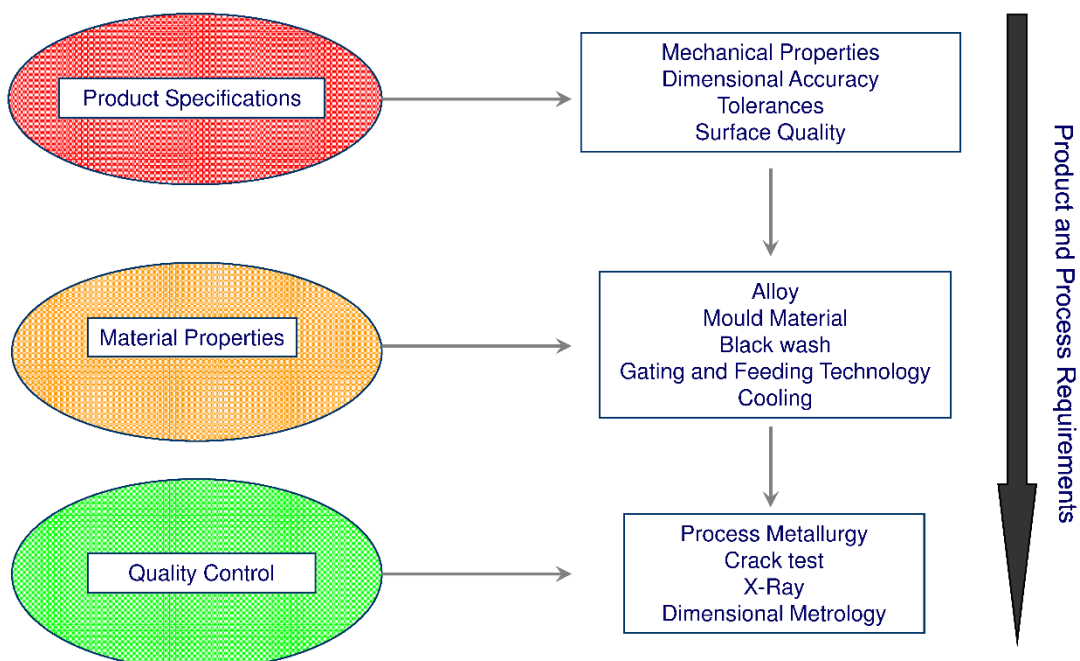
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Integrated Casting Product and Process Development

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Casting Process Development

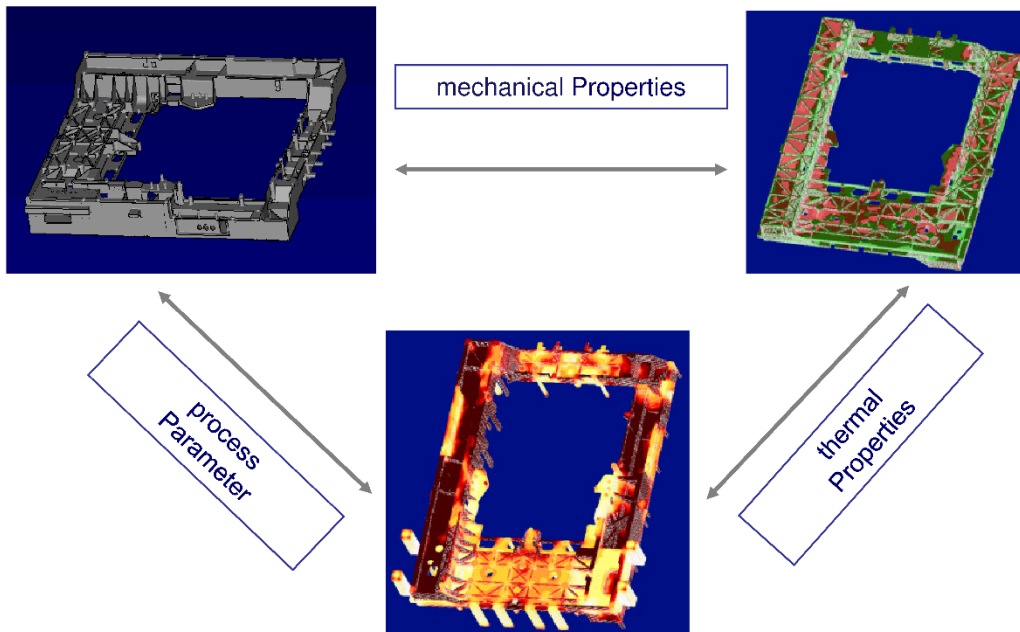
Specification, Properties and Quality Requirements determine the Process Development.



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CAE - Development

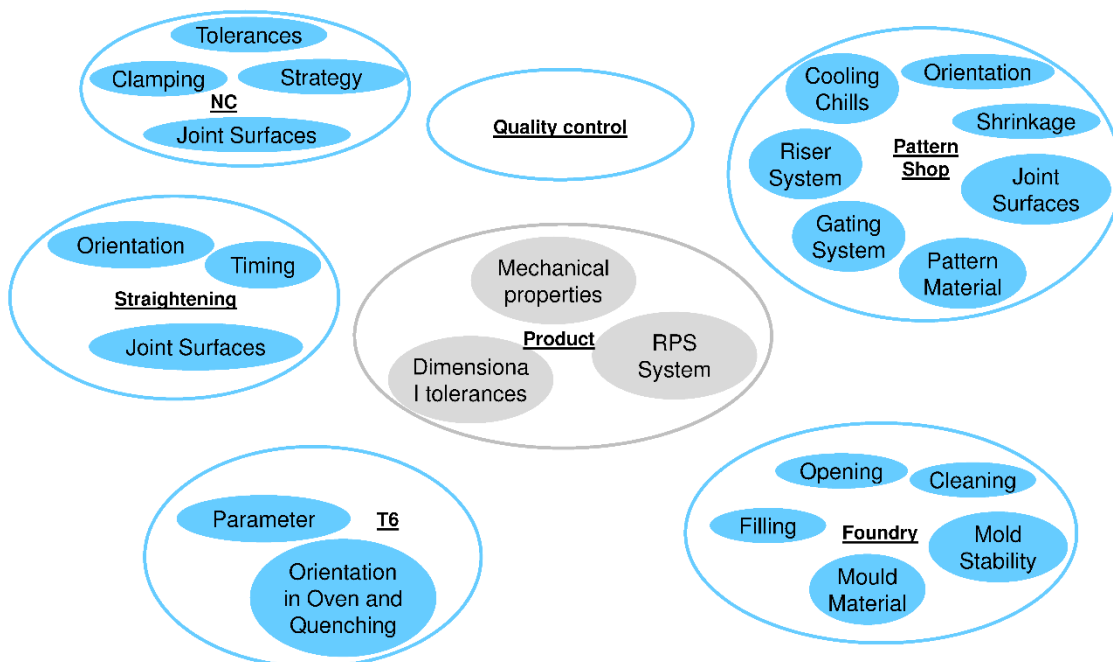
The Feasibility of thermal + mechanical Properties are analysed on basis of numerical Simulation. Boundary Conditions and Process Parameter are calculated.



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Process Tolerances

Process Steps, Functions, Parameters, Tolerances and Interfaces have to be developed and defined in an integrated Process Chain to achieve Quality and Cost Effectiveness



Process Flow and Dependencies

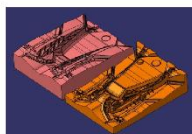
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Moulding and Casting Process

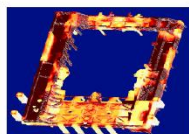
- Rapid Prototyping, Qualified Master Casting (QMC)
- Low Pressure Sand Casting

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Vertical Integration leads to Reliability and Liability as well as Lead Time Reduction.



CAD/CAM



Simulation
Modelling



Rapid
Prototyping



Pattern
Making



Moulding



Melting



Casting



Fettling



Heat-
Treatment



NC-
Processing



Metrology



Quality Control

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Pattern Making

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Specialists with Handcrafting Know How finish and complete the 5-axis machined plastic Patterns.



Manual Finishing after NC-Processing

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Mould Production

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Black Washing and Coating Techniques create high Quality surfaces.



Moulding

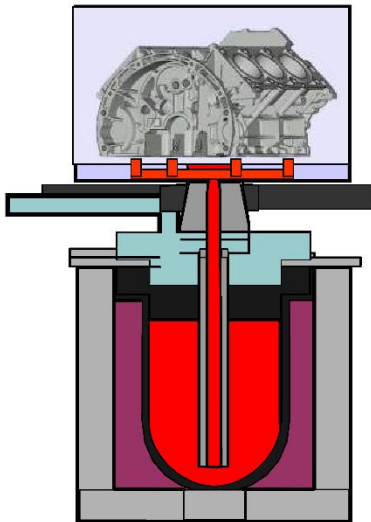
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Low Pressure Sand Casting

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Low Pressure Casting Systems produce repeatable thin walled Castings.



- Low Pressure Casting Technique
- Crucible Volume 300 kg Al, 2 changeable Crucibles
 - Dynamic Pressure Control
 - Core Block - Sand Casting

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Heat Treatment

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Heat Treatment Know How to achieve specified mechanical Properties.



Heat Treatment and Quenching
Water and Air
Accuracy +/- 1K

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Straightening

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Specialists with Handcrafting Know How straighten the Castings.



Straightening

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Blasting

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Modern Blasting Technology generates regular Surfaces.



Blasting Cabin

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NC – Machines (examples)

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5-Axis Milling Technology and NC – Specialists produce finished Parts.



1.800 x 2.100 x 1.250 mm



1000 x 800 x 500 mm



NC – finished Part Processing

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Assembly

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Use of Aerospace Assembly Strategies and Quality.



Assembly of e. g. Helicoils and Add-On Parts

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Pre-Series Casting

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Daimler AG, SL – Roof Component

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Pre-Series Casting

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Daimler AG, SL – C-Pillar

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Pre-Series Casting

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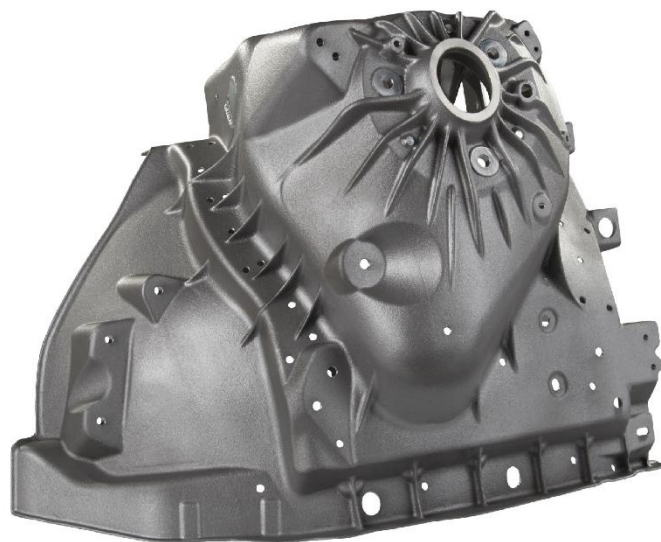
Daimler AG, SL – Crossbeam

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Prototype Casting

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Body In White Component

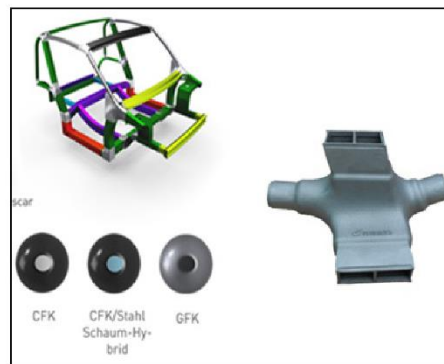
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Competitive Factors

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Know How Transfer Carbon Fibre (CFRP) into Hybrid Car Structures

Competitiveness per Composite Know How and Capability.



Aerospace



Automotive

1. CFRP Part Design
2. Production Tooling Techniques like Lay Up Tools, RTM Tools
3. Manufacturing Processes
4. NC-Processing and Water Jet Cutting (Savings in Fettling up to 75%)
5. Assembly and Adhesive Technologies

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Know How Transfer Assembly Strategy and Technology

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Competitiveness per Assembly Know How and Capability.



Aerospace



Automotive

1. DIN ISO 9100 Certification
2. Adapted Assembly Tooling Techniques
3. Process Quality Improvement
4. Qualification of Employees

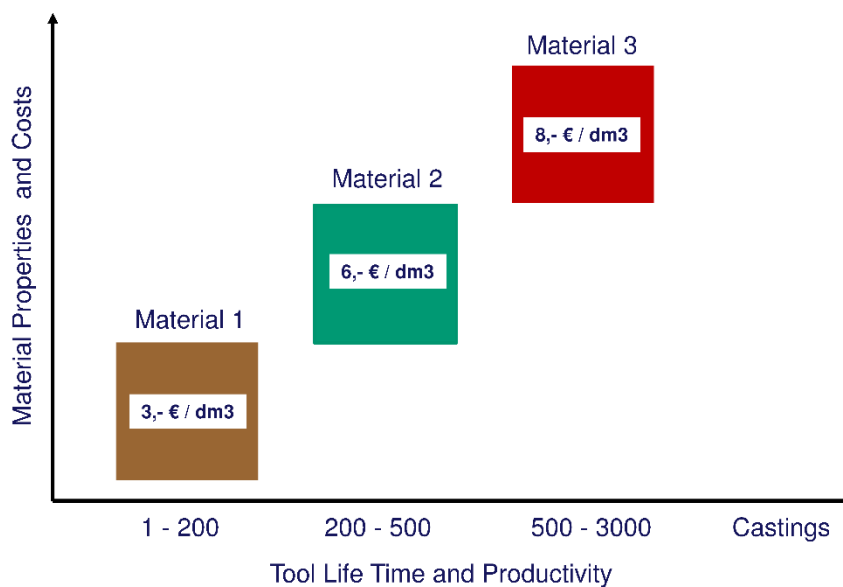
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Pattern and Tool Life Time

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Competitiveness per professional Material Selection and Processing Know How.



Plastics Technology → Casting Patterns

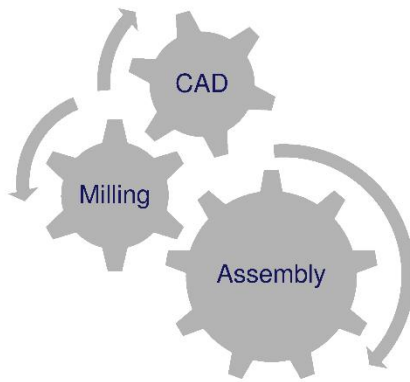
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Optimization of Interfaces

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Competitiveness per Optimization of Interfaces.



technical Interfaces



human Interfaces, communicative Competences

professional Education → professional communicative Behavior

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Summary and Perspectives

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Further Technical Information

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Components:	A-, B-, C-Pillars, Window Frames, Roof Components, Joint Components, Doors, Tail Gates, others
Part Dimensions:	up to ca. 1500mm x 1200mm x 400mm
Geometrical Accuracy:	+/- 0,8mm (Raw Part)
Wall Dimensions:	> 2mm (+0,4mm/-0,2mm)
Casting Techniques:	Sand Casting, Low Pressure Sand Casting, QMC Prototype Casting on Basis of Laser sintered Rapid Prototyping Polystyrene Models or Sand printed Moulds
Melting Capacity:	ca. 300kg – 1000kg, Prototype Volumes are possible
Moulding Material:	Cold-Box, Pep-Set, Furan Resin Sand, others
Surface Finish:	correspondent to Moulding Material
Surface Treatment:	Passivation, KTL, Ni-Plating, others
Tool Life Time:	Plastic Tools 1 – 30000 (Material dependend, incl. Maintenance), Metal Tools x – 100.000 (Material dependend, incl. Maintenance)
Production Capacity:	1 - ca. 5000 Castings per Year



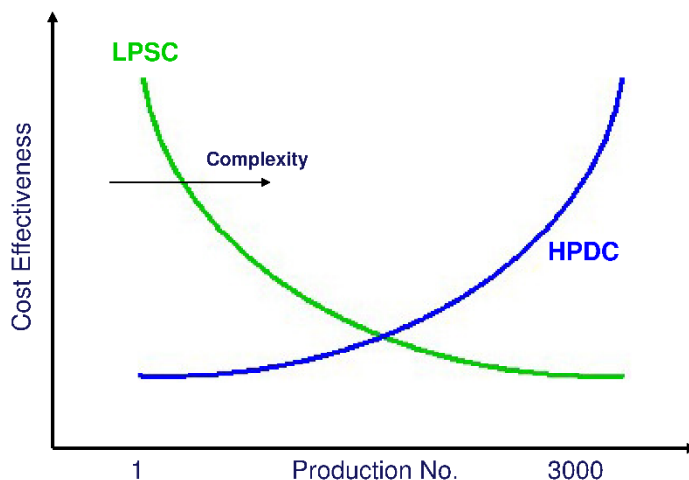
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Cost Effectiveness

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Small Volumes can be produced economically with Low Pressure Sand Casting.



Low Pressure Sand Casting (LPSC) / High Pressure Die Casting (HPDC)

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Thank you for your Attention.

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