




# Competence in Aluminium and Magnesium Die Casting

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 Foundry Experts at Work Worldwide.

Source Bild: //blog.mercedes-benz-passion.com

# Process Optimisation of Transmission Housing(1)

- ... for OEM magnesium die casting Automotive
- ... for a low-porosity and pressure oil-tight transmission housing
- ... for automatic passenger car transmissions (premium segment)

## Contents:

- Mould filling and solidification simulations with casting system optimisation to improve mould filling / Reduction of cold run, pre-run, build-up, pores and solidification shrinkage
- Carrying out technical casting calculations / Determination of casting process parameters
- Redesigning the casting system to suit die casting / Reduction of blast surfaces and recycled material / Arrangement of necessary overflow beans / Determination of the gate cross-sections
- Design and optimisation of the gearbox housing for pressure die casting / Elimination or reduction of critical material accumulations
- Introduction of die casting mould venting passive and active / Project management for the selection and procurement of vacuum systems / Coordination and monitoring of the installation and commissioning as well as monitoring of the casting processes incl. vacuum process.



Source: //blog.mercedes-benz-passion.com

# Process Optimisation of Transmission Housing(2)

- ... for OEM Mg die casting automotive
- ... for a low-porosity and pressure oil-tight transmission housing
- ... for passenger car automatic transmissions (premium segment)

## Contents (continuation):

- Execution of sample castings on the casting cells / parameter determination (1st phase ("parashot"), 2nd and 3rd phase) and documentation of the casting parameters / mould tempering incl. ensuring the casting quality / X-ray random samples
- Hot spotting of the new die-casting moulds on the die-casting machine and image documentation of the touching results
- Consulting and implementation of process optimisations in the die casting cells to optimise cycle times / definition of casting parameters / planning and coordination of conversion and expansion measures on the magnesium die casting cells
- Development and application of X-ray specifications for the new gearbox housing / training of employees on product-specific details (error patterns)
- Project meetings with various client-internal departments / reporting / project reviews / creation and processing of task lists



Source: //blog.mercedes-benz-passion.com

# Process Optimisation of Transmission Housing (3)

... for OEM magnesium die casting automotive  
... for low-porosity and pressure oil-tight transmission housings  
... for automatic passenger car transmissions (premium segment)

## Conditions:



Source: Internet (Brabant)

- Longer-term assignment on site at the customer's foundry.
- Extensive experience in all process steps along the die casting process chain up to trimming and automatic fettling.
- Extensive experience in performing and interpreting mould filling and solidification simulations.
- Extensive experience in the design of large Mg die castings for die casting, trimming and fettling.
- Good knowledge of casting system design in Mg die casting.
- Good knowledge of the heat balance of Mg die casting moulds.
- Confident cooperation with the customer.
- Good communication skills with project management and shop floor staff.

# Casting cell conversion planning (1)

... for OEM Al and Mg die casting automotive

... for low-porosity and weldable die casting (vehicle structural parts)

## Contents:

- Preparation of specifications and interface definitions for various trades of the DGM 01 (Al) and DGM 02 (Al) conversion projects as well as extension measures for DGM 03 (Mg)
- Project meetings with customer (internal) and suppliers / reporting / project reviews / preparation and processing of action lists
- Consultation in the field of vacuum systems to be used (evacuation of the die-casting moulds by means of robust vacuum systems suitable for die-casting with very high availability).
- Offer comparisons / recommendations for supplier selection / commissioning
- Start-up and supervision of the conversion measures / ensuring work safety, order and cleanliness / supervision of the construction sites on site in the foundry
- Project schedule, change management and deadline tracking
- Recording of additional expenses or reductions / cost tracking
- Planning, coordination and execution of pre- and final inspections
- Support for the operators of the casting cells during start-up and ramp-up / production tests.



Source: Internet

## Casting cell conversion planning (2)

... for OEM Al and Mg die casting Automotive  
... for low-porosity and weldable die casting (vehicle structural parts)

### Conditions:



Source: Internet

- Longer-term on-site assignment in the client's foundry planning.
- Extensive experience in consulting, planning, implementation and project management of foundry projects.
- Very good knowledge of all sub-processes within a die casting cell for Al and Mg die casting.
- Experience in mechanical engineering
- Business management knowledge
- Confident cooperation with customers and suppliers.
- Good communication skills with employees in foundry planning and project management of the customer and the suppliers of the various trades as well as the assembly teams on the construction sites.

# Process optimisation of roof parts (1)

- ... for convertible folding roofs with load-bearing structures made of magnesium die casting
- ... for two new vehicle developments in the premium segment

## Contents:

- Mould filling and solidification simulations with casting system optimisation to improve mould filling / reduction of cold run, build-up, hot cracks and shrinkage
- Redesign of cast parts to suit pressure die-casting / Optimisation of pressure die-casting and trimming tools / Reduction of porosities, solidification shrinkage cavities / Change management and deadline tracking
- Determination of sampling points for tensile and flexural specimens / Evaluation of tensile and flexural specimens / Improvement of tensile strength and elongation at break
- Monitoring of casting batches in the start-up and ramp-up phase and series production over 3/5 shifts / Crack and X-ray inspection / Ensuring casting quality
- Consulting process optimisation die casting cell / casting parameters
- Advice on process optimisation of the trimming press / correction of mould separations / reduction of fettling costs >50% / preparation of fettling patterns and fettling work instructions
- Development and application of X-ray specifications / Training of employees on product-specific details
- Measures to optimise set-up times



Source: //blog.mercedes-benz-passion.com

## Process optimisation of roof parts (2)

... for multi-part convertible folding roofs made of die-cast Mg (Leg. AM50)  
... for two new vehicle developments in the premium segment



Source: Daimler AG

### Conditions:

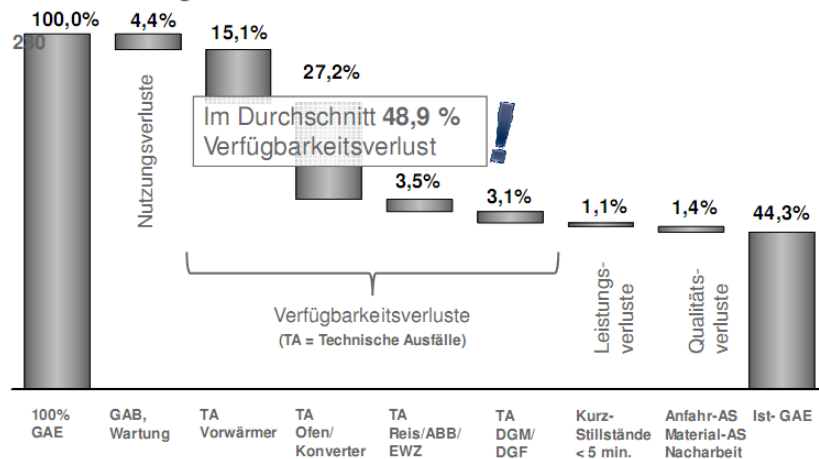
- Longer-term assignment on site at the customer's foundry
- Extensive experience in all process steps along the process chain up to machining
- Extensive experience in carrying out and interpreting mould filling and solidification simulations
- Extensive experience in the design of large Mg die castings in accordance with die casting, trimming and fettling requirements
- Good knowledge of casting system design in Mg die casting
- Good knowledge of the heat balance of Mg die casting moulds
- Confident cooperation with the customer
- Good communication skills with staff in project management and on the shop floor



# OEE Analysis of Die Casting Cells (1)

... to identify potentials for improved output  
... implementation / monitoring of measures to increase output

2 Auswertungen und Ist-GAE zu Gießzelle



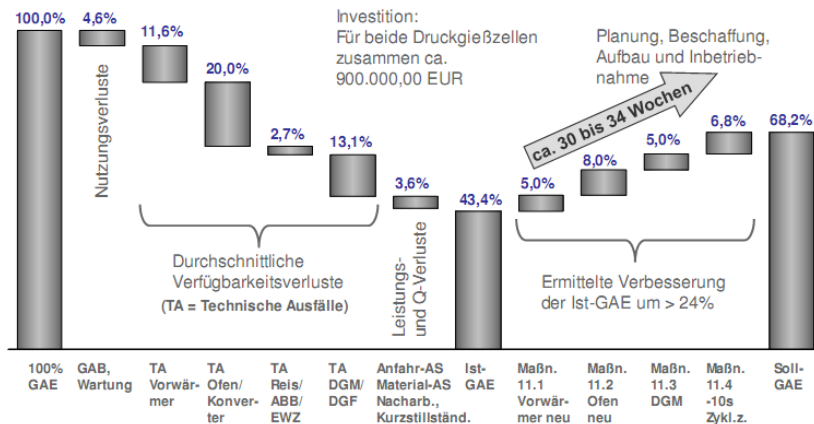
Source: MAC GmbH Deutschland

- Recording of malfunctions and interruptions at two die-casting cells for gearbox housings over three weeks (early, late and night shifts)
- Immediate root cause analysis in case of malfunctions and interruptions
- Evaluation of malfunctions and interruptions and determination of OEE key figures
- ABC analysis of technical faults and interruptions
- Description of key measures and catalogue of recommendations
- Carrying out investment and amortisation calculations for new melting furnace plants
- Calculations of unit costs / comparison before and after investment
- Carrying out capital value comparisons before and after the investment

# OEE Analysis of Die Casting Cells (2)

... to identify potentials for improved output  
... implementation / monitoring of measures to increase output

12 GAE-Wasserfall-Darstellung Soll-GAE für Gießzellen



## Conditions:

- Longer-term deployment of the consultant on site at the client's foundry
- Business management knowledge
- Time flexibility to accompany early, late and night shifts
- Extensive detailed knowledge of the processes in a die casting cell as well as the die casting and deburring cutting processes
- Quick comprehension and problem-solving skills
- Good communication skills with staff in project management and on the shop floor

Source: MAC GmbH Deutschland

# Project support ZF axle drive (1)

... to accelerate the aluminium die casting project phase  
... up to on-time initial sampling

## Contents:

- Drawing up process flow charts for die-cast axle drive housings and housing covers
- Preparation of specifications for production equipment for die casting and mechanical processing
- Preparation of enquiries / comparison of quotations
- Conducting internal and external supplier discussions
- Planning and conducting design meetings for production equipment
- Revision of existing flow charts for machining scopes
- Collision analyses of tools and machining fixtures
- Coordinating with the customer in case of drawing changes
- Visiting mould makers / recording work progress / monitoring deadlines
- Coordination of initial sampling / work preparation and foundry
- Monitoring of initial sampling at the die casting cell



Source: Bild ae group AG; Gussteil ZF

## Project support ZF axle drive (2)

... to accelerate the aluminium die casting project phase  
... until on-time initial sampling



### Conditions:

- Deployment of the consultant on site at the customer's foundry.
- Extensive knowledge along the aluminium die casting process chain.
- Project experience in the automotive sector / requirements
- Project management
- Detailed knowledge of the processes in a die-casting cell as well as in machining, leak testing and dimensional inspection
- Flexibility in terms of time within the framework of the support of initial sampling

Source: ZF Achsgetriebe GmbH

# Microspraying (1)



Source: Altea s.r.l.



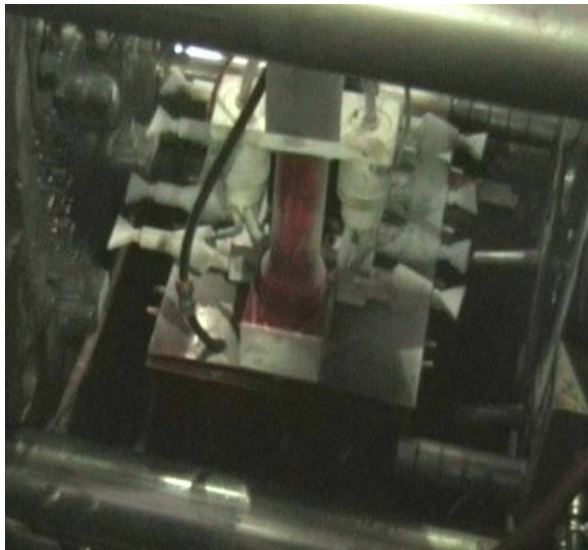
Source: Altea s.r.l.

## Introduction of a new, very innovative and economical spraying process

- Release agent application on mould contour with water-free oil mist (micro spray) or powder (dry Lube)
  - No costs for fresh water and wastewater treatment and disposal!
  - No blowing out of the mould after release agent application!
  - No costs for biocides (no bacteria in the release agent)!
  - Very high-cost saving potential
  - Very small spray quantities (a few cubic millimetres per spray nozzle)
  - Significant cycle time reductions can be achieved!
- Increase of the process temperature at the surface of the cavity possible!
  - Longer die service life due to reduced thermal shock loading
  - Mould filling: Reduction of pressure and speed possible /  
Protection of die and die casting machine / Increase of service life
  - Improved casting quality (surfaces and microstructure)
- Lower extraction rates → Lower investment
- Very good basis for use in semi-solid processes
- Very well suited to produce thin-walled structural parts

# Microspraying (2)

Introduction of a new, very innovative and economical spraying process



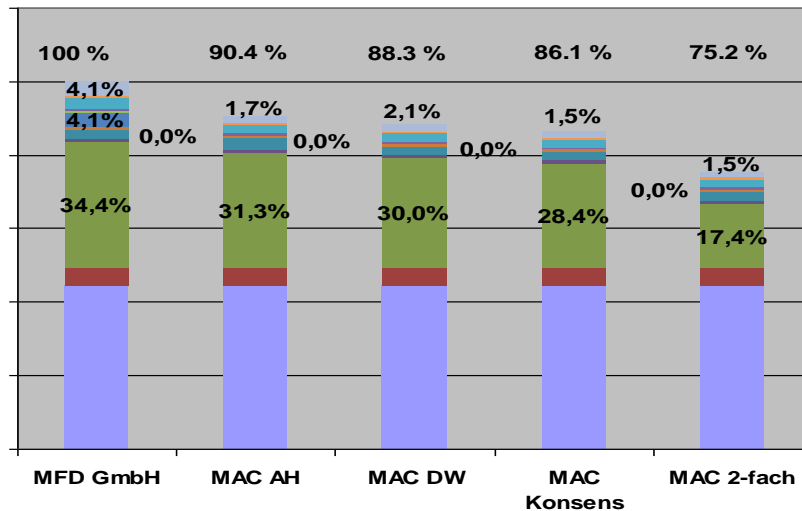
Source: Altea s.r.l.

## Conditions:

- Binding decision of the foundry to unconditionally introduce a new spraying process / acceptance in the foundry
- Investment in plant technology and heat balance Die casting mould:
  - Design of the die casting mould for higher heat dissipation via internal heating and cooling circuits / procurement of new or modified die casting mould inserts, if necessary.
  - Carrying out mould filling and solidification simulations
  - New spraying tools with micro-spraying nozzles incl. release agent supply
  - If necessary, procurement and integration of additional heating/cooling units

# Potential analysis (1)

Teil 1 - Spannweite Teilekosten Ventilgehäuse



## Analyses of potential:

### Directly through an audit

- Projected snapshots supported by company data
- The knowledge gained for the company shows potential for improvement
- Can only be carried out with intensive presence of the auditors in the company

### Based on existing figures

- Figures reflect a period and are not dominated by snapshots
- Allow direct conclusions to be drawn on the costs of parts and on the company's results
- Can be carried out with little auditor presence in the company

Source: MAC GmbH Deutschland

# Potential analysis (2)

## Schmelzkosten

Schmelzkosten	€/kg	Kommentar
Kalkulationswert Vollkosten	0,254	90% des ausgewiesenen Vollkostensatzes
Grenzkosten	0,1881	
Vollkosten	0,2824	mit kalkulatorischen Kosten
Modifikationen	--	
Vollkosten*	0,2824	
Potentiale		
Abschreibungen	0,003	für Invest von ca. € 1,0 Mio. auf Niveau Benchmark zusätzlich bei Neuinvest. für 3 MA/Schicht
Umlagen	0,05	
Energiekosten	?	
<u>Personalkosten</u>	<u>0,04</u>	
Summe	0,093	
nach Potential	0,1894	Reduktion um 33%
Benchmark	0,187	Vollkosten inkl. Zuschläge

... based on existing figures such as preliminary and final costing, post-calculation, cost accounting and profit and loss accounting

- By comparing standardised parts cost calculations, technical potentials are identified.
- By comparing cost, hourly and overhead rates with benchmarks, undesirable developments in cost structures are identified..

### Conditions:

- A well-organised accounting system coupled with management openness.
- A costing system that does justice to the manufacturing under study.
- Valid benchmarks that are truly comparable. Very good knowledge of cost accounting / costing for the evaluation.

Source: MAC GmbH Deutschland



# Contact

For questions about our field of activity or for an initial discussion of a task for **COMAC**, please do not hesitate to contact us at any time.



Source: //blog.mercedes-benz-passion.com

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