

North America 2015 9th - 11th of Nov

AUTOMOTIVE LIGHTWEIGHT

PROCUREMENT SYMPOSIUM

Cobo Center, Detroit, USA



SYMPOSIUM FOCUS

- Aluminum
- Carbon Fibre
- Composites
- High Strength Steel
- Magnesium

The 3rd Automotive Lightweight Procurement Symposium to be focused on automotive lightweighting, supply / process chain and procurement management, will take place in Detroit from the 9th – 11th of Nov 2015. The symposium is held in the days leading up to the "ALUMINUM USA" exhibition taking place at the Cobo Center, Detroit, Michigan (Walking distance to symposium venue)

ATTENDING COMPANIES:



ORGANIZING PARTNERS & SPONSORS



AluMag®
 Europe 2016 27th - 29th of Nov
 AUTOMOTIVE LIGHTWEIGHT
PROCUREMENT SYMPOSIUM
 Hilton Hotel in Duesseldorf, Germany

AluMag®
 Asia 2016 6th - 8th of July
 AUTOMOTIVE LIGHTWEIGHT
PROCUREMENT SYMPOSIUM
 Jumeirah Himalayas Hotel in Shanghai, China

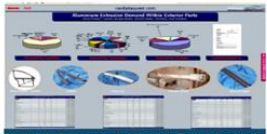
AluMag® offers the four following services - worldwide:



Market Research

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

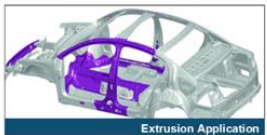
AluMag as your provider of automotive research and forecasting studies, offers you and your business, the market intelligence you need to realize the best strategic decisions



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-research and interviews, AluMag generates validated researches



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 Meeting 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

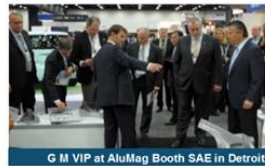
- Organization of Technical & Commercial Roadshows
- Oversea Commercial & Technical Events
- Host In-House Events & Presentation
- Common Technology Booth at Leading Exhibitions

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



Daimler Sindelfingen as Roadshow Location

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



G M VIP at AluMag Booth SAE in Detroit

Upcoming Events:

- 2015 Nov: Automotive Light-weight Procurement Symposium in Detroit, USA
- 2016 April Common tech- booth at the SAE World Congress in Detroit, USA
- 2016 Jul: Automotive Light-weight Procurement Symposium in Shanghai, China
- 2016 Nov: Automotive Light-weight Procurement Symposium in Duesseldorf, Germany.



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

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

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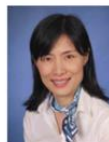
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N. America Automotive Lightweight Procurement Symposium 2015 9th – 11th Nov

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THE MARKET DEVELOPER

Company Speechs by:

Ford Research and Innovation Center

Carbon War Room and Meritor Headquarters

Striko Westofen America

Kurtz

Bharat Forge Aluminiumtechnik

C.P.C. USA

BOCAR Group

Ford Motor Company

Automotive Insight

EJOT Fastening Systems LP USA

UACJ Corp.

Lightweight Innovations for Tomorrow

Aluminum Blanking Company

Agenda

Agenda: (Is Continuously Being Updated)

Monday The 9th Of November – Cobo Center, Detroit

05:30pm - 07:30pm



Pre-registration and Welcome

Reception

Tuesday The 10th Of November – Cobo Center, Detroit

08:30am – 09:15am



Registration

Morning Coffee / Tea

09:15am – 09:30am



Welcome:

Mr. Jost GAERTNER - Managing Partner At AluMag Automotive GmbH

09:30am – 10:25am



Opening Keynote: Mr. Craig RENNEKER - Chief Engineer, New A/T Programs & Component – Transmission & Driveline Engineering At Ford Research & Innovation Center

Lightweight Transmission & Driveline Components: Practical Challenges

10:25am – 11:00am

Break for Refreshments/Coffee/Tea, Snacks, Networking, Tech Exhibition

11:00am – 11:45am



Paper 1: Mr Mike ROETH – Executive Director At North American Council for Freight Efficiency (NACFE) & Operations Leader – Carbon War Room



Paper 1: Mr. Karl MAYER – Director Product Line Management At Meritor

Lightweighting Heavy Duty Class 8 Tractors and Trailers

11:45am – 01:45pm

Break for Lunch, Refreshments, Networking, Tech Exhibition

01:45pm – 02:25pm



Paper 2: Mr Ryan BROWN – Director Of Sales At StrikoWestofen America

Analysis Of Cost Drivers When Buying Lightweight Solutions / Materials & The Elimination Of These

02:30pm – 03:10pm



Paper 3: Mr. Lothar HARTMANN – Managing Director Foundry Machines & Trimming Presses At Kurtz GmbH

Chassis & Suspension Weight Reduction By LPDC Aluminum With Hollow Cross Sections



Mr. Kevin CROY - NAFTA Sales Manager Foundry Machines & Trimming Presses At Kurtz GmbH

03:15pm – 03:45pm



Paper 4: Mr. Jörg MANTWILL – Director Sales At Bharat Forge Aluminiumtechnik GmbH & Co. KG

HCM And Aluminum Forging – Partnership To Birth Chassis Parts' Safety

03:45pm – 04:15pm

Break for Refreshments/Coffee/Tea, Snacks, Networking, Tech Exhibition

04:15pm – 04:55pm



Paper 5: Mr. Gary F. RUFF - President and Chief Executive Officer, Ruff and Associates, LLC 8/12 - Present

Advanced Counter Pressure Casting Process for Light-Weighting of Auto and Truck Chassis and Suspension Components

05:00pm – 05:55pm



Closing Keynote: Mr. Gilberto SALDIVAR – New Projects Group Manager At Bocar Group

Key Factors To Achieve Mechanical Properties In Lightweight Structural Parts

05:55pm – 06:00pm



Summary:

Mr. Roberto BOEKER – Managing Partner At AluMag Automotive LLC

Agenda

06:00pm - 08:00pm



Dinner Speech:

Mr. Richard KLEIN -
Responsibility Strategic Planning -
Business Development & German
Business At BOCAR

Wednesday The 11th Of Nov – Cobo Center, Detroit

08:15am – 08:55am



Mr. Ali JAMMOUL – Global Director
Body Exterior And Safety Engineering
At Ford

Body Lightweighting

09:00am – 09:40am



Paper 1: Dr. Gerald COLE – President
At Light Weight Strategies LLC

**Light Weighting the Automotive
Industry - The Road to 2025 CAFÉ**

09:45am – 10:25am



Paper 2: Mr. Laurence CLAUS -
President At NMI Training & Consulting
Inc. & Technical Consultant To EJOT
Fastening Systems LP USA

**EJOT Fastening Solutions Enable
Lightweight Body-in-white Assembly**

10:25am – 11:00am

Break for Refreshments/Coffee/
Tea, Snacks, Networking, Tech
Exhibition

11:00am – 11:40am



Paper 3: Dr. Akio NIIKURA - General
Manager R&D Division At UACJ Corp.

**UACJ's Global Strategy And
Approach To The Automotive
Aluminum Market**

11:45am – 12:05pm



Paper 4:
Mr. Lawrence E. BROWN – Executive
Director At Lightweight Innovations For
Tomorrow

**Lightweight Innovations For
Tomorrow!!!!**

12:10pm – 12:40pm



Closing Keynote:
Ms. Laura ANDERSON – CEO At
Aluminum Blanking Company

**The Story Behind Aluminum's
Sourcing Evolution: A North
America Perspective**

12:40pm – 12:45pm



Summary:

Mr. Jost GAERTNER, Managing
Partner At AluMag Automotive
GmbH

12:45 pm – 01:30pm



Reception Speech With Snacks &
Finger Food

Mr. Michael KOEHLER - Industry Vice
President At Reed Exhibitions USA

01:30pm – 05:30pm



Individual Or Guided Visit At The
2015 "Aluminum USA" Exhibition

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TITLE

Chassis & Suspension Weight Reduction By LPDC Aluminum With Hollow Cross Sections

ABSTRACT

Lightweight construction is a dominant theme in the automotive industry. The latest emission standards and CO2 fleet requirements of governments are forcing our customers to find new ways to reduce the weight of the vehicle. This ranges from lighter, yet more stable crankcases via weight-optimized chassis parts.



Mr. Kevin CROY
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TITLE

Chassis & Suspension Weight Reduction By LPDC Aluminum With Hollow Cross Sections

ABSTRACT

Lightweight construction is a dominant theme in the automotive industry. The latest emission standards and CO2 fleet requirements of governments are forcing our customers to find new ways to reduce the weight of the vehicle. This ranges from lighter, yet more stable crankcases via weight-optimized chassis parts.

Today new developments in the field of sand core production, casting machines and process technology allow structural parts and crankcases to be produced with the low-pressure casting.



Chassis & Suspension Weight Reduction By LPDC Aluminum With Hollow Cross Sections

Agenda

1. **Short introduction – Who is Kurtz?**
2. **General Topics and motivation to use LPDC**
 - Motivation
 - Casting process – Low Pressure Casting
 - Cost pressure
 - Process as a whole
3. **Layouts Casting Lines from experience**
4. **Application regarding light weight construction**
 - Properties cast parts
 - Productivity
 - Sand core technology
 - Type of sand cores
 - Core handling
5. **Summary and prospects**

1. Who is KurtzErsa?

Business Segments

Electronics Production Equipment

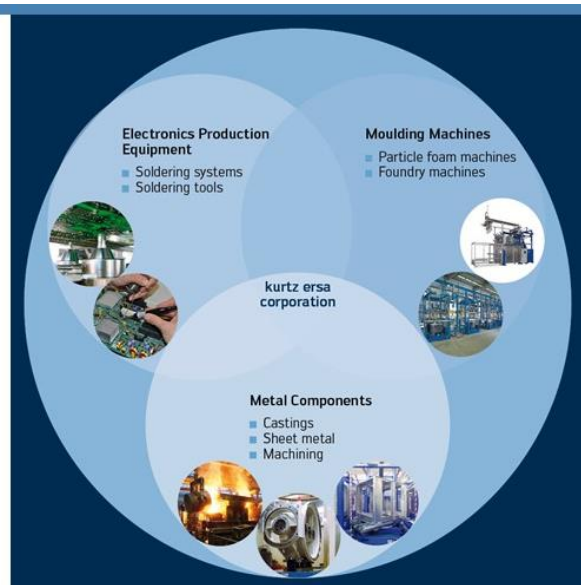
- Soldering systems
- Soldering tools

Metal Components

- Castings
- Sheet metal
- Machining

Moulding Machines

- Particle foam machines
- Foundry machines



Corporate history

- 1779 Forge hammer mill
- 1852 Iron foundry
- 1860 Machine factory
- 1971 Particle foam machines
- 1982 Aluminum foundry
- 1983 Casting machines
- 1984 Internationalization: USA
- 1987 Internationalization: China
- 1993 Soldering technology
- 1996 Sheet metal technology
- 1998 Kurtz Holding
- 2004 225th anniversary of kurtz ersa
Machinery factory Kurtz Zhuhai, China
- 2006 Internationalization: Russia
- 2007 Stencil printers
- 2009 Trimming presses
- 2011 New corporate identity
- 2012 New powder coating plant
- 2013 New assembly shop
- 2014 Anniversary 235 years Kurtz Ersal Hammer Museum
- 2015 Opening SMART FOUNDRY



Where it all began: Forge hammer mill in Hasloch

kurtz ersa headquarters in Kreuzwertheim today



KURTZ Trimming Presses



KPS 3000 SKT



KPS 1000

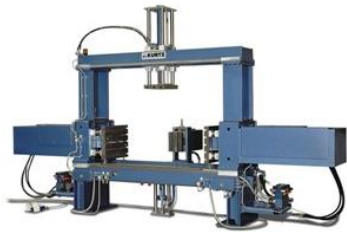


KPS 500



KPC 520

KURTZ Tilting and Gravity Casting Machines



AK10



AK01



Gravity Casting Cell

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KURTZ Low Pressure Casting Machines



AL 10-7 SC



AL 14-10 SR

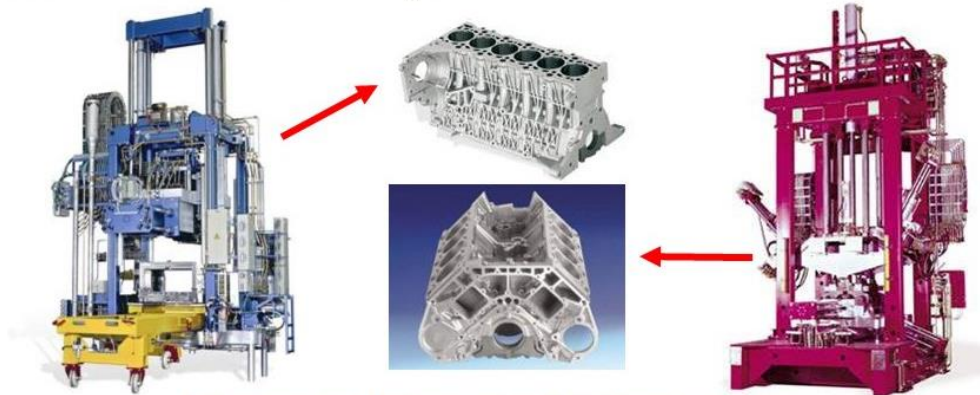


AL 13-13 FSC with furnace shuttle

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KURTZ Customized LP-Casting Machines

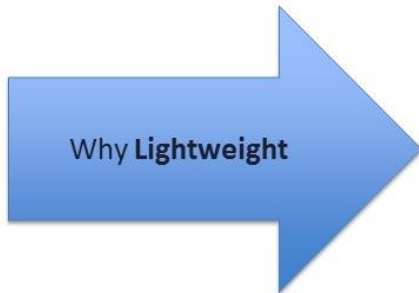


Following engine blocks are cast on KURTZ foundry machines:
BMW F1 – Racing, BMW V8, V10 and V12, Porsche V8 - Sports utility vehicle; Audi V6 and V8, BMW R6 Diesel, VW R5 and V10 Diesel, Jaguar V8, Land Rover V8

2. General Topics and motivation to use LPDC for Chassis and Suspension part casting

- Motivation
- Casting Process – Low Pressure
- Cost pressure
- Process as a whole

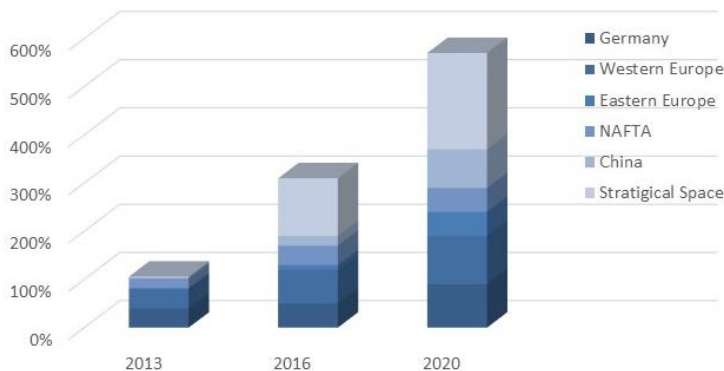
Motivation of our customers



- CO2 reduction
- Reduced fuel consumption
- Material substitution
- Component substitution
- Material Handling

Motivation of our customers

Development Purchasing Volume Chassis and Suspension LM-Castings



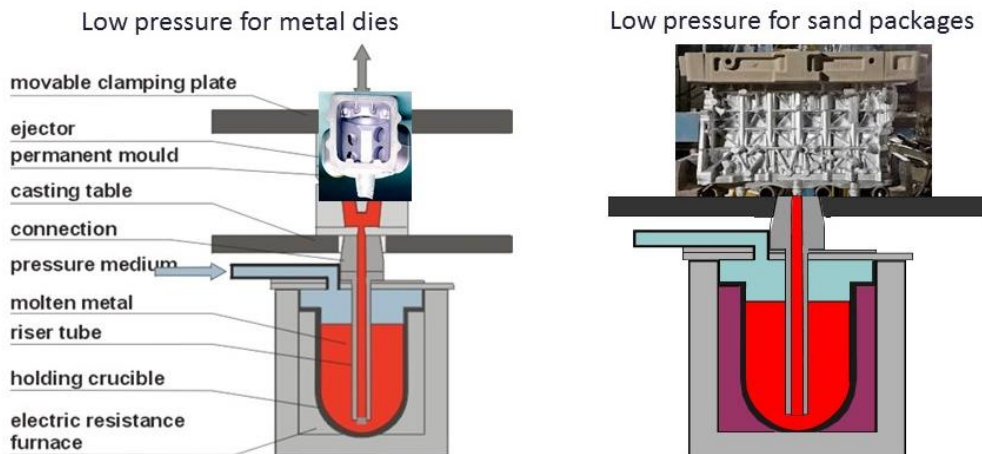
- Growth of market volume in Europe through use of more LM castings in chassis and suspension parts
- NAFTA grows with new automobile architectures
- China grows over proportional due to additional quantities

Graphs are courtesy of BMW

Requirements of machine- and process development

- Developing of inorganic core binder systems
- Developing of a special casting process with the use of low pressure machines
- Developing highly efficient LPDC machines and casting lines
- Special casting line concepts for highest AI material cleanliness

Basic Concept of Low Pressure Die Casting



Advantages and Benefits of Low Pressure

- ❖ **Controllable filling of the mold**
filling against gravity force
 - ➔ no turbulence
 - ➔ less oxide films
 - ➔ better mechanical properties
- ❖ **Feeding Pressure**
 - ➔ better mechanical properties
 - ➔ 1bar feeding \triangleq 6m height (Mg)
 - ➔ 1bar feeding \triangleq 4m height (Al)
- ❖ **Metal is kept within a closed vessel**
metal bath surface not disturbed or ruptured
 - ➔ cleaner material
- ❖ **Operation under a protected atmosphere**
 - ➔ no respectively low hydrogen content
- ❖ **Controlled solidification with pressurized furnace**
higher yield than with conventional risers
 - ➔ higher yield
- ❖ **Highly automated process**
 - ➔ less human faults

Comparison Gravity Die Casting – Low Pressure Die Casting

Example of yield:

Comparison of gravity die casting and low pressure die casting

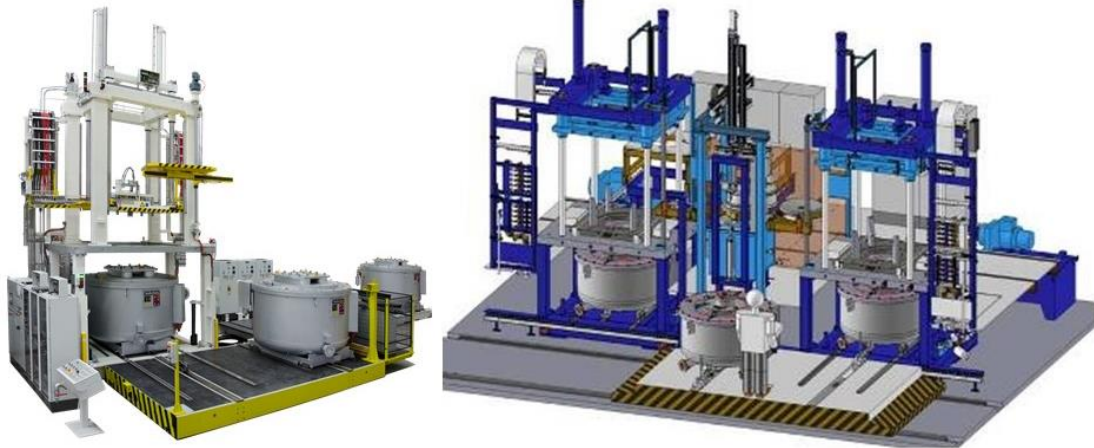


21,3 kg	Casting weight	12,2 kg
54%	Output	92%
7 pcs/h	Productivity	8 pcs/h

Example

- 50,000 parts / year
- 9 kg / part saving cycle
- = 450,000 kg aluminum
- 7% melting loss = 31,500 kg
- Total weight 481,500 kg
- Melting costs per kg \varnothing 0.50 € x 481,500 kg
- = 240,750.00 €

New Machine concepts



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Furnace exchange shuttles – 2800 kg Al



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Furnace Concept - Metallurgy

Furnace exchange with following advantages:

- Preparation of melt outside of casting unit
- Furnace under sealed conditions
settlement of melt
- No metal transfer after degassing
- Exchange of furnace within short time intervals
1 – 2 cycle down; “start“ furnace exchange within
non-productive time positive for thermal economy of tooling
therefore no or only few starting scrap due to furnace exchange
- Flexibility and different alloys



Furnace insulation / Energy costs



Cost reduction thanks to furnace insulation

- reduction of energy costs by 40 - 50 %
- Savings per year: approx. 50.000,- €
 - 300 kg furnace
 - 6 x 2 furnaces in line

Special mold cooling system – for optimized process control



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Tool change system – for very quick mold change overs

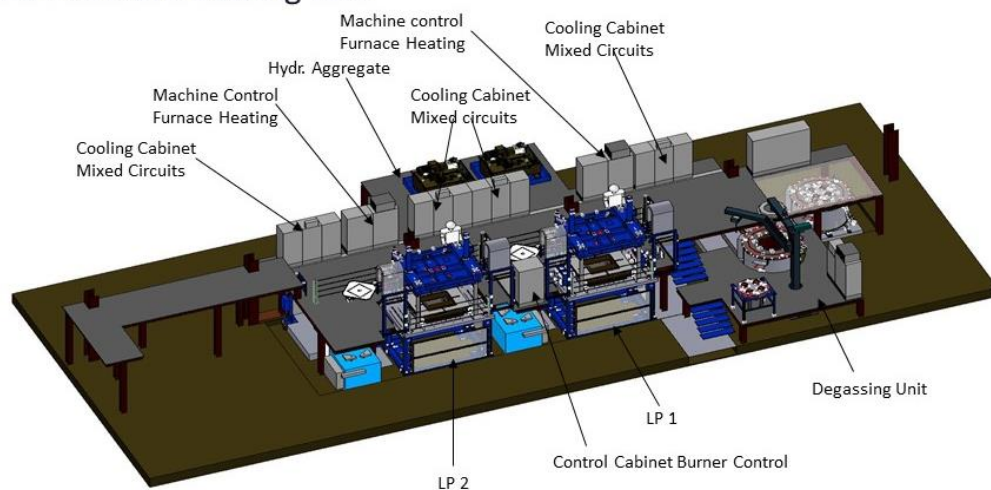


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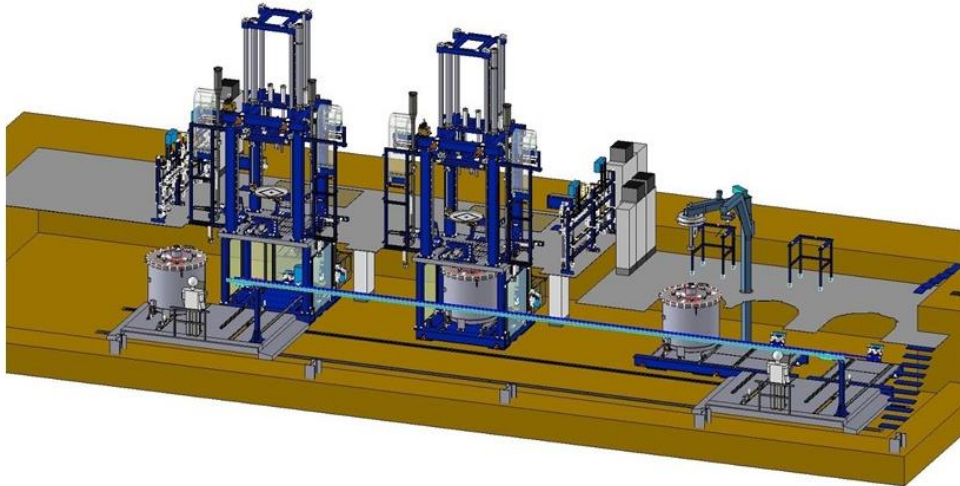
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3. Layouts Casting Lines from experience

Low Pressure Casting Line



Low Pressure Casting Line



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Low Pressure Casting Line



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Low Pressure Casting Line



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Automation

Automation Tasks

- Core handling
- Insert sieves
- Casting removal
- Cleaning mould
- Cooling
- Marking with plausibility check
- Peripherals
- Unloading



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4. Application regarding light weight construction

- Properties cast parts
- Productivity
- Core technology
 - Type of cores
 - Core handling

Structure Part Side Beam for Al-Car Body

Product:
Side beam,
complex cast with cores
LP-Die-Casting
AlSi7Mg0,2 T6
Wall thickness $\geq 3,5$ mm

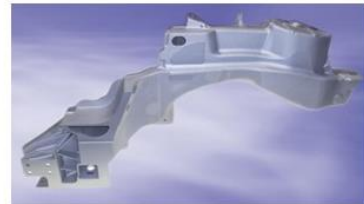
Mechanical Properties
(critical areas):

$R_{p0,2} \geq 160$ N/mm²
 $R_m \geq 240$ N/mm²
 $A_5 \geq 12$ %

Main Characteristics:

- Large dimensions
 - 1200 mm
- Thin walls
 - Actual 4 mm
 - Aim $\geq 2,5$ mm
- High ductility
- High yield strength

1200 x 800 / 20kg



Source: Martinrea Honsel Germany GmbH



Low Pressure WITHOUT Sand Core

Product: B8 knuckle front le/ri
Model: Audi A4, A5
Process: Low pressure die casting, 4 cavities
Scope: Casting, boring, blasting, heat treatment
Alloy: AlSi7Mg; 3,65 kg



Source: Georg Fischer Kokillenguss GmbH,
Herzogenburg, Austria

+GF+

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Low Pressure WITH Sand Core / Suspension Part

Product: knuckle le/ri
Model: Porsche Panamera
Process: Low pressure die casting, 4 cavities
Scope: Core making, casting, de-coring, trimming,
sawing, heat treatment, processing
Alloy: AlSi7Mg; 4,35 kg



Source: Georg Fischer Kokillenguss GmbH,
Herzogenburg, Austria

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Mechanical Properties Knuckle

Knuckle Porsche Panamera - Sandcore

Yield Strength

Target: 220 MPa

Actual: 222-260 MPa

Tensile Strength

Target: 260 Mpa

Actual: 288-336 MPa

Elongation

Target: 6 %

Actual: 6-12 %



Knuckle Audi B8 – no cores

Target: 220 Mpa

Actual: 239-286 MPa

Target: 280 MPa

Actual: 305-343 MPa

Target: 5 %

Actual: 5-14 %



Source: Georg Fischer Kokillenguss GmbH,
Herzogenburg, Austria

+GF+

Low Pressure WITH Sand Core / Suspension Part

- Product:** Transverse control arm le/ri
- Model:** Porsche Panamera
- Process:** Low pressure die casting, 2 cavities
- Scope:** Core production, casting, de-coring, trimming, sawing, heat treatment, processing, assembly rubber bearings
- Alloy:** AlSi7Mg; 3,70 kg



Source: Georg Fischer Kokillenguss GmbH,
Herzogenburg, Austria

+GF+

Low Pressure WITH Sand Core / Suspension Part

Product: Swivel bearing le / ri
Model: Porsche Panamera
Process: Low pressure die casting, 4 cavities
Scope: Core production, casting, de-coring, trimming, sawing, heat treatment, processing, assembly cone bushings
Alloy: AlSi7Mg; 4,20 kg



Source: Georg Fischer Kokillenguss GmbH, Herzogenburg, Austria



Mechanical Properties Swivel Bearing

Swivel bearing Porsche Panamera

Yield Strength

Target: 220 MPa Actual: 221-268 MPa

Tensile Strength

Target: 260 MPa Actual: 292-346 MPa

Elongation

Target: 6 % Actual: 6-12 %



Swivel bearing Porsche Panamera

Target: 220 MPa Actual: 228-265 MPa

Target: 260 MPa Actual: 293-344 MPa

Target: 6 % Actual: 6-12 %



Source: Georg Fischer Kokillenguss GmbH, Herzogenburg, Austria



Low Pressure / Suspension Part

Product: Cross beam
Model: Porsche Panamera
Process: Low pressure die casting, 2 cavities
Scope: Casting, trimming, sawing, heat treatment, processing
Alloy: AlSi7Mg; 6,1 kg



Source: Georg Fischer Kokillenguss GmbH,
Herzogenburg, Austria

+GF+

5. Summary and Prospects

Summary

- **Light weight construction / Core casting**
 - One cast part replaces several sheet metal parts which have to be joined together
 - Weight reduction
 - Profitably
- **Part geometry**
 - Dimensions of known suspension parts up to structural parts
 - Larger and more complex
 - Core technology– anorganic cores
- **Plant designs**
 - Casting machines and furnaces become larger
 - Multiple cavity 4- up to 8-cavities
 - Riser tube/ gating concepts more complex
 - More cooling and controlled
 - Melting/ furnace logistics

Reasons for low pressure casting

- **Casting requirements**
 - Mechanical properties
 - Elongation
- **Economical**
 - Cycle material
 - Profit by reduced energy costs – melting down
 - Profit by „Return cycle material – Recycling“
 - Cycle time – multiple cavities
- **All round part concept**
 - Easier way from cast part up to finished part
 - Less post-processing
- **Plant concepts / Investments**
 - The bottom line is economical!
 - Will stand every competition!

Prospects

- Light weight construction / core casting as promising casting
- Tailored universal machines in large format
 - Is our standard
 - Cycle time – multiple cavity
- Low pressure as intelligent concept
 - Classic low pressure casting
 - Low pressure casting combined with gravity casting
 - Cycle time by multiple cavity unbeatable
 - MORE than competitive, low pressure compared to high pressure die casting

**Thank you very
much for your
attention!**



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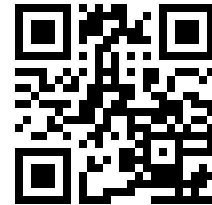
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AUTOMOTIVE LIGHTWEIGHT

PROCUREMENT SYMPOSIUM

Hilton Hotel in Duesseldorf, Germany



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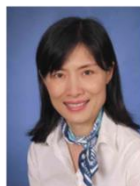
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