

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



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

Organised by Reed Exhibitions

Partners GDA GESAMTVERBAND DER ALUMINIUMINDUSTRIE e.V. European Aluminium Association

Visions become reality.

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



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, con-trolling, 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

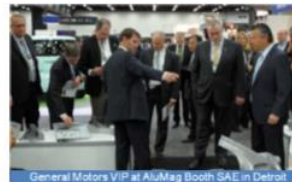
- Organization of Technical & Commercial Roadshows
- Oversea Commercial & Technical Events
- Host In-House Events & Presentation
- Common Technology Booth at Leading Exhibitions

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



Daimler 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

CONTACTS & PROJECT TEAM



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



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Introduction

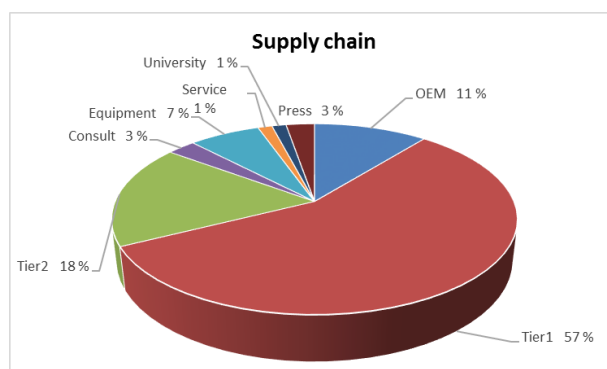
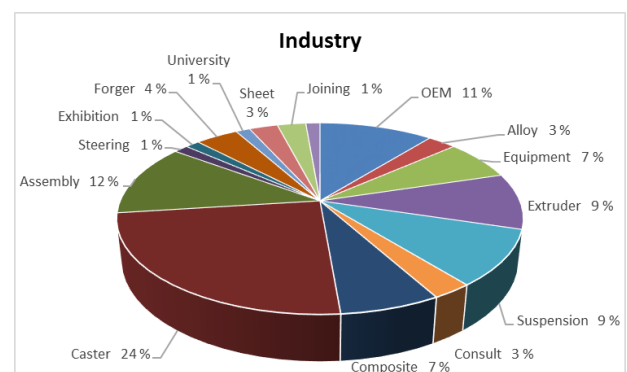
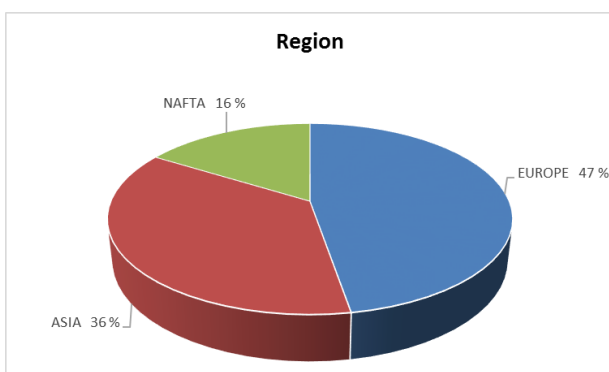
The 'Automotive Lightweight Procurement Symposium' in 2014 from October the 5th – 7th at the Hilton Hotel in Duesseldorf, Germany is the first unique and cutting edge event that brings together the procurement and supply side of lightweight materials and their advanced processes (aluminium, carbon, composites, 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

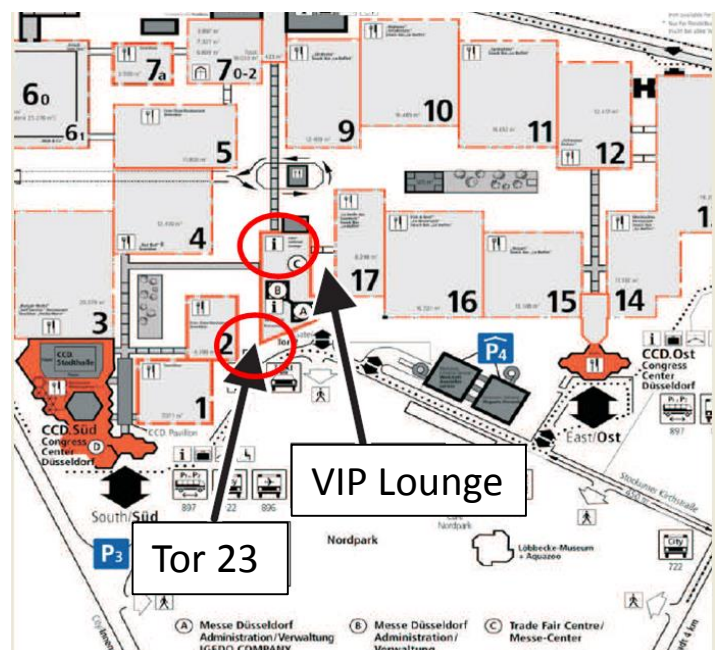
05:55pm – 06:00pm Summary: Mr. Jost Gaertner – Managing Partner – AluMag Automotive GmbH

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**



EXHIBITOR

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BHARAT FORGE



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TITLE

Design Approach & Process Methodologies: How To Improve Aluminum Alloys Advantages In High Performance Components

ABSTRACT

Top performances required by nowadays automotive components cannot be reached by chance. The engineering community dealing with weight savings is as well seeking for a product's solution able to meet cost target. In order to solve this challenging equation all details count. The attractive high pressure die casting transformation process, able to integrate functions and to provide high performances to weight ratio components, will continue to grow only if, from raw material to final application, process and product development tools (i.e. ingot and casting filling and solidification numerical simulation, component Finite Element Modeling thermo-structural analysis) are used extensively. Once the equation is solved with the virtual approach, the day by day success of the application relies on material quality, supply reliability and process stability. The speech will provide an overview on the Rheinfelden Alloys role in this path to the sustainable exploitation of aluminum advantages for the automotive market.



Design approach and methodologies : how to improve aluminum alloys advantages in high performances components

Automotive Lightweight Procurement Symposium
October 5 - 7th , 2014
Düsseldorf , (D)

Claudio Mus **Rheinfelden Alloys – President**



Solutions thru Innovation



The ALUMINIUM RHEINFELDEN Group



RHEINFELDEN ALLOYS MISSION

To develop and supply aluminum alloys

- ... that meet Customer's needs & requirements
- ... Co-designed with the end-user
- ... in the requested quantity (from minimum 1,5 t)
- ... on a fast delivery time (72 hours from P.O.)
- ... in ingot with the RHEINFELDEN - Quality

RHEINFELDEN ALLOYS is certified by ISO TS 16949



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Top performances required by nowadays automotive components cannot be reached by chance

The engineering community, dealing with top performances and weight savings, has the challenge to find a product's solution able to meet cost target

In order to solve this challenging equation all details count

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Understand product development challenge: competition among materials

Drivers

Performances

MATERIAL PROPERTIES
TRANSFORMATION PROCESS
RELIABILITY
MANUFACTURING PROCESS
ABLE TO SATISFY DESIGN
BEST SOLUTION

Costs

MATERIAL
SCRAP
DIE LIFE
CYCLE TIME
NET/POUR RATIO
CAPITAL
INVESTEMENT

Aluminum Alloys answers

IMPROVED INGOT QUALITY
HIGHER STRENGTH & DUCTILITY
NO HEAT TREATMENT
IMPROVED CASTABILITY
LONGER DIE LIFE
GOOD ENOUGH ALLOY

When metallurgist

- are able to understand the end users needs
- have the know-how to design and produce a new material
- have the experience on how to transform new material into cost competitive and/or high performances components

No wonder

The market will grant them !



Rheinfelden Alloys plays an important role in this path to the sustainable exploitation of aluminum advantages for the automotive market

With its intuition in the development of structural aluminum alloys, important milestones in this field have been set

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Silafont® - 36 Heat treated structural parts



1994
HPDC Nodes in the first Aluminum Intensive Audi A8

- Heat treatable
 - Good weldability
 - No corrosion
- Riveting possible in temper T 7

2006: Space-Frame Nodes in the Audi TT

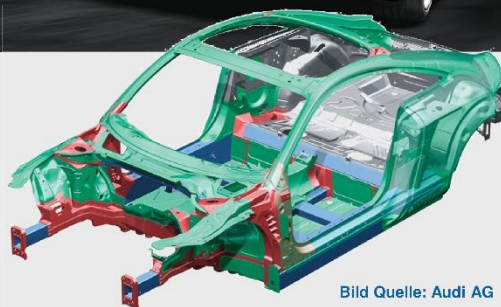
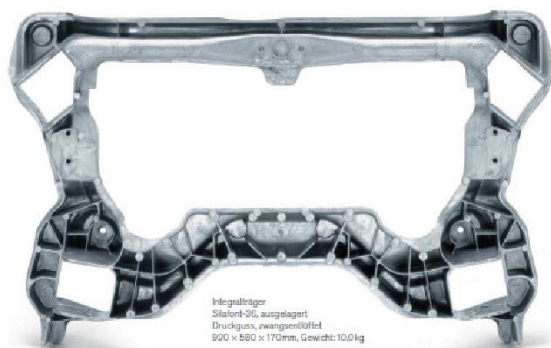


Bild Quelle: Audi AG

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Silafont®-36 [AlSi9MgMn]



Integrallinger
Silafont®-36, ausgegallert
Druckguss, zwangsverformt
900 x 580 x 170mm, Gewicht: 10,0 kg



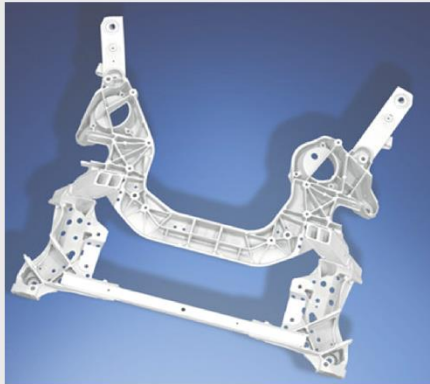
Motorrad-Rahmen
Silafont®-36, wärmeausgegallert
Druckguss, verschleißfest
800 x 480 x 540mm, Gewicht: 10,4 kg

Si	Fe	Cu	Mn	Mg	Zn	Ti	andere
9,5-11,5	0,15	0,03	0,5-0,8	0,1-0,5	0,07	0,15	Sr

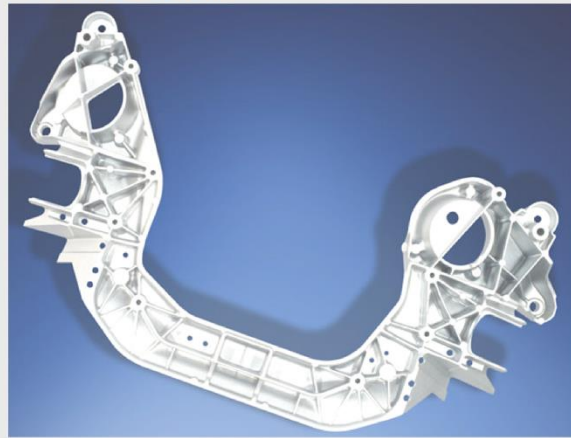
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Magsimal® - 59 Lighter structural castings



- High mechanical properties in the as cast condition
- Weldable
- No corrosion



Solutions thru Innovation



Magsimal® - 59 Lighter structural castings



Shock Tower:

- integrated diagonal strut
- high fatigue strength
- high crack resistance



Door Frames:

- High rigidity to weight ratio



Solutions thru Innovation



Magsimal[®]-59 [AlMg5Si2Mn]



Rear cross member
Magsimal-59, as-cast state
High pressure die casting, wall thickness 4 mm
1080 x 370 x 150 mm, weight: 6.5 kg



Cabrioledckel
Magsimal-59, Gusszustand
Druckguss, Wanddicke 2-5 mm
740 x 150 x 125 mm, Gewicht: 1,2 kg

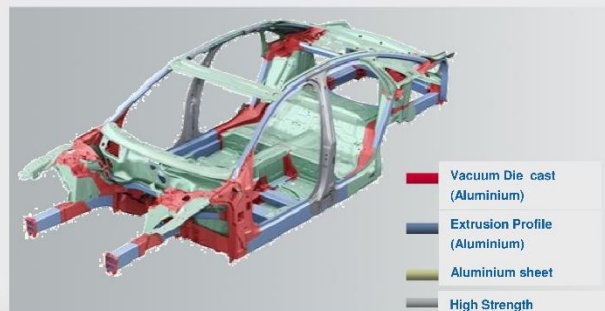
Si	Fe	Cu	Mn	Mg	Zn	Ti	Be
1,8-2,6	0,20	0,03	0,5-0,8	5,0-6,0	0,07	0,20	0,004

Solutions thru Innovation

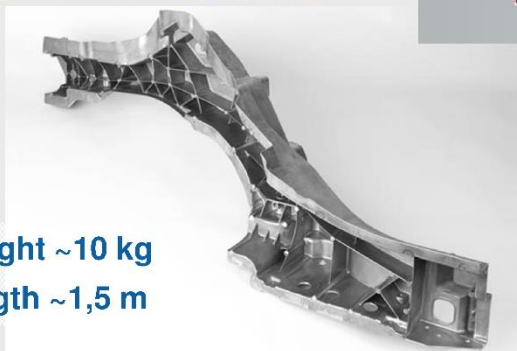


Castasil[®] - 37 As cast structural parts

- No heat treatment
 - High dimensional stability
 - No long - term ageing
 - Rivetted, welded
 - No corrosion
- (tight control of alloying elements)



- Vacuum Die cast (Aluminium)
- Extrusion Profile (Aluminium)
- Aluminium sheet
- High Strength Steel Sheet



weight ~10 kg
length ~1,5 m



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Castasil®-37 [AlSi9MnMoZr]



Türschwelle eines Sportwagens
Castasil-37
Druckguss
620 x 340 x 170mm, Gewicht: 1,2kg
700 x 340 x 170mm, Gewicht: 2,1kg



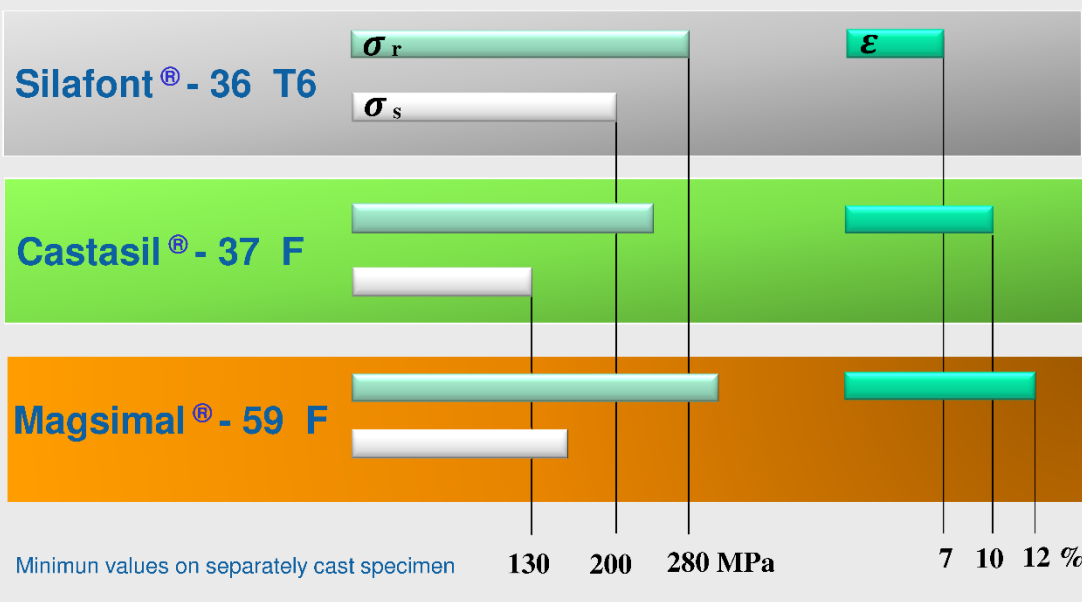
Seitenstützen einer Aluminiumkarosserie
Castasil-37
Druckguss, schweißgeeignet
340 x 210 x 200mm, Gewicht: 2,0kg

Si	Fe	Cu	Mn	Mg	Zn	Mo	Zr	andere
8,5-10,5	0,15	0,05	0,35-0,60	0,06	0,07	0,3	0,3	Sr

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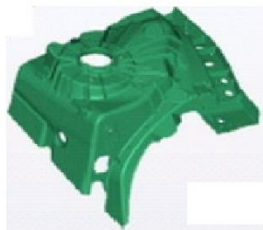




Alloys for structural casting at a glance



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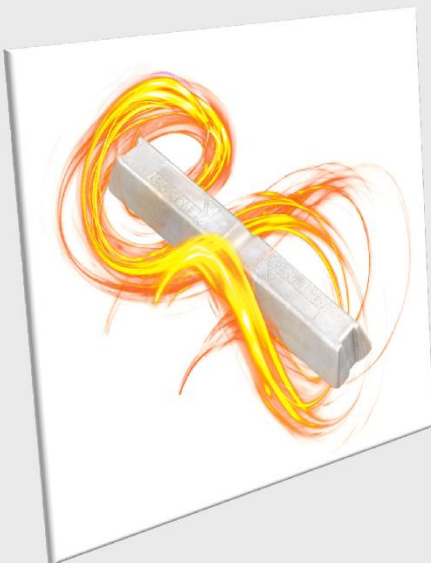
Product benchmark : Shock tower

Alloy	Silafont-36, AISi10MnMg	Magsimal-59; AlMg5Si2Mn	Castasil-37, AISi9MnMoZr
			
Customer	Mercedes Benz, actual C-Class	Porsche Panamera	Jaguar
Weight	3,1 kg	2,3 kg	3,5 kg
Dimensions	450x420x330 mm	590x450x340 mm	380x380x340 mm
State of casting	two-step heat treatment T6	as cast state F without HT	as cast state F without HT
Foundry	Daimler, Mettingen (Germany)	Georg Fischer, Altenmark (Austria)	JVM, Worcester (England)
Wall thickness	7 mm at central gate to 2,5 mm	2,5 mm	3 mm 4 mm
Comment	2 cavities die with 3 plates vacuum assisted process forced-air system for HT (T6)	Part design has to follow guidelines taking into consideration higher shrinkage , higher casting temperature	Properties are WT dependant Vacuum assisted process can provide Sigma S value of 120 MPa also in thicker sections
Die life	100	80	100
Sigma R	> 180 MPa	> 290 MPa	> 230 MPa > 220 MPa
Sigma S	> 120 MPa	> 160 MPa	> 120 MPa > 105 MPa
A%	> 10 %	> 7 %	> 10 % > 10 %

15.05.2014

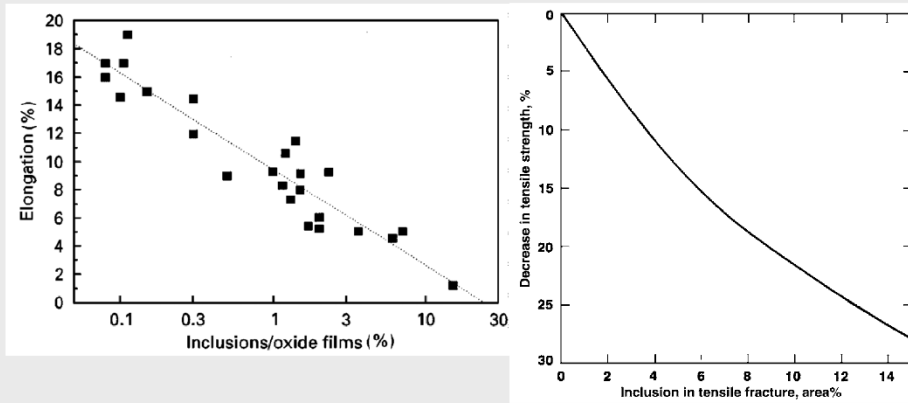
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How to go along with end users drivers ?



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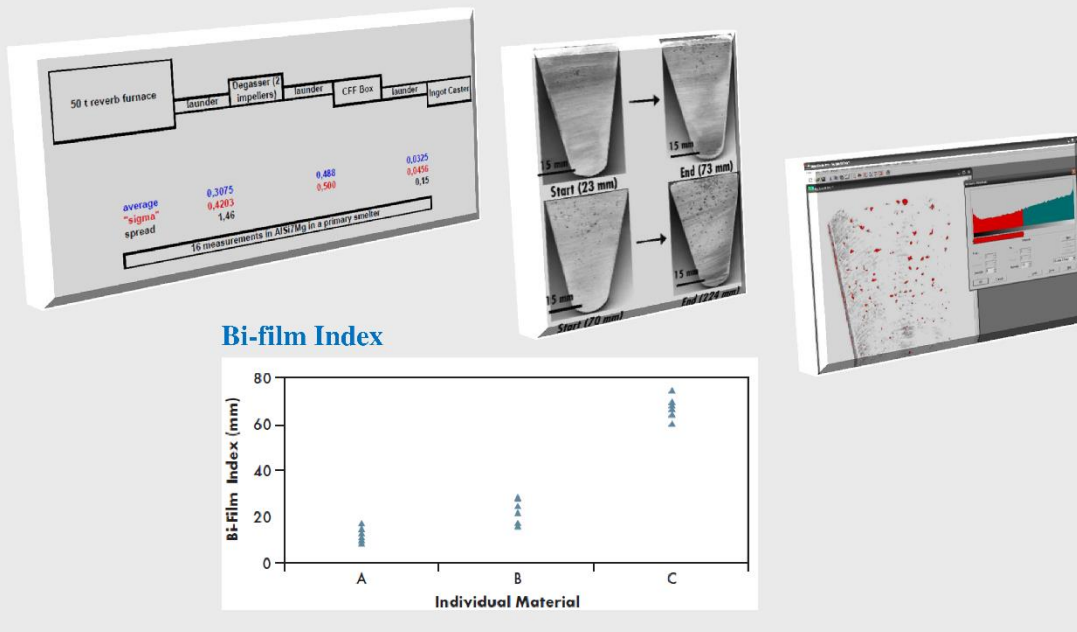
Improved ingot quality



Influence of inclusions and oxides on mechanical properties

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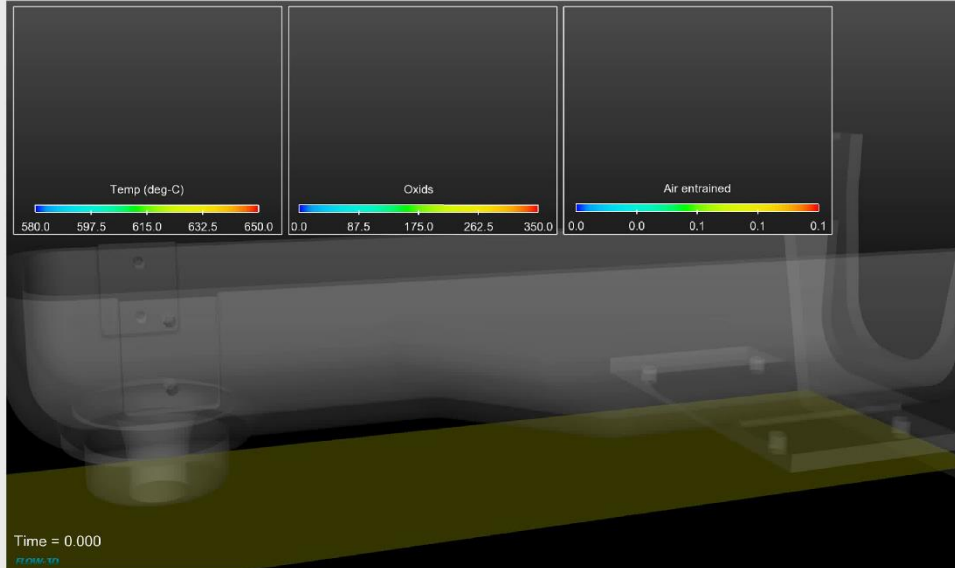
Improved process control



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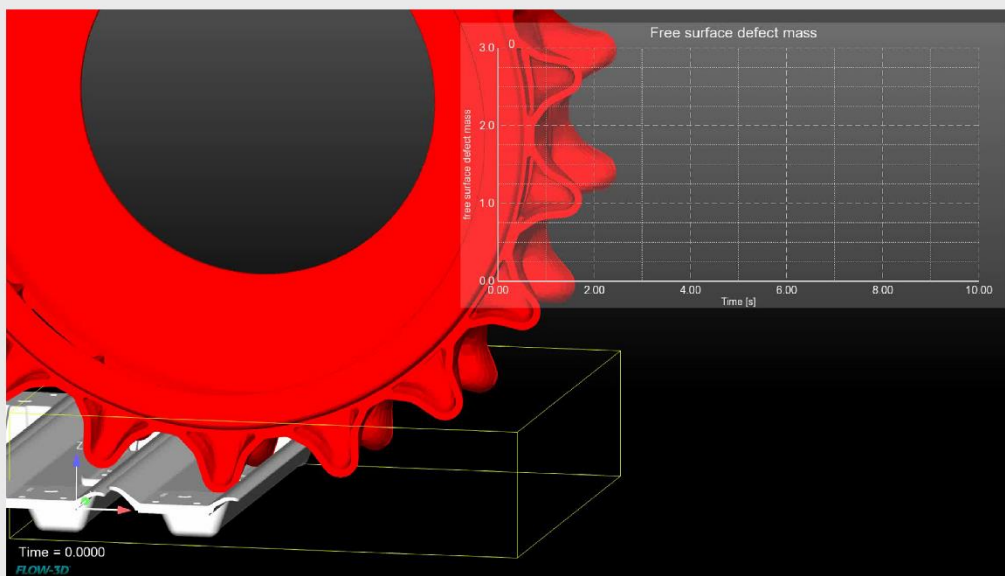
Advanced process design methodologies



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Advanced process design methodologies

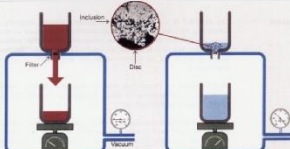


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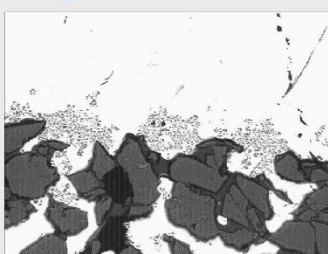
Quality assessment / correlation with modeling

ALPHA ALUMINA: $\alpha\text{-Al}_2\text{O}_3$

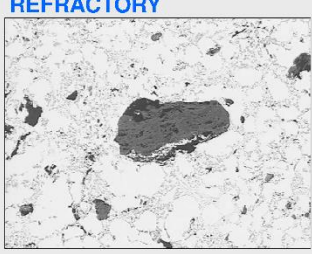
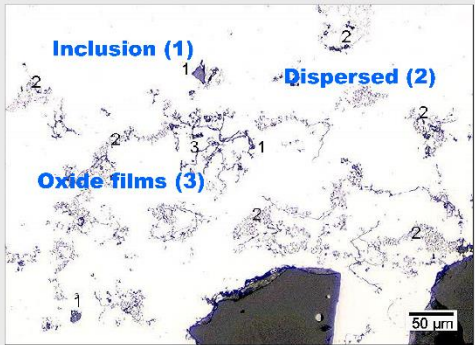
PoDFA Analyze



TiB₂: TITANIUM BORIDE
(TiV)₂: TITANIUM-VANADIUM BORIDE

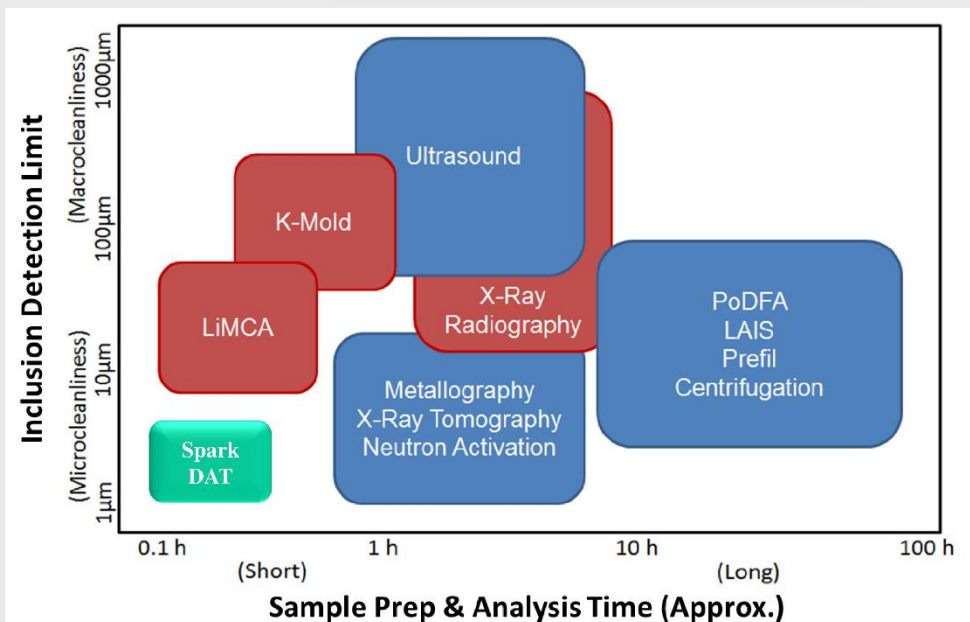


REFRACTORY

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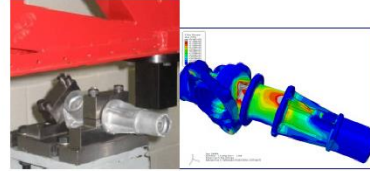
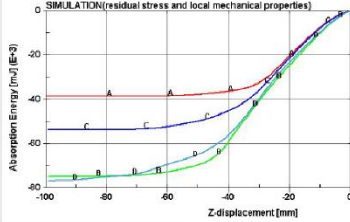
Faster process control



Solutions thru Innovation

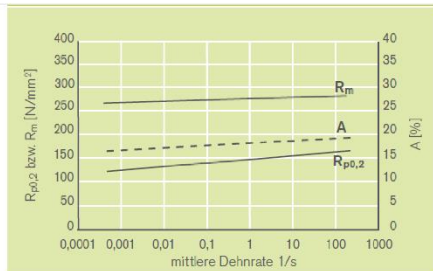
Understand end users needs for structural parts

Energy Absorption



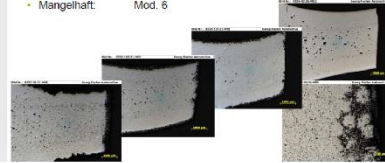
Crash relevant component design

Castasil-37 Zustand F nach FAT-Richtlinie ermittelt



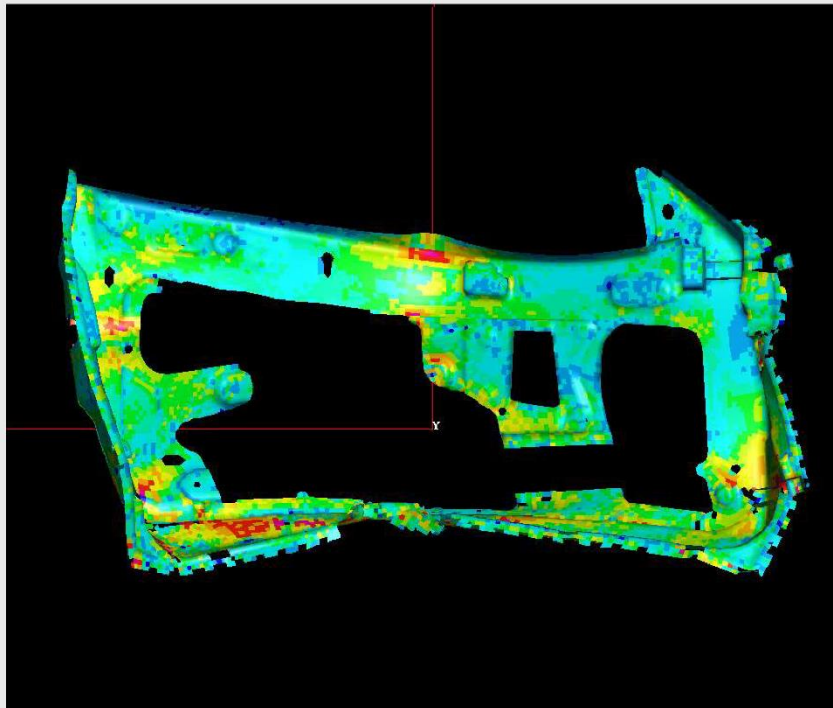
Strain rate material sensitivity

- Interkristalline Korrosion gemäß Norm VW P113
- Sehr gut: AlMg5Si2Mn
- Gut: AISI10MnMg, Mod. 2, Mod. 3, Mod. 4, AISI7Mg
- Befriedigend: Mod. 1, Mod. 5, AISI10Mn, AISI10Mg sek.
- Ausreichend: AISI9Cu3
- Mangelhaft: Mod. 6



Corrosion behavior

Solutions thru Innovation

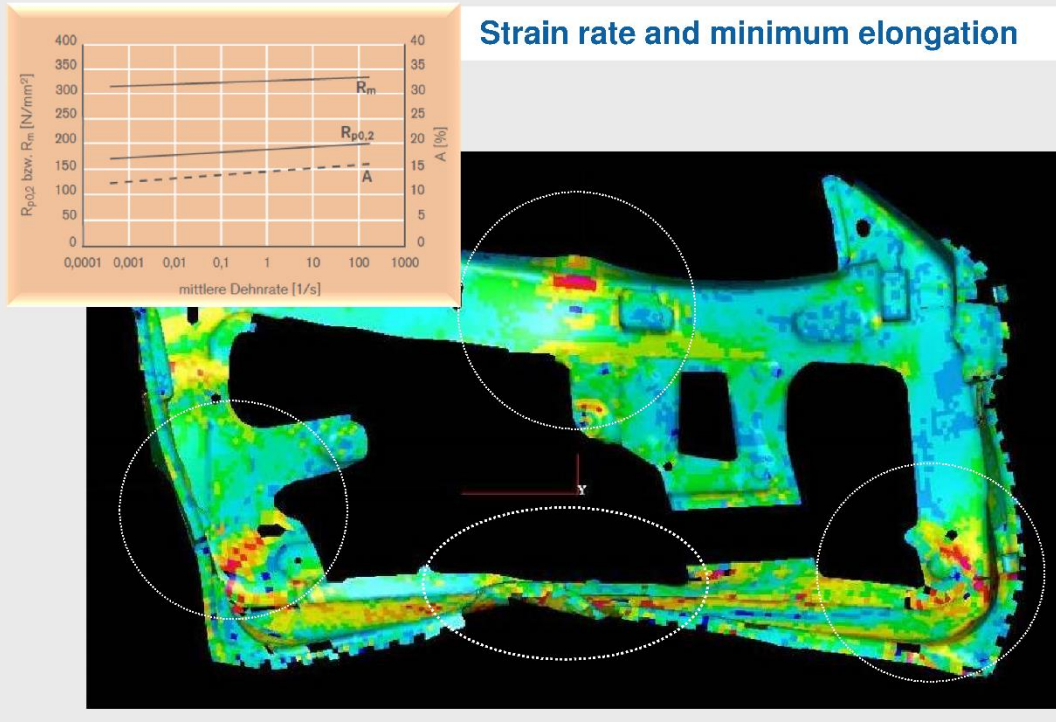


Lateral Crash door frame deformation

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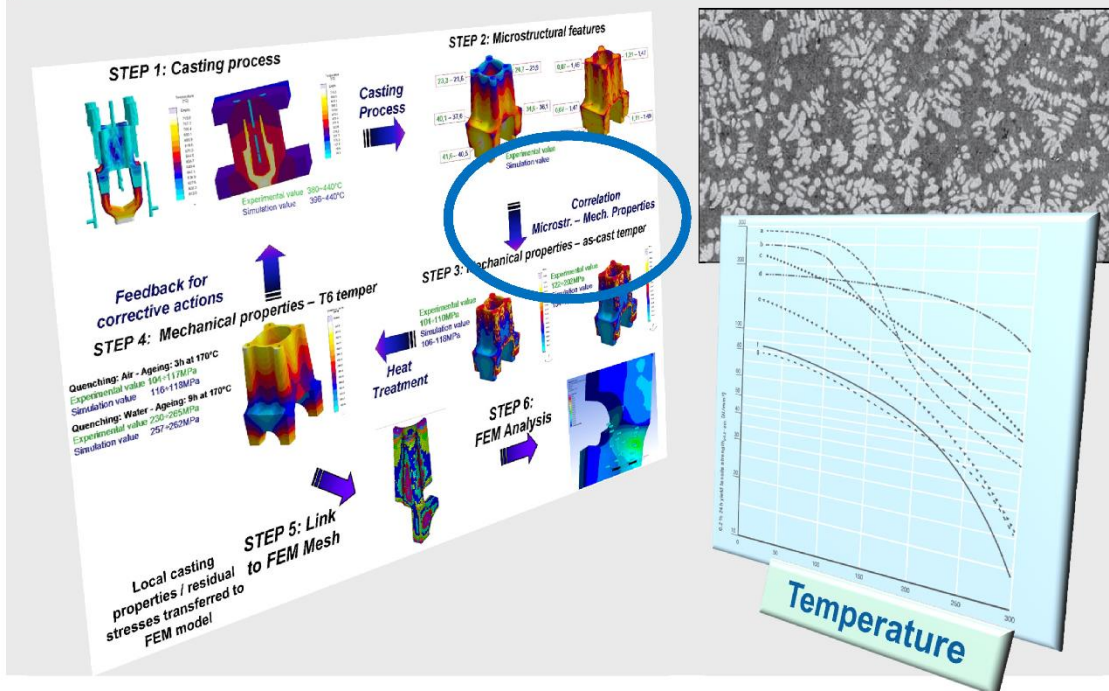
Strain rate and minimum elongation



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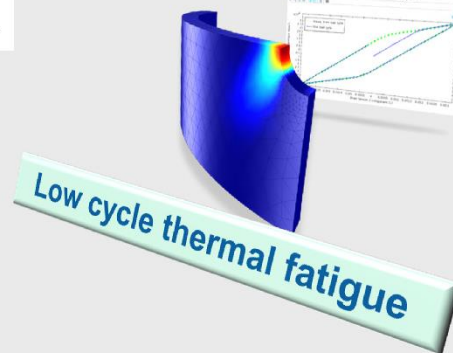
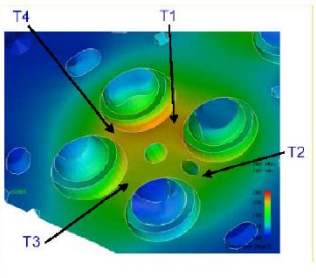
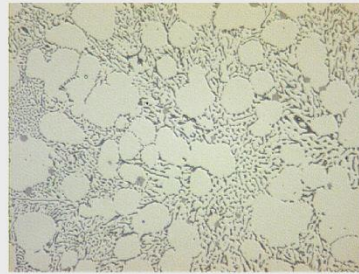
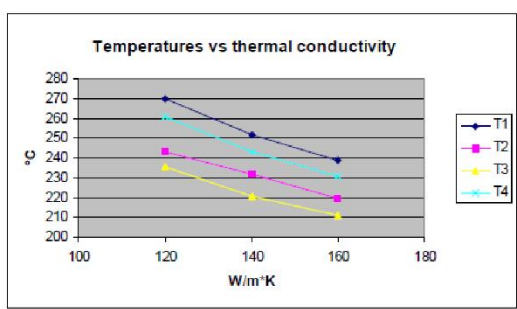


Understand end users needs in powertrain



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Understand end users needs in powertrain



Low cycle thermal fatigue

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Drivers

Performances

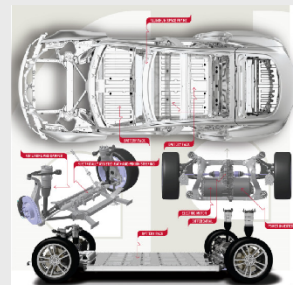
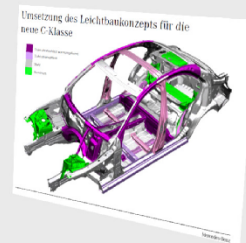
MATERIAL PROPERTIES
TRANSFORMATION PROCESS
RELIABILITY
MANUFACTURING PROCESS
ABLE TO SATISFY DESIGN
BEST SOLUTION

Costs

MATERIAL
SCRAP
DIE LIFE
CYCLE TIME
NET/POUR
RATIO
CAPITAL
INVESTMENT

Aluminum Alloys answers

IMPROVED INGOT QUALITY
HIGHER STRENGTH & DUCTILITY
NO HEAT TREATMENT
IMPROVED CASTABILITY
LONGER DIE LIFE
GOOD ENOUGH ALLOY

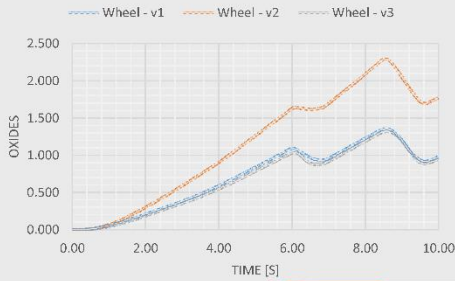


Once the equation is solved with the virtual approach, the day by day success of the application relies on material quality, supply reliability and process stability

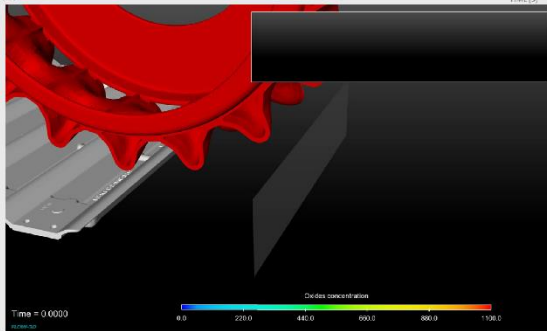
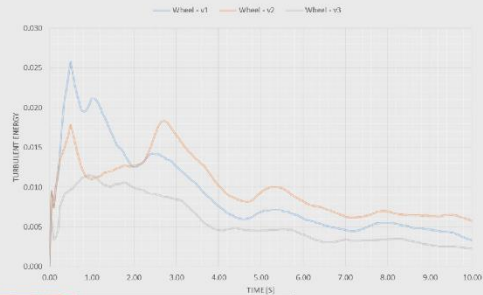
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Material quality and process stability

Global metal oxides

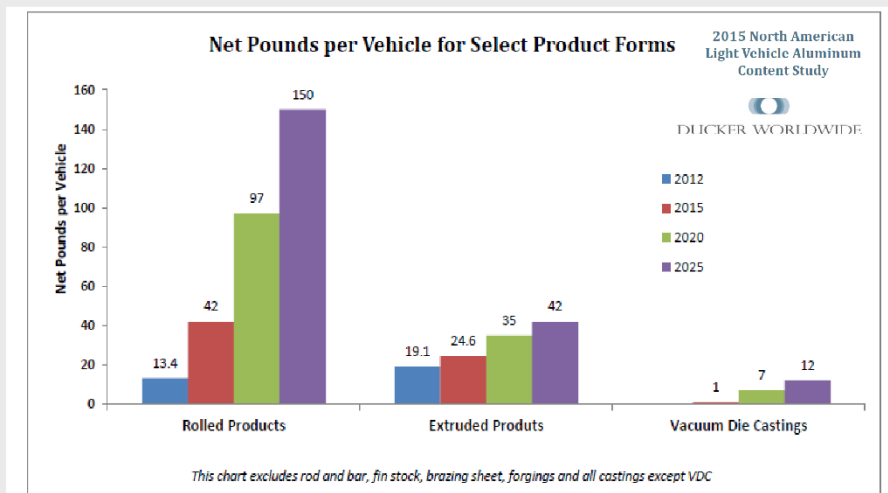


Global metal turbulent energy



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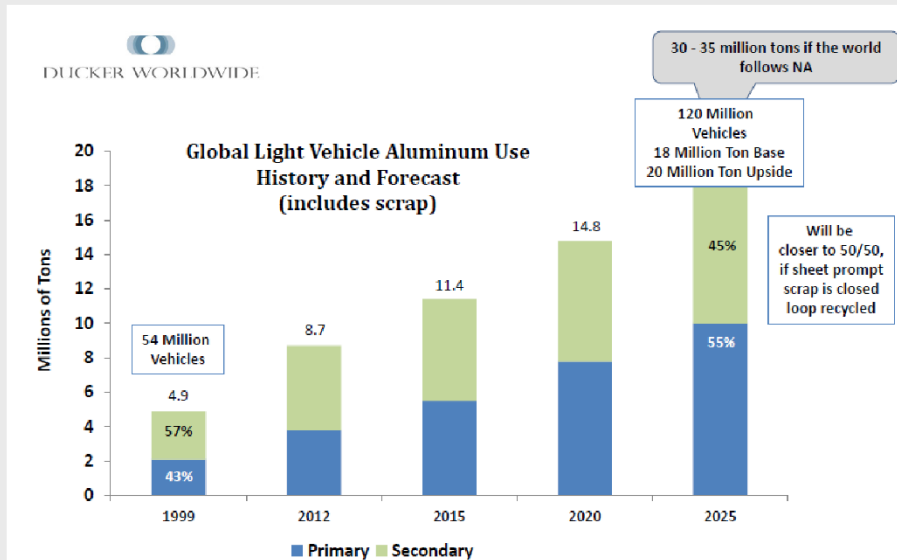
Perspective



Aluminum is in a steady growing phase

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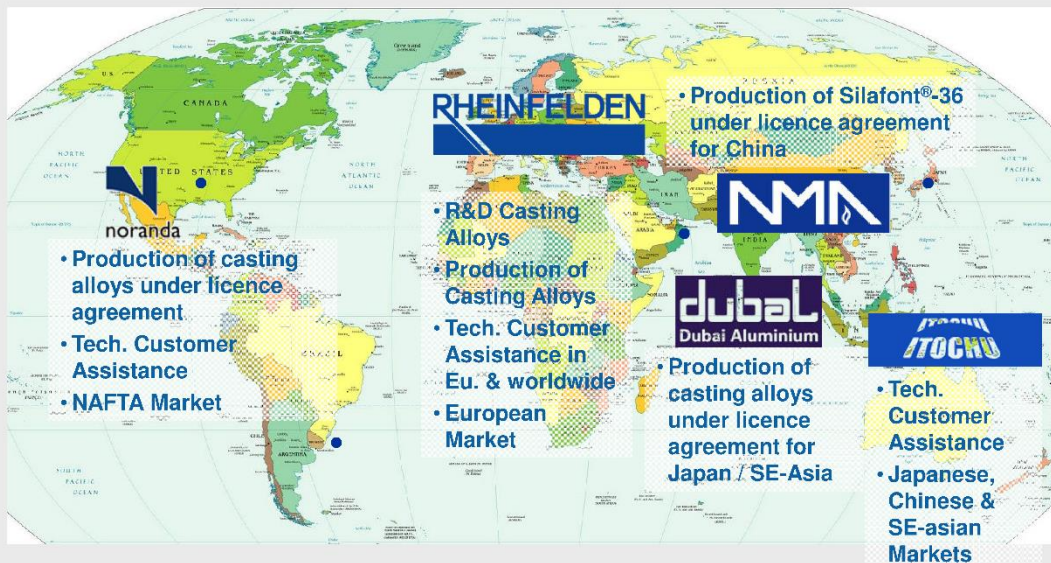
Perspective



Alloys producers have to support global supply

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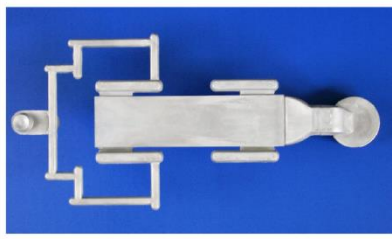
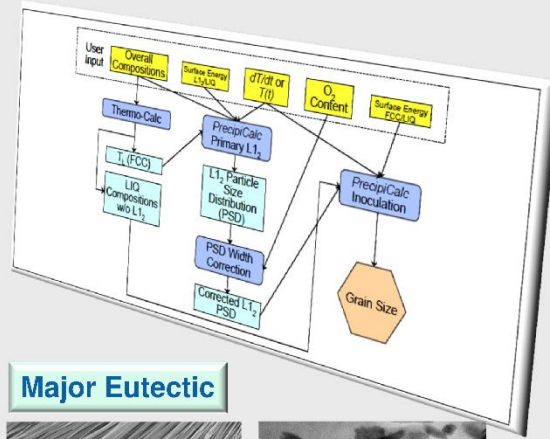
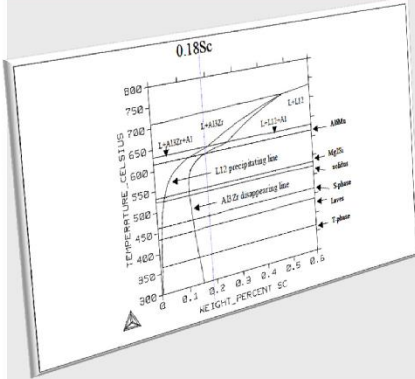
RHEINFELDEN ALLOYS Alliance Partnerships



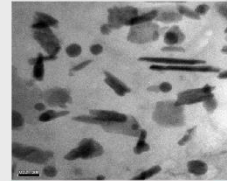
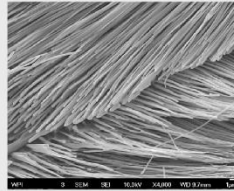
Solutions thru Innovation



Innovative alloys tailored to the end user needs



Major Eutectic



Precipitates

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Latest development

Development of improved corrosion behavior with adhesive bonding



Alloys optimization for stir welding joining technique

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**Committed to be Your Partner
sharing past experiences, today´s best practices
and
tomorrow´s challenges**



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