

Automotive Lightweight Procurement Symposium

2014 Oct 5 th – 7 th In Duesseldorf



AluMag®

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THE MARKET DEVELOPER

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7-9 Oct 2014 | Messe Düsseldorf
10th World Trade Fair & Conference
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EUROPEAN ALUMINIUM ASSOCIATION



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!

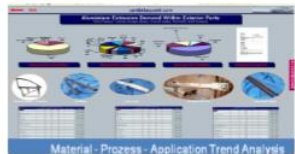
AluMag® offers the four following services - worldwide:



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



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, 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 Roadshow Location

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



General Motors visit 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

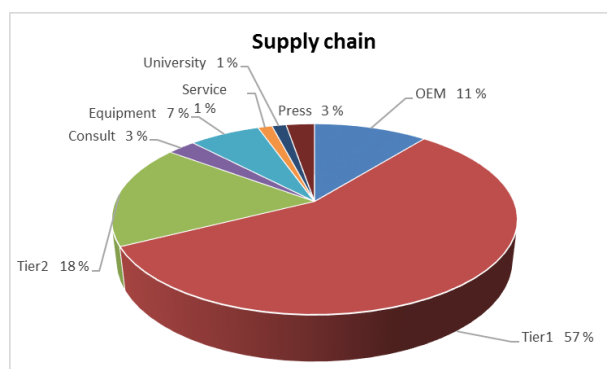
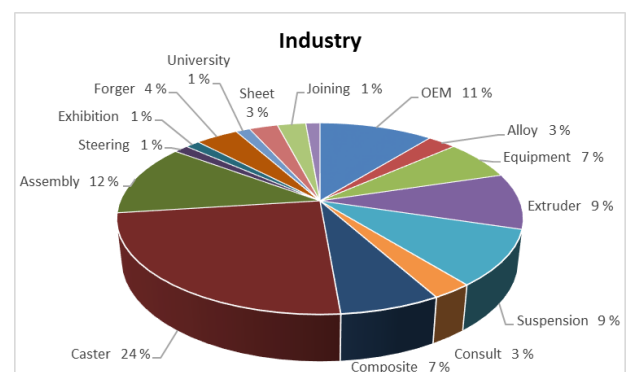
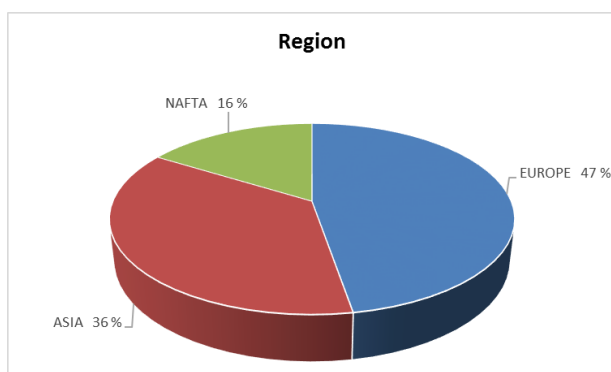
The 'Automotive Lightweight Procurement Symposium' in 2014 from October the 5th – 7th at the Hilton Hotel in Duesseldorf, Germany is the first unique and cutting edge event that brings together the procurement and supply side of lightweight materials and their advanced processes (aluminium, carbon, composites,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

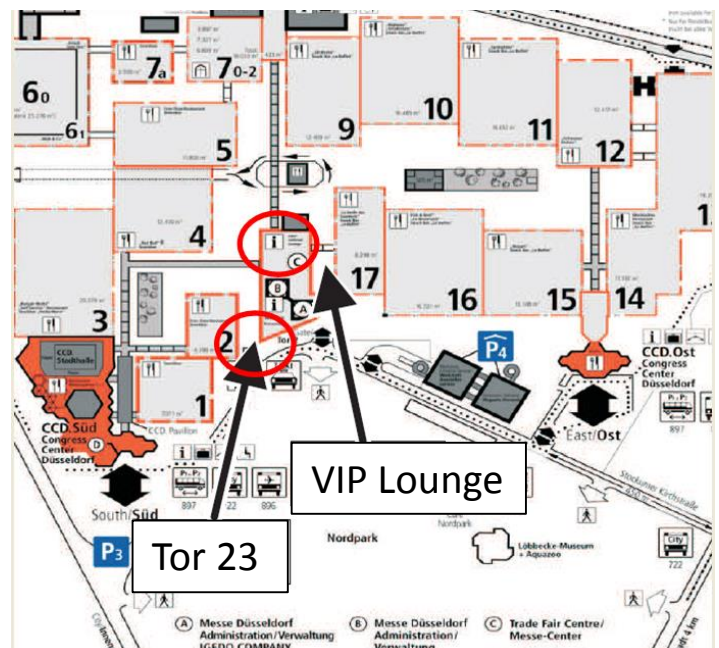
05:55pm – 06:00pm Summary: Mr. Jost Gaertner – Managing Partner – AluMag Automotive GmbH

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**



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TITLE

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

ABSTRACT



Lightweighting Technology Selection Based on a Material and Process Benchmark

- An Aluminium Extrusion Case Study Successfully Transferred into Series Production -

Dr. Axel Meyer, RIFTEC GmbH

Automotive Lightweight Procurement Symposium

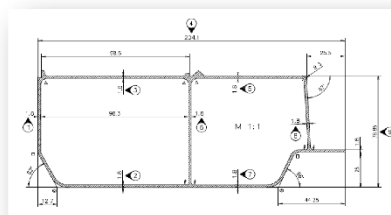
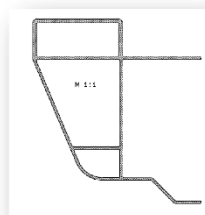
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Initial situation



Design engineer specifies an aluminium extrusion as structural component within the BIW with the intention to realise some lightweight potential.



Did we used the lightweighting potential to full capacity already by selecting an Aluminium extrusion ?
Please answer this question for yourself after this presentation.



Initial situation

There is significant potential to gain weight and even costs in the areas of:

A: Material

- Special alloys within the given international standards
- Properties tailored to the driving requirements for the individual application (static strength, energy consumption, corrosion resistance, fatigue properties, ...)

B: Process

- Enable linked potential along the entire process chain
- Use innovative approaches and joining methods to create large extruded assemblies

Profiles have to be lighter with smaller tolerances and with more functions included.

Comprehensive considerations along the entire production chain are essential to gain the lightweighting potential to full capacity.

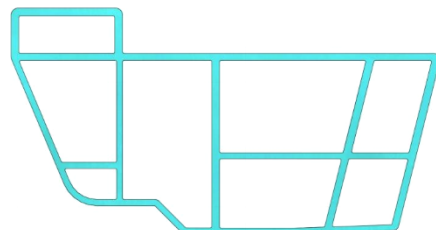


Benchmark on a structural profile application

Application: 650 mm long extrusion (280x150 mm) in a structural, crash relevant application

Concept A: conventional single extrusion

- Single, hollow extrusion with 8 chambers
- Large inscribed circle results in wall thicknesses far above the ones required by the design loads
- Geometric tolerances relatively coarse
- Complex cooling conditions limit the mechanical properties (ductility, strength, corrosion, ...)
- Low utilisation factor of the used/bought material



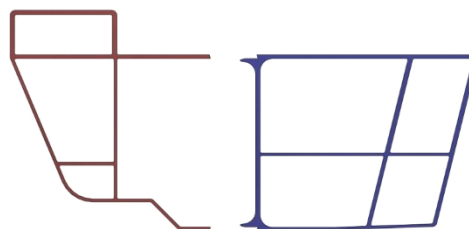


Benchmark on a structural profile application

Application: 650 mm long extrusion (280x150 mm) in a structural, crash relevant application

Concept B: optimised extrusion design and processes

- Two, hollow extrusions with 3 and 4 chambers
- Smaller inscribed circles enable smaller wall thicknesses and allow the use of smaller extrusion presses
- Tight geometric tolerances as requested by the design engineers
- Geometry of the extrusions give good cooling conditions. Reproducible mechanical properties on high levels
- High utilisation factor of the used/bought material
- Joining operation required
- Modification of the design to form the specific joint geometry might be necessary



Benchmark on a structural profile application

Extrusion is used as B-pillar in the Audi R8 Spyder.

Tight geometric tolerances, high ductility and low weight are essential for successful application. Original requirements almost impossible to achieve with a single extrusion approach.

Two-extrusion solution requires joining of the single components from both sides along the full length of 650 mm.

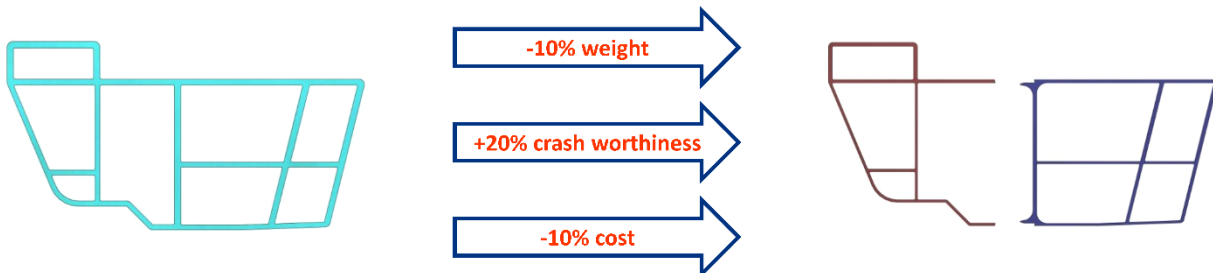
Friction Stir Welding (FSW) identified as high-quality, low-distortion and very reproducible welding process.



Benchmark on a structural profile application

Outcome of the benchmark:

- The friction stir welded extrusion is successfully used in the series production of the B-pillar in the Audi R8 Spyder since 2008.
- Reduced investment costs by 30%. Two smaller extrusion dies are less expensive than one large and more complex one.
- The welded component has superior technical properties compared to a “conventional” extrusion.
- Tolerances are smaller, crash worthiness is 20% higher, total weight reduced by ~10%.
- Costs per piece reduced by more than 10%!
- Secondary effects caused by reduced weight or improved properties are not taken into consideration within this study.



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Outlook

- Substantial improved properties and/or cost and weight reductions of extruded profiles are possible. In order to achieve this goal, focused cooperation along the entire process chain is essential. (design engineer, alloy development, extrusion, processing)
- Fulfilment of the specific requirements of the product should be the main objective.
- Using new technologies and processes of the alloy development and further processing will enable unique and superior properties (i.e. high strength with high corrosion resistance) far beyond the standardised values.
- Cost saving potential will become even higher if considering complete sub-modules.
- Shown potential is often left unused. Open and unbiased cooperation along the entire process chain is prevented by the individual self-interest of the parties.
Concentration of know-how and responsibility of as may process steps as possible in one hand gives highest chance of success.



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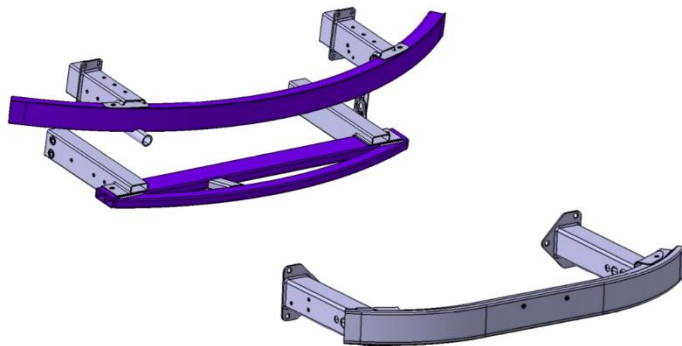
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Outlook

Front and back bumper modules for BMW i8

- Engineering, design and development of the entire module made at Hammerer Aluminium Industries
- Development included crash simulation and alloy development
- Prototyping and serial production are all made at Ranshofen, Austria



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Automotive References for extruded profiles (selection)



Mercedes SL

Engine mount and integral subframe



BMW M3

Different components for front subframe



Rolls Royce Phantom

Extrusion for the hood ornament (Spirit of Ecstasy) kinematic



Mercedes S-Class Coupé

Extrusions for door structure and side impact protection

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Further applications of friction stir welding



Automotive Industry

Floor structure of the Mercedes SL made from thin-walled extrusions

68,000 panels produced so far



Automotive Industry

Panels for the firefighter superstructure made from up to six welded extrusions

Annual production: approx. 500 panels



Automotive Industry

Tailored welded blank on the centre tunnel of the Mercedes SL, as well as for the Audi R8

75,000 blanks produced so far



Aircraft Industry

Cargo floor panels for military transporter Airbus A400M made from high strength extrusions

2,100 parts planned for 2014



Further applications of friction stir welding



Medical Industry

Aluminium / stainless steel front cover for X-ray intensifier

Annual production: 4,000 – 6,000 parts



Railroad Industry

Coupling-box, main cross girder and I-profile assembly for Siemens Inspiro Series

Total 1,800 components with up to 40 mm thickness



Electrical Industry

Aluminium/Copper connector for various applications in electrical infrastructure and batteries



Railroad Industry

Railcar bodies for the aerial cableway Wuppertal

31 trains (93 railcar bodies) 2013 - 2015



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