

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



SYMPOSIUM FOCUS

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

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THE MARKET DEVELOPER

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

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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!

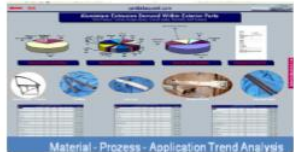
AluMag® offers the four following services - worldwide:



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, 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

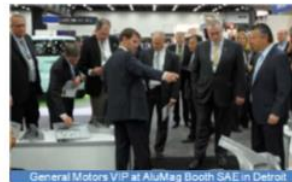
- Organization of Technical & Commercial Roadshows
- Oversea Commercial & Technical Events
- Host In-House Events & Presentation
- Common Technology Booth at Leading Exhibitions

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 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



Mr. Jost Gartner
Managing Partner
AluMag® Automotive GmbH
Kirchplatz 1a
58706 Menden
GERMANY
Tel: +49 2373 929492
j.gartner@alumag.de
German & English



Ms. Ying Zhou
Project Coordinator
Japan & China
AluMag® Automotive GmbH
Kirchplatz 1a
58706 Menden
GERMANY
Cell: +49 172 64 15576
y.zhou@alumag.de
German & English & Chinese & Japanese



Mr. Roberto Boeker
Managing Partner
AluMag® Automotive LLC
42056 Michigan Avenue
Canton, MI 48316
USA
Cell: +1 248 962 5086
r.boeker@alumag.de
English & German & Spanish



Mr. Thomas Katchmer
New Business Development Manager
AluMag® Automotive LLC
20929 Sunnydale
Farmington Hills, MI 48336
USA
Cell: +1 313 410 0865
tkatchmer@alumag.de
English



Mr. Jesper Ove Larsen
Manager Market Research
AluMag® Scandinavia
Bjergvejensvej 69
8330 Beeder
DENMARK
Cell: +45 2373 8790
jlarsen@alumag.de
German & English & Danish



Ms. Jacqueline Teuber
Senior Roadshow Organizer
AluMag® Automotive GmbH
Kirchplatz 1a
58706 Menden
GERMANY
Tel: +49 2373 929496
jteuber@alumag.de
German & English



Mr. Ricardo Schoer
Senior Consultant
AluMag® Automotive LLC
Av. San Antonio 109-131
Col. Napoles 03810
MEXICO
Cell: +52 55 4002 0501
rschoer@alumag.de
English & German & Spanish





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



**AluMag Automotive GmbH
Jost Gaertner
Managing Partner
Tel.: +49 2373 929492
Cell: +49 172 6000569
j.gaertner@alumag.de
www.alumag.de**

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Introduction

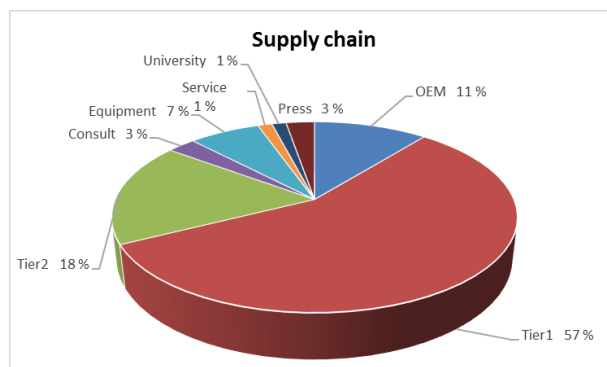
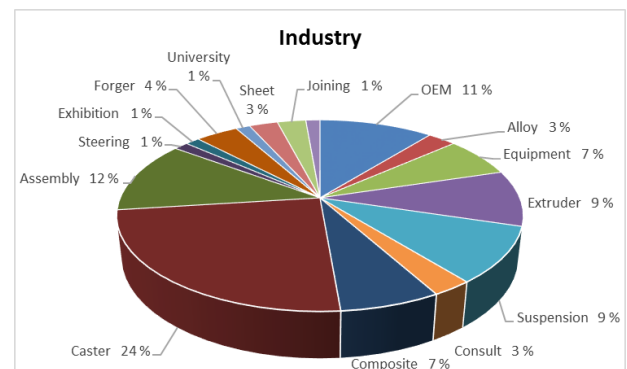
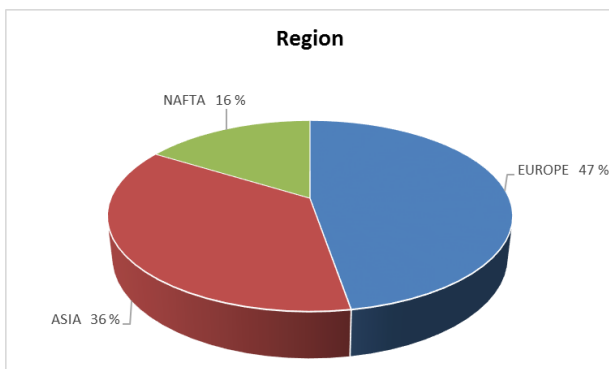
The 'Automotive Lightweight Procurement Symposium' in 2014 from October the 5th – 7th at the Hilton Hotel in Duesseldorf, Germany is the first unique and cutting edge event that brings together the procurement and supply side of lightweight materials and their advanced processes (aluminium, carbon, composites,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

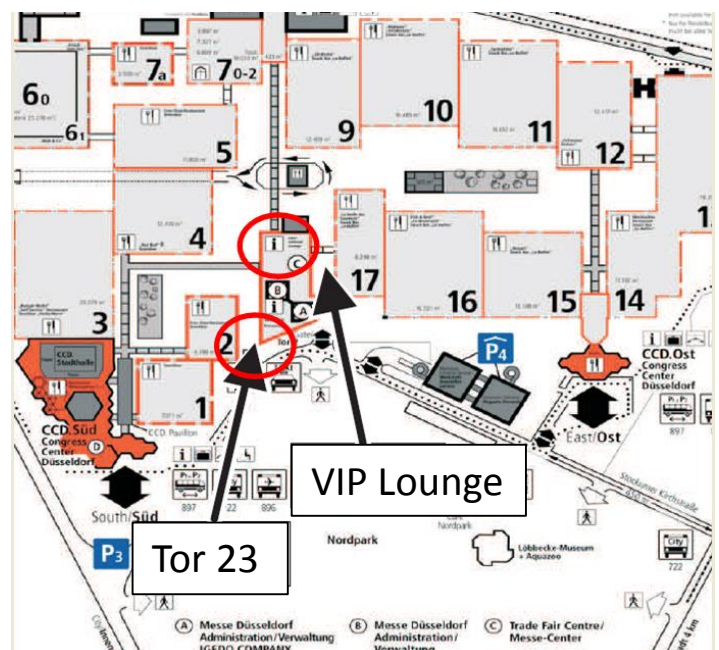
05:55pm – 06:00pm Summary: Mr. Jost Gaertner – Managing Partner – AluMag Automotive GmbH

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

Georg Fischer Automotive AG
Amsler-Laffon-Strasse 9
8201 Schaffhausen
Schweiz
www.gfau.com



Rheinfelden Alloys GmbH & Co. KG
Friedrichstrasse 80
79618 Rheinfelden
www.rheinfelden-alloys.eu



Buehler Druckguss AG
Gupfenstrasse 5
9240 Uzwil
Schweiz
www.buhlergroup.com



Bharat Forge Aluminiumtechnik GmbH & Co. KG
Berthelsdorfer Strasse 8
9618 Brand-Erbisdorf
www.bharatforge.com



BHARAT FORGE



Mr. Klaus DECKING
Director Marketing - Communication & Business
Development new Markets
Amsler-Laffon-Strasse 9
CHF-8201 Schaffhausen
+41 52 631 1111
www.gfau.com

TITLE

Head of Marketing and Communication - Business Development New Markets

ABSTRACT

+GF+

GF Automotive AG
**Comparison of
Iron, Aluminum,
Magnesium vs.
Composite Solutions**

Automotive Lightweight
Procurement Symposium 2014

Lightweighting





Georg Fischer AG

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Georg Fischer Corporation



Georg Fischer AG: Three strong Divisions

GF Piping Systems
GF Automotive
GF Machining Solutions

Facts & Figures

Foundation: 1802
Headquarter: Switzerland

124 companies in 32 countries
Listed (Swiss stock exchange)
For over 200 years independent

Employees: 14.000
Sales 2013: CHF 3.8 billion



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Georg Fischer



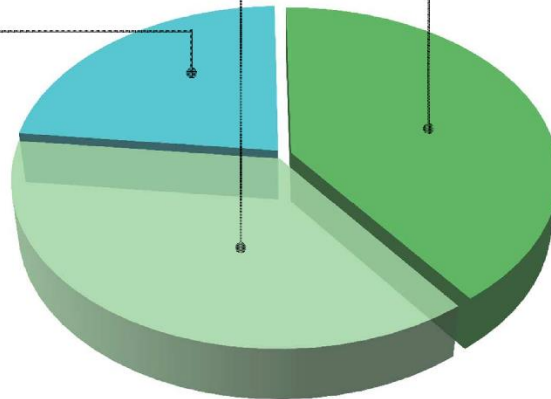
Three strong Divisions

100% = CHF 3,77 billion ~ EUR 3,06 billion

40% GF Lightweight Solutions

37% GF Piping Systems

23% GF Machining Solutions



GF Automotive

GF Automotive

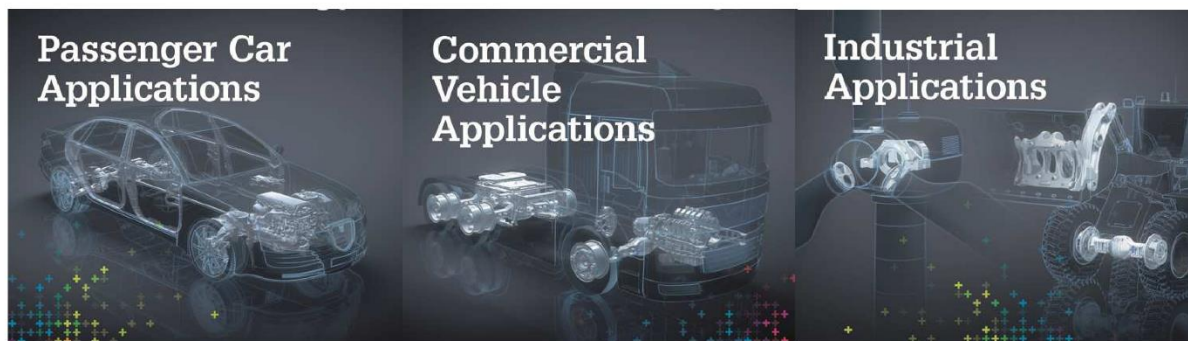


EUR 1.22 Bill.
Sales

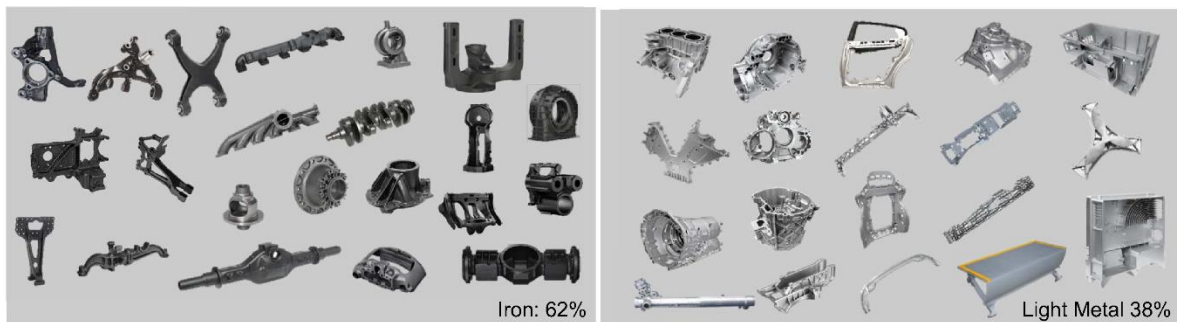
4 940
Employees

9 Production
Locations

GF Automotive Segments & Products



~ 3000 Products \triangleq 100 000 000 Parts

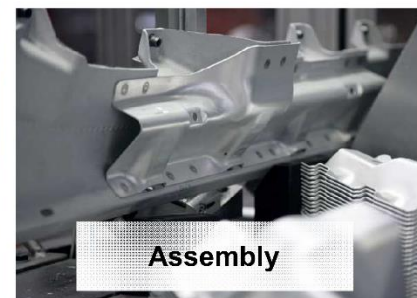
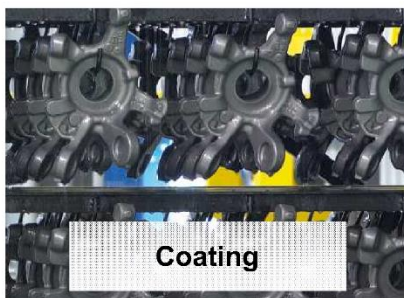
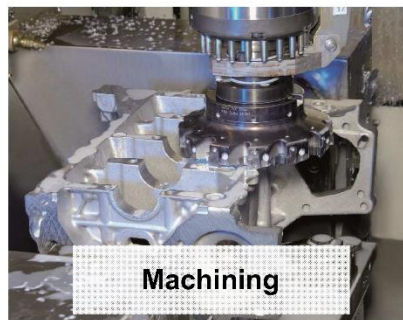


GF Automotive Global Locations



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GF Automotive Added Value: It does not stop with a casting



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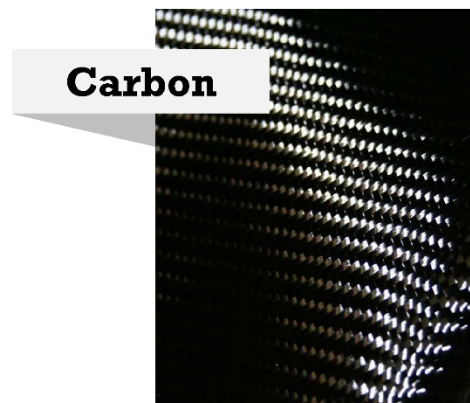
Casting or Carbon?

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Casting or Carbon Composites?



Iron
Aluminum
Magnesium



Carbon

Recycling **Costs** **Production**
Lower Energy Consumption Corrosion Resistance
Repair Repair
Material Cycle Resistance
Lighter

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Material Characteristics

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Material Comparison

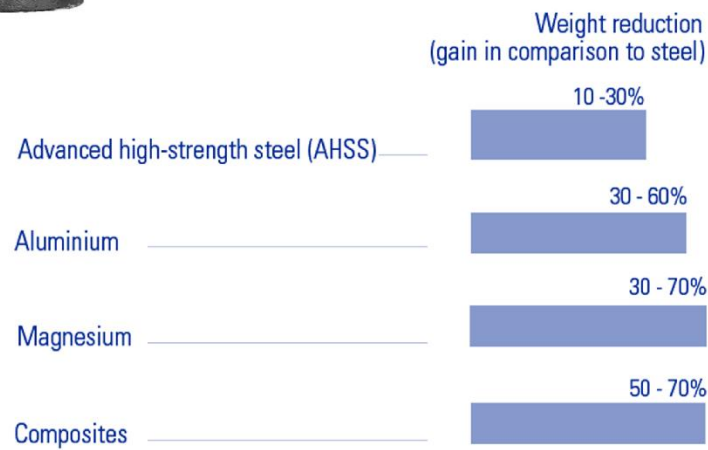
	GJS 400-15 GJS 450-10	SiboDur 700-10	Aluminum	Magnesium	Carbon Fiber
Tensile Strength Rm (N/mm ²)	Min. 400-450	Min. 700	277-338	217.5-230	3530-4560
0.2%-Yield Stress Rp_{0,2} (N/mm ²)	Min. 250-310	Min. 440	142-196	112.5-155	-
Elongation (%)	Min. 10-15	8-12	3.5-12.5	3.5-10	1.1-1.5
Young's – Modulus (kN/mm ²)	175	175	72-77	43-45	230-395
Density (g/cm ³)	7.1	7.1	2.6-2.7	1.8	1.8

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Lightweighting Potential



Weight Reduction



Source University of Cambridge

Repair Job



Metal Repair



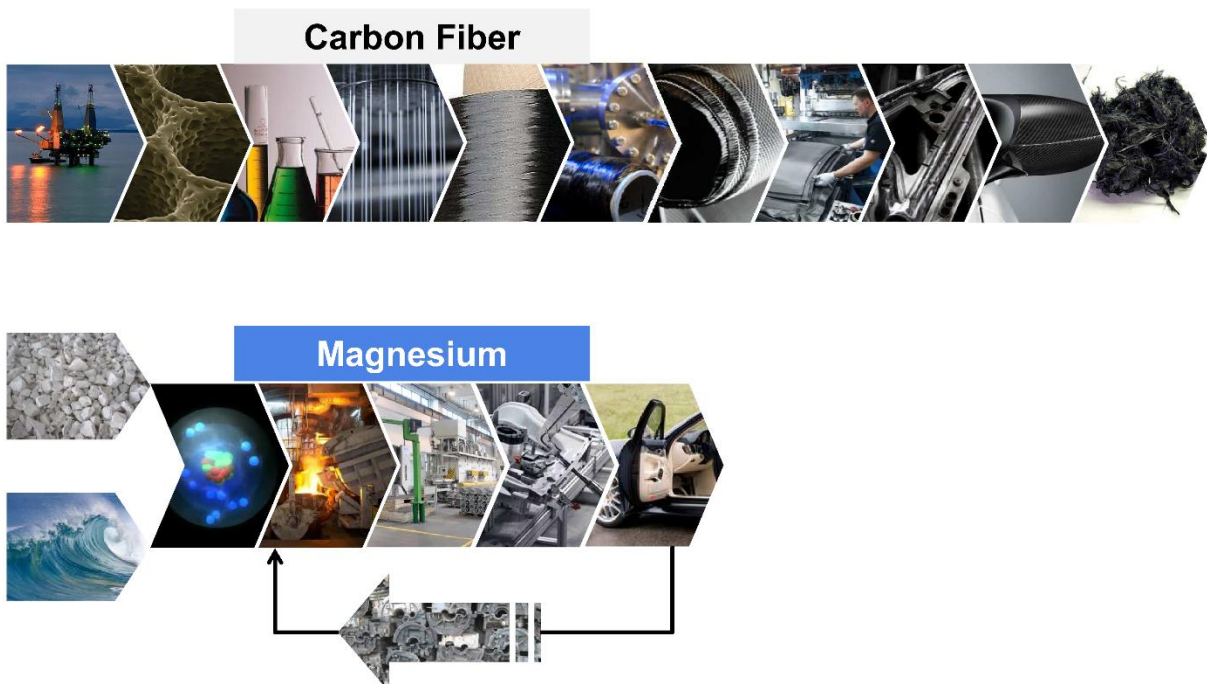
Carbon Fiber Repair



Production Process/ Sustainability

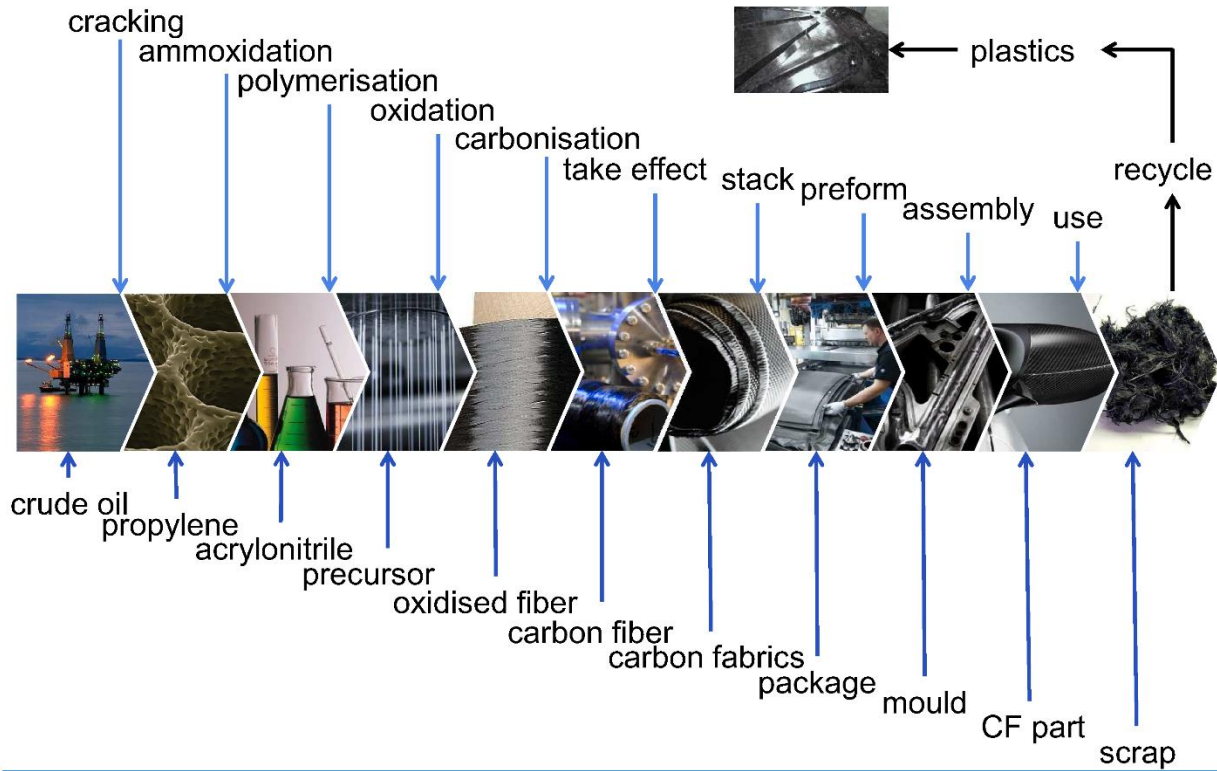
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Production Chain of Carbon Fiber and Magnesium



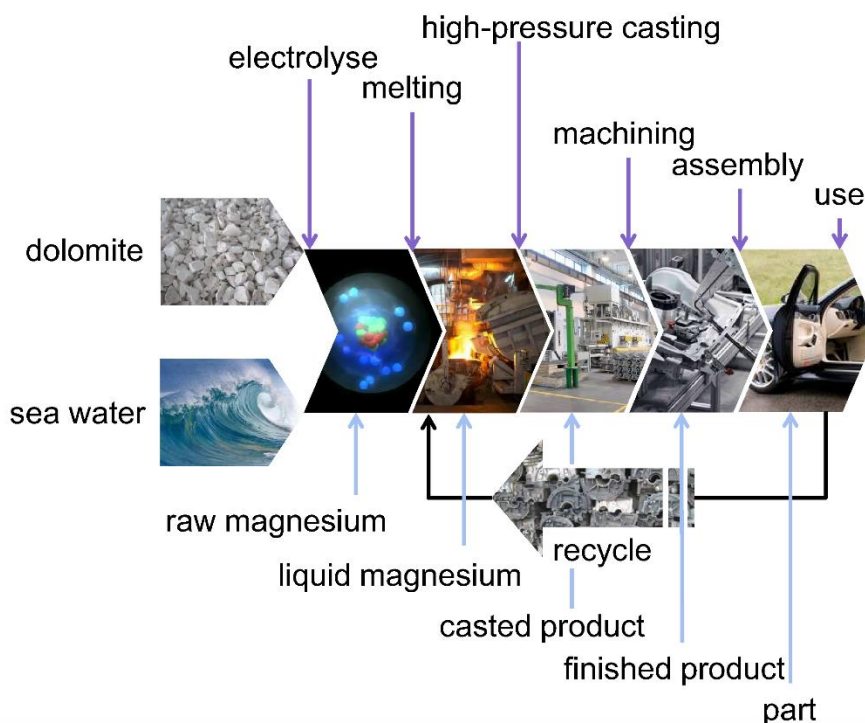
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Carbon Fiber Production Chain



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Magnesium Production Chain

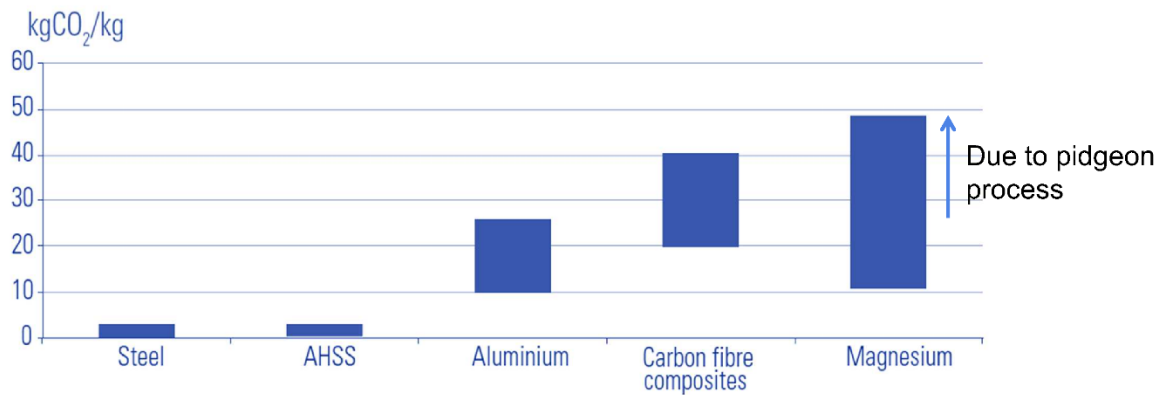


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Manufacturing Climate Balance Sheet **+GF+**



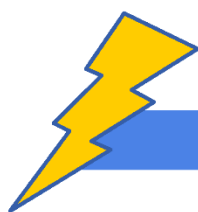
CO₂ Emissions



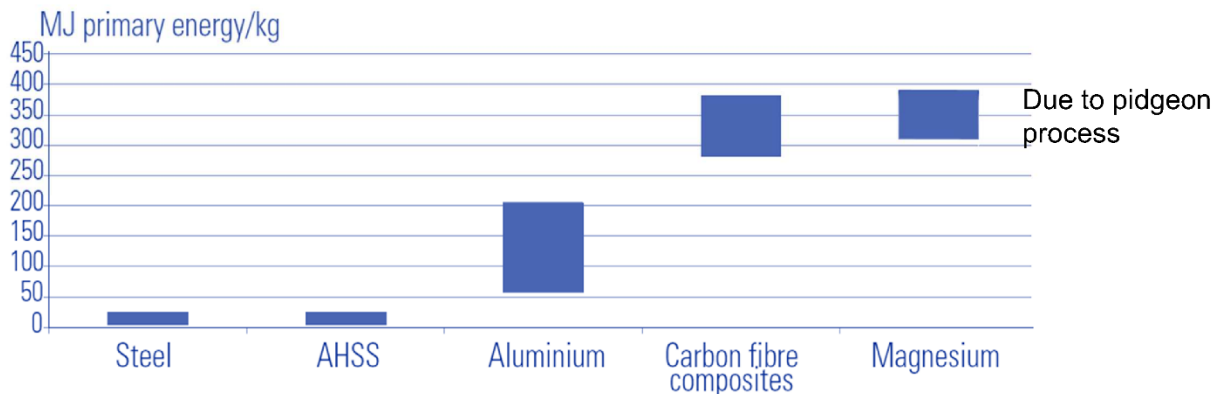
Source University of Cambridge

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Manufacturing Energy Consumption **+GF+**



Energy Consumption



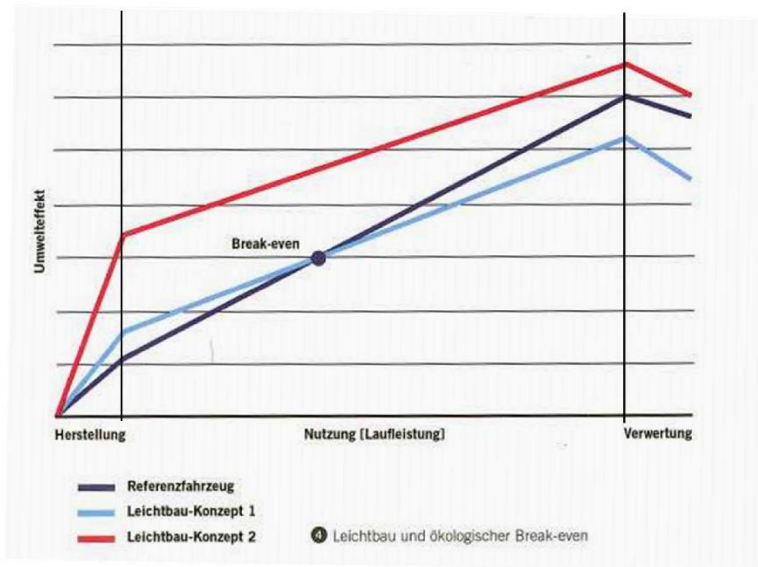
Source University of Cambridge

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Emission over Life-Cycle



Change of Perspective: Break-Even



Source: VW

Availability



Magnesium:
8th abundant element
in earth's crust



Carbon fiber:
Uses polyacrylonitrile

Recycling



Metals



Fully recyclable
Used in new alloys
Used as a mixture in new alloys

Carbon Fiber

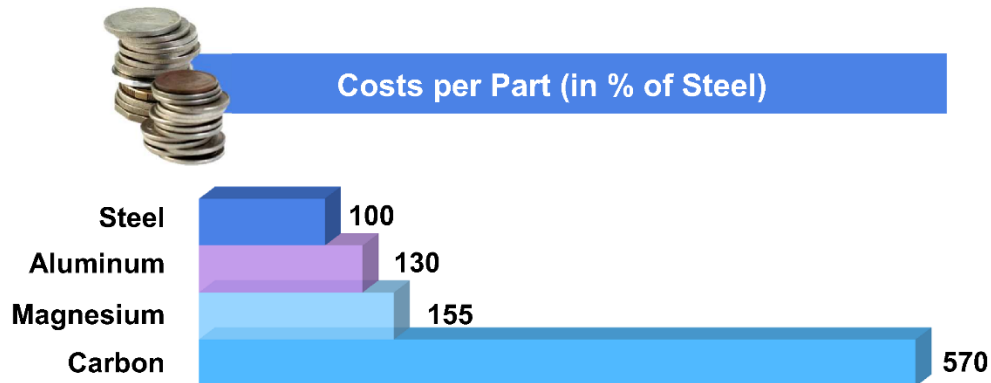


Recyclable?
At least downcycling or scrap



Costs

Cost Comparison



Today Up to 3 times higher costs of the carbon fiber

Tomorrow With new precursors and technological progress improving production processes, a decrease of almost 30% in the global cost of composites is expected between now and 2020

Source: McKinsey&Company, Magnesium own Research
University of Cambridge

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Comparison Examples

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Substitution of Sheet Metal Constructions



Weight Reduction
Casted aluminum compared to steel sheet assembly out of 10 parts up to 45% less weight



Carbon Fiber vs. Aluminum



100% Carbon?



Source: BMW AG

Substitution of Sheet Metal Constructions



Weight Reduction
Seat frame in casted Magnesium up to 30% less weight than metal sheet assembly



Carbon Fiber vs. Magnesium



Carbon Fiber



Source BASF

- 30% Weight Reduction compared to conventional Steel-based Designs

Magnesium



- 30% Weight Reduction compared to conventional Steel-based Designs

Conclusion

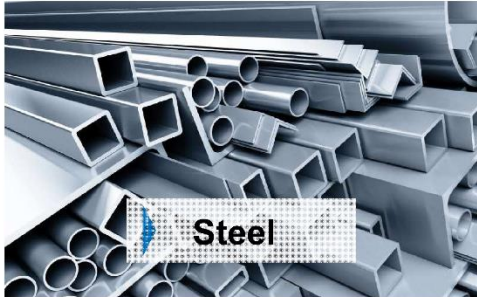
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Material Strengths and Weaknesses

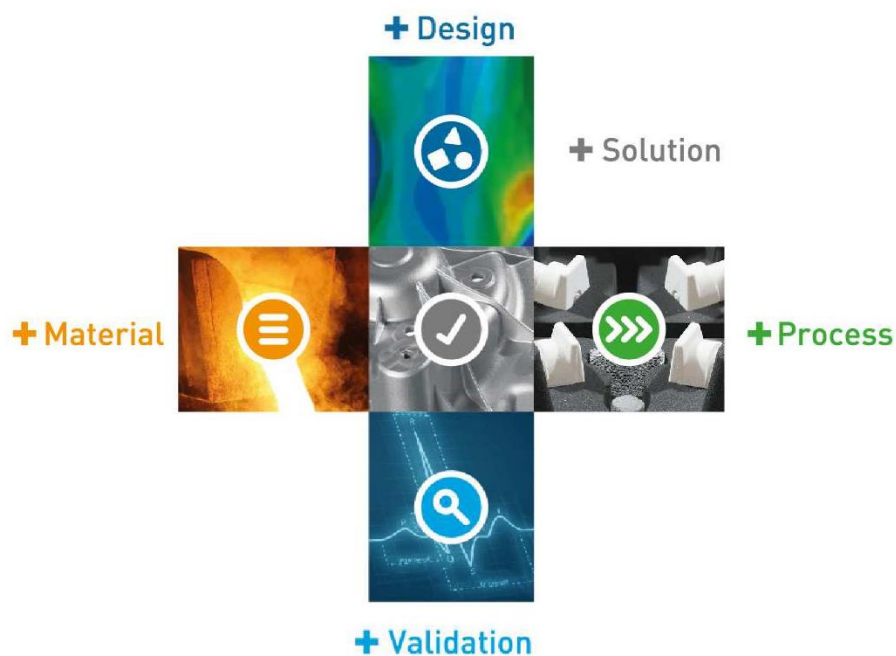
	Iron / Steel	Aluminum	Magnesium	Carbon
Strength	++	+	o	++
Costs	++	+	o	--
Energy Consumption	+	o	-	-
Weight Reduction	-	+	++	++
Repair	++	+	+	--
Recycling	++	+	o	--

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Which Material?



Material is only one Aspect to think about



Bionic Design



Weight reduction
Iron steering knuckle up to 35% less weight through bionic design



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High Design Freedom for Castings



Front Steering Knuckle



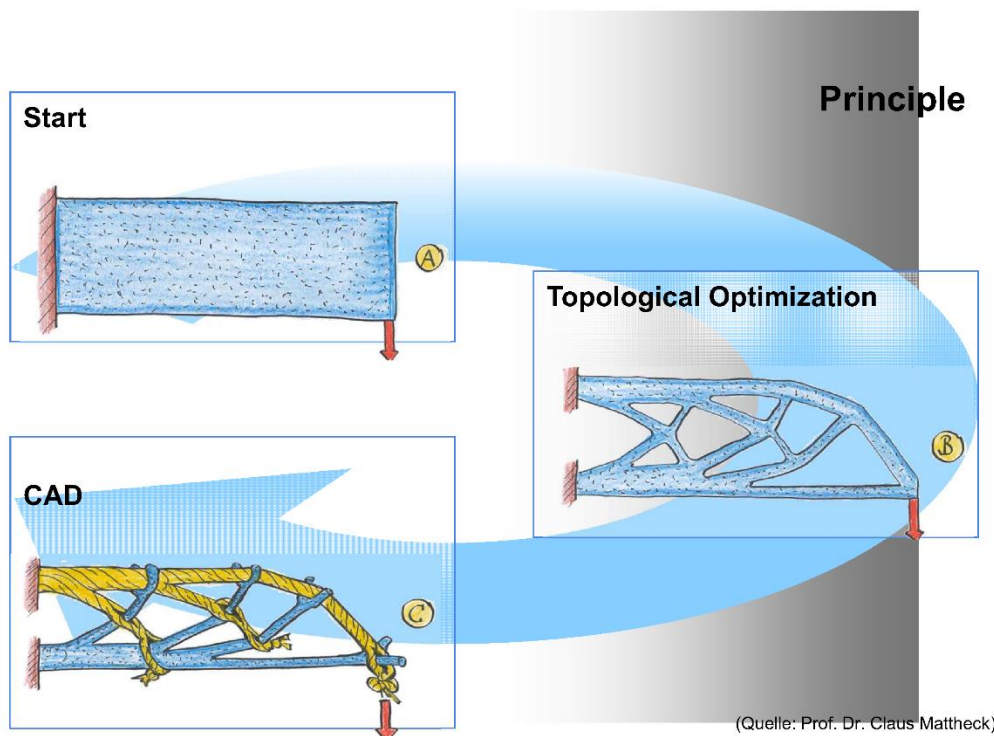
Carbon
- 40%



Iron
- 35%

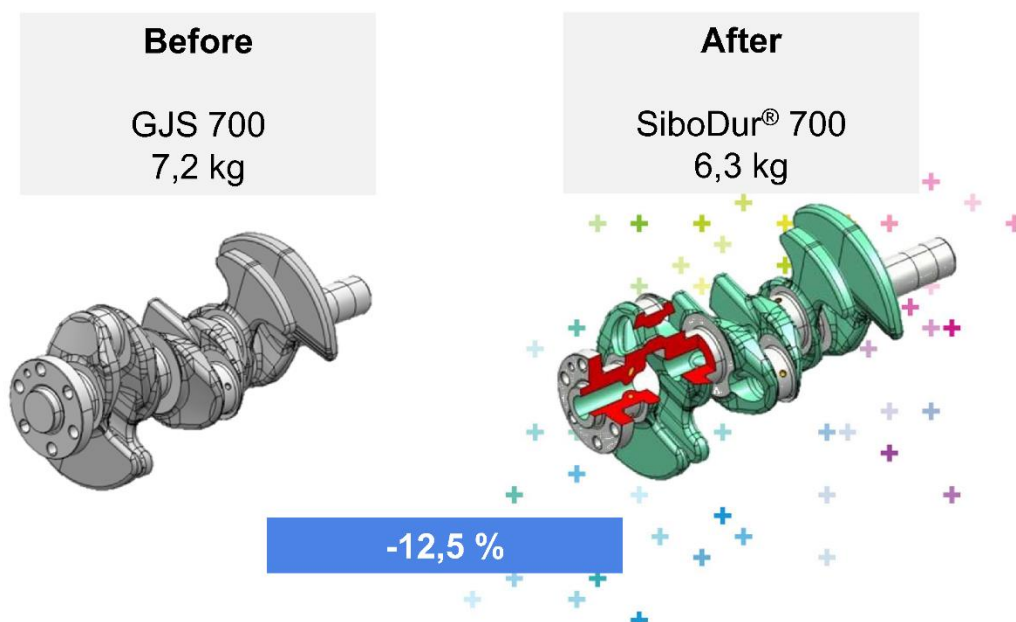
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Bionic Design



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Bionic Design



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Bionic Design



Weight Reduction
Differential housing in iron casting up to 15% less weight than predecessor through bionic design



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Substitution of System Parts



Weight Reduction
Crossmember, completely casted in iron has 17% less weight than combined assembly out of steel sheet and iron



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Substitution of Sheet Metal Constructions



Weight Reduction
Inno Door Frame in casted Aluminum up to 40% less weight than metal sheet assembly



Product Samples in Series: Maserati Quattroporte



Inner Door Frame

Alloy: AlMg5Si2Mn
Weight : 4,8 kg (- 40%)



Product Samples in Series: Porsche Panamera



Copyright by Porsche

Product Samples in Series: Porsche Panamera



Copyright by Porsche

Product Samples in Series: Porsche Panamera



Oil Sump V6 2WD

Alloy: AE 44/MgAl4RE4
Weight: 4,6 kg (- 47%)

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Product Samples in Series: Porsche Panamera

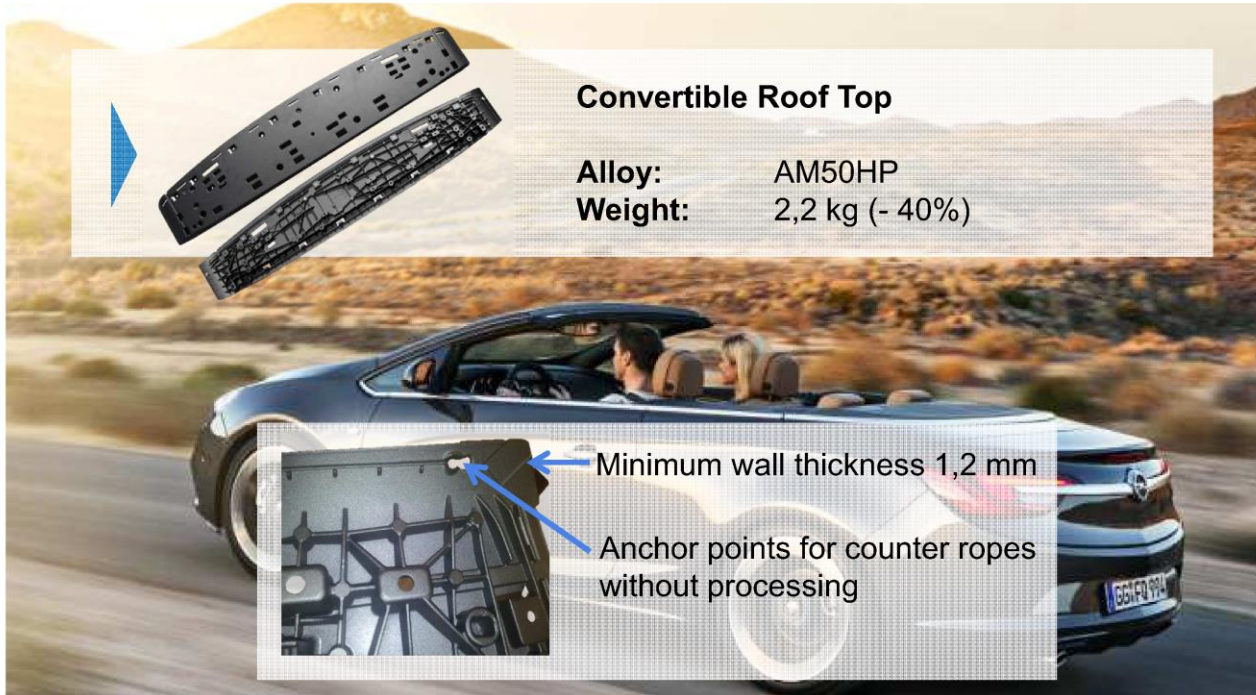


Engine Front Cover

Alloy: AE 44/MgAl4RE4
Weight: 2,6 kg (- 47%)

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Product Samples in Series: Opel Cascada



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Product Samples in Series: Mercedes-Benz SLK



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Product Samples in Series: Smart fortwo

+GF+



Instrument Panel Crossbar

Alloy: MgAl5Mn
Weight: 2,4 kg

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Product Samples in Series: BMW X3

+GF+



Box Swing Arm

Alloy: MgAl9Zn1 (AZ91)
Weight: 0,8 kg (-35%)

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Product Samples in Series: Porsche Macan



Engine Front Cover

Alloy: AE44

Weight: 2,6 kg (- 40%)

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Lightweighting – Conclusion



Proved solution for lightweighting? Castings offer...

High functional integration

High design freedom

Broad choice of materials

Large potential for weight savings

Compared to carbon fiber much lower costs and better recyclability

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Contact

Klaus Decking
Head of Marketing, Communication & Services
Business Development New Markets
Phone +41 52 631 21 17
Mobile +41 79 633 11 37
Fax +41 52 631 28 59
klaus.decking@georgfischer.com

GF Automotive
Georg Fischer Automotive AG
Amsler-Laffon-Strasse 9
8201 Schaffhausen
Switzerland
www.gfau.com

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