

Asia 2015 6th - 8th of Jul

AUTOMOTIVE LIGHTWEIGHT

PROCUREMENT SYMPOSIUM

Jumeirah Himalayas Hotel in Shanghai, China



SYMPOSIUM FOCUS

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

HIGHLIGHTS

INTERNATIONAL SPEAKERS

AUDI - MAGNA - DGS - GEELY - NOVELIS - JSC - VOESTALPINE, ...

LIGHTWEIGHT TECHNOLOGY EXHIBITION

DGS - StrikoWestofen - Kurtz - Novelis – Idra

SIMULTANEOUS INTERPRETING

Chinese - English / English - Chinese

ATTENDING COMPANIES



MEDIA & ORGANIZATION PARTNERS



Brings together the procurement and supply side of lightweight materials and their advanced processes in accompany with cost balance or reduction....

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

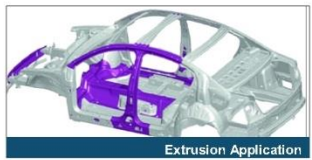
AluMag as your provider of automotive research and forecasting studies, offers you and your business, the market intelligence you need to realize the best strategic decisions



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



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 Jul: Automotive Light-weight Procurement Symposium in Shanghai, China
- 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



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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Asia Automotive Lightweight Procurement Symposium
6th – 8th of July 2015
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THE MARKET DEVELOPER

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Agenda

Agenda: (Is Continuously Being Updated)

Monday The 6th Of July – Jumeirah Himalayas Hotel, Shanghai – 6th Floor

06:00pm - 10:00pm

Pre-registration and Welcome Reception

Tuesday The 7th Of July – Jumeirah Himalayas Hotel, Shanghai – 6th Floor

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. Frank VENIER, Strategy and Innovation; Lightweight Design Centre at AUDI AG

Lightweighting SUV - The New Audi Q7 In Multimaterial Car Body Design

10:25am – 11:00am

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

11:00am – 12:00am

Paper 1 – Part 1:

Mr. Gerhard KRACHLER, Director Advanced Development & Product Strategy at MAGNA STEYR Engineering AG & Co.KG

Paper 1 – Part 2:

Mr. Christian JURICEK, Manager R&D Europe at COSMA MAGNA International

Magna's Global Advanced Lightweight Competences

12:00pm – 01:45pm

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

01:45pm – 02:25pm

Paper 2:

Mr. Andreas MUELLER, CEO at DGS Druckguss Systeme AG

Localization And Industrialization Of Cast Aluminium Structural Applications

02:30pm – 03:10pm

Paper 3:

Mr. Li WAN, Vice President at Guangdong Hongtu Technology (Holdings) Co Ltd

Aluminum Alloy High Vacuum Die Casting Technology And It's Application On Automotive Structural Parts

03:15pm – 03:45pm

Paper 4:

Mr. Lothar HARTMANN – Managing Director Foundry Machines & Trimming Presses at Kurtz GmbH

Mr. Michael BARTEL – Asia Sales Manager Foundry Machines & Trimming Presses – Kurtz GmbH

Low Pressure Casting

A traditional casting technology helping to step ahead for light weight solutions in engine block manufacturing

03:45pm – 04:15pm

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

04:15pm – 04:55pm

Paper 5:

Mr. Peter BERNSCHER, Member Of The Board & Director Automotive Body Parts at Voestalpine Metal Forming GmbH

Lightweight Solutions In The Automotive Industry By Voestalpine

05:00pm – 05:55pm

Closing Keynote:

Mr. Jochen SIEBERT, Managing Partner at JSC Automotive Consulting Co. Ltd.

Outlook And Hurdles Of The Chinese Economy And Automotive Industry

05:55pm – 06:00pm

Summary:

Ms. Ying ZHOU, Project Coordinator China – Japan at ALUMAG Automotive GmbH

06:00pm - 10:00pm

Reception Sponsored By StrikoWestofen

Dinner Speech – Part 1:

Mr. Rudolf RIEDEL – Group Managing Director at StrikoWestofen GmbH

Dinner Speech – Part 2:

Mr. Rainer ERDMANN – Managing Director Asia Operations at StrikoWestofen Thermal Equipment Co.Ltd

Profits With Light Metal Castings Start In The Melt Shop

Agenda

Agenda: (Is Continuously Being Updated)

Wednesday The 8th Of July

08:15am – 08:55am

Opening Keynote:

Prof. Fei XIONG Chief Engineer & Director of Auto Lightweight Department at GEELY

Automotive Lightweight Promoting The Application Of Aluminium

09:00am – 09:40am

Paper 1:

Mr. James LIU, Managing Director and Vice President of Asia Auto at NOVELIS China

High Volume Aluminum Solutions For Lightweighting

09:45am – 10:25am

Paper 2:

Dr. Jin HOU – General Manager – Sapa Technology Asia

High Performance Aluminium Alloys For Automotive Light-Weighting

10:25am – 11:00am

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

11:00am – 11:40am

Paper 3:

Mr. Yoshikazu MUKAI, Executive Vice President & Technical Specialist at Kobelco Automotive Aluminium Rolled Products (China) Co.,Ltd – Shanghai Branch

Kobe's R&D Activities For Automobile Lightweighting

11:45am – 12:25pm

Closing Keynote:

Mr. Martin SHI, Chief Editor at GASGOO International And Senior Analyst at GASGOO Research Institute

The Status And Development Trends Of China Automobile Lightweight

12:30pm – 12:35pm

Summary:

Mr. Jost GAERTNER, Managing Partner at ALUMAG Automotive GmbH

12:45pm – 01:00pm

Walk To The SNIEC
Shanghai New International Expo Centre

01:00pm – 01:40pm

Reception With
Snacks & Finger Food at the SNIEC

01:40pm – 05:30pm

Individual Or Guided Visit At The 2015 "Aluminium China " And "China Diecasting" Exhibitions

Backup Speech

Mr. Jost GAERTNER, Managing Partner at AluMag Automotive GmbH

Top 16 Global Ranking Of Aluminium And Magnesium Foundries By Revenue

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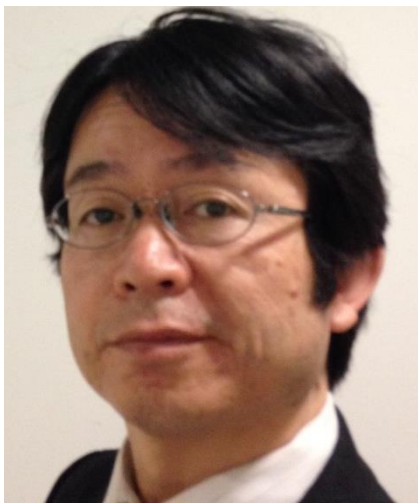
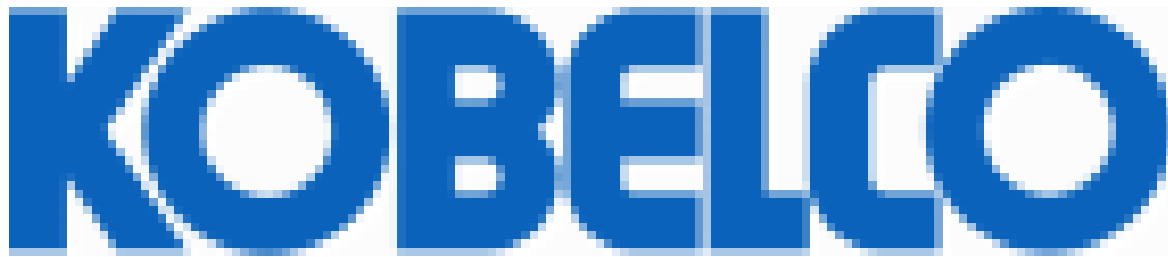


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TITLE

Kobe's R&D Activities For Automobile Lightweighting

ABSTRACT

R&D strategy

- Kobe's 6xxx ,5xxx alloy and newly developed alloy
- Newly developped pedestrian protect food structure
- PP resin and Aluminum injection joining and newly developed mechanical joining



Kobe's R&D Activities for Automotive Lightweighting

Yoshikazu Mukai
Kobelco Automotive Aluminum Rolled Products (China) Co.,Ltd
神钢汽车铝材(天津)有限公司
KOBE STEEL GROUP

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◆ KOBELCO STEEL company overview

Introduction of Kobe Steel

◆ R&D topics

1) Research and Development Strategy.

2) Material

- Newly developed 6xxx alloy with high paint bake response

3) Structure design

- Pedestrian protection aluminum hood development
- Thermal deformation CAE for Aluminum parts

4) Forming & Joining

- Electromagnetic forming technology for Bumper system.
- Newly developed mechanical joining
- Technology of Aluminum & PP-resin direct joining

5) Solution for NV problem caused by Lightweighting

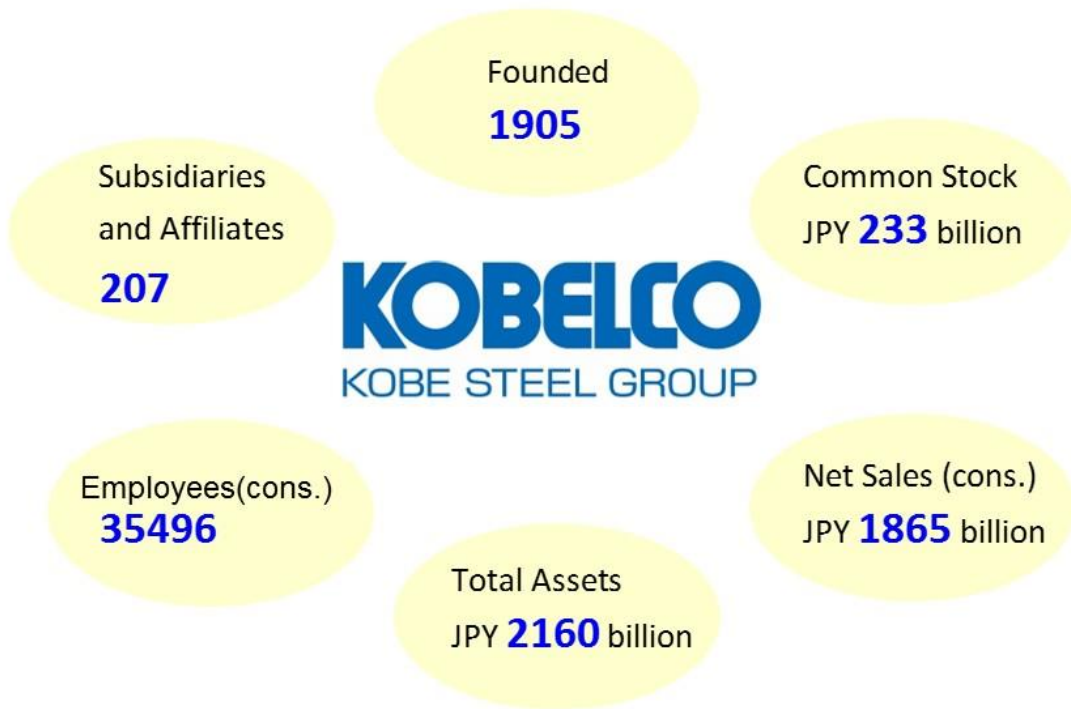
◆ Global foot print

Flat rolled, Forged, Extruded products supply scheme
in Japan, China, US, Europe

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KOBE STEEL Overview



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KOBE STEEL Overview



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Automotive applications with Kobe Steel Products

High Strength Steel, Valve Springs

High Strength Steel, Gears

High Strength Steel, Body Structures

High Strength Steel, Suspension Springs
Forged aluminium, Suspension arms

Aluminum Alloy, Heat Exchangers

Aluminum Alloy, Closure Panels

Copper Alloy, Electrical Terminals

High Strength Steel, Bolts

Steel Cord Wire Rods

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Contribution to Automotive Lightweighting

KOBE STEEL have a potential to support the lightweighting, with supplying the Flat rolled, Forged, Extruded products.

Engine hood

Trunk lid

Subframe

Side frame (crash absorbing)

Side sill

Bumper beam

Suspension forging

Door beam (with brackets)

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◆ **KOBE STEEL company overview** Introduction of Kobe Steel.

◆ **R&D topics**

1) **Research and Development Strategy**

2) **Material**

- Newly developed 6xxx alloy with high paint bake response

3) **Structure design**

- Pedestrian protection aluminum hood development
- Thermal deformation CAE for Aluminum parts

4) **Forming & Joining**

- Electromagnetic forming technology for Bumper system
- Newly developed mechanical joining
- Technology of Aluminum & PP-resin direct joining

5) **Solution for NV problem by Lightweighting**

◆ **Global foot print**

Flat rolled, Forged, Extruded products supply scheme
in Japan, China, US, Europe

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1) R&D strategy

What's the Problems when using AL?

Difference between steel and aluminum

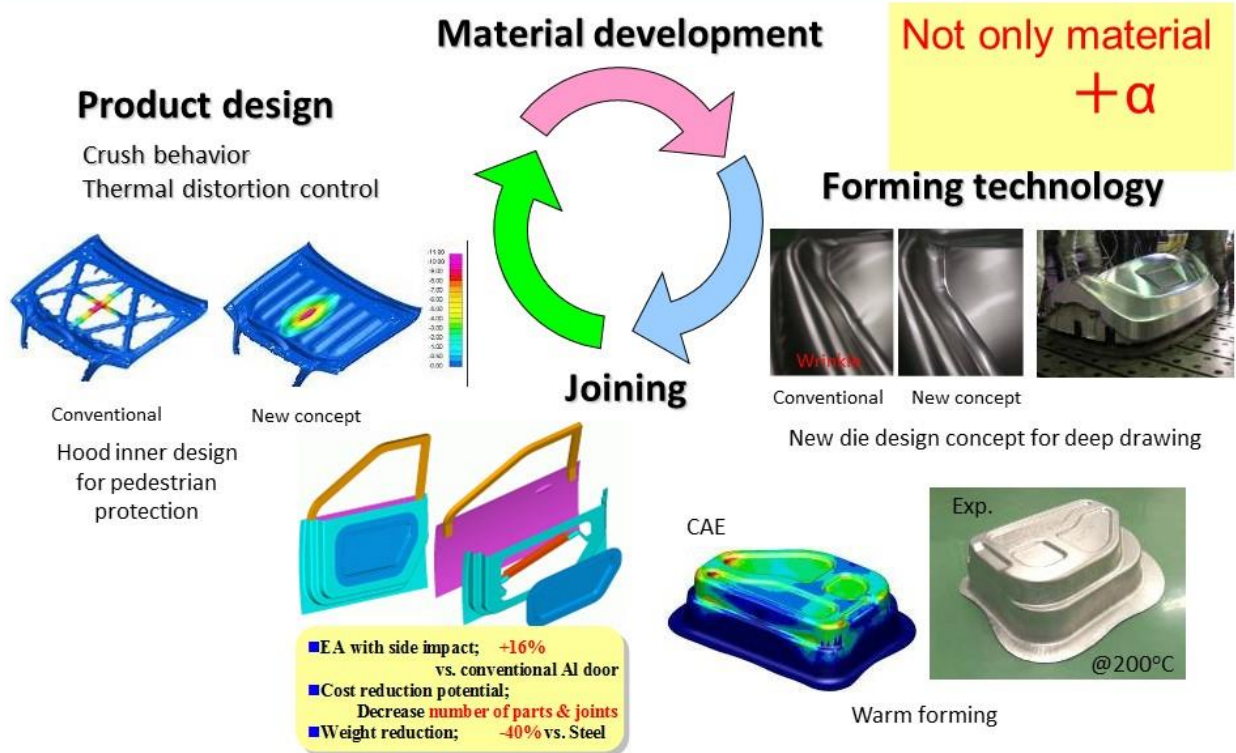
(↓: Inferior to Steel, ↑: **Superior to Steel**)

- **Formability, Weldability** : Aluminum ↓
- **Surface treatment handling** : Aluminum ↓
- **Surface defect sensitivity** : Aluminum ↓
(Easily deformed)
- **Material cost**: Aluminum ↓ (but scrap can be sold higher than steel)
- **Weight** : Aluminum ↑ (**Lighter**)

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1) R&D strategy



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2) New 6xxx alloy development

Material List

Materials	AA	Applications	Definitions	Mechanical properties				
				TS (MPa)	YS (MPa)	EL (%)	PB-YS* (MPa)	
6000 series	6K21	6022	Outer/Inner	Well balanced PB alloy	240	125	29	200
			Inner	Better formability (very low PB)	250	130	30	165
	6C16	6016	Outer	Well balanced PB alloy	220	110	29	190
			Inner	Better formability (very low PB)	230	115	30	160
	6C44	6014	Outer	Well balanced PB alloy	220	110	29	190
	6C32	6111	Outer/Inner	Better formability PB alloy than 6K21	260	135	29	210
6C31	-	Inner	Excellent formability, only for inner (very low PB)	275	130	32	165	
5000 series	5J32	5022	Outer/Inner	Excellent formability, high Cu volume (susceptible for corrosion)	285	135	33	155
			Outer/Inner	Excellent formability, high Cu volume (susceptible for corrosion)	275	135	30	155
	5182	5182	Inner	In common	270	125	29	140
	5052	5052	Inner	In common	195	90	29	140

PB: Paint Bake

*1) 2% pre-strain, at 170 °C for 20 minutes

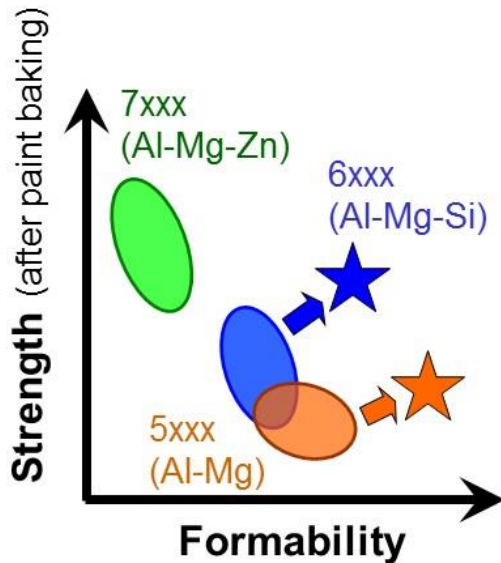
*2) Specimen Dimension: JIS Z2201 #5

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2) New 6xxx alloy development

To improve required performance for 6xxx,
Kobe Steel is working continuously with our customers.



Application	Key words
Panel	Formability Paint bake response Hemming Natural aging control Roping free
Structural parts	Strength Energy absorption

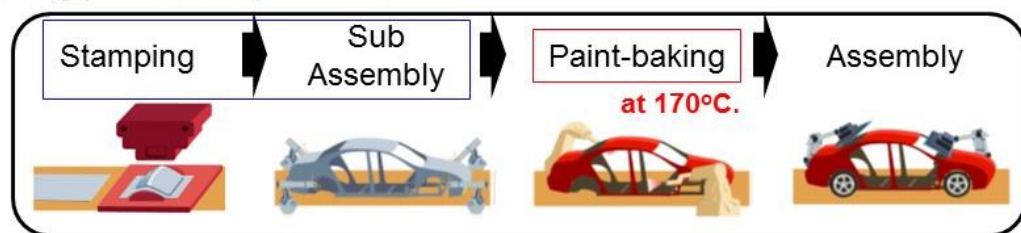
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Motivation of Paint Bake Response improvement

- Manufacturing process of parts at car manufacturers

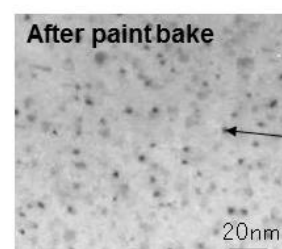
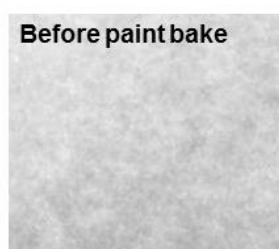


- Mechanical properties of Al sheets

Lower strength for better hemming performance.

Higher Paint Bake Response even at low temperature.

- Microstructure (Transmission Electron Micrograph)



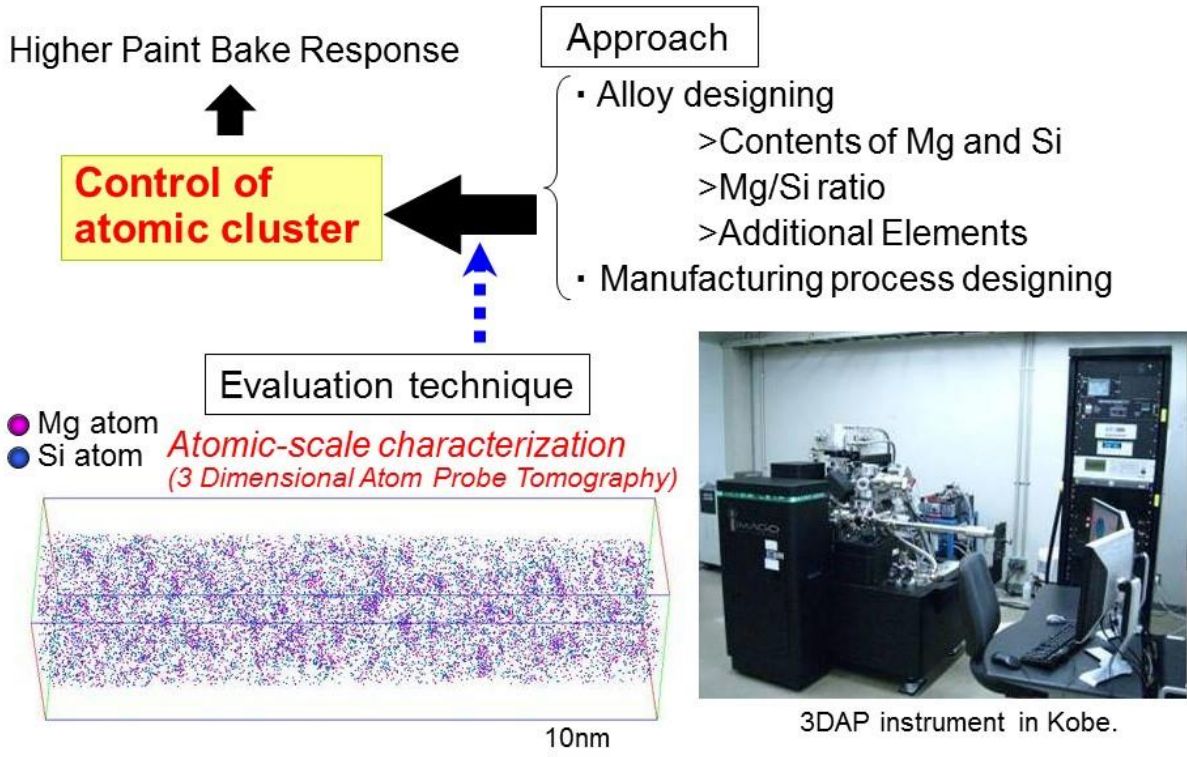
Strengthening precipitates

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Evaluation of atomic cluster distribution



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Properties of Developed 6xxx alloy

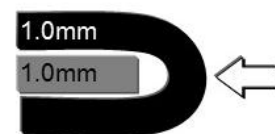
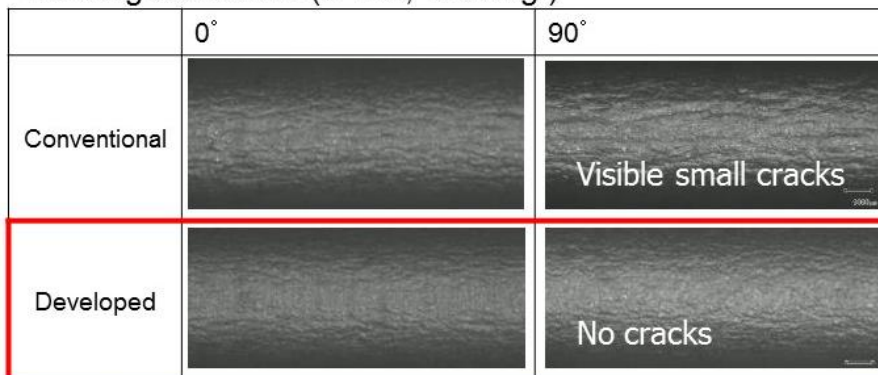
Chemical composition & mechanical properties of test materials (Lab)

	Chemical composition (wt%)				Tensile property: JIS13A Direction 0° RD						
					Before paint bake					After Bake	
	Si	Mg	Cu	Addi-tive	R _m MPa	R _{p0.2} ^{*1} MPa	R _{p0.2} /R _m	A ₈₀ %	n-value (5%)	R _{p0.2} ^{*2} MPa	ΔBH (*2-*1) MPa
Conventional	1.0	0.4	0.15	-	237	116	0.49	27	0.30	215	99
Developed	0.8	0.4	-	0.06	186	79	0.42	25	0.34	199	120

Bending test results (R=0.5, 180 deg.)

Paint bake: 2%st.+185°C,20min

Natural aging for 1 month



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Paint Bake Response at 170°C

Newly developed 6xxx alloy showed;
 -better hemming performance.
 -higher Paint Bake Response even at low temp (170°C).

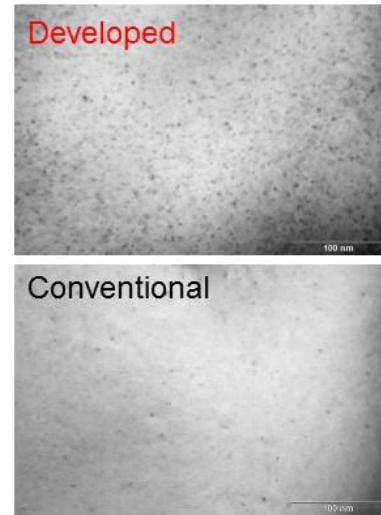
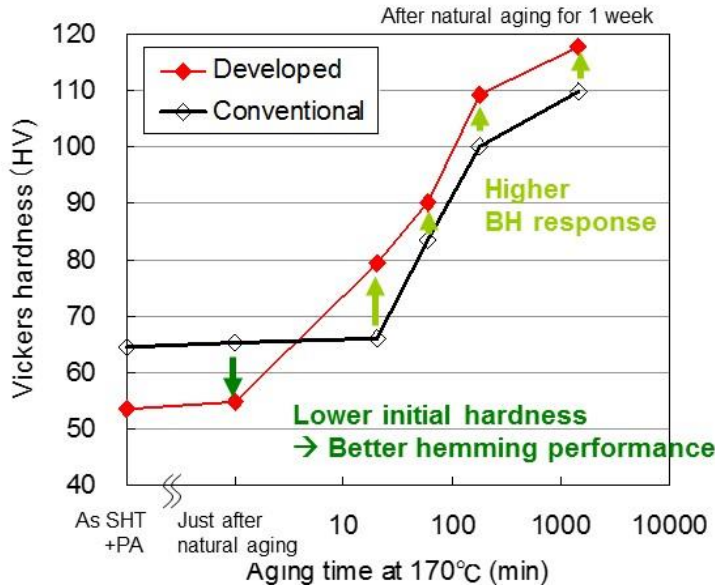


Fig. TEM observations for the samples, aged at 170°C for after 20 min.

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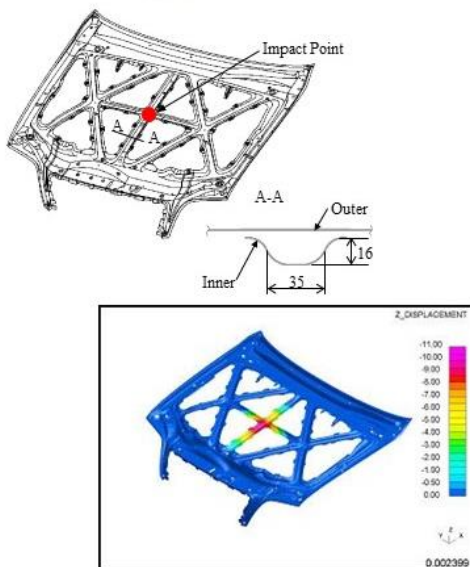
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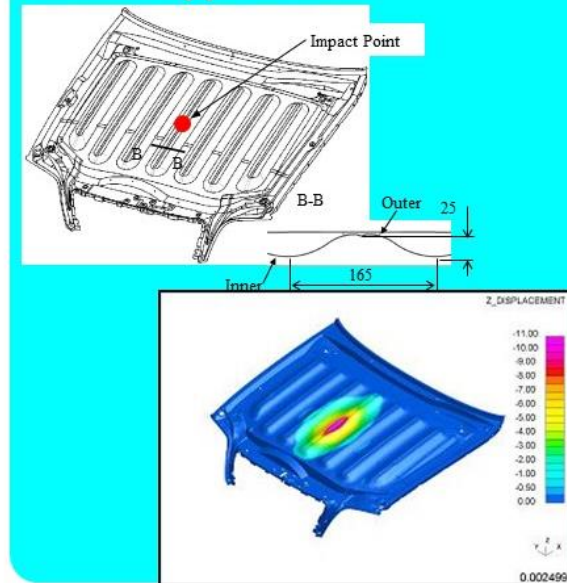
3) Structure Design

● Pedestrian protection Aluminum Hood

Beam-type inner



Wave-type inner



(The source: IBEC '03 (International Body Engineering Conference & Exposition), No. 20037070)

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● Newly developed wave-type inner Structure

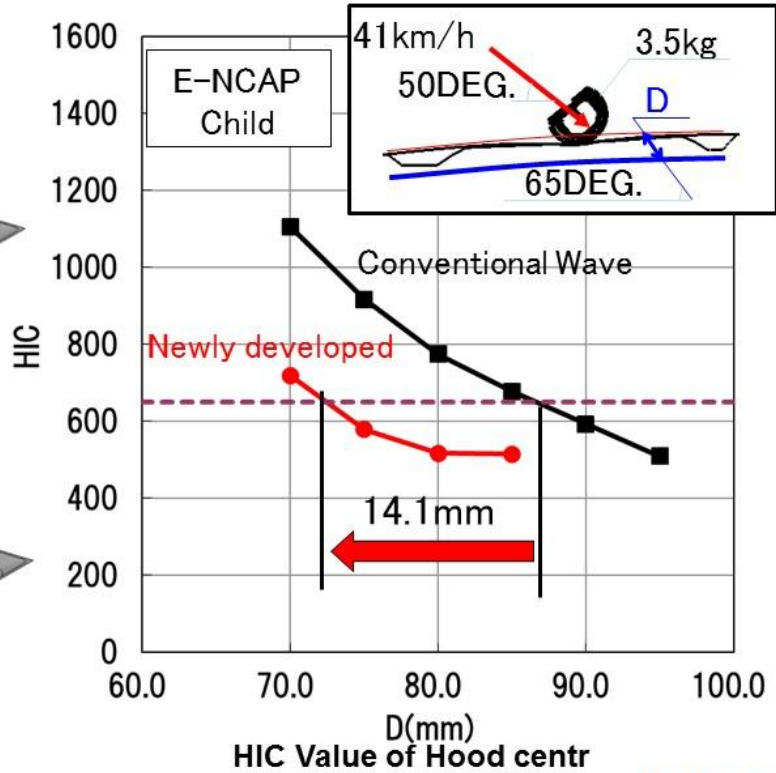
Conventional Wave



Newly developed



OTR: $t=1.0 \Rightarrow 0.9\text{mm}$
 INR: $t=0.9\text{mm} \Rightarrow 0.8\text{mm}$



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● Examples of Wave-type Inner Hood

After 2003 ~ Wave-type increasing

※Kobe proposed



Toyota Crown 2004 ※



Toyota Crown 2008 ※



Mitsubishi Lancer Evo. X 2007



Lexus HS ※



Lexus GS 2012



Infiniti Q50 2014※

⇒ Further improvements requested !

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3) Structure design

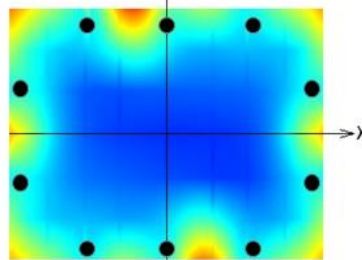
● Thermal deformation CAE for Aluminum parts : Roof(Al)-Side panel(Steel) structure

▪ Identification by experiment

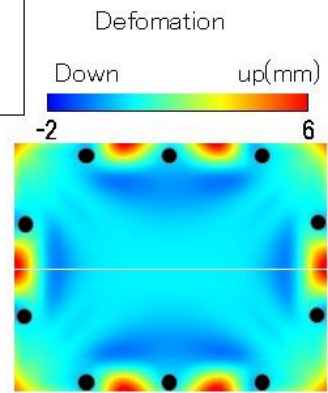
- Sample Size : Steel frame & Aluminum sheet (□500mm × 400mm)
- Joining : Steel bolt & adhesive
- Heat treatment : 180°C × 20min
- : Bolt location



【After baking】



【Result of experiment】



【Result of FEM】

⇒ FEM coincide well with the experiment

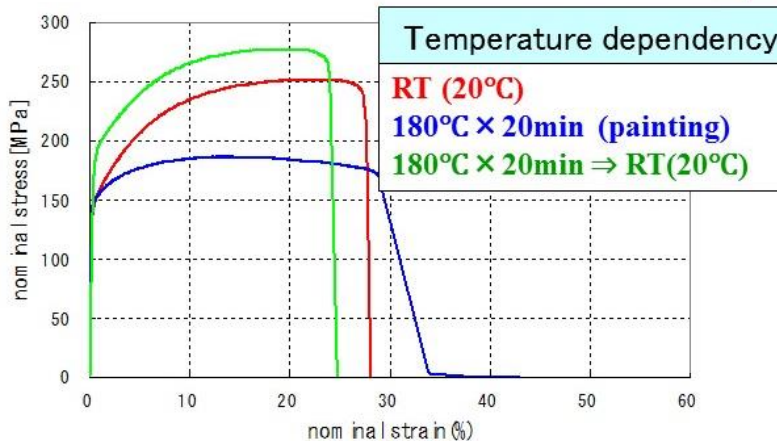
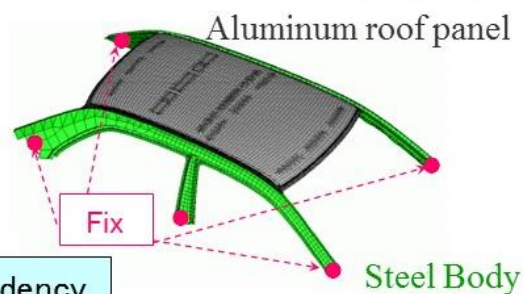
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3) Structure design

▪ Thermal deformation CAE for Aluminum Roof

Heat expansion coefficient

Steel	1.16×10^{-5}
Aluminum	2.30×10^{-5}

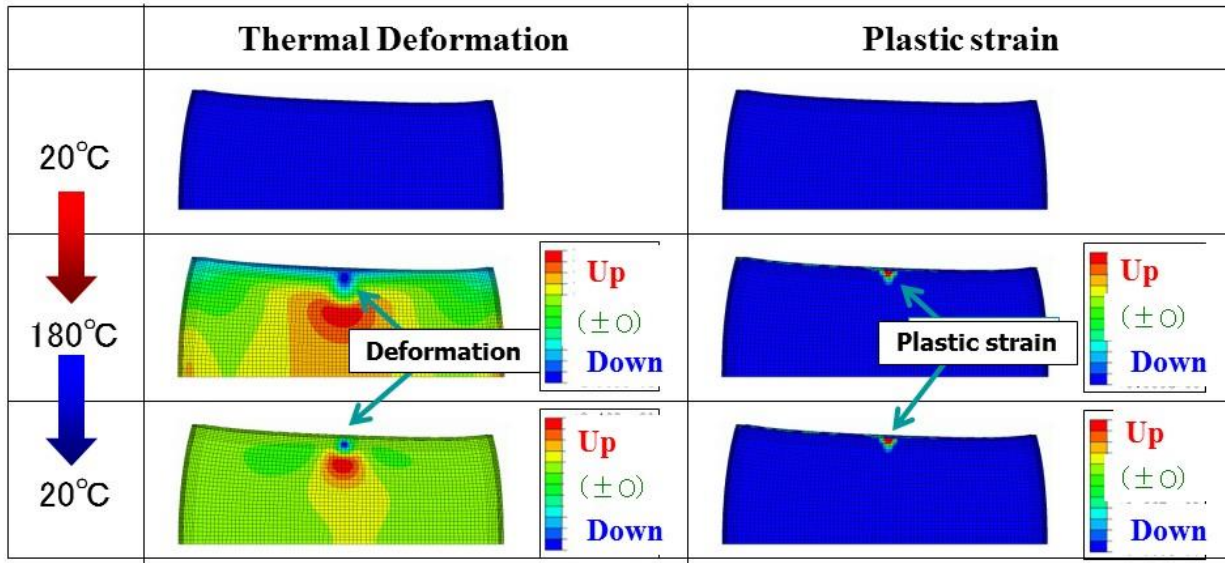


Material : 6K21

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CAE result of thermal deformation

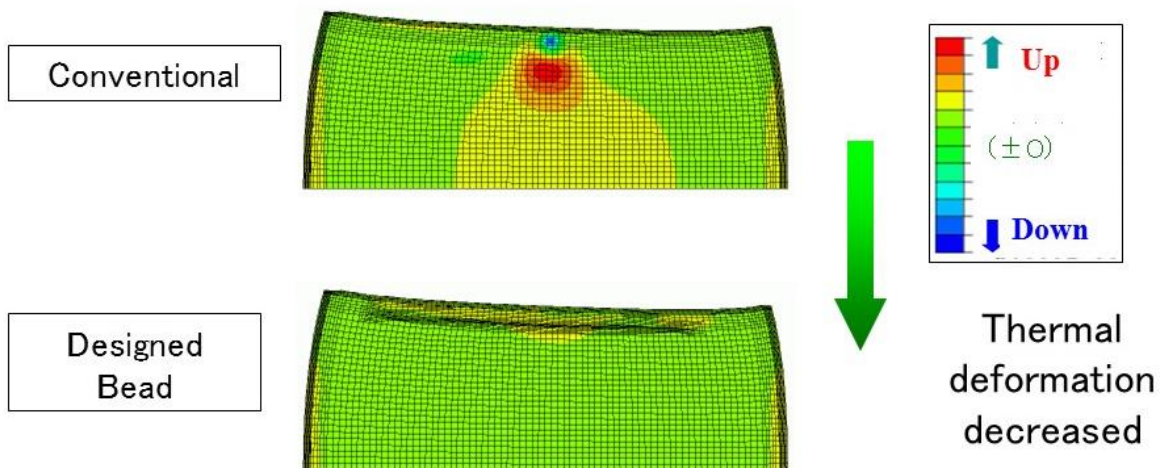
○Material: 6K21-T4 t1.0mm
 ○Temperature change profile: 20°C⇒180°C⇒20°C



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Developed Designed Bead Effect



Thermal Deformation (up&down): 6K21-T4 t1.0mm

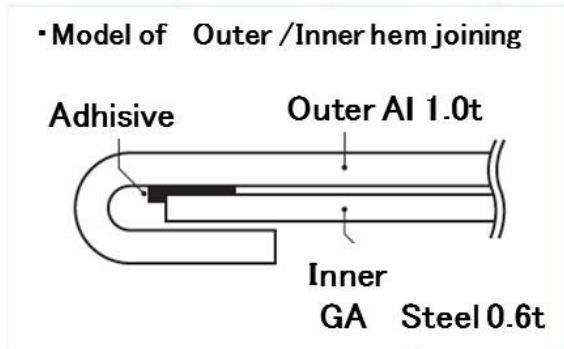


Mitsubishi Motors co.
Lancer Evolution (2004)
OUTLANDER (2005)

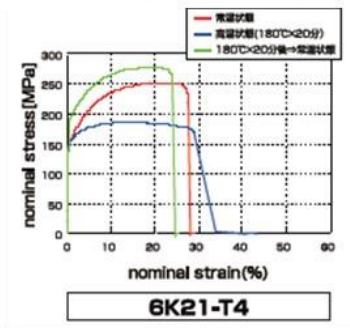
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● Thermal deformation CAE for Aluminum parts : Al(Outer)-Steel(Inner) Door structure

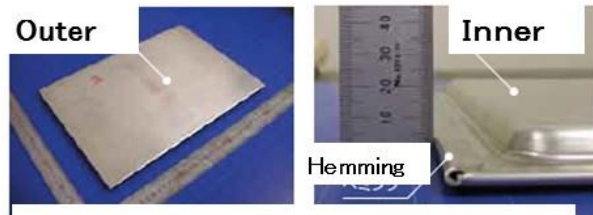


• Mechanical property change of Al



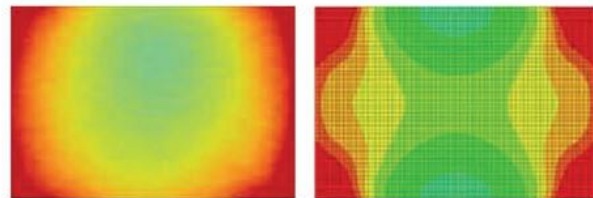
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● Experiment of thermal deformation



Outlook of joined sample(350x259x1.0mmt)

Outer AI 1.0t/Inner GA Steel 0.6t)



Experimental result CAE result

Fig. Distribution of thermal deformation after baking

ΔZ(mm)

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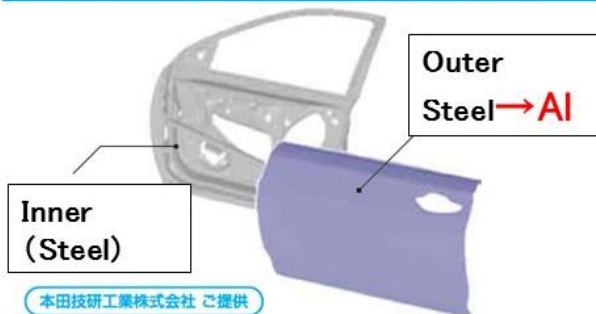
● Application for Aluminum(Outer)-Steel(Inner) Door structure

Honda Acura RLX



from Shanghai Motor Show 2015, China

Kobe cooperated
thermal deformation CAE



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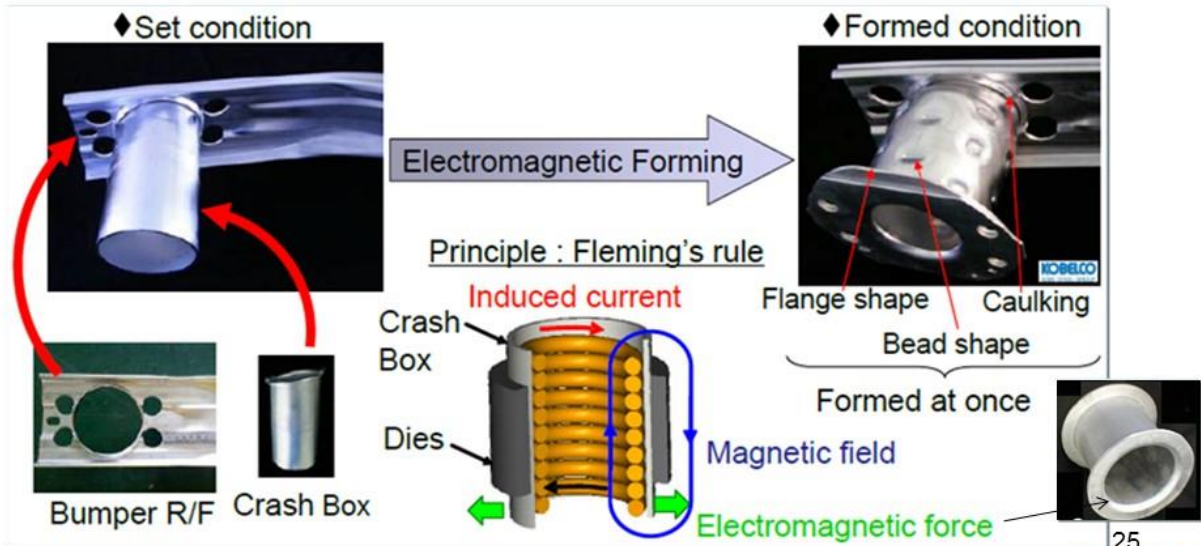
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4) Forming & Joining

● Electromagnetic forming technology

For a demand of the three-dimensional processing of aluminium extrusion, we developed electromagnetically forming technology with high productivity.

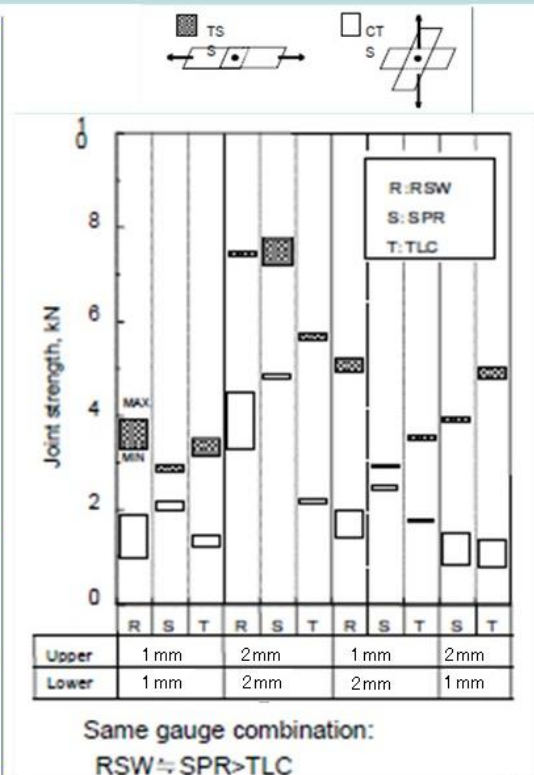
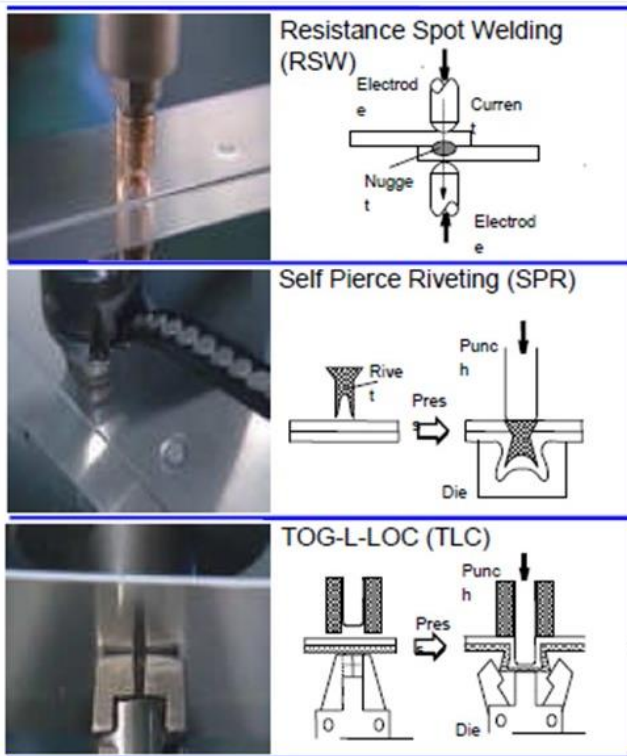
- Suitable for high conductivity materials, such as aluminium.
- Processing time is less than 20 μ s.



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4) Forming & Joining



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● Newly developed mechanical joining

: Piercing Metal Joining

<p>Piercing & Joining of Piercing Metal</p>	<p>Resistance Spot Welding Process</p>	
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Developed piercing metal joining

Piercing Metal (Steel)
Al 1.0mmt
Steel 0.8mmt

Cross-section sketch of Piercing Metal Joining

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● Technology of Aluminum & PP-resin direct joining by injection molding

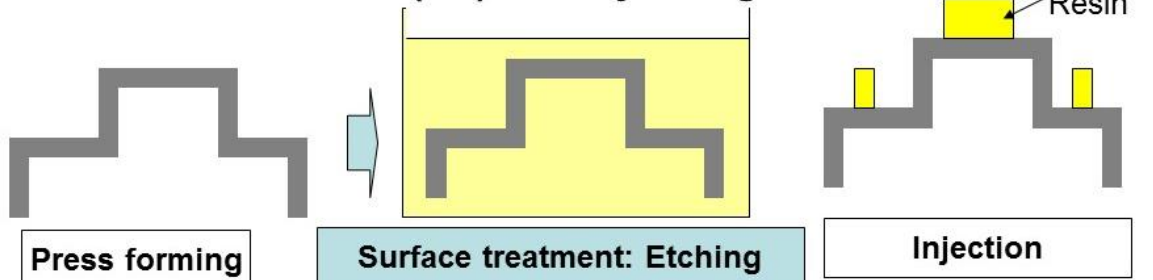
1. Conventional Metal- (PP)Resin joining

⇒ PP resin Inner & Steel RF is joined with steel bolt



Steel RF

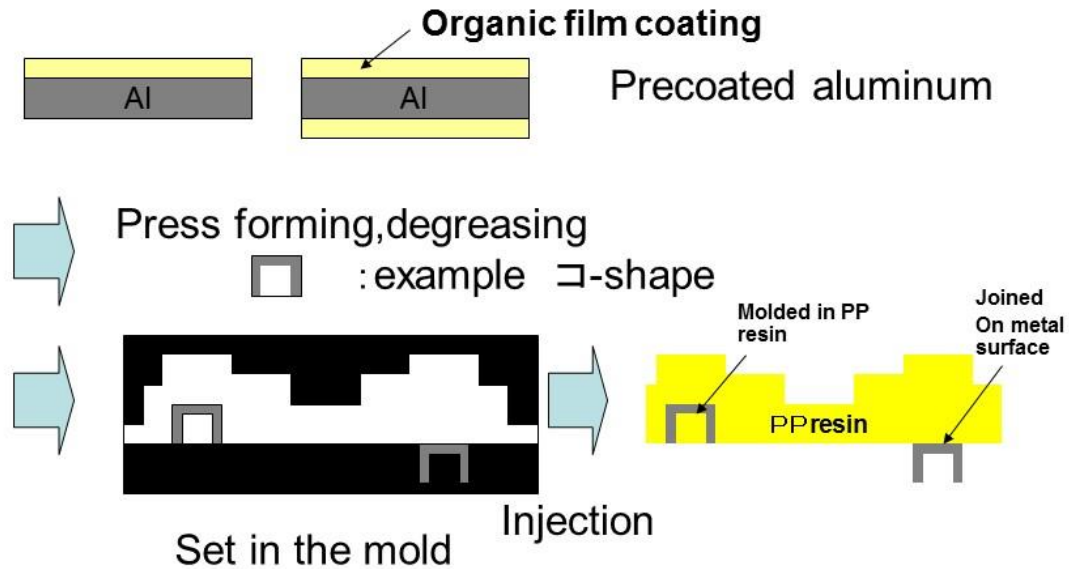
2. Conventional Metal- (PP)Resin joining



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● Kobe's proposal



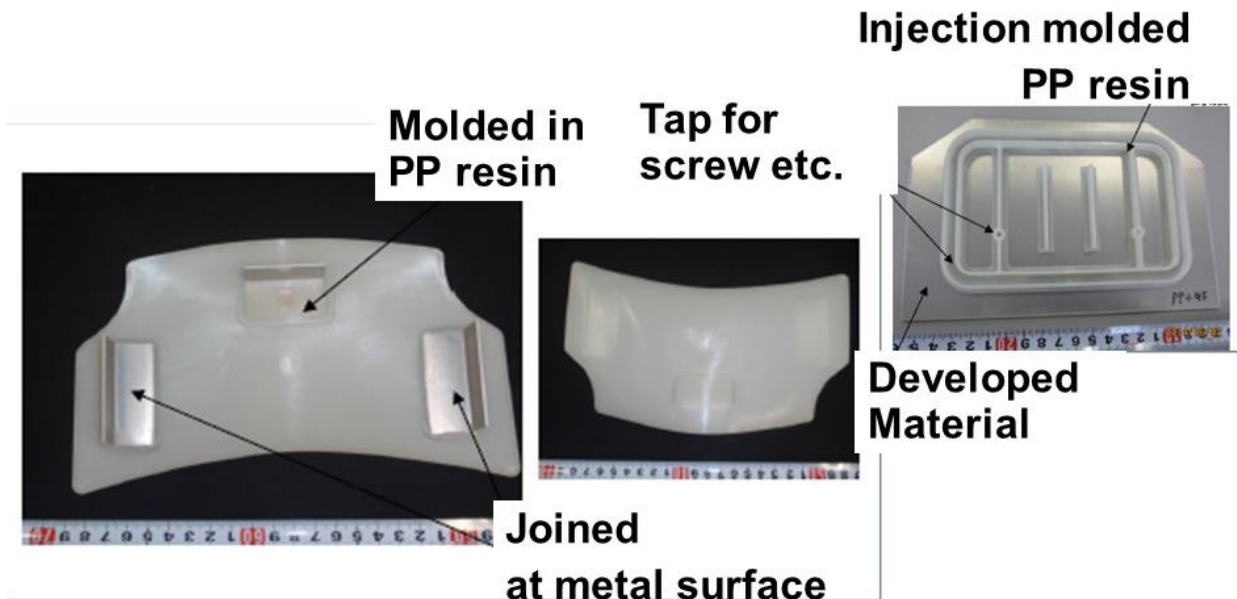
⇒ Useful solution for PP resin-Aluminum multi-material structure

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● Aluminum & PP-resin

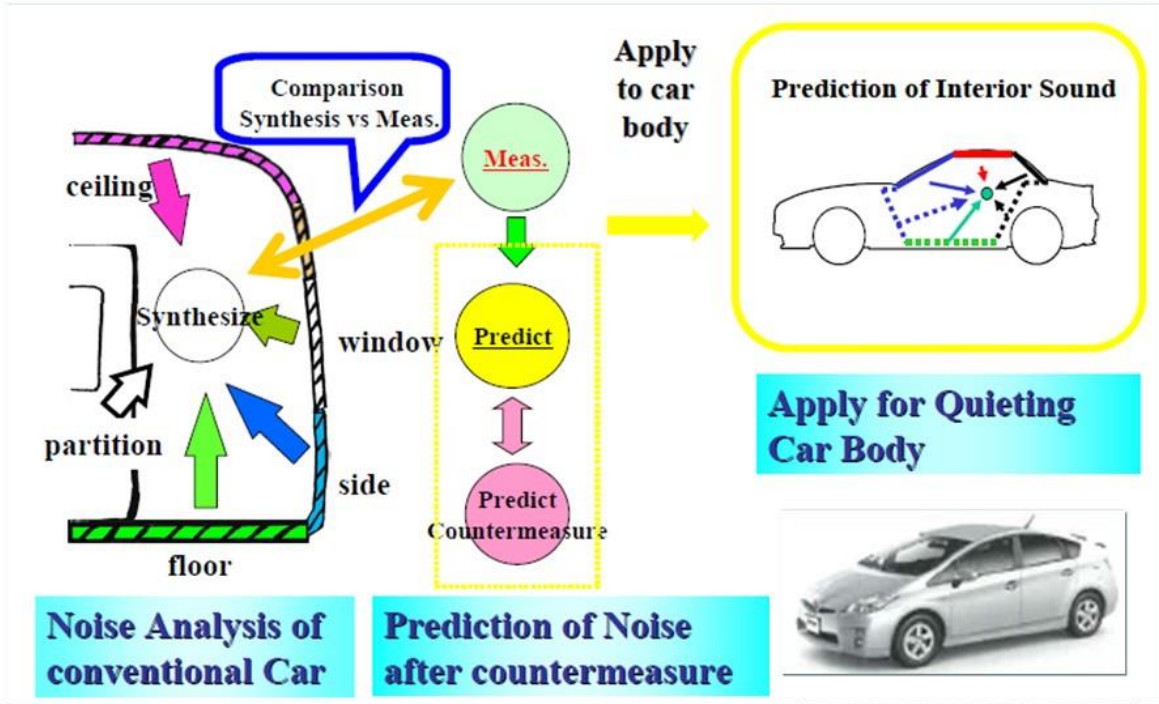
directly joined samples



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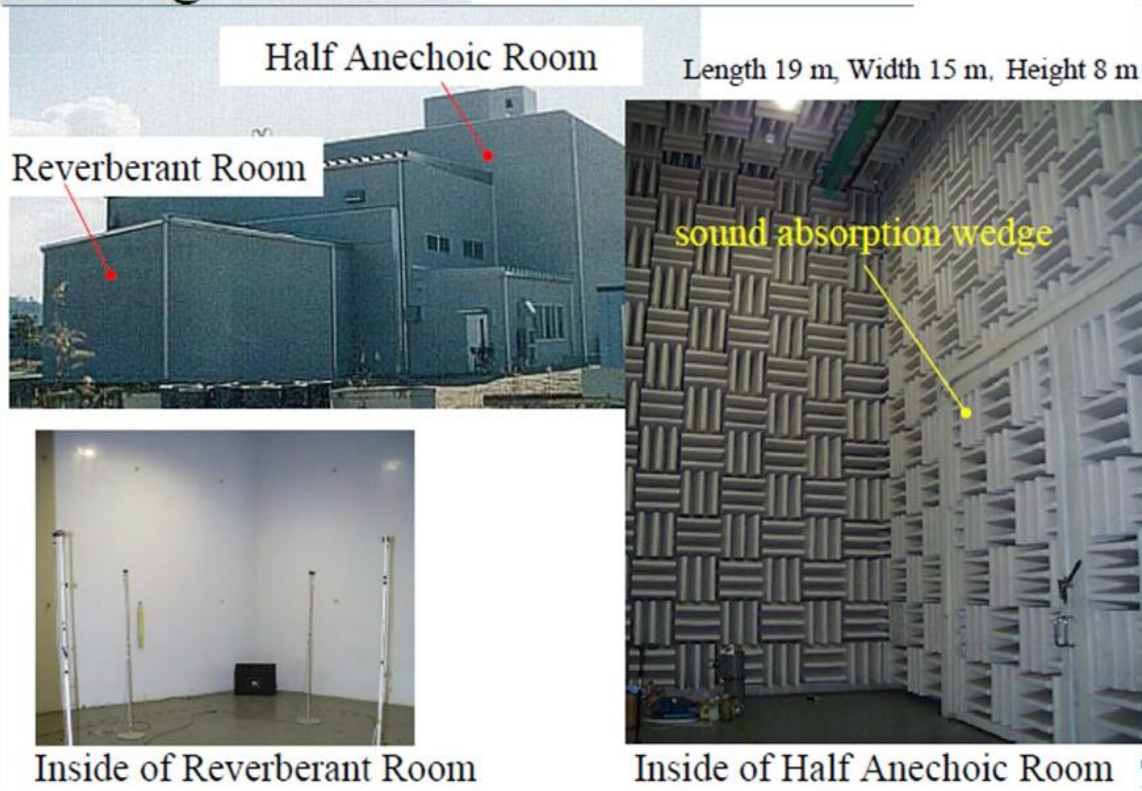


5) Solution for NV problem caused by Lightweighting



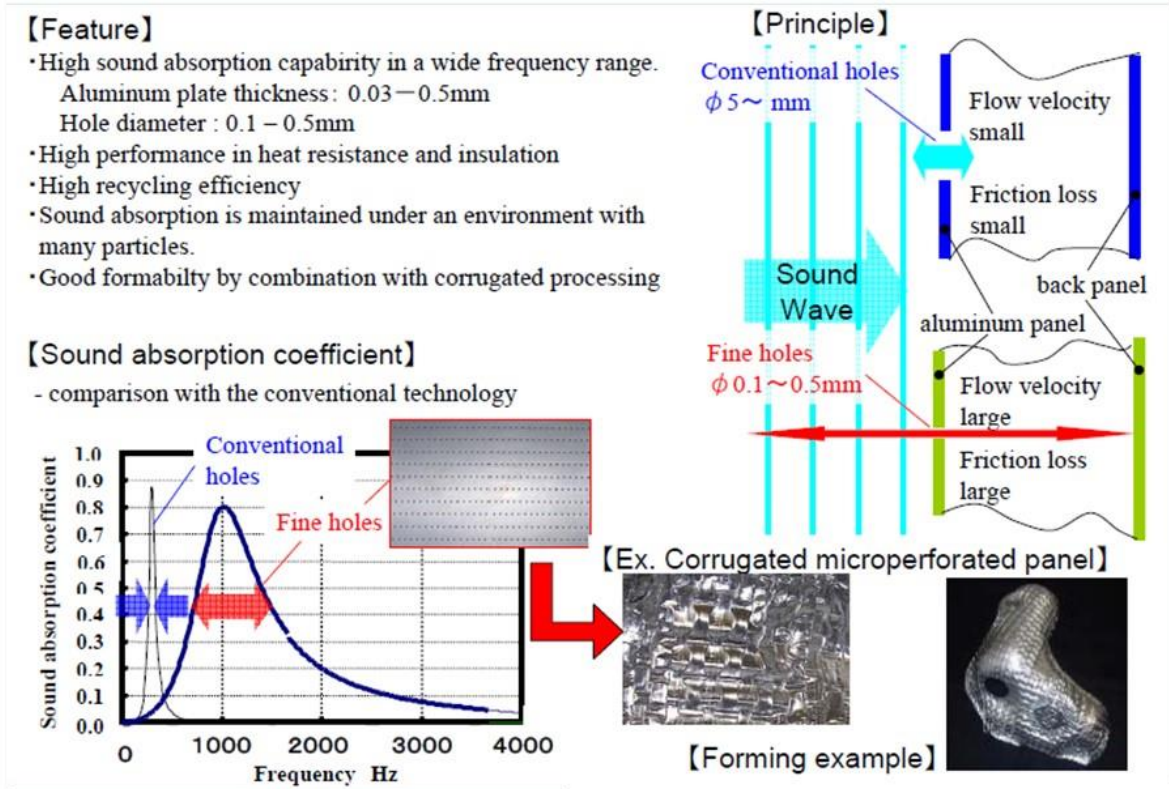
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Testing Facilities



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● Absorbing Aluminum Micropurforated Panel



made by Sanwa Packing Industry, Osaka, Japan

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Contents

◆ KOBE STEEL company overview

Introduction of Kobe Steel.

◆ R&D topics

1) Research and Development Strategy

2) Material

- Newly developed 6xxx alloy with high paint bake response

3) Structure design

- Pedestrian protection aluminum hood development
- Thermal deformation CAE for Aluminum parts

4) Forming & Joining

- Electromagnetic forming technology for Bumper system
- Newly developed mechanical joining
- Technology of Aluminum & PP-resin direct injection joining

5) Solution for NV problem by Lightweighting

◆ Global foot print

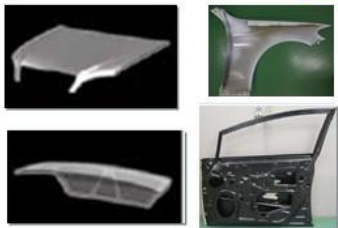
Flat rolled, Forged, Extruded products supply scheme
in Japan, China, US, Europe

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Global footprint of Kobe Steel, aluminium

Products	Japan	US	China	Europe
Flat rolled	● Tochigi	(●) TBD	● Tianjin 2016-	□ Technical cooperation with Hydro
Forged	● Mie	● KY	● Suzhou	● Under consideration
Extruded	● Yamaguchi	● KY (Materials: SAPA, Fabrication: KOBE)	● TBD	● TBD



Flat rolled products for BIW.



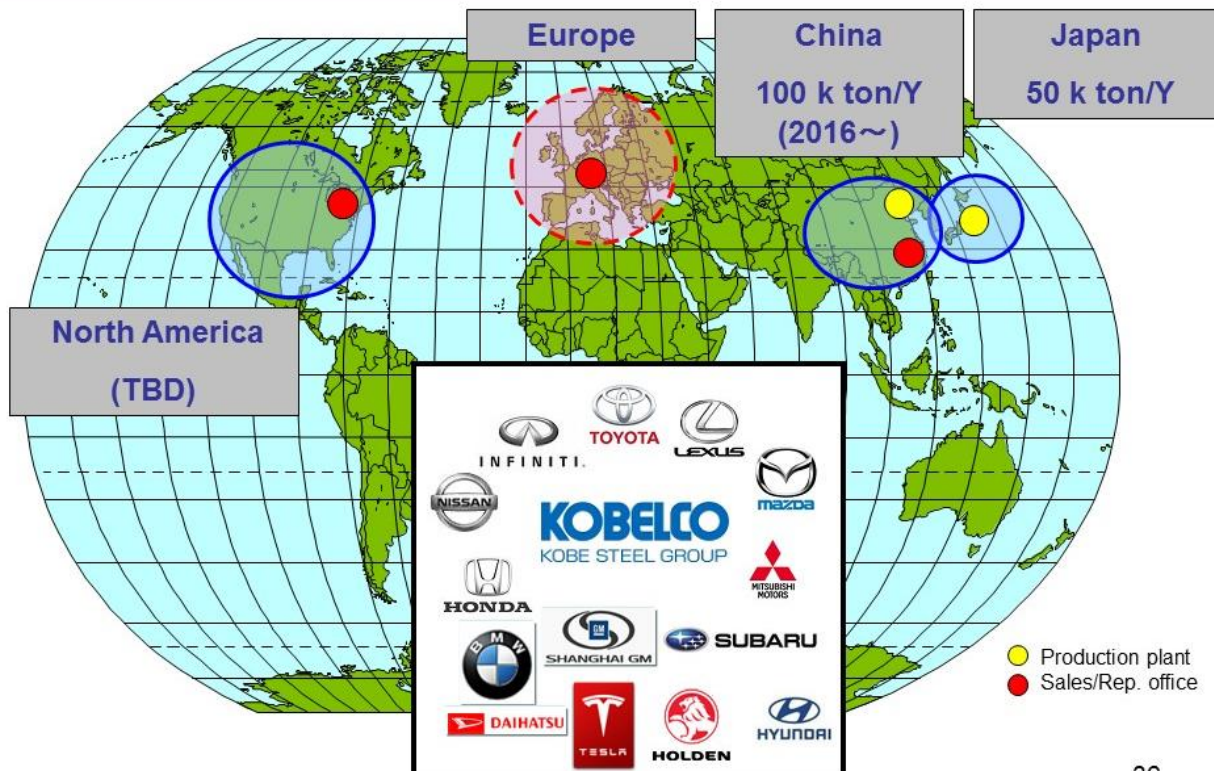
Forged suspension parts.



Extruded bumper system.

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Aluminium Flat Rolled Products



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New plant in China

Production capacity will be 100,000 M ton/year, from 2016.



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Summary

- Kobe Steel have a potential to support the lightweighting activities for OEM's globally.
- To improve required performance of the car, Kobe Steel is working continuously with our customers.
- To achieve the lightweighting BIW with aluminium, Kobe Steel is proceeding the application technology development, such as Forming, Joining and Product design with thermal distortion and/or crush behavior control.

See you at Kobe Steel booth during Aluminum China 2015 !!

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Thank you for your attention.

**See you at Kobe Steel booth
during Aluminium China 2015 !!**

We Welcome You To Our Next Event

AluMag®

North America 2015 9th - 11th of Nov
 AUTOMOTIVE LIGHTWEIGHT
PROCUREMENT SYMPOSIUM
 Westin Hotel in Detroit, USA



AluMag®

AluMag SAE 2016 12th - 14th April
 Light Weighting - Emission Reduction - Car Comfort
 Technology Center, Booth # 763 - Detroit - Cobo Center, MI USA



AluMag®

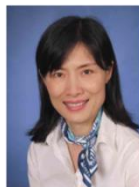
Europe 2016 27th - 29th of Nov
 AUTOMOTIVE LIGHTWEIGHT
PROCUREMENT SYMPOSIUM
 Hilton Hotel in Duesseldorf, Germany



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THE MARKET DEVELOPER



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