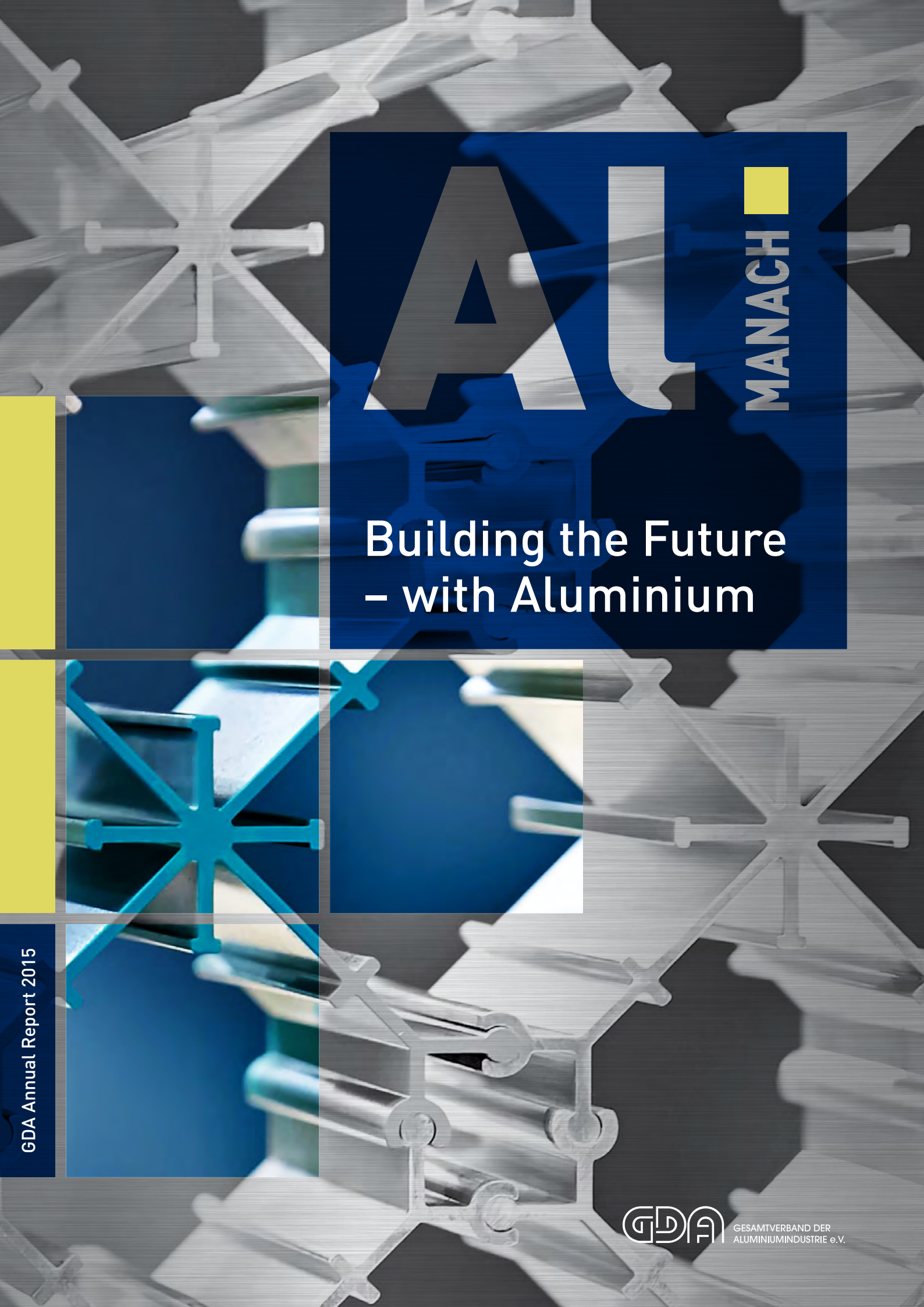


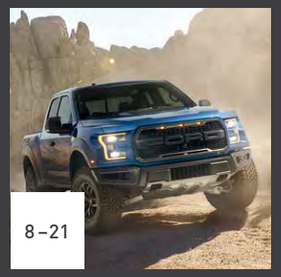
Building the Future – with Aluminium

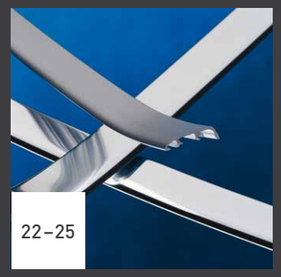
GDA Annual Report 2015

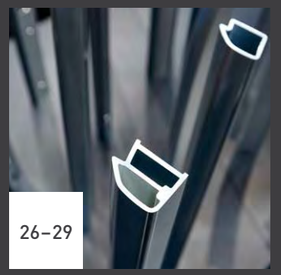
GESAMTVERBAND DER ALUMINIUMINDUSTRIE e.V.

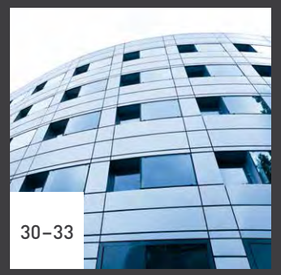
GDA ■ CONTENTS

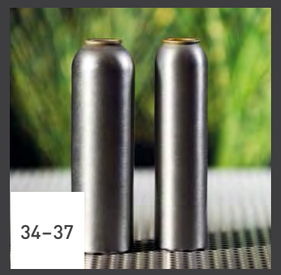
Contents

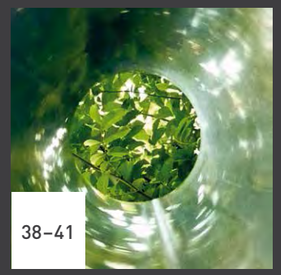


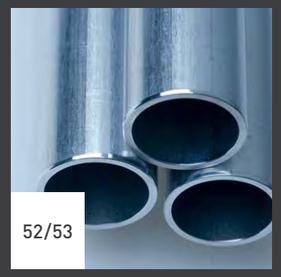


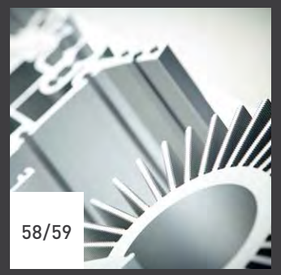


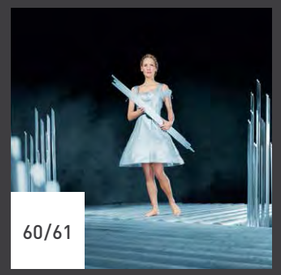












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The Mobility of the Modern Age is Made of Aluminium

Aluminium is now enjoying an economic upswing, the main reason being the marked increase in the use of aluminium in the transport sector, with continuing above-average growth there in the coming years.

Authors:
left: Heinz-Peter Schlüter, GDA President, Chairman of the Supervisory Board, TRIMET Aluminium SE
right: Christian Wellner, GDA Executive Director

The German aluminium industry clearly outstripped overall economic growth last year and is confident about the prospects for 2015. We are expecting volume growth in almost all markets. The growing demand for aluminium from the aerospace industry and expanding markets in the car industry are contributing to a positive mood in the sector. In 2015 our aluminium companies are therefore expected to exceed the production levels of the previous year.

The aluminium sector is one of the strongest growing material sectors globally. There is a mood of optimism that is reflected in the good market forecasts and data: we used some 12 million tonnes of aluminium in Europe in 2014 and demand will almost double in the next 30 years. The global demand for aluminium will therefore grow continuously, also and especially in Germany.

'The mobility of the modern age is made of aluminium!' This guiding principle will characterise the development of future aluminium markets. Above all automotive industry business is driving demand for aluminium. Aluminium is already the most widely used lightweight construction material in the automotive sector today and on top of this there is a growing demand from customers for new solutions and applications using aluminium. The metal is also being increasingly used in high-volume cars – be it for engines, in the body area, for structural components or in the chassis. The producers of semi-finished rolled products in particular are currently investing heavily worldwide in the expansion of their capacities and annealing lines for body sheet in order to meet growing demand. Aluminium castings and extruded profiles are also showing increased production and demand.

Competition and open markets are elementary features of our economic system. Ultimately it is innovative capability and resourcefulness in creating added value that determines one's own market position. Compared with other materials, our metal has an outstanding market position but nevertheless competition is still intensive. The aluminium industry needs to work more closely with car manufacturers to open up further applications. The task here is to highlight and strengthen the benefits of aluminium compared with steel or CFRP components. This includes, for example, the development of new alloys in order to obtain higher strength and greater ductility, and thus thinner gauges and lighter components.

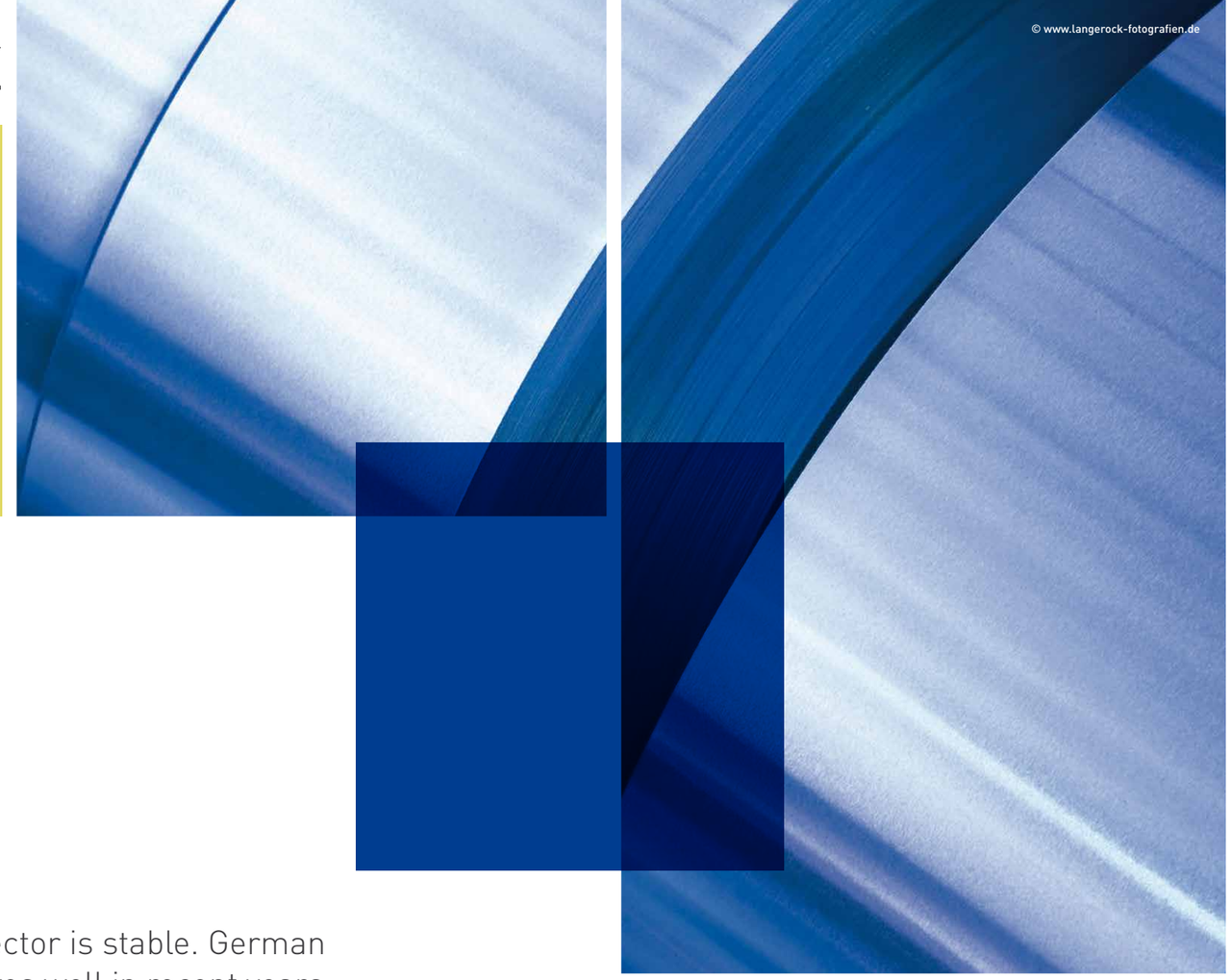
Successes in the past are no guarantee of success in the future. The market environment for the German aluminium industry has changed considerably in recent years, with the pressure of global competition increasing. The long-term success of the metal and the industry depends on new solutions and products. Innovations are critical factors for future success and guarantee the future viability and competitiveness of companies. More complex material properties require a high degree of technical expertise and the development of special solutions. The focus of new developments in future will also be on the resource efficiency of all processes and their ability to reduce CO_2 emissions and save energy. To remain competitive globally, new technical developments are continually required. Large companies as well as the small and medium-sized enterprises along aluminium's whole value-added chain from the primary smelter to the end-user have to meet the associated challenges.

Anyone wishing to make decisions for today, tomorrow and the future ought to be aware of the megatrends of the future – in other words should know what opportunities these trend developments offer and what risks they pose. Mobility, conservation of resources and reuse, Industry 4.0 or new materials are megatrends that are driving the markets of the future and which will also have a decisive influence on the future of the 'wonder metal' aluminium.

The guiding theme of the GDA Annual Report 2015 is 'Shaping the Future with Aluminium'; it wants to show the potential for aluminium as a material in the various user markets and document the focal points of the work of the association in this challenging field. In addition, GDA reports on these topics and experts from industry and research make guest contributions describing their experience of working with the metal and the association. ■

LME Official Price Report

London Metal Exchange (LME) in London, especially the aluminium contracts. It includes Aluminium HG Cash Buyer, Aluminium Alloy Cash Buyer and NASAAC HG Cash Buyer as well as Aluminium HG 3-Months Buyer, Aluminium Alloy 3-Months Buyer and NASAAC HG 3-Months Buyer. The LME Official Price Report also provides information on Cash Buyer contracts for copper, lead, nickel, tin and zinc.



An Overview of the Aluminium Industry

The economic environment in the aluminium sector is stable. German aluminium companies have positioned themselves well in recent years and have been able to defend or increase their market shares.

In terms of quantity, 2014 was a positive year for the aluminium industry in Germany. Aluminium producers increased production at the vast majority of their plants. The German aluminium industry generated revenues of 15.2 billion euros. This corresponds to a rise of 17.8 per cent compared with the previous year and is attributable to price and volume effects. In particular the price of aluminium, which increased significantly during the course of the year, contributed to this development.

The aluminium industry plays an important role as an employer in Germany. Some 600 plants provided jobs and income for a large number of people associated directly and indirectly with this sector of the economy. The small businesses, medium-sized enterprises and concerns of the aluminium industry employed 74,000 people directly in 2014.

Transport was the most important customer sector in 2014. With a share of 47 per cent it accounted for almost half of total demand in Germany. The building and construction and packaging sectors together account for just over a quarter of demand. A further 14 per cent is attributable to mechanical and electrical engineering. The remaining share of total demand goes into office equipment, household goods, the iron and steel industry and other end uses.

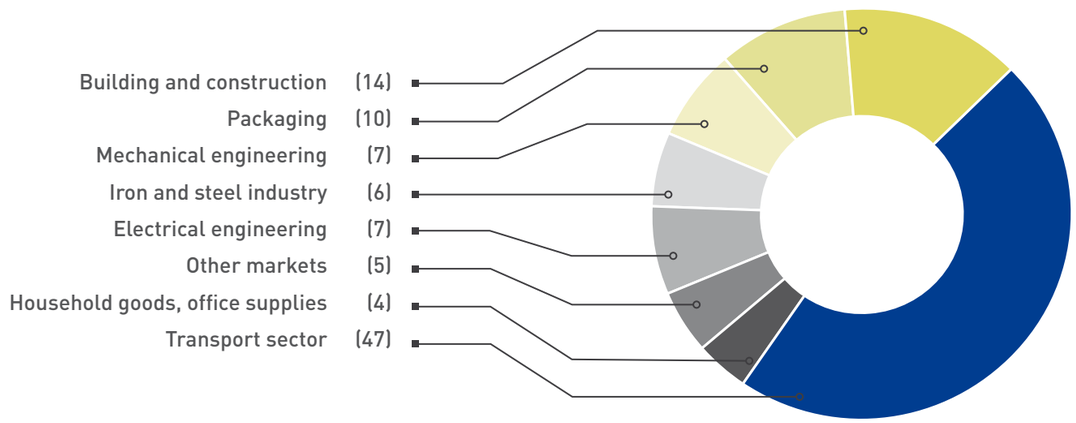
Export markets play an important role in the development of the aluminium industry. In terms of quantity, most German exports go to the other member states of the European Union. In 2014 the positive economic development in the United Kingdom in particular contributed to the export successes of the German industry, while the weak underlying economic conditions in France led to a tendency for export activities to decline. Overall, exports provided an important pillar for German aluminium producers in 2014.

The German aluminium industry is entering 2015 with optimism. The state of the global economy has stabilised. Clear positive stimuli are coming from the USA. Although the economic situation in Europe is not satisfactory, there are signs of a further improvement in sight. Business expectations in Germany are largely positive. This also applies not only to the industrial downstream markets but also to the building and construction industry. Overall one is therefore expecting solid growth. ■

Christian Wellner,
GDA Executive Director

The improved order situation at the end of 2014 and the stable situation at the beginning of 2015 indicate a further improvement in the economic situation. In the transport sector, carmaking will continue to dominate but growth is still expected in shipbuilding, aircraft construction and local public transport systems. The building and construction and packaging markets will continue their good development.

Main markets for aluminium in 2014 (in %)



International Aluminium Die-Casting Award 2016

GDA's Recycling trade association is organising the International Aluminium Die-Casting Award again in 2015/2016. Its partner in running the event is the German Foundrymen's Association (BDG). The Aluminium Die-Casting Award has been an established platform for demonstrating the high quality of aluminium die-castings for many years.

The aim of the competition is to boost interest in the versatile material aluminium and highlight further areas of application. The assessment criteria for the castings submitted are a die-casting-friendly design and the use of recycled aluminium. Castings that comply with the requirements for quality, topicality, an innovative approach to solving a problem and technical advancement will receive a certificate. The award ceremony will be held during EUROGUSS 2016 (12–14 January 2016) in Nuremberg.

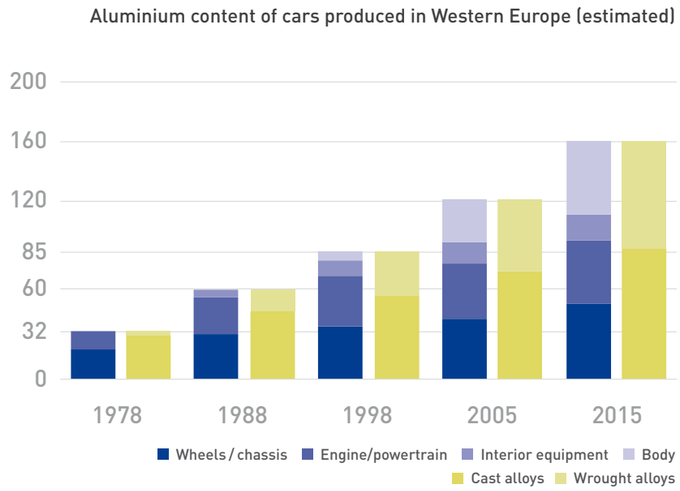
AUTOMOTIVE

The Car and the Aluminium Industry – a Long-Standing Symbiosis

Demand for aluminium will continue to grow in the automotive sector, where customers will be looking for new solutions and applications using aluminium alloys. The major aluminium concerns are currently expanding their capacities for the production of body sheet in order to be able to meet growing demand from the car industry.

Wolfgang Heidrich,
Technical Officer, Transport and
Mechanical Engineering

Aluminium is already the most important lightweight construction material in the automotive sector today and moreover there is a growing demand from customers for new solutions and applications using aluminium. The metal is also being used increasingly in high-volume cars – be it for engines, in the body area, for structural components or in the chassis.



Lightweight construction has always been important ever since car racing started at the beginning of the 20th century. The development of the first AUDI A8 with its all-aluminium body and revolutionary ASF (Audi Space Frame Space) method of construction at the beginning of the 1990s marked the marked the start of intensive cooperation between the car and aluminium industries to develop jointly the aluminium wrought and cast semi-finished products needed to meet the greater demands of this method of body construction for production vehicles.

Since 1995 there has been rapid development in the use of aluminium in vehicle manufacturing, and in the body in particular in recent years. Besides all-aluminium vehicles from other carmakers like Jaguar Land Rover, a multi-material method of construction is often used in the medium-size car sector with its larger volumes. These can be aluminium-intensive bodies with some steel in the rear section or methods of construction that involve a composite design for the body structure and a body shell and doors and lids made from aluminium.

There is no question of the need to use lightweight construction to meet the limits for CO_2 emissions. Even though the strategies of the individual OEMs regarding lightweight construction are quite different, aluminium still makes a significant contribution in all cases to realising the potential of lightweight construction.

The pre-competitive cooperation between the car and aluminium industries was intensified considerably with the setting up of the GDA Automotive Rolling working party in 2011. Participants from both industries are preparing harmonised requirements for the widest possible range of properties and characteristics, such as the mechanical characteristics, forming properties and surface properties of standard aluminium alloys for rolled products in car manufacturing. The joint results are discussed with the relevant VDA bodies and then lead to revised VDA guidelines, which will also be an important guide for the intensive use of aluminium in vehicle manufacturing. ■

The VDA Light Metals Project Group

The car industry is focussing on expanding the potential use of aluminium sheet by means of standardised mechanical and other properties.

The aim of the VDA Light Metals project group is to identify, collate and deal with matters requiring common action where aluminium sheet and other topics such as magnesium are concerned.

The carmakers' demands on the light metals industry with respect to standard and new aluminium alloys have been compiled and presented. The extent of the testing required has been identified and coordinated, and demands have been made for feasible testing by the supplier. The standardisation activities of the carmakers regarding standard alloys and new aluminium alloys are being harmonised, intensified and discussed with the aluminium industry within the GDA Automotive Rolling working group and mutually agreed if at all possible. This cooperative mode of operation has developed very positively and proved its worth since the GDA working party was established in 2011.

The following topics have turned out to be of interest and necessary for the OEM participants:

- global standards for aluminium sheet
- an exchange of knowledge and experience with respect to magnesium sheet
- a comparison of test procedures.

A common quality standard and characteristic values and tolerances were laid down for standard 5xxx and 6xxx series alloys that which are processed by every OEM.

This quality standard has been embraced in VDA 239-200. This follows the version for steel sheet (VDA239-100). There have been numerous presentations and discussions with GDA and aluminium sheet producers with regards the required characteristic values, tolerances and views concerning guarantees. VDA239-200 has been available from VDA since September 2013.

As far as possible, each supplier of aluminium sheet has to offer a solution for each requirement. Several offers to a single requirement have to be justified.

At the moment, the required quality standard of VDA 239-200 for 6xxx series alloys is being extended to include

- ductility / low dent resistance
- higher and high strength solutions

and will be presented to the GDA working party for discussion in 2015.

Regarding magnesium sheet, characteristic values and requirements are being gathered but a VDA recommendation is not being pursued at the moment in view of the currently manageable number of OEM implementation activities, available standard sizes and standards.

Concerning the comparison of testing procedures, the drop tower test is currently being investigated at certain locations with respect to the results and the informative value using a commonly used standard ductile 6xxx series alloy as an example.

The joint preparation of effective and acceptable standards for rolled aluminium products for automotive applications will ensure the supply and use of customised and innovative products in this important market sector in the future as well. ■

Active members of Light Metals PG:

- Audi AG
- BMW AG
- Daimler AG
- Ford Werke GmbH
- Opel AG
- Porsche AG

Author:
Dr.-Ing. Thomas Possehn,
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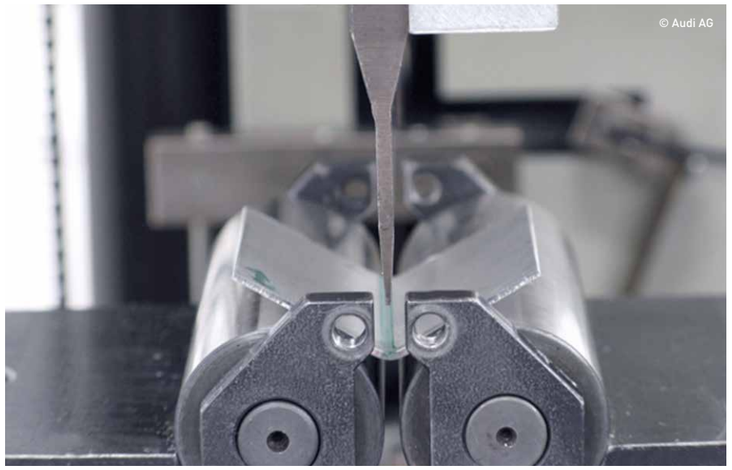
Neckarsulm



Execution of plate bending test.

Author:
Marion Brasse,
Quality Assurance Materials Technology,
Audi AG Neckarsulm

The Plate Bending Test

The so-called plate bending test is used to determine the susceptibility of metallic materials to failure during bend forming processes as well as the characteristic values required for numerical simulation of forming behaviour.

The so-called plate bending test is performed in practice to allow conclusions to be drawn about the deformation behaviour and the vulnerability to failure of metallic materials during forming processes that involve a high degree of bending (e.g. folding operations) or under crash load conditions. The execution of the test on metallic materials and the determination of the angle of bend are described in VDA 238-100: Plate Bending Test for Metallic Materials.

The increased demands made on aluminium sheet materials during forming processes and under crash load conditions means the attempt to characterise and describe material properties has gained in importance. The 'Plate Bending Test' working group was established within the Automotive Rolling working party in order to do justice to this importance. The working group comprises the four OEMs Audi, BMW, Daimler and Ford together with the aluminium producers Alcoa, Aleris, AMAG, Constellium, Hydro and Novelis. The aim of the working group is to describe the execution and determination of the angle of bend in such a way that results are comparable and reliable.

The limits for aluminium sheet were determined in round-robin tests and the reasons for differences discussed. The interlaboratory comparison showed that the following factors influence the reliability of the test:

- roller spacing
- punch radius
- rigidity of the testing device.

Based on the knowledge gained from the round-robin test, an expert group was then formed with the aim of revising VDA 238-200 and defining the requirements for aluminium sheet materials.

As the VDA guideline is not only applicable to rolled aluminium products but can also be used for extruded aluminium profiles and rolled steel products, the revision was submitted to the Extrusion working party and the Plate Bending Test panel of experts of the Steel Institute VDEh in order to incorporate their requirements. ■

Roping and Flawless Surfaces on Shaped Aluminium Sheet Parts in Carmaking

Roping is surface roughening attributable to the rolling texture that can occur transverse to the rolling direction.

The quality and appearance of shaped sheet components in carmaking have a major influence on the perceived value of the vehicle in which they are used. The surface finish of visible bodyshell components has a major influence on creating this impression. In this contribution, light is shed on the surface phenomenon called roping and its importance for carmakers.

The phenomenon of roping involves repetitive linear surface defects that result during forming of aluminium sheet materials. With the alloys used today, these ridges and valleys on the sheet surface have a width of 0.5 to 2 mm, a length of 10 to 30 mm and a height of up to 15 µm. Almost all AlMg, AlMgSi and AlMgMn bodyshell alloys currently used in car body manufacture exhibit roping after forming. The phenomenon is particularly marked in processes in which the sheet is formed in a direction perpendicular to the direction of rolling.

Cathodic electrodeposition and subsequent painting do not conceal the roping on the sheet surface. To some extent the painting process acts like a filter filling out the short-wave roughness and thereby emphasising the visible long-wave structure in the area of the roping phenomenon. In each case, the observer perceives even weakly pronounced repetitive patterns more strongly and, with respect to a flawless surface, regards them as being troublesome.

This means on the one hand that carmakers have to develop strategies to be able to use the materials as well as possible with respect to new requirements. On the other the manufacturers of the aluminium sheet are called upon to reduce the occurrence of such disruptive surface textures.

Coordinated by GDA, a group that incorporates carmakers and aluminium producers was formed (three years ago) to jointly develop a standardised and production-relevant characteristic value to quantify the roping of sheet surfaces. The test method currently prioritised is based on image analysis in the frequency domain. A high-contrast image of the roping ridges and valleys is produced, digitalised and evaluated using a programme to determine the characteristic values for roping. A characteristic value is generated starting with the severity and the frequency of the roping characteristics.

Laboratory sample with pronounced roping after cathodic electrodeposition.

In a laboratory test, sheet strips perpendicular to the direction of rolling are stretched by a predetermined amount (10 % uniaxial strain in the GDA tests) to cause roping. Subsequently, roping effects are highlighted by grinding, digitalised, evaluated using the roping-evaluation tool and then compared.

The characteristic roping value is used to evaluate the materials supplied and the surfaces of stampings. It is also used during the development phase of a component: recommendations for the choice of material can be derived from the strip orientation with respect to the direction of rolling and the loading in the shaping tool using the characteristic roping value of the material. ■

Dr.-Ing. Ralf Denninger, Quality Management
Stamping Plant, Audi AG Neckarsulm

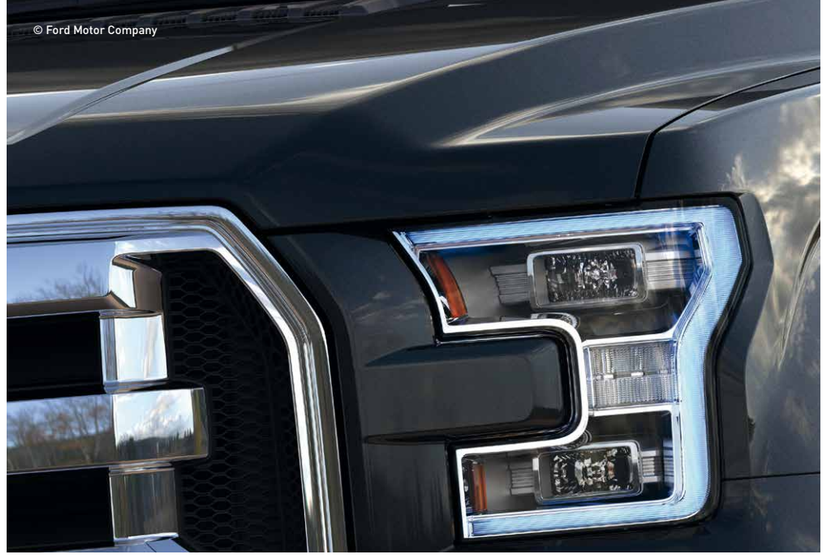
Ford F-150 – The American Dream

Carmakers in the USA are focussing increasingly on aluminium instead of steel. The latest example of this trend is the new Ford F-150. Compared with its predecessor, the use of aluminium and other lightweight materials reduces the unladen weight of the new pick-up by up to 320 kilograms.

In North America, Ford's F-150 has been the bestselling pick-up truck for 38 years running and the overall bestselling vehicle for 33 years, with peak yearly volumes at times exceeding 700,000. More than a simple utility vehicle, it is most often a very well appointed personal recreational vehicle of exceptional abilities, able to transport 5 adults in comfort while towing more than 5 tons. It is available in 3 body styles and 3 boxes.

The manufacturing footprint is solidly Mid-Western, with two assembly plants in Dearborn, Michigan and Kansas City, Missouri, supported by two Ford stamping plants in Dearborn, Michigan and Buffalo, New York. These two plants provide more than 80 % of the stamped components by weight. Three South-East Michigan Tier-1 stamping suppliers provide small & medium stamped parts, while Constellium delivers all the stretch-formed extrusions. Novelis, ALCOA and Aleris provide the aluminium sheet, while SAPA and Kaiser provide the extruded tubes for the large hydroformed parts made by Ford.

Laurent B. Chappuis, Ford Motor Company, Technical Expert – Lightweight Stampings Vehicle Program Engineering – SBU/Ford Vehicle Operations



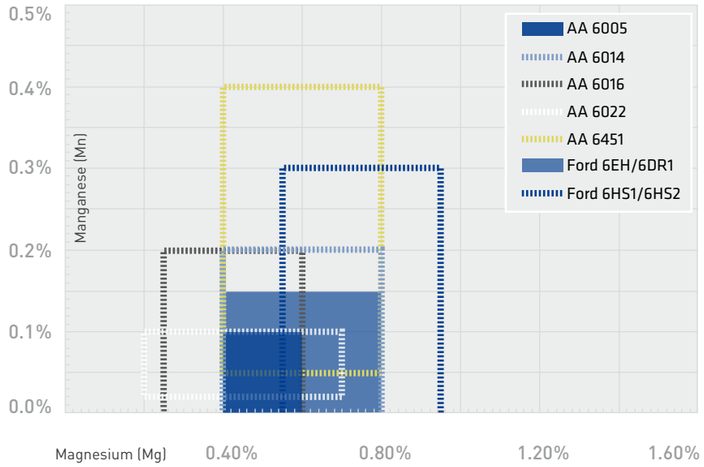
© Ford Motor Company

Extensive investments

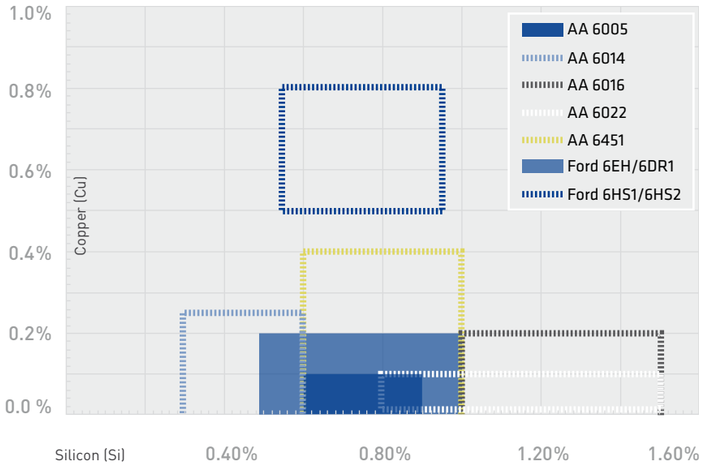
The project required large investments: on top of refurbishing existing lines and facilities, Ford added 4 new stamping lines, 3 blanking lines, 1 roll form line, 3 hydroform lines, surface treatment and heat treatment lines to the Dearborn Plant, while adding a blanking line and refurbishing 3 lines in Buffalo. New bodyshop and paint system upgrades for Dearborn and Kansas City Assembly Plants round out the infrastructure upgrades at Ford. Similarly, the Tier-1 stampers added lines as well as upgraded existing ones. ALCOA and Novelis added heat treat and surface treatment capacity to support the new demand for heat treated sheet in Davenport, Iowa and Oswego, New York respectively, while Aleris upgraded their plant in Lewisport, Kentucky.

From a product design point of view, the aluminium body and box have enabled an overall weight saving of more than 300kg, while offering increased load capabilities without sacrificing any toughness or durability. The cab structure incorporates a laminated steel dash panel; the doors feature boron intrusion beams. The overall material distribution is shown on Figure 1 on the left.

Flow of scrap with low copper content



Flow of scrap with high copper content



Chemical composition for Ford grades 6EH, 6DR1 and 6HS3 – "Low Cu" scrap stream vs. 6HS1/2, "High Cu" scrap stream.

Closed material loop

The establishment of a closed loop tolling system between the stamping plants and the aluminium mills was a major consideration from the earliest planning stages. The challenge was to establish a practical and cost effective recycling scheme with 3 aluminium companies supplying 7 alloys representing 9 specifications. It was immediately apparent that sorting each of the 11 unique combinations of alloy & supplier was unfeasible. The project focused on three areas: the development of a set of recycling compatible specifications, a geographical consolidation of the consumption and the engineering of a cost effective scrap handling system.

Ford's specifications focus on engineering properties, allowing individual suppliers the freedom to choose which alloy they will use to meet a given specification. From a recycling point of view, the breakthrough came with the realization that suppliers actually produce any given alloy within a narrow subset of the published compositional limits. Furthermore, the need to achieve similar mechanical properties tends to bring actual limits of distinct alloys closer together than the official alloy definitions would suggest. The new Ford specifications focus on the major alloying elements of automotive sheet alloys (Mg, Mn, Cu & Si) and standardize the other elements to constant levels across all the specifications. The specifications create 4 scrap categories – "High Mg", "Low Mg", "High Cu" and "Low Cu".

Grades instead of alloys

To differentiate from traditional aluminium industry thinking, specifications refer to grades, not alloys. Each Ford grade is centered in narrow common areas for all of the candidate alloys. In this fashion, alloy (x) from supplier (A) can be comingled with alloy (y) from supplier (B) and the resultant scrap can be tolled back to either supplier.

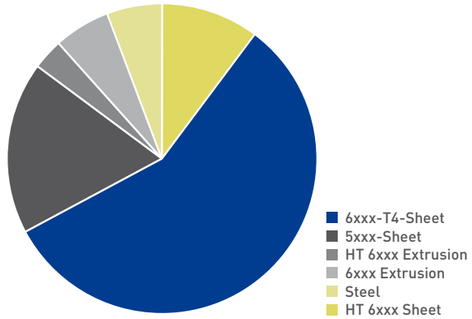
The second step was to rationalize the sourcing of the stamped components. From a weight point of view, 2 Ford stamping plants were awarded more than 80 % of the business; one Tier-1 supplier got 10 % while 3 other specialized suppliers shared the rest. Ford Dearborn Stamping Plant (DSP), home of 3 blanking lines, 6 high speed press lines, 2 progressive lines and a roll forming line was transformed into a dedicated aluminium plant and was awarded most of the business. This concentration allowed the rationalization of the scrap stream, with DSP as the hub. It is the only plant equipped to handle all 4 scrap streams and serves to balance the scrap returns between the mills according to deliveries. The next two stamping plants have only 2 streams. Together, these three stamping plants generate almost 96 % of the scrap flow.

To handle the scrap segregation, Ford selected a pneumatic conveying system with programmable switches instead of a traditional conveyor system. Each press line can feed directly to a series of in-line switches that direct the scrap to its proper destination. The system can be retro-fitted as an addition to a conventional scrap handling system, allowing mixed metal stamping plants.

A dedicated fleet of specialized trailers handles both the coil deliveries and the return of the scrap between the aluminium mills and Ford, minimizing one way trips.

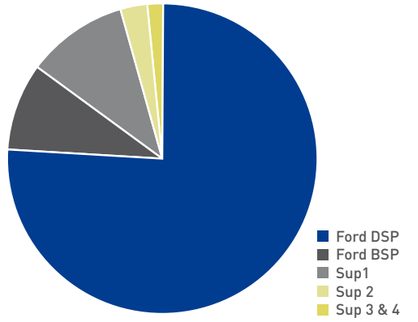
The production volume of the F-150 made all of this infrastructure development possible, while the early focus on recycling contributed substantially to the viability of the project. ■

F-150 BIW, Closures and box Material Distribution



Breakdown of the materials used in the body, add-on parts and box of the F-150.

F-150 Stamping Production Distribution



Ford DSP & BSP and Sup 1 are included in the tolling loop. They represent 96% of the total sheet bus.

Commercial Vehicles Working Group

Aluminium opens up many additional opportunities in commercial-vehicle construction like increasing the permitted payload, reducing the axle loading or creating structurally highly stressed body structures and equipment. To successfully implement such new approaches, answers need to be found to various questions, whether it be the joining technology for the different materials or the corrosion behaviour.

In order to be able to discuss these questions with specialists from the aluminium industry GDA has established a new working group. The Commercial Vehicles working group aims to provide an answer to technical and statistical matters such as discussion of the increased use of extruded or rolled products so as to open up further potential for aluminium in commercial-vehicle construction. The kick-off workshop for the new Commercial Vehicles working group took place in November 2014 in Düsseldorf and further meetings are planned for 2015. So far 30 participants from GDA member companies have announced their intention to attention.

Global Aluminium Capability for the F-150

For the first time, the body of the Ford F-150 is being made completely from high-strength aluminium sheet. All major aluminium companies are supplying Ford with aluminium components for its most versatile pick-up of all time.

Alcoa – Increased use of aluminum in vehicles

With the transition of the Ford F-150 from a steel based body to an AIV (Aluminium Intense Vehicle), the use of aluminium in automotive applications enters the mass volume car segment for the first time.

That said, aluminium has been penetrating into several areas in vehicles for decades, including powertrain, wheels, heat transfer systems, and is already the #2 material used in the industry today. The aluminium share per vehicle grew in Europe from 50 kg in 1990 up to 140 kg in 2014 and in US from 75 kg in 1990 up to 165 kg in 2014.

Now lightweighting of vehicles is pushed even further due to regulations from U.S. government and EU for reducing CO_2 emissions of vehicles. Ducker Worldwide predicts that in 2025 the average aluminium content in an European car will be at 185 kg and in an US vehicle even at 215 kg. This increase will mainly come from more intense use of aluminium in BIW structures and closures in AIV, including the Ford F-150 in US or the JLR Range Rover in Europe, as well as from closures in multi material solutions like the Daimler C-class or the BMW 5-series vehicles. The global demand in auto body sheet is forecasted to exceed 2 million tons in 2020. To support this growth in body sheet demand in North America, Alcoa has invested in additional capacity in Davenport, Iowa and Alcoa, Tennessee.

In addition to the capacity increase, Alcoa's has developed innovative solutions like the surface pretreatment Alcoa 951 with its enhanced adhesive bond durability performance for structural bonded parts. Late last year, the company launched the Alcoa Micromill, its proprietary technology that manufactures the most advanced aluminum sheet on the market, creating an aluminum alloy that has 40 percent greater formability and 30 percent greater strength than the incumbent automotive aluminum used today while meeting stringent automotive surface quality requirements. Alcoa continues to introduce key enablers for the increasing use of aluminium sheet in automotive body applications. ■

Aleris – Aleris adds Aluminum Automotive Body sheet Capabilities in North America

As a leading supplier to the global automotive industry, Aleris provides automakers with technically advanced light-weight solutions for a sustainable approach to the design and manufacture of vehicles. Aleris has been a long-term partner to the industry for more than a decade, providing advanced auto body sheet material from its plant in Duffel, Belgium to premium car makers like Audi, Mercedes, and BMW and partnering with OEM's on R&D projects focused on improving material properties and commercial viabilities

The introduction of the aluminum-intensive Ford F-150 is the first example in North America of the global trend toward lightweighting vehicles in order to meet rising emissions standards. With robust quality systems and a dedicated automotive team, Aleris today supplies aluminum for structural parts for the F-150.

Leveraging its technical know-how and experience in Europe, last year Aleris announced an expansion of its automotive capabilities in the U.S., which will equip the company to supply auto body sheet material to customers in North America as they pursue broader aluminum use to make vehicles lighter and more fuel efficient. Aleris is investing $350 million to upgrade its Lewisport, Kentucky facility, adding heat treatment and finishing capabilities, a new wide cold mill, two continuous annealing lines and an automotive innovation center. Upon completion of the facility's upgrade, Lewisport will be the company's first site in North America that is equipped with aluminum auto body sheet finishing capabilities. Construction work on the project started in October 2014, with a goal of shipping automotive body sheet material to customers by early 2017. When fully operational, the new facility will allow for the production of 217,000 metric tons (480 million pounds) of aluminum auto body sheet annually.

With an experienced team on board and the ramp-up of innovation centers allowing long-term R&D work with immediate impact, Aleris is a leader in the development of light-weight automotive solutions in Europe and North America. ■

Constellium – High-strength aluminium structural parts for the new Ford F-150

Constellium provides Ford with aluminium structural parts for the all-new Ford F-150 pickup truck that extensively uses high-strength, military-grade, aluminium alloy as a build material. Constellium, a global leader in the development and manufacturing of aluminium structural parts for the automotive industry, is one of Ford's largest suppliers of these components for the F-150.

The 2015 Ford F-150 delivers the industry's best towing and payload capability among full-size light-duty pickups, enabled by reducing up to 700 pounds of weight through the use of high-strength steel in the frame and aluminium alloy in the body. To keep pace with increased demand, Constellium has doubled manufacturing capacity at its facility in Van Buren, Michigan, and enhanced advanced prototyping and development capabilities.

"We are delighted to become one of Ford's largest supplier of high-strength aluminium structural parts for the groundbreaking F-150 and see this as an important milestone in the expansion of our global automotive structures business," said Paul Warton, President of Constellium's Automotive Structures and Industry business unit. "We believe that the automotive industry demand for aluminium will continue to grow as automakers seek to reduce vehicle weight and improve fuel efficiency. With our innovative and value-added solutions and the expansion of our component manufacturing capabilities in the United States, Europe and China, Constellium is strongly positioned to help meet that demand worldwide." ■

Sapa – Sapa teams with Ford F-150 to create new aluminium solution

The use of aluminum in all vehicles, not just automobiles, is growing as improved performance, fuel efficiency and environmental sustainability become increasingly critical. Lighter vehicles can accelerate faster, stop sooner, tow and haul more, and consume less fuel than products that weigh more. The savings are even greater when you consider that aluminum is virtually perfect for recycling. According to the U.S.-based Aluminum Association, nearly 75 percent of all aluminum ever produced is still in use today.

Sapa, the world leader in aluminum extrusions, has announced its partnership with Ford to supply the all-new F-150 with structural aluminum tubing, and provide ongoing development support for future aluminum extrusion applications.

The 2015 Ford F-150, which Ford calls its "toughest, smartest, most capable F-150 ever," features a high-strength, military grade, aluminum-alloy body, and is about 700 pounds lighter than the 2014 model. Despite lighter weight, engineers indicate that a truck body using aluminum can equal or outperform steel in overall strength and dent resistance, depending on the type of material used, its thickness and how the structure is designed and assembled.

For the F-150, a global team of Sapa engineers and metallurgists rigorously tested and analyzed the extruded aluminum before Sapa began production for Ford.

Sapa Technology, the company's advanced R&D group, and Sapa's North American Technical Center support customers globally with world class engineering, metallurgy, product design, and fabrication expertise. The highest level of control on material properties and dimensional tolerances is critical to developing new applications for aluminum extrusion.

Anticipating continued market growth, Sapa is prepared for increased demand for aluminum extrusions thanks to a 2013 joint venture with Hydro Aluminum. ■

Novelis – New production lines for the automotive industry

With more than 40 years of experience in the automotive industry and 180 vehicle models using its aluminium today, Novelis is the largest producer of automotive aluminium sheet in the world. A leading supplier to the Ford F-150, Novelis projects the use of aluminium in the automotive market will grow by approximately 30 percent each year through the end of the decade and will increase the company's automotive shipments from 10 percent of total shipments to approximately 25 percent by 2020.

As a result, the company is actively constructing new automotive sheet lines in the United States and Germany, and recently commissioned a new line in China, making it the only company with automotive capability on three continents – North America, Europe and Asia.

In addition to more than 20-year relationships with Ford and Jaguar Land Rover, current Novelis customers for automotive sheet include Audi, BMW, Fiat-Chrysler, Ferrari, GM, Hyundai, Mercedes-Benz, Porsche, Volvo, Honda and others. The company is extremely customer-centric, partnering with each automaker in the early stages of development to determine the unique needs of each vehicle model – from strength and durability, to bonding, formability and recyclability.

Novelis is responsible for many of the products and processes that are today's industry standards, including such widely used automotive alloys as 6111, 6451 and 5754. The company continues to advance the industry with its Novelis AdvanzTM family of alloys. A recent example is the Novelis AdvanzTM s615 product, developed to meet Ford's demanding 6HS2 specification and first implemented in the 2015 Ford F-150. Designed to deliver unique performance for a wide range of structural requirements, Advanz s615 is setting new standards for aluminium strength and toughness for enhanced durability, crash energy absorption and manufacturing robustness. Novelis is also collaborating with Henkel Adhesive Technologies to develop new bonding technologies. The partnership recently brought to market a surface pre-treatment that is set to become the new industry standard, providing new levels of performance, versatility and cost-effectiveness.

Closed-loop recycling is also key to Novelis' business model and delivers a lower carbon footprint to automakers. The world's largest aluminium recycler, Novelis has closed-loop recycling contracts with customers such as Ford and Jaguar Land Rover and is using the scrap to produce higher recycled content alloys, such as the RC 5754 alloy used by Jaguar Land Rover. The company says improved end-of-life recycling is the next challenge. ■

Specialist Seminars and Lectures

Among the classic events regularly organised by GDA are seminars covering joining of aluminium profiles and sheet, surface technology and the technology of extruded profiles. The programme is complemented by basic seminars on the metal and a module-based range of seminars that focus on ecology. In collaboration with the Aluminium Engineering Center Aachen (aec) of the RWTH International Academy, GDA also regularly organises a training seminar 'An Introduction to the Technology of Aluminium', which is aimed at natural scientists, engineers and technologists from the aluminium industry and the aluminium processing industry.

Photo: Trim

The Surface – a Material's Image Bearer

Humans are creatures of the eye. They purchase and use things that not only fulfil their intended purpose but also have visual appeal and express the person's personality.

First impressions count. The diverse surfaces that can be obtained using anodising and coating have furthered the use of aluminium in many products. Extrusion is used to produce profiles that incorporate certain functions and offer a near-net final shape for use in façades and cars. It is the anodised aluminium decorative trim that gives a car its perceived value. Bold façade structures have only become possible thanks to aluminium and it is coatings that give them their unique character.

Werner Mader,
Head of Surface, Corrosion & Construction at GDA and Managing Director of GSB International

With the growing demands imposed on the appearance of buildings there are also greater demands on the part of the customer with respect to the quality and the durability of the coatings on the metallic elements of roofs and façades. In addition, more stringent regulations in the fields of environmental protection are leading to increased costs for the coater, especially in view of the changeover to chromium(VI)-free processes.

„A surface mirrors internal values but in order to see them one needs good senses, a keen eye and empathy. The eye can capture the external appearance much more easily.“

(Author unknown)

Surfaces tailored to customers' requirements

Many high grade products rely for their impact on their colour and their design. It is expected and taken for granted that a product or structure fulfils its intended functions. They are usually interchangeable. When buying a new vehicle the customer gets a perfect technical product regardless of whether it is supplied by carmaker A or B. Besides the price, the decision to buy is influenced significantly by design and image. Technical data and functions play a secondary role and are taken for granted.

The disappointment is great, of course, if the shine on the decorative trim fades quickly or if the red of the façade changes chameleon-like into a soft pink because of the incidence of the sun's rays. It is then not only the reputation of the surface treatment that is ruined but at the same time the product, the façade and the material as well. This is because a customer does not differentiate between the properties of the interior and the exterior. And it is not possible technically to simply move the outstanding interior properties of the material to the outside. The surface and the development of technologies play a key role even though the surface treatment is only one of many process steps and its cost contribution is more likely to be in the single-digit per cent range.

Strategic importance of surface treatment

In keeping with the words of the author Antoine de Saint-Exupéry – 'Your task is not to foresee the future, but to enable it' – the aluminium industry recognised the strategic importance of surface treatment for the metal early on and has always been actively involved in the development of surface treatment processes. By co-founding quality assurance bodies for anodising and coating in the mid-1970s, it has established internationally recognised quality standards and brought about innovative technology leaps in surface treatment.

GDA coordinates and provides support for publicly and industry funded research projects covering anodising and coating. This long-term involvement has proven its worth. In 1990 there was a ban on the use of aluminium in public building and construction projects in Berlin. GDA was active here. Thanks to the efforts of the GDA, this ban was rescinded in the mid-1990s, however with the proviso that the surfaces had to be pre-treated without using chromium-containing products. There was an outcry in the sector because chromating was practically the state-of-the-art in architecture at the time. There was considerable uncertainty for the coating companies. Where there comparable chromium-free processes? What quality standards and service lives could be expected? These were just two of the many questions raised.

Changeover to chromium(VI)-free processes

Today there are sufficient processes available that are of equivalent quality and competitive. However, the chromium(VI)-free processes have a smaller application window and are more demanding with regards process control and monitoring, which in addition to all the technical challenges also places greater demands on personnel: the changeover begins in the mind – there is a need to rethink and abandon familiar practices.

A few years ago it was still up to the individual company to decide whether to use chromium-free pre-treatments or chromating but REACH now means they will no longer have any choice when it comes to surface treatment prior to coating. The technological transformation must be implemented. A ban on chromium-free pre-treatments prior to coating comes into effect in September 2017. Many user industries have already changed their delivery specifications.

For the coating companies affected, their future depends closely on successfully implementing the process changeover. Although it looks as if there is still plenty of time left, the fact that the changeover cannot be carried out during periods when order levels are high coupled with the need to run in such processes means the windows of opportunity are now a mere few months.

Looking back, the outcry at the time was really a blessing for the sector. The fruits of taking early action can now be harvested. Sixty per cent of our member companies have already successfully completed the changeover, whereby some have already been using competitive alternative processes for more than ten years. With the knowledge and experience that has been acquired since the mid-1990s, GSB International is a reliable partner for the aluminium industry and your member companies. As quality association in whose bodies GDA is actively represented, it develops quality and test procedures for alternative pre-treatments. It actively assists and supports companies undertake this technological transformation with information, working parties and seminars. Since 2011 there has been an office-sharing arrangement between GSB and GDA, which now provides the management of the quality association. ■

Chemically nickel-plated aluminium compressor impellers for turbochargers

Forum Gold & Silber, Schwäbisch Gmünd

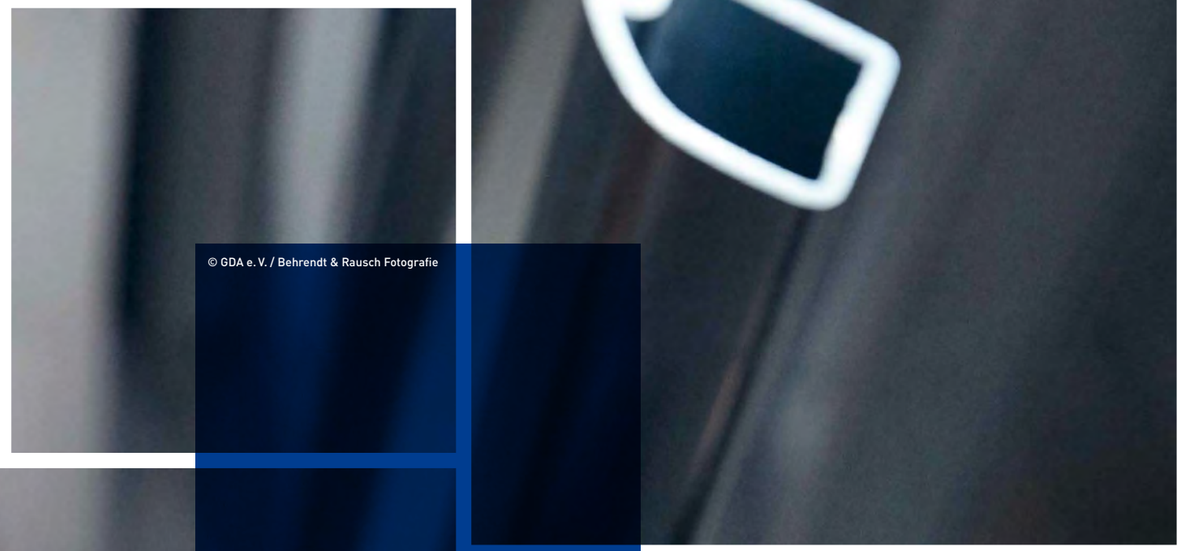
Developers:
Gerhard Grimminger, Cemal Isin, Gmünder Edelmetallverband, Germany

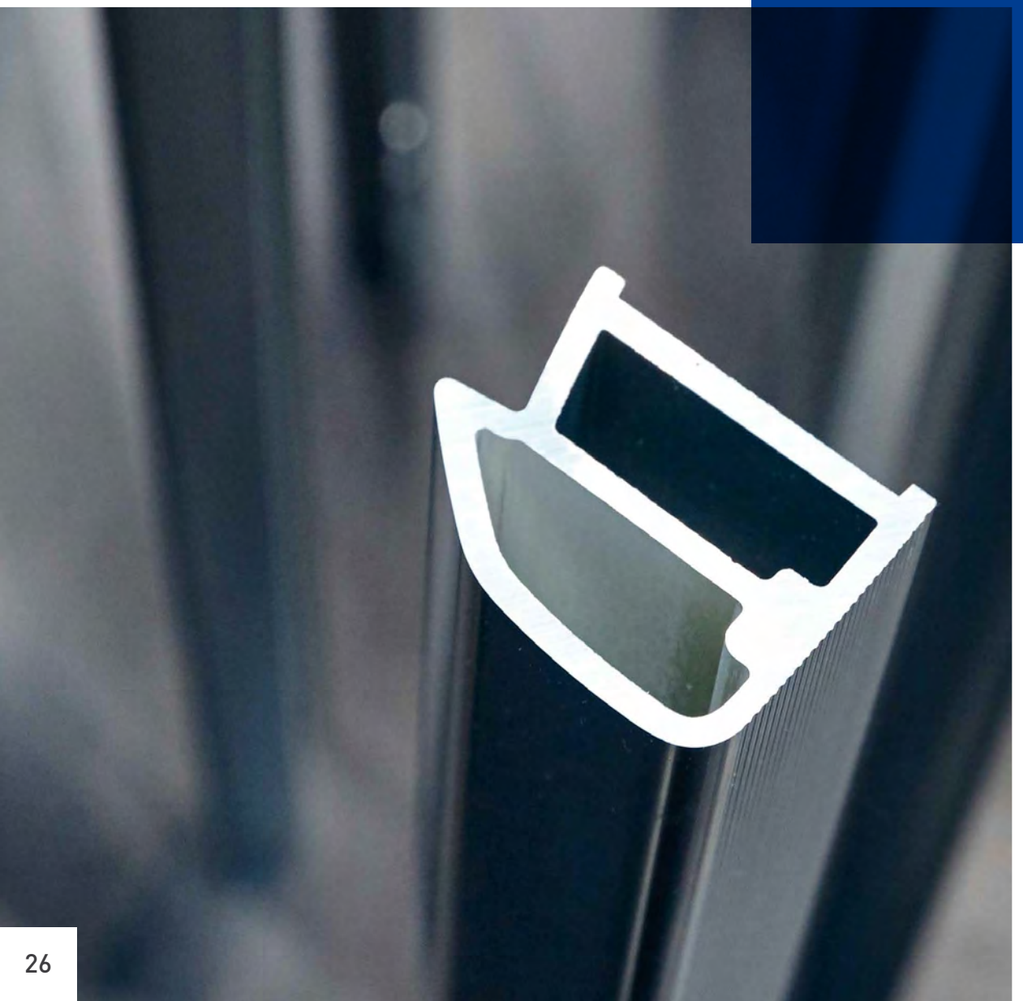
Architect:
isin architekten Generalplaner Projekt GmbH, Aalen, Germany

Façade planning:
Ebener GmbH, Bad Marienberg, Germany

Coating:
HD Wahl GmbH, Jettingen-Scheppach, Germany

Liquid paint:
Duraflon gold (similar to EV 3) HD Wahl GmbH, Jettingen-Scheppach, Germany





GDA ■ CONSTRUCTING

Aluminium in Civil Engineering – Challenges for Teaching and Research

Aluminium is an ideal material for the planning and execution of modern constructions and offers a great deal of freedom when it comes to creative design.

Aluminium in structural engineering has been taught and researched at the TU München for decades. The Lehrstuhl für Metallbau (chair of metal structures) was renamed in 2006 since when it has been held by Prof Martin Mensinger; it carries on the tradition of the earlier specialist field of lightweight construction and fatigue under Prof Kosteas. TU München is thus one of the few universities in Europe that offers courses in constructing with aluminium.

In the winter semester the focus is on basic metallurgical principles, the different aluminium alloys and their properties, and on design in accordance with Eurocode 9 Part 1 (DIN EN 1999-1-1). Other topics covered are safety in case of fire, corrosion protection and sustainability. In the summer semester attention is given to fatigue and fracture mechanics. In addition to general information on alternating loading, crack initiation and crack propagation, other topics covered include verifications in accordance with Eurocode 9 Part 3 (DIN EN 1999-1-3).

Communicating enthusiasm for the material aluminium

The aim of the lectures is communicate the necessary knowledge to design, execute and evaluate aluminium structural applications. They should raise awareness for the fact that aluminium has to be dealt with differently to steel. Apart from that, enthusiasm for the material aluminium should also be communicated to the students. The course contents are backed up with examples and if possible laboratory tests. Practical relevance is provided by lectures given by company representatives.

All in all, courses on the subject of aluminium are very popular. For the winter semester 2014/2015 alone, 55 participants registered for the respective course.

Projects involving more than one chair are also carried out at regular intervals. Whether it be in the form of guest presentations, guest lectures or support for term papers and drafts. An interesting example of this is the development of a free-standing sculptural pavilion called 'The Swarm' by the students of the chair of emerging technologies of the faculty of architecture. The sculpture is reminiscent of a flock of birds taking off and comprises milled and folded aluminium sandwich panels. The Lehrstuhl für Metallbau supported the project with tests in the laboratory on load-carrying capacity and on the finished sculpture.

Dr. Radlbeck explains the areas of application of aluminium constructions during a lecture.

Students using exhibits to trace the route from bauxite to an aluminium profile.

Intensive research to optimise products

With regards research, topics from the widest possible areas have been covered in recent years: one can mention here the use of aluminium in bridge building, investigation into residual stresses in welded aluminium joints, the behaviour and the analysis of adhesive-bonded joints, the holistic consideration of aluminium constructions, i.e. from social, ecological and economic points of view, and investigation of the fracture toughness behaviour.

The fatigue strength of aluminium constructions is to the fore in current research activities. In many cases it is a matter of optimising products or structural details in the widest possible range of applications, e.g. building and construction, automotive, shipbuilding or aerospace. For the given constraints one strives to achieve the respective maximum fatigue resistance or a satisfactory service life. The testing required is carried out in the associated materials testing institute. A further field of activity is the development of the design lines Eurocode 9 Part 3 and the establishment of a database with results from Wöhler tests. The basis of this are the data available in the chair's archives coupled with new test data obtained in accordance with the state-of-the-art.

Other projects deal with the simulation of aluminium welds under static and alternating loading and the investigation of remote laser-beam welding. This is particularly relevant for aluminium sheet in carmaking. One of the problems to be investigated here is the formation of hot cracks. The investigation will analyse their cause and effects and possible ways of avoiding them.

The topics and projects mentioned show the different aspects that result from working with aluminium. The Lehrstuhl für Metallbau thus has to find and optimally train junior staff and at the same time solve demanding problems posed by research and industry. ■

The contents of the aluminium lectures are explained using laboratory tests at the Materials Testing Institute of the TU München.

Univ.-Prof. Dr.-Ing. Dipl. Wirt.-Ing. (NDS) Martin Mensinger, Technische Universität München (TUM), Chair of Metal Construction, Institute for Building Materials and Construction

TU München is one of the few universities in Europe offering courses on construction with aluminium. The aim of the lectures is to communicate the necessary knowledge to design, execute and evaluate aluminium structural applications.

Dr.-Ing. Christina Radlbeck, Technische Universität München (TUM), Chair of Metal Construction, Institute forBuilding Materials and Construction

The fatigue strength of aluminiumconstructions is to the fore in currentresearch activities. In many cases it is a matter of optimisingproducts or structural details in the widest possible range of applications.

Aluminium for Construction Applications – Unlimited Opportunities for Creative Design

Sustainable building means implementing ecologically compatible building solutions and using energy and resources sparingly.

Adam Cymmer,
Technical Officer for Recycling,
Sustainability and Metal Powder

With regards an agreed European solution, EPDs that carry the ECO Platform EPD label stand for the best possible comparability that is available at the moment. The agreement reached on certain minimum standards with respect to quality management together with the verification procedure that the programmes participating in the ECO Platform are obliged to use therefore represents the basic prerequisite for cross-border recognition of EPDs in Europe at a later date.

GDA ■ SUSTAINABLE CONSTRUCTION

The European building and housing sector emits about 35 per cent of the climate-relevant emissions in Europe. About 50 per cent of the energy and the materials produced are used in this area every year. These are figures that substantiate why considering buildings from an ecological point of view is of major importance for a sustainable society and ecologically prudent development in economic regions.

In order to illustrate the environmental effects of buildings it is advisable to consider their life cycles from a holistic point of view. One aspect here is an ecological audit of the construction materials and products used and their performance during the production, use and post-use phases.

Instruments such as environmental product declarations (EPDs) that allow environmental effects to be presented uniformly have been created with the aim of standardising the assessment procedure. A large number of national initiatives based on technical standards have come into existence in Europe and these aim to achieve comparability and transparency of environmental product declarations.

This task is undertaken in Germany by Institut Bauen und Umwelt e.V. Uniform assessment rules have been prepared for numerous construction products, base materials and building services in order to deal with the complexity of ecological product assessments. GDA recognised early on that builders and property developers needed information and therefore initiated environmental product declarations for four basic construction applications involving aluminium (1).

ECO Platform was recently established at European level. It is the umbrella organisation of the different national EPD programme operators in Europe and is promoting the creation of uniform European core EPD systems (European core EPDs or ECO EPDs) based on the European standard EN 15804. This standard stipulates the basic rules for the issuing of environmental product declarations for construction products. The initiative of ECO Platform to establish the basic principles for cross-border recognition is being very well received in the industry. Amongst other things it contributes towards removing trade barriers.

The association is increasingly bringing together European programme operators with the aim of harmonising, standardising and mutually recognising assessment rules and product-specific environmental product declarations. With the result that the benefits of construction applications involving aluminium can be considered in a uniform and transparent manner throughout the whole life cycle.

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Aluminium – the modern day construction material

Versatile due to its ease of formability and its diversity with regards form, colour and surface structuring, aluminium has been fulfilling and inspiring the requirements and concepts of architects and structural designers for about 120 years. Then as now the decisive reasons for using aluminium instead of other materials in construction applications are weight and strength together with its long useful life and low maintenance.

The high degree of corrosion resistance reduces maintenance costs during the use phase. Thanks to this property, aluminium is often in demand in areas of application where other materials require enhanced protection and regular maintenance. Aluminium lends itself to uses particularly in coastal areas and urban residential or industrial conurbations. Due to the strongly passivating effect of a surface oxide layer, the metal practically protects itself against the effects of environmental influences such as acid rain or aggressive environments like those caused by salt water or emissions from combustion processes.

The transport and handling of aluminium components during erection often reduces haulage distances and costs and saves a lot of time. Compared with other materials, vehicles can transport far more. This means, for example, that complete bridges can be prefabricated, loaded and transported to their destination. Façade and roofing elements can be despatched in a cost-efficient manner and assembled at site with little use of auxiliary devices.

During the use phase, innovative façade composite elements containing aluminium reduce the energy requirement of a building to a minimum. Energy for heating and cooling both play a role. Aluminium provides complex insulation materials with reliable protection against solar radiation and humidity. As a shading element aluminium makes a valuable contribution to the ambient conditions inside buildings. The cooling load can be reduced considerably and the perfect reflection properties and directional lighting mean the energy requirement for room lighting can be reduced considerably. In addition, the use of aluminium in construction applications also offers benefits for the macroclimate in the immediate vicinity of a building. The high reflectivity reduces the heating up of the outer building envelope and roof surfaces and the back-reflection of heat to the immediate surroundings. In this way excessing warming of urban areas in the summer months can be avoided and the quality of life of urban residential areas can be considerably improved.

Aluminium constructions are durable, always innovative and fit into our living environment. As a symbol of progress and innovative capability, aluminium adorns and supports numerous prestigious buildings all over the globe. The investment and the choice of aluminium as the material pays for itself in the post-use phase of a building. Compared with other construction materials, the dismantling of aluminium constructions can be carried out efficiency and cleanly. In addition the intrinsic value of the metal generates income during the dismantling phase. Construction scrap is a popular commodity and aluminium in particular is infinitely recyclable so it therefore demonstrates its importance to society and its versatility time and time again anew. This means the investment in an aluminium application is also always a contribution to a sustainable future in which living environments are improved, and valuable resources for a sustainable society are created because once it has been produced aluminium is available for countless future generations. ■

Aluminium Packaging – Well Prepared for the Future

Modern packaging will stand for functionality, sustainability, attractiveness, consumer convenience and communication in future as well. These core requirements must be taken into consideration at the start of the packaging development (excellence by design).

Effective product protection is and remains a priority

Foodstuffs are still deteriorating because they are inadequately packaged: 60 million tonnes a year in Europe alone.

Compared with other packaging materials, aluminium is characterised by its excellent barrier function. An aluminium layer just 6 µm thick offers a functional barrier to light, oxygen and water vapour. Thanks to these properties, aluminium packaging protects more resources than are used to produce it by preventing deterioration and loss of the contents. GDA is a member of the Save Food Initiative to emphasise this.

The motion tabled in January 2015 by the CDU / CSU and SPD factions in the German parliament calling for healthy eating to be encouraged and appreciation given to the value of foodstuffs also includes the demand to resolutely pursue the reduction of avoidable waste of foodstuffs and thus include the whole value chain; this is in keeping with the Save Food philosophy. Aluminium can make a valuable contribution here thanks to its excellent protective function either as a mono-material or part of a composite packaging.

Gregor Spengler,
Head of Packaging, Head of Tubes,
Cans and Impact Extrusions

Thanks to its compelling material properties and the related multi-functionality, aluminium will also remain an important player in the brave new world of packaging. The intensive competition between materials means proven values have to be combined intelligently with new technology for the benefit of the consumer. Only that packaging that creates real added value for the consumer will also be successful in future in a rapidly-changing age where consumption habits are undergoing change.

Sustainable Aluminium Packaging Summit

The annual Sustainable Aluminium Packaging Summit has now become an established tradition where GDA / AEROBAL and etma bring together the whole aluminium packaging supply chain. The event intensifies the exchange of opinions and experience between the suppliers of aluminium feedstock, packaging manufacturers and customers with regards sustainability and recycling and provides information about the functioning value chain for the recycling of packaging.

Sustainability as a key component of corporate activities in future

With regards ecological sustainability, aluminium is characterised by some impressive unique features which can be decisive for aluminium packaging when it comes to the choice of material. Some 75 per cent of the aluminium ever produced is still in use today. Aluminium has the highest scrap value of all packaging materials. When aluminium is recycled up to 95 per cent of the energy used for primary production can be saved and thus valuable raw materials can be conserved.

Aluminium is a permanent material in the best sense of the word because it can be recycled an infinite number of times. The material-recovery recycling rate for aluminium packaging is 60 per cent in Europe and an impressive 89 per cent in Germany. Consequently the European metal packaging industry has worked successfully to implement the new 'permanent material' category in addition to the 'renewable' and 'non-renewable' categories already covered by legislation in order to differentiate itself from other materials. The European Economic and Social Committee of the EU Commission had already supported this approach in December 2014 responsible use of resources is of elementary importance for future generations.

Compared with heavier materials, even more energy can be saved during transport by means of added weight reductions e.g. with beverage or aerosol cans or with composite packaging.

Over and above the ecological aspect, however, any form of packaging is only sustainable in the end if it asserts itself in competition. Two aspects in particular will also play a major role for the consumer in future here: appearance on the shop shelf and consumer benefit.

Achieve a strong brand presence flexibly

Consumers often make purchasing decisions in a matter of seconds at the point of sale. The attractiveness of the packaging has a strong influence because it is the packaging that gives the product a face. Visual and haptic elements play a decisive role here.

Aluminium packaging has an intrinsic premium character because of the luxurious look of the material, and it can be shaped in diverse ways and enhanced using the latest technologies, which also add a haptic experience. It convincingly conveys the brand identity and the product concept and makes for a high recognition value and corresponding brand loyalty on the part of the consumer, which will play a particularly decisive role in future with retailing increasingly being carried out on the internet.

In future, growing individualisation of society and the associated smaller sizes of production batches will also result in flexible technologies like digital printing gaining momentum. Flexible technologies allow the appearance of the packaging to be tailored to the individual requirements of the individual consumer. Some brand manufacturers already offer design tools on their websites to achieve such individualisation. And the new 3D printing technology could also open up completely new fields of business for the packaging industry in future.

Nothing can be achieved without age-appropriate consumer convenience

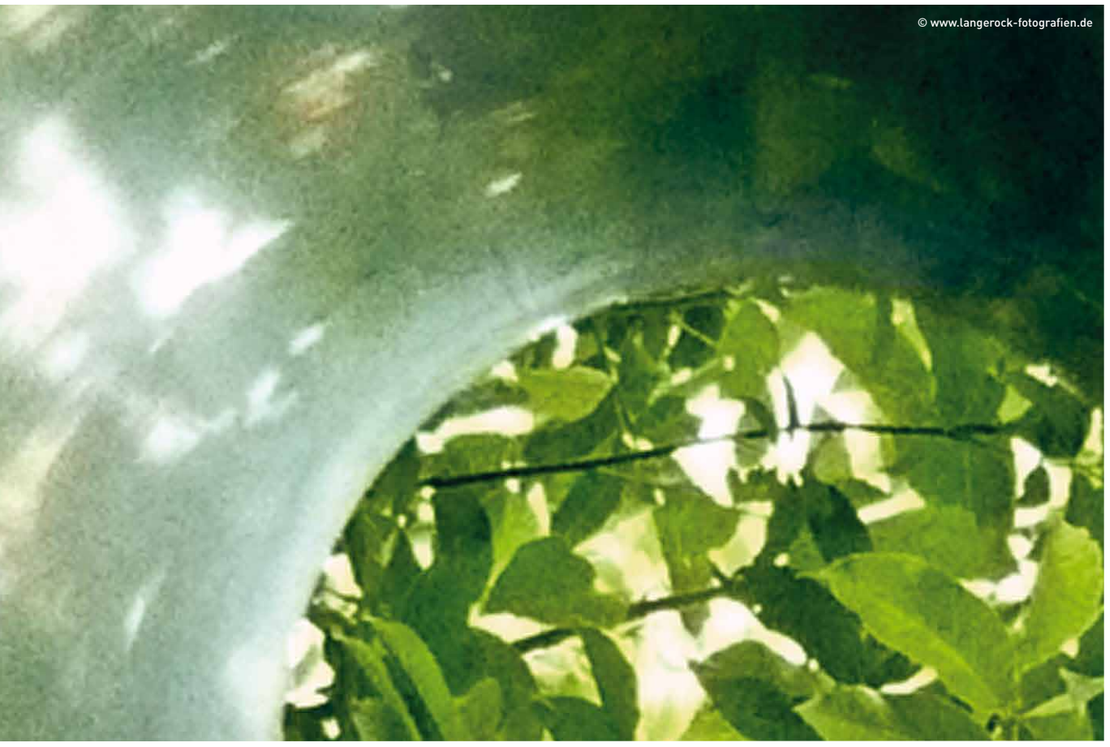
If the appearance of the goods on the shop shelf has been successful and they have already landed in the shopping basket and been taken home, the consumer benefit generated by the packaging then plays a decisive role in an ageing but at the same time technologically well-equipped world. Here aluminium packaging such as aerosol cans and tubes can score with its stability and lightness as well as with its ease of handling and the fact that the contents can be portioned accurately.

Companies are working intensely on new solutions for the future. A resealable beverage can made completely from aluminium will certainly be available in the not too distant future. And in view of the continuing trend to single and small households there will be stronger demand in future for smaller aluminium mono-material or composite packaging units offering adequate product protection. Today people are no longer preparing pots of coffee or tea but individual portions using aluminium capsules. And it is even conceivable that the success story of Nestlé's Nespresso system will also be applied to cold drinks. A whole range of different juices, colas or even beers in capsules could revolutionise the beverage market of the future.

Packaging as an intelligent communicator

Besides aesthetics, there is another aspect of our high-tech world with its use of the internet on the move that packaging will have to provide to a greater extent in future: interactivity. Purchasing and experiencing is taking place using every channel of communication today – offline and online. Thus the best way for anyone wishing to reach his or her target groups is to use all of these channels. In addition to goods that can be experienced haptically and optically, the virtual availability of product information is also on the increase. Customers can obtain information and inducements in real time directly on the shop shelf. Packaging thus generates added value for the consumer. In the age of the mobile internet, so-called augmented reality applications like QR codes can help link together the benefits of online and offline retail marketing.

Intelligent packaging provides information and communicates with the consumer. Radio-frequency identification (RFID) or near-field communication (NFC) via sensors or even in the form more cost effective printed electronics with liquid electronic functional materials that can be read with a smartphone means products are not only traceable and tamper-proof but also offer new marketing opportunities. All of these features can also be achieved with aluminium or aluminium-containing packaging, and the range of possibilities is far from becoming exhausted. ■



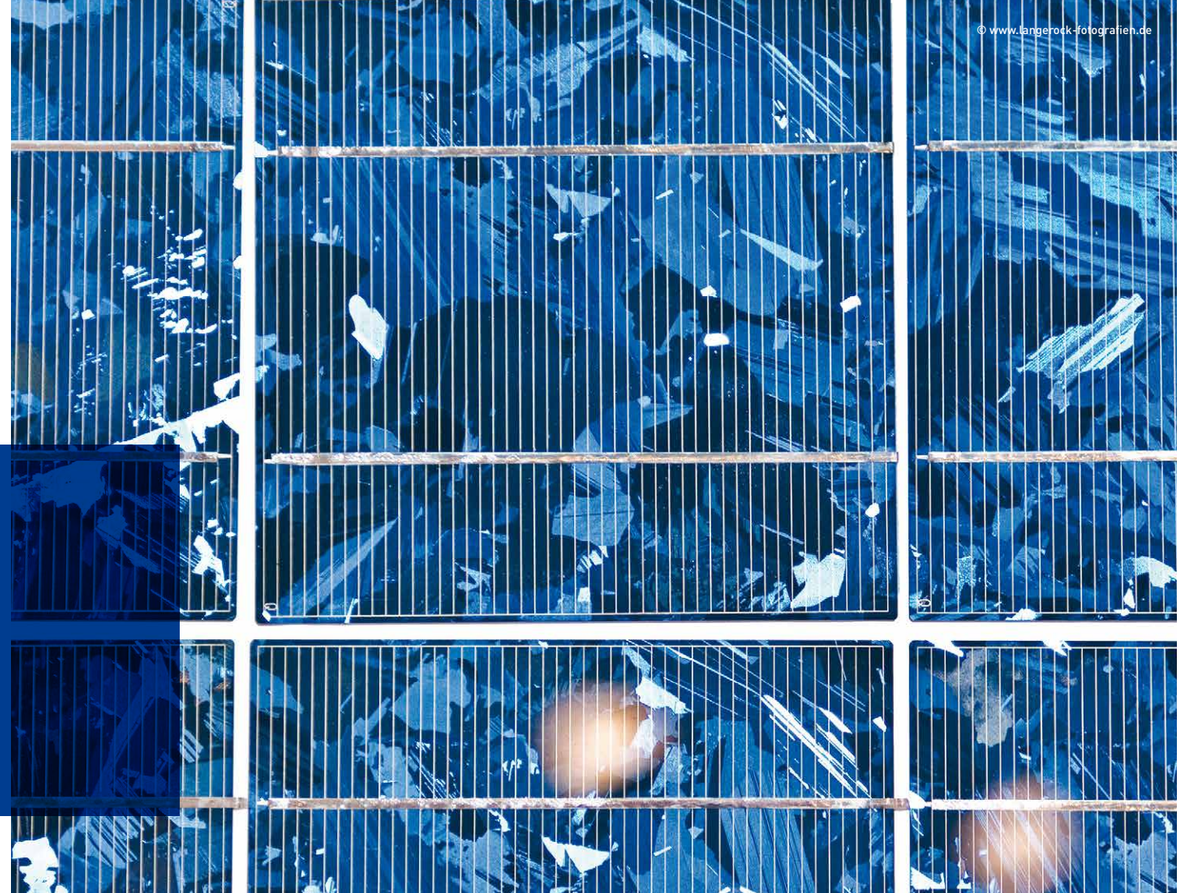
International Health & Safety Workshop

The European Metals Particulates Association (EMPA), which is affiliated to GDA, hosted and organised the Health & Safety Workshop in Berlin. Some 70 experts from the USA, Asia, Latin America and Europe met in Berlin in May 2014 to discuss safety-relevant topics associated with the manufacture of powder products. More than 30 papers were presented covering regulatory frameworks, innovations and examples of best practice and subsequently discussed. A diversified supporting programme gave the visitors ample opportunity to get to know each other and exchange ideas. The international workshop takes place every two years, alternately in Europe or the USA, and is organised by GDA/EMPA with the support of the Aluminum Association from the USA. The next workshop will therefore be held in the United States in 2016.

The Greenwashing Debate: The Environment and Consumers are the Losers

Anyone who engages in greenwashing unjustly lays claim to being committed to sustainability. This can be dangerous and can risk damaging one's credibility in the eyes of consumers and clients.

Solar panel



Solar units

Jörg Schäfer,
Head of Sustainability and Recycling

Of course companies who sell to end-users want to have messages that are as simple and catchy as possible. However, one should not jeopardise one's long-term credibility. The temptation to wash oneself green based on short-term considerations is great but this could backfire in the medium term: regaining lost trust is a difficult and lengthy process – and usually costs more than a short-term marketing ploy might achieve.

The battle for market share and the growing pressure of materials substitution are making people inventive. Nobody objects to that. After all, a successful product always starts out as an exceptionally good idea. But what about when it is a case of inventions that only exist on paper and where feasibility, truth and transparency are left lying at the wayside? It is precisely this that is increasingly happening when topics such as sustainability, resource efficiency or environmental protection are used as distinguishing features to market certain products.

Today, when making a comparison with competitive products increasing use is being made of advertising statements such as 'far lower emissions of greenhouse gases during production than aluminium versions', 'recyclable' or simply 'more sustainable than aluminium'. Usually they dispense with need for substantiating studies, relevant supporting evidence or other proof. They often also conceal important conflicts of objectives by making claims for a specific aspect like environmental protection but ignoring other points such as waste generation. This makes sense when a product reveals a good carbon footprint but a poor waste balance. Even the use of statements that are actually meaningless – but usually well packaged – is increasingly appearing in product advertising.

Everything is done to wash a product so that it is shiny clean or 'green'. This greenwashing debate is now being conducted more rigorously than ever before. It is the consumer that is manipulated and the environment that suffers. Both of them are the losers.

The following sheds light on some classic greenwashing arguments.

1. 'Far lower emissions of greenhouse gases during production than aluminium versions'

This statement appeared on packaging. If one contacts the originator one will, of course, not receive any information whatsoever. No studies or other proof are available. So it is a matter of blind faith.

On second reading it becomes apparent that the basis of the comparison is the production process – in the case of aluminium reference is made to the electrolysis process. With due respect, one does not have to give much thought there before one can cite many processes that require less energy and emit less greenhouse gases than electrolysis. But is recycling then taken into consideration? Or how are the reduced quantities of greenhouse gases during transport of the lightweight aluminium packaging depicted? All aspects that speak clearly in favour of aluminium. The motto is to be simple, quick and dirty in order to give the consumer a good feeling. Some consumers would have difficulty coping with the complete information or would reach for the aluminium product precisely because of it.

2. 'Recyclable'

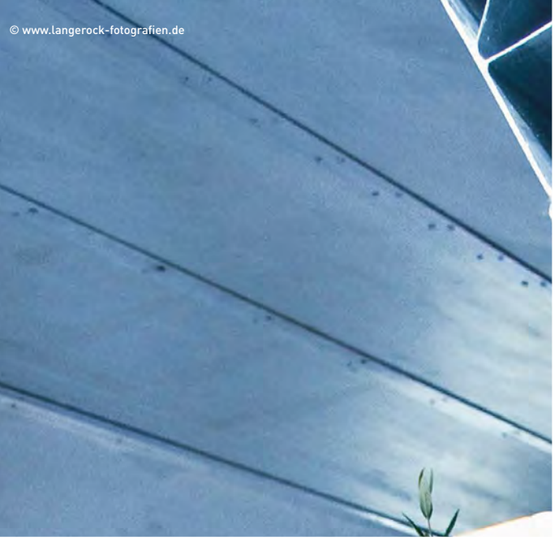
This statement also appears on packaging but it could also appear elsewhere – for example in the transport sector. The absence of any data here means a certain degree of flexibility to reflect on the use and background of the statement. 'Recyclable' does not mean, however, that recycling actually takes place. One way or another the statement would have been honest. However, one is jumping on the bandwagon of aluminium's key strength, namely that recycling actually takes place. Our products are not only capable of being recycled: they are recycled! Recycling rates that now exceed almost 90 per cent in the packaging sector, and partially over 95 per cent in the building and construction industry and transport sectors, provide impressive evidence of this.

3. 'More sustainable than aluminium'

Simple and striking and brimming with self-confidence this statement was promoting a construction product. It was backed by graphics displaying the eco-points. However, sustainability cannot be achieved simply in terms of eco-points. It is more a case of having to include aspects such as costs or even durability, safety and comfort in the consideration. It would appear that one should not pay any attention to the small print, which ought to be written in large letters here.

The aluminium industry will have to prepare itself increasingly for such negative advertising statements in future. Aggressiveness is increasing, transparency and honesty are on the decline. One has to find one's own way to assert oneself. Perhaps this might be: 'Do a good deed and talk about it a lot!' It might sound immodest. But how sustainable is an approach in which transparency and honesty become lost?

Aluminium is unique, though. Not only where resource efficiency or sustainability are concerned but also when one is striving to achieve something out of the ordinary. The aluminium industry will face up to competition whatever form it takes. In doing so there will be absolutely no need for greenwashing whatsoever. ■



COMMUNICATION

Georg Grumm,
Head of Information and Communications

From the classical to the contemporary – we speak aluminium

"We speak aluminium. Whatever the opportunity. Whatever the media channel. Whatever the audience – such as this annual report. Or in special publications on subjects like health, packaging or building and construction. We give the sector a voice. At press conferences on the state of the German aluminium industry. In information services for the press and the interested public. At trade fairs such as ALUMINIUM and interpack. And of course online as well in our knowledge and information database at www.aluinfo.de. Speak to us – we speak aluminium."

An Association that Associates

The proactive PR activities of GDA Gesamtverband der Aluminiumindustrie help ensure that aluminium has a good press and therefore there is a better image of the sector, the material and the individual market participants. GDA's ongoing communications activities form the basis for the presence of the material, the companies from within the sector and the trade association in the different media of the technical and business press.

Whether it is member companies, top representatives from politics or the media, or multipliers, in our communications and PR work, we regard ourselves as the linking element. Our aim is to bring together all sections from the economy, politics, the media and the general public and inform them about aluminium – from conducting a business discussion through to the 'Sendung mit der Maus' TV programme. Promptly and competently with data from the sector. As the first contact for all questions relating to the material. With sustainable image campaigns for our light metal.

Communication and information for and about a modern material: that is the central service idea in GDA's communications activities. At GDA a great deal of importance is placed on dialogue-oriented PR work, classical press work, exhibiting at trade fairs and acting as strategic communications consultants for member companies.

Professional dialogue with journalists

The basis of GDA's communications work is continual and up-to-date press work. Even in the age of the internet, the good old press release is still indispensable for contacting the media effectively. Some 75 per cent of journalists work with this conventional form of information. GDA regularly issues information for the media on economic data, seminars and personnel complements the objective and comprehensive Information for the media and makes the sector transparent for editors. The annual press conference and background discussions with journalists as well as exclusive contributions and technical papers ensure the metal and the trade association maintain a continual presence in the daily, trade and business press. By addressing editorial offices regularly, systematically and personally, it was possible to further improve the results of the press work both qualitatively and quantitatively. All information is also accessible to journalists online at www.aluinfo.de.

Trade fairs and congresses

A presence at important leading exhibitions like ALUMINIUM or interpack together with the organisation of specialist congresses are another important integral part of GDA's communications activities. Here GDA's specialists are in direct contact with experts from the aluminium industry or representatives of user industries. GDA has the opportunity here to talk about current topics and answer visitors' questions directly and in a service-oriented manner. The central forum for the transfer of knowledge is the European Aluminium Congress which is held every two years and brings together high-calibre professionals from all over the world.

European Aluminium Award

The European Aluminium Award competition, the most important prize in the aluminium sector, was organised for the ninth time with the support of GDA in 2014. Prizes were awarded for products and projects that use aluminium in an innovative manner. The organisers were looking for innovations from the fields of industrial and consumer products in six categories: Design & Lifestyle, Lighting & Interior, Building & Architecture, Aerospace & Automotive, Marine & Offshore, and Production Techniques, Tools & Machinery.

The European Aluminium Award is an initiative of the Dutch Aluminium Centrum in collaboration with the European Aluminium Association (EAA), GDA and the ALUMINIUM 2014 trade fair. The International Aluminium Institute (IAI), the Aluminium Center Belgium, Svenskt Aluminium and Aluminium Danmark also supported the award. An independent international jury comprising members from Germany, the UK, Italy and Scandinavia under the chairmanship of Prof Laurens Katgerman (Technische Universität Delft) with Vito Oražem (Managing Director, Design Zentrum Nordrhein-Westfalen) as co-chairman chose the prize-winners.

Newsletters, brochures and publications

Other communication measures for the different target groups of GDA include the compilation of publications and brochures covering the latest topics in the sector. Three times a year GDA aktuell provides information on the trade association's latest activities. In 2014 the packaging brochure was revised and the content updated; the new brochure was published to coincide with the interpack 2014 trade fair. GDA has summarised the important aspects relating to aluminium and health in a special issue of GDA aktuell in order to carry out a more objective discussion.

Online communication

Web 2.0 technologies are changing the internal communication of trade associations. E-letters, blogs, wikis, RSS feeds and podcasts are just a few of the keywords here. The question is when the use of such instruments is useful. GDA is relying increasingly on online media both for internal communications as well as for communications directed outside the association. Digital communication channels open up new opportunities for processing and offering news and content aimed very precisely at specific target groups.

On its website, www.aluinfo.de, GDA offers comprehensive information on aluminium; the services on offer include the Knowledge Shop, technical consultancy, product and manufacturer directories, and basic information on important topics and markets for the sector. There are statistics, presentations and reports from the working groups which can be accessed exclusively by GDA members and their employees in the extranet area for GDA member companies. In addition there are online appearances accompanying GDA events, such as the ALUMINIUM Conference or the EAC European Aluminium Congress. ■

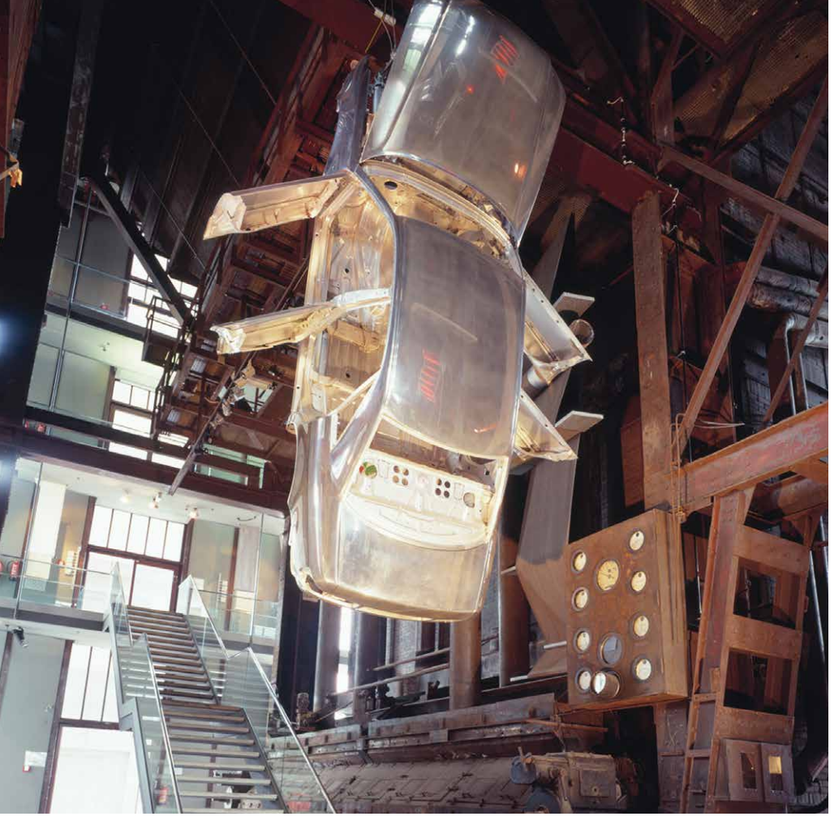
Aluminium in the History of Design – Permanent Guarantor for Maximum Design Creativity

The 'Design and Mobility' concept plays a particularly important role where the design-related functions of aluminium are concerned. It can be transposed in an analogous manner to two different areas where the focus is on human beings. Firstly it empowers human beings to achieve physical movement using designer items made of aluminium.

Macbook Air

By way of example one can mention here the aluminium bike from Kettler, the first bike to have an aluminium frame, with which the company revolutionised the sports world in 1977. And not only that: Kettler changed the whole meaning of the word 'movement' – by adding lightness. The model was continually modernised and developed over the years. However, the original material is still at the centre of the production chain – even in the latest model, the Kettler e-bike. In this way the 'Design and Mobility' concept using aluminium can be carried forward. 'Design and e-Mobility': a modern remake of the original.

Secondly there is the capability of design using this same material to allow human beings to move passively. This approach is particularly apparent, for example, with the Airbus A380, Lufthansa's flagship and the largest passenger plane in the history of aviation. With a top speed of 945 km/h and a dead weight of 276,800 kg, the Airbus A380 is a prime example of a mobility benefit achieved by design and weight reduction using the Glare aluminium composite. Even the electrical wiring in the Airbus A380 is made from aluminium to save even more weight. Likewise with the Audi TT Coupé: its bodyshell weighs only 206 kg and aluminium alone accounts for 69 per cent of that. One should not forget where it all began: the Audi Space Frame from 1993 which created the world's first all-aluminium body. This is on view at the Red Dot Design Museum in Essen. It weighs only 180 kg, about 40 per cent lighter than a traditional steel body, and thus reduces the fuel consumption tremendously. It is not without reason that Audi is playing a leading role in the global car industry when it comes to lightweight construction.



Audi

Can Watch

AluDisc

Kettler aluminium bike

By hanging the Audi body with its doors wide open from the roof of the so-called 'Schürerstand' in the museum in Essen, the Ruhr metropolis that is associated with Krupp, the leading figure of heavy industry, Red Dot has installed an aluminium icon in the city of steel.

In addition to its lightness, aluminium also impresses with other functional features such as its formability. There is hardly another material that allows the design form to be controlled and governed so precisely as with aluminium. Its specific material capabilities permit the greatest possible degree of creativity. This manifests itself particularly markedly in the so-called 'unibody' notebooks. The casings of these computers are actually made from a single piece of aluminium. This not only makes the notebooks lighter but at the same time also sturdier and more stable.

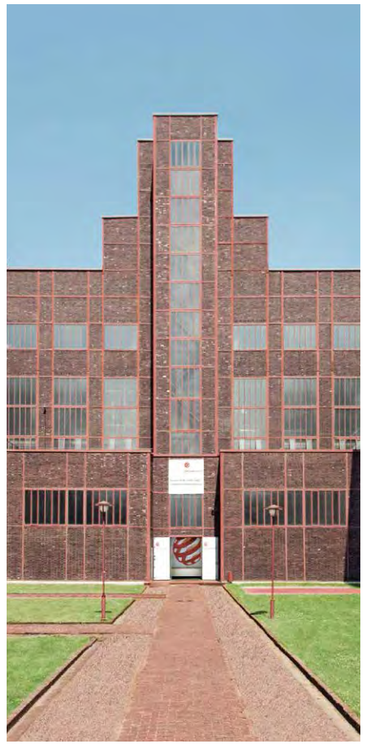
One of the largest and most famous companies to use this type of forming operation is Apple. Unlike any other company the manufacturer with the world-famous apple-shaped logo has managed to secure an unmistakeable status in the marketplace with its unique design. The consumer recognises an Apple product at first glance: the rounded corners and the smooth, well-proportioned, almost perfect housing. It is this discrete but nevertheless captivating style that manages to give the product a classy appearance from every angle. For example, the classic Apple product, the 13-inch MacBook Pro with its one-piece precision housing made from a single block of aluminium. The special forming operation and the precise choice of material have made it possible to create a completely new dimension in the field of notebooks. The MacBook Pro is flat and light, and at the same time a pioneer of its time in terms of robustness. Likewise the MacBook Air, which only weighs 1.36 kg, is extremely thin and nevertheless scores because it is absolutely robust. No other company manages to present itself so discretely at the design level and still create such an impact.

We all recall the moment we held an Apple product in our hands for the first time. It is not without reason that the Apple design icons of the 21st century are honoured with their own exhibition in the Red Dot Design Museum in Essen. It documents the evolution of the design of products that unlike almost any other represent the zeitgeist and is aimed at creating a space for this special design language. Each of the products exhibited received the Red Dot award, the seal of timeless quality for above-average design. Even young companies, such as the Taiwanese start-up company Just Mobile, which makes accessories for smartphones and whose vision it is to unite form and function, relies on the production benefits of aluminium: the AluDisc is a pedestal for the iMac and the Apple Thunderbolt Display, and is made from just a single piece of aluminium. Or the AluPocket, a pocket-shaped device that is mounted on the wall and allows users to charge their iPhones. Both products received the Red Dot Award: Product Design 2014 for innovative design solutions.

The design aspect coupled with the forming operation leads to an additional feature in the design-related use of aluminium: lifestyle. In the 1950s, the period when mass consumption originated, aluminium products enjoyed a societal boom. In the post-war years they epitomised a new trend that represented a new-fangled way of life. From the famous Cola cans, which besides being a drink also extoled an attitude to life, through to furniture, such as the now-famous aluminium chair from Ray and Charles Eames – another example of how an aluminium product became design classic. At the time associated with the future, progress and the desire for beauty and luxury, the Eames' chairs are also regarded as exuding a certain industrial charm today. At the time, the benefits of using aluminium castings for furniture were discovered. Today the aluminium chair has managed to influence office culture right up to the executive floor: as a representative of prosperity, performance and trust. Why else would a stool carry a 30-year warranty?

The quality aspect also contains another important feature of aluminium – sustainability. This is the principle behind the Can-Watch, a watch whose dial comprises the base of an aluminium beverage can. Here a used product, a 1950s' Coca-Cola can is integrated into a completely different design context thanks to its recyclability, true to the maxim 'make new from old'. The industrial material of the base combined with new high-value elements creates a completely new design language. And the concept of the Can-Watch, which received the Red Dot: Best of the Best award in 2013, once again demonstrates that aluminium is at both the beginning and the end of a value chain without which the history of design would not be conceivable. A specific choice of material and material capability is the guarantee for maximum design creativity – with aluminium as one of the most important media. ■

Red Dot Design Museum Essen



Vito Oražem,
Managing Director,
Design Zentrum Nordrhein-Westfalen

About the photos:
Macbook Air: The MacBook Air has combined a robust and lightweight unibody enclosure with high performance and ease of use ever since it first appeared. The enclosure is manufactured in a resource-conserving manner from a singleblock of aluminium. This makes it very thinand extremely light but nevertheless very robust for everyday use.

Audi: The Audi Space Frame – the world'sfirst all-aluminium body – was presentedfor the first time at the IAA internationalmotor show in Frankfurt in 1993. With aweight of only 180 kilograms and itspolished surface finish it is hanging with itsdoors wide open from the roof of the of theso-called 'Schürerstand' at the Red DotDesign Museum in Essen.

Can Watch: The Can Watch received theRed Dot: Best of the Best award in 2013.The watch dial comprises the base of analuminium beverage can. An example of asustainable design with a completely newdesign language.

AluDisc: The AluDisc – a 360-degree rotatable pedestal for an iMac or an AppleThunderbolt display is made from a singlesolid piece of aluminium.

Kettler aluminium bike: Kettler revolutionisedcycling with the world's first aluminium bikein 1977. Today the Kettler E-Bike is amodern redesign that is taking the place ofthe original.

Red Dot Design Museum in Essen: Making good design tangible and the quality of everyday objects apprehensible – that is the task of the Red Dot DesignMuseum. With some 2000 exhibits themuseum displays the whole range of current product designs.

TECHNICAL INFORMATION AND FURTHER EDUCATION

“Aluminium überall!” Teaching Materials for General and Vocational Schools

Together with the editorial staff of the German young people’s magazine “SPIESSER”, GDA is preparing a new brochure “Aluminium überall!” (Aluminium Everywhere) for students who attend schools offering general education or vocational training. “Aluminium überall!” will be published in A4 format and will be 16 pages long. It shows in a clear, easily understandable and illustrated manner why the light metal is indispensable for building machines, high-rise buildings, aircraft or kickboards. The folder also contains more detailed information on the history of the metal, its extraction and its processing, with examples of applications. Emphasis will be placed on the sustainability and recycling aspects. The fresh design with its modern infographics and collages is an invitation to browse through the folder. “SPIESSER” is read by some 650,000 young people (core target group 16 to 24 year-olds) every month and has a print-run of 400,000.

Aluminium in the Classroom – Different Approaches

Technical professions have a future. That is why GDA is supporting materials’ teaching in schools in order to use the fascination of technology to capture the imagination of more young people again.

Dr. Karsten Hein,
Head of Technical Literature and
Further Education at GDA e. V.

Aluminium is fascinating. We want to convey this fascination to children when they are at school. We want them to experience the metal along its complete value-creation chain – from the extraction of the ore to its use, for example in a smartphone, and its subsequent recycling.

Aluminium in the Classroom – an Analysis

The guideline for subject-related didactics occupies a central position in chemistry lessons: substance – structure – properties. What does this mean for the material aluminium?

The guideline for subject-related didactics occupies a central position in chemistry lessons: substance – structure – properties. It depends on the basic concepts particle-substance relation and structure-property relation. Questions regarding the occurrence or production of the substance and the application and recycling aspects complement this approach. What does this mean in the case of aluminium?

Aluminium is extracted from bauxite in a two-stage process using a large amount of energy. Even the extraction of aluminium cannot be treated solely from a chemical point of view but is closely interwoven with physical, (econo-)geographic and ecological questions. Adopting the classical guideline used in chemistry teaching allows typical relationships between the structure of aluminium (keyword: metallic bond) and the properties resulting from it to be demonstrated. These in turn make clear the large number of important possible applications. Of particular importance is highly efficient recycling of aluminium products after the use phase. The concept described is not only fundamental from a subject-related didactics point of view but its significance is even emphasised from the industry's side via the term 'life-cycle management of aluminium'. Life-cycle management is inextricably linked to the energy-related aspect, especially by the close relationship between primary and secondary aluminium. According to this, schools and industry have largely identical perceptions of the presentation of the material aluminium.

When one takes a quick look at the syllabuses and textbooks it is striking that aluminium is mostly discussed with respect to the extraction (the particularly energy-intensive fused-salt electrolysis process) and possible applications. Considerations of the (material) properties and recycling are often missing. By way of example one can mention a caption in a textbook that reads: 'Aluminium – too expensive for the rubbish'. Then in the figure itself only the fused-salt electrolysis process is shown without any further attention being given to purpose of the caption. It is thus expedient at the place of learning, the school, to develop an awareness of life-cycle management and the need to consider the substance aluminium holistically. ■

Prof. Dr. Katrin Sommer,
Faculty of Chemistry and Biochemistry,
Didactics of Chemistry, Ruhr University Bochum

It is expedient at the place of learning, the school, to develop an awareness of life-cycle management and the need to consider aluminium holistically.

In the past GDA has undertaken various steps to establish aluminium as a part of the school curriculum. For a long time, it pursued the strategy of offering teaching materials concerning the metal at specialist trade fairs, such as folders for teachers, educational films on DVD and brochures with metalworking courses. GDA presented its range of teaching media for many years at Didacta, the specialist trade fair for teaching materials. There was a high degree of acceptance but after years of elaborate effort at the different locations of the fair it became apparent that it was always the same respective group of interested teachers from general schools, schools providing vocational education and training centres that frequented the GDA stand. Certain teachers' interest in educational media was thus saturated after a time.

A second strategy adopted was to offer training courses for teachers in order to provide them with a comprehensive and practical insight into the metal. The teacher training course 'All about Aluminium – Between School and Industry' was held for the first time in 2001. The idea arose in close co-operation between Ruhr-Universität Bochum and GDA, whereby the centrepiece of the tandem approach was the content-related co-operation between school and industry at a regional level. This training course has so far been carried out at 11 locations of the aluminium industry throughout Germany.

The programme previously carried out took place at a co-operating school near the location issuing the invitations; it was followed by a change of location to the company. There the emphasis was on presenting the location and a works visit. Despite the good reception and the large attendance this strategy also had natural boundaries: the distribution of the aluminium producing and processing locations, which dictates the catchment area for teachers who are interested in taking part, and the opportunity to take time off from teaching to participate in the further training. In addition, the organisational effort was greater than when GDA exhibited at the education fair. It was thus time to also reconsider this concept.

A new third strategy has now been initiated. Together with the editorial staff of the young people's magazine SPIESSER, GDA is planning to prepare a special issue on the subject of aluminium which will be supplied directly to schools and distributed to the teachers there.

This direct and comfortable distribution channel is only possible because of the editorial staff's fine network throughout Germany. This way it will reach some 2500 schools. In a brief and clearly arranged manner, the special issue will cover the metal's history, extraction, processing and use in an illustrated manner. The important aspects recycling and sustainability will be outlined as well, of course. The aim is to create a good overview in a manner suitable for schools and arose general curiosity in the wonderful metal. After some time, the brochure will also be available directly from GDA. ■

GDA's Programme of Events

GDA's programme of events is aimed at its member companies and their employees, design engineers and users. Congresses and seminars geared to practical needs are used to promote the interdisciplinary exchange of expertise and provide information on methods of application, innovations and resource efficiency.

Geared to practical needs and competent

GDA informs its member companies continually and comprehensively about all relevant new developments. Instead of a confusing plethora of information, GDA offers customised information. An important pillar here is an attractive programme of events which appeal not only to member companies but also to their customers as well as to component and equipment suppliers to the whole of the European aluminium industry. In addition, the association is represented at numerous specialist events and trade fairs, such as ALUMINIUM or interpack.

Compact information about the metal

Knowledge regarding the manufacture, processing and use of aluminium has developed strongly in recent years. GDA therefore wants to present the complete spectrum and diversity of the aluminium industry, its equipment suppliers, technology partners and customers with various focal topics in practice-related congresses and seminars. Expert lecturers from member companies and external organisations ensure there is a high standard. The contents of its training courses are continually updated and focus on key company-relevant topics.

International congresses

In recent years GDA has established itself as an organiser of special international congresses. The European Aluminium Congress, which it has already organised three times, is designed to be a forum for technical dialogue and offers equipment suppliers and technology partners of the aluminium producing and processing industry a platform to present their new developments. GDA also organised the conference that is run in parallel to the ALUMINIUM trade fair for the third time. With its innovative presentations, this congress is aimed at aluminium users.

Seminars and congresses

Among the classic events regularly organised by GDA are seminars covering joining of aluminium profiles and sheet, surface technology and the technology of extruded profiles. The programme is complemented by basic seminars on the metal. In collaboration with the Aluminium Engineering Center Aachen (aec) of the RWTH International Academy, GDA also regularly organises a training seminar 'An Introduction to the Technology of Aluminium', which is aimed at natural scientists, engineers and technologists from the aluminium industry and the aluminium processing industry. ■

EAC 2015: Aluminium – Building the Future

On 23 and 24 November 2015 GDA is organising the EAC European Aluminium Congress 2015 in Düsseldorf under the motto 'Aluminium – Building the Future'. It is doing so within the 'D-A-CH, Allianz für Aluminium' in close co-operation with the Swiss aluminium association (alu.ch) and the non-ferrous metals trade association of the Austrian Economic Chambers (Fachverband der NE-Metallindustrie, Wirtschaftskammer Österreich).

The long-term success of aluminium as a material depends on new solutions and products. The continuing dynamic development of the sector and its companies is closely related to the innovative capability of the plants and the beneficial properties of the metal. EAC 2015 will be looking at which key factors are important for the future success and the competitiveness of the aluminium industry. Experts from the aluminium industry, representatives of user industries and from science will present and discuss innovative, current and visionary solutions. A comprehensive exhibition and sponsoring opportunities round off the programme.

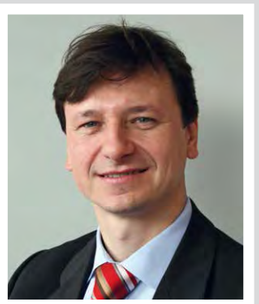
ALUMINIUM 2014: GDA is Sector Meeting Point

ALUMINIUM 2014 in Düsseldorf set a new record with a total of 24,261 visitors. The 934 exhibitors from 50 nations also included GDA, which provided information on its services and company-neutral and product-independent advice on the uses of aluminium. At the same time, the GDA stand served as a communications platform and meeting point for visitors and exhibitors. On all three days of the fair, numerous representatives of member companies visited the GDA stand and took the opportunity to exchange views with other members of the aluminium community. The central theme of ALUMINIUM 2014 was the great potential for the 'magic metal' aluminium.

GDA also offered visitors to the fair an attractive supporting programme which included the Aluminium Conference and expert discussions during its Aluminium Talks with experts from the sector on the topics 'The Magic Metal Aluminium' and 'Megatrend Automotive Lightweight Construction': the talks were very well attended and there was a lively discussion with the audience. The participants in the discussion on 'The Magic Metal Aluminium' were Oliver Bell, Vice President of GDA, President of Eurometeaux and Director of Norsk Hydro ASA, and business journalist Hans-Willy Bein. Peter Rueben hosted the discussion on 'Megatrend Automotive Lightweight Construction' with the industry experts Dr. Dietrich Wieser, Director Business Development Global Automotive at Alcoa Global Rolled Products, Stephan G. Klose, Senior Manager Advanced Materials Group Research & Advanced Engineering and Frank Busenbecker, Commercial Managing Director of Erbslöh Aluminium GmbH.

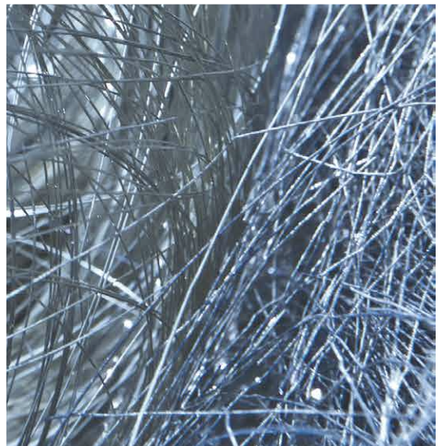
Aluminium – Material for the Future Conference

The Aluminium – Material for the Future conference, organised jointly by GDA and Reed Exhibitions for the third time and run in parallel to ALUMINIUM 2014, was a complete success. The event was well attended on all three days with about 250 participants, which was a new record. The conference language was English and as the name suggests the guiding theme was aluminium as the material of the future. In the 40 papers presented during the sessions on Plant and Equipment, Automotive, Surface and Aluminium Markets, the participants were given a broad and intensive overview of aluminium's future prospects in the various user markets.



Dr. Karsten Hein,
Head of Specialist Literature and Further Education

Pots and pans, cutlery, lamps, shelves, picture frames, handles for cupboards – many household items are made from aluminium. Some, like cookware have a long tradition, others have come from designers who have adopted new ways to express their creative endeavours. The aluminium collection acquired by GDA documents the extensive range of products that has been developed and made using aluminium.



A Historical Aluminium Collection

Pots and pans, cutlery, lamps or picture frames – the use of aluminium in articles of daily use has a long tradition. A collection acquired by GDA documents how the metal became part of our everyday life.

In April 2014 GDA received some unusual information: in southern Germany a collection of historical objects made from aluminium, which were part of a collector's estate, was looking for a new owner. Intensive research revealed that Dr. Walter Böhning (1934-2003) had amassed the collection since the 1960s. He was once the head of the Völkerkundemuseum (Ethnological Museum) in Heidelberg as well as head of the collection of ethnological artefacts belonging to a private trust for science and art in Heidelberg (Josephine und Eduard von Portheim-Stiftung für Wissenschaft und Kunst).

Walter Böhning had recognised the uniqueness of aluminium in the 1960s and after that had collected privately everyday items made from aluminium. His field of collection and the form of the metal knew no bounds. Practically everything was preserved for posterity, from mass-produced household items through to individual objects and curiosities. So it is not surprising that the collection contained over 1500 items in the end. It also included everyday items from overseas and some of the items are exotic.

It is striking to see how over a period of more than a hundred years aluminium has entered and maintained its place in everyday life. The collection contains coffee pots, teapots, milk churns, kettles, thermos flasks, canteens, cooking pots, cake moulds, cutlery, plates, serving trays, cooking and baking utensils, presses, mills, lunch pails, trays, containers for spices and tea, beakers, beer bottles, beer barrels, funnels, pestles, wall plates with motifs, vases, candle holders, ashtrays, cigarette cases, coins, helmets, jewellery, religious depictions, stirrups and even a hunting horn.

The idea behind Walter Böhning's passion for collecting was to establish for posterity a lasting monument for what was then still a young material. Böhning himself had already planned a larger exhibition of the collection but was unfortunately not able to implement his plans.

Walter Böhning's commitment was also aimed to be in memory of the German chemist Robert Wilhelm Eberhard Bunsen (1811-1899) who had also worked in Heidelberg. Robert Bunsen is inextricably linked with the history of the development of aluminium. In 1854 he conducted research on fused-salt electrolysis of sodium aluminium chloride – as did his French colleague Henri-Etienne Sainte-Claire Deville (1818-1881) independently of him – in order to thus be able to produce pure aluminium. Robert Bunsen was appointed professor at the University of Heidelberg in 1852.

At the beginning of September last year two GDA employees drove to Sinsheim to inspect and receive the collection that had been bequeathed as a gift to GDA. Given the size of the collection, only good examples of duplicate items were accepted for safekeeping by GDA. The objects have since been photographed and catalogued and stored at GDA. In future, part of the collection will be exhibited on the premises of GDA. ■

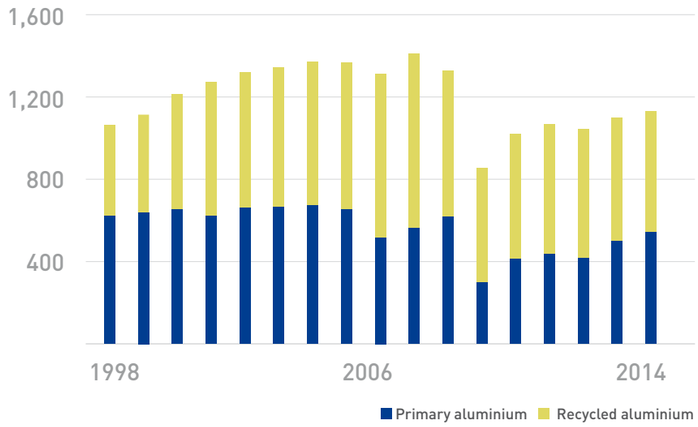
Business Activity in the Aluminium Sector in 2014/15

Overall, the economic environment in the aluminium sector is stable. German aluminium companies have positioned themselves well in recent years and have been able to defend or increase their market shares. They have proven to be resilient compared with other European producers.

Primary and recycled aluminium

Some 1,130,100 tonnes of raw aluminium were produced in Germany in 2014. Production was thus 3.7 per cent higher than the level of the previous year. The production of raw aluminium during the period comprised 530,700 tonnes of primary aluminium and 599,400 tonnes of recycled aluminium. Compared with the previous year the production of primary aluminium rose 7.8 per cent while that of recycled aluminium was 0.3 per cent higher.

Primary and recycled aluminium in Germany from 1998 to 2014
(in 1000 tonnes)



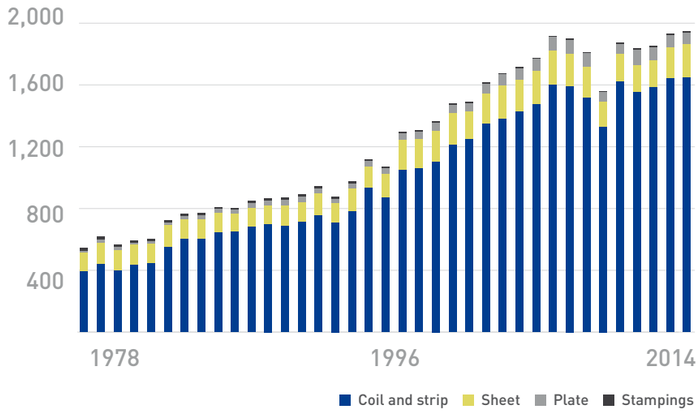
Aluminium semis production increases

The production of semi-finished aluminium products totalled 2.548 million tonnes in 2014. Compared with a year earlier this was a rise of 2.2 per cent. Here the product portfolio includes rolled products, extruded products, wire and forgings. Semi-finished aluminium products are the most important sector of the German aluminium industry in terms of quantity.

Rolled products with slight plus

A total of 1,952,400 tonnes of rolled products were produced in Germany in 2014. This represents a rise of 1.0 per cent year-on-year. With the exception of plate and stampings, the development of volumes in the other product areas was positive. Production of coil and strip, which is the most important product group in terms of quantity, rose 0.7 per cent. The production increase was even higher – 9.0 per cent – in the case of sheet.

Production of rolled products in Germany from 1978 to 2014
(in 1000 tonnes)



Extrusions markedly positive

A total of 574,400 tonnes of extruded products were produced in Germany in 2014 and this was 6.5 per cent more than the previous year. Growth in bar and rod production was particularly positive here: up 28.8 per cent year-on-year.

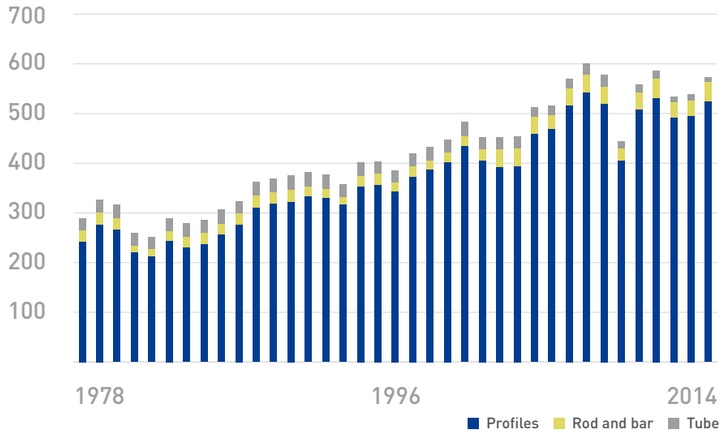
Exports pleasing

Exports of semi-finished products were pleasing: German industry exported a good 1.56 million tonnes in 2014. Exports rose 3.8 per cent compared with 2013. European partner countries play a significant role as consumer markets for the German aluminium industry. Exports to Europe account for about 80 per cent and those to the EU27 countries for 73 per cent.

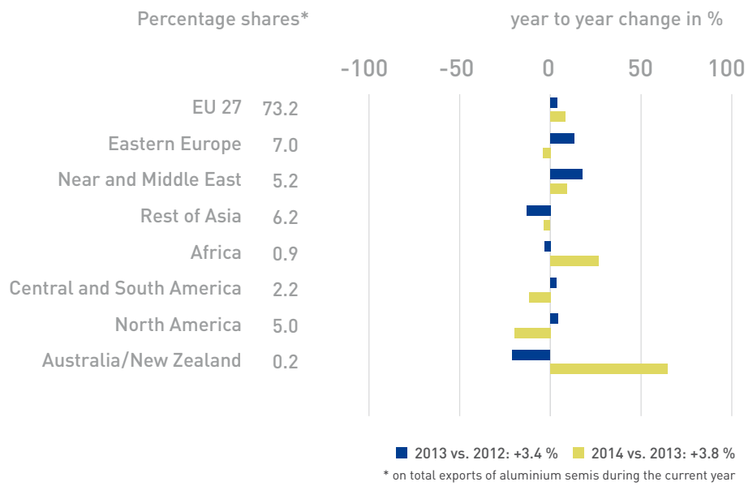
Aluminium conversion

A total of 348,500 tonnes of aluminium was converted in Germany in 2014. Production volume rose 3.9 per cent year-on-year. Conversion is divided into three sectors: foil and thin strip, tube, aerosol and other cans, and metal powder. ■

Production of extruded products in Germany from 1978 to 2014
(in 1000 tonnes)



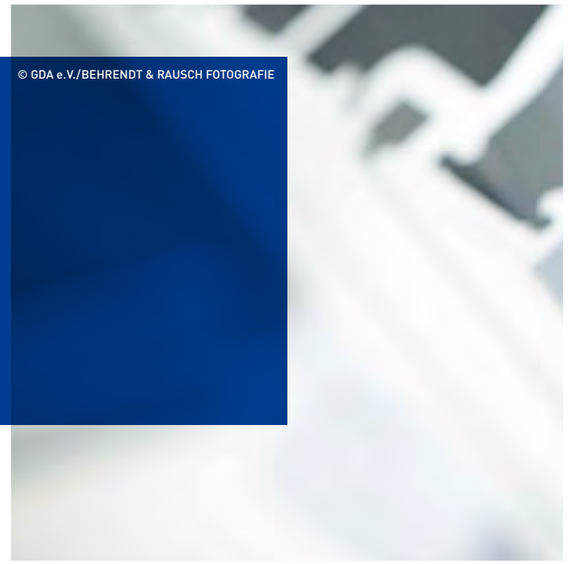
Exports of semi-finished aluminium products according to region in 2013 and 2014

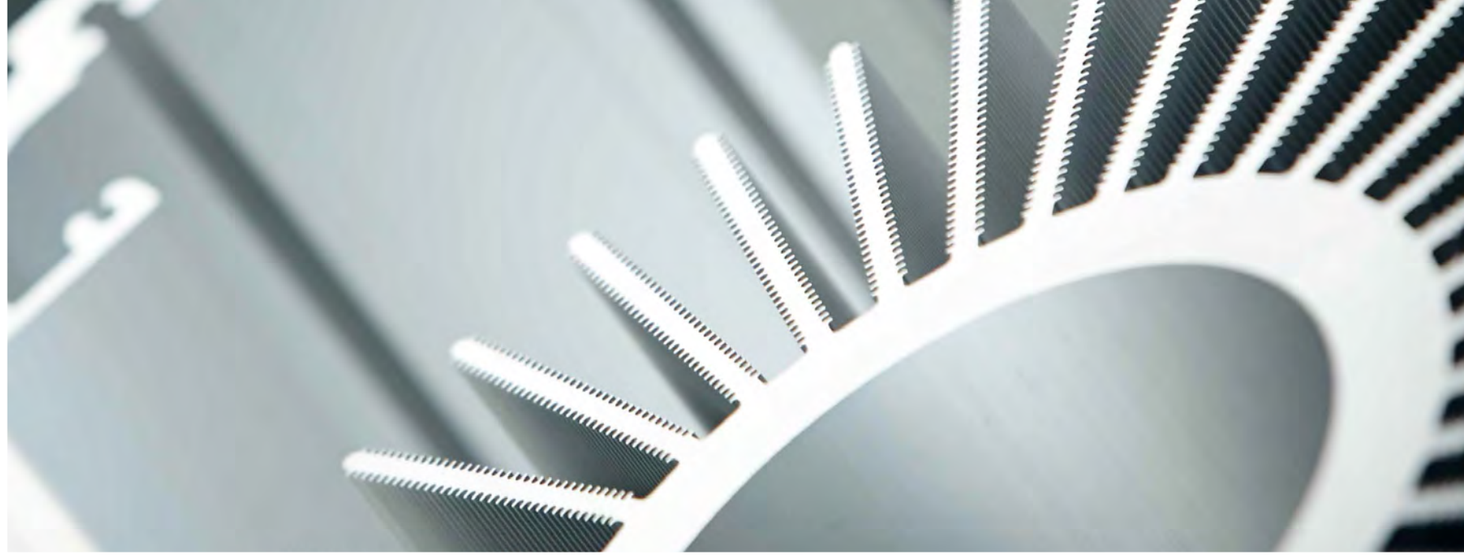


* on total exports of aluminium semis during the current year

Outlook

The economic prospects for the German aluminium industry in 2015 are good. The global economic environment has stabilised further. For important regional markets – such as North America and Europe – the prospects for the first quarter of 2015 have even improved. For example in the USA: private consumption has risen, investments have continued to develop quite dynamically and the unemployment rate is expected to fall further. The development in the BRIC countries continues to be very mixed. While the business climate in India is again showing a clearly positive tendency, the indicators for Brazil and Russia are giving cause for concern. Although China is still continuing to lose momentum it is still reporting relatively high growth rates. In Germany, the business climate has improved continuously since the end of 2014. The expectations for German industry and the German building and construction industry are quite positive. The chances for further economic recovery in the German aluminium industry are there for good.





Statistics

Production

Semi-finished aluminium products	2013	2014
Rolled products	1,933,000	1,952,000
Rods and bars	31,000	39,000
Profiles	496,000	524,000
Tubes	13,000	11,000
Wires	17,000	17,000
Forgings	N/A	N/A
Conduction material	5,000	5,000
Total	2,495,000	2,548,000

Aluminium castings (tonnes)	2013	2014
pressure die-casting	503,000	576,000
Permanent-mould casting	275,000	303,000
Sand casting	105,000	106,000
other casting processes	3,000	8,000
Total	886,000	993,000

Further processing of aluminium (tonnes)	2013	2014
Aluminium foil	271,000	271,000
Tubes, Cans and Impact Extrusions	42,000	43,000
Aluminium powder	23,000	35,000
Total	336,000	349,000

Foreign trade

Primary aluminium (tonnes)	2013		2014	
Country	Import	Export	Import	Export
EU 28	1,385,700	390,300	1,430,600	371,200
EFTA	559,000	21,900	537,300	22,600
Eastern Europe	137,800	900	232,700	1,200
Rest of Europe	0	0	0	0
Europe total	2,082,500	413,100	2,200,600	395,000
North America	50,700	1,100	40,600	1,600
Central and South America	8,100	0	9,600	0
Africa	80,500	100	62,500	0
Asia	182,100	9,600	219,300	8,200
Australia/New Zealand	10,000	400	4,400	0
Rest of the world	121,900	0	107,900	0
Total	2,535,800	424,300	2,644,900	404,800

Secondary aluminium (tonnes)	2013		2014	
Country	Import	Export	Import	Export
EU 28	796,600	1,063,500	816,200	1,141,000
EFTA	144,600	52,000	194,800	46,900
Eastern Europe	173,400	62,500	193,300	62,700
Rest of Europe	> 0	> 0	> 0	> 0
Europe total	1,114,600	1,178,000	1,204,300	1,250,600
North America	16,900	96,800	8,800	78,400
Central and South America	7,500	39,100	5,900	34,600
Africa	24,500	11,300	26,300	15,000
Asia	42,000	174,600	50,600	177,800
Australia/New Zealand	200	1,700	> 0	3,000
Total	1,205,700	1,501,500	1,295,900	1,559,400

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Services from GDA: quick, competent, informative

GDA rigorously pursues a policy of being a modern trade association for its members, customers and those with an interest in the sector, offering the aluminium industry and its partners a comprehensive range of services.

GDA's comprehensive range of services covers education and training, technical advice, information such as statistics and the library, and specialised events. The services offered are aimed at GDA members, establishments of further education and the public at large. The following list is an overview of the services offered.

... supports rapid searches for information on manufacturers of aluminium products via its **products and manufacturers database.** A simple system and online search form helps the user find innovative companies and optimal solutions.

... is actively engaged in the area of **schools and education and training.** The future of work does not begin in the production facilities. When it comes to determining future direction, important steps are already taken during school education. GDA develops teaching materials, such as folders or DVDs, and provides information on practical training and works visits in the aluminium industry.

... offers comprehensive information on aluminium as a material **on its website at www.aluinfo.de.** The extranet section is for GDA member companies and contains statistics, presentations and reports from the working groups, and can be accessed exclusively by GDA members and their employees.

GDA ...

... answers practically any question relating to aluminium via its **library.** GDA's library is the largest German library dedicated to aluminium. The library's archives contain one of the most extensive collections of information on aluminium – all well documented and edited.

... provides specific advice on the processing and application of aluminium, including topics such as standardisation, alloy designations and alloy data, via its **Technical Advisory Service.**

... provides information on the current economic and business situation in the German and European aluminium industries together with the latest **statistics.** Statistical data on indices, employment, turnover, production or foreign trade help analysts and market players asses market developments.

... publishes its information **online.** Anyone interested can download technical information sheets, technical papers, brochures and fact sheets directly.

GDA – Gesamtverband der Aluminiumindustrie e. V.

Gesamtverband der Aluminiumindustrie e. V. (GDA) with headquarters in Düsseldorf, Germany, was established in its current form in 1992 in Dresden. It is an association of aluminium companies that produce raw aluminium or aluminium products, including composites with other materials. As an industrial sector association, GDA represents the interests of an efficient aluminium industry and the jobs it offers with the aim of:

- conveying the economic, ecological and technical benefits of aluminium
- implementing the ecological, economic and social aims of the aluminium
- continuing determinedly to pursue the implementation of sustainable, future-oriented development in the aluminum industry.

As the representative of the aluminium industry, GDA strives to maintain an open dialogue with the general public in order that customers and consumers have a more transparent view and better understanding of aluminium and the products of its member companies. To this end there is a continual exchange of experience and ideas within the association; this ensures that the interests of all member companies are represented effectively, also externally.

GDA and its specialist trade associations have made it their job to represent the common interests of all of their members and thus the whole sector in all areas of the economy relating to aluminium. This involves the collection and processing of market information and planned legislation at national and international level. In addition, the association carries out media and public relations work for its member companies. GDA is also co-operation partner and promotional supporter of the world's largest aluminium trade fair ALUMINIUM. ■

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