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NEWS

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INTRODUCTION

Dear Reader,

Welcome to the third edition of Aludrive, the new newsletter from the *European Aluminium Association (EAA)*. Aludrive provides readers in the automotive sector with updates on innovations and projects in the aluminium industry directly affecting the automotive sector.

This issue brings you details of a new aluminium extrusion for exhausts, details on high strength alloys, surface treated sheets, no polish wheels and fuel line coolers for diesel engines. All the articles in this newsletter are free for further publication as long as they acknowledge the *European Aluminium Association (EAA)* as the source.

The Automotive Market Group at the *EAA* is responsible for this newsletter. This group comprises seven aluminium companies that are supplying the automotive industry.

We hope you find it a useful and enjoyable publication. Feel free to forward it and invite others to subscribe.

To either subscribe or provide comments, email us at auto@eaa.be

HIGH-STRENGTH ALLOY FOR AUTO BODY SHEET OUTER PANELS

Thanks to continuous efforts to increase the strength after paint bake simulation, Corus Duffel has successfully developed a 6016 grade (High Strength 6016: HS6016 or Superlite® HS), with properties comparable to alloy 6111 in both T4P and T6 condition. Furthermore HS6016 (or Superlite® HS) can be used together with the company's 6016 inner panels such as Ecolite™ or Ecolite™ pre-bake, both 6016 based (uni-alloy concept).

The new alloy is being considered for strength-dominated applications such as hoods and roofs for future Audi models as well as for Ford and GM. It attains strength levels of about 255 MPa after 2% prestrain and paint bake simulation at 185°C for 20 minutes.

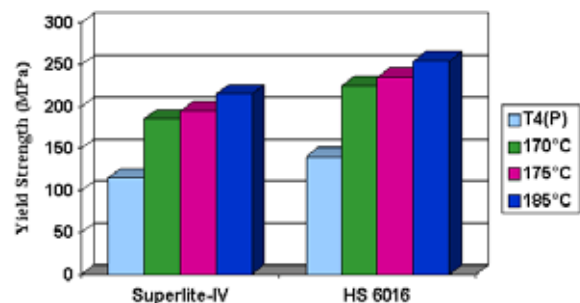
For several years prebake grades (T4P) of aluminium alloy AA/EN 6016 have been available in Europe. Their high strength after paint baking enables a significant dent resistance in the finished part, without the need for a separate heat treatment.

Corus Duffel's Superlite®IV pre-bake grade is widely used in Europe fulfilling tight customer specifica-

tions after paint bake simulation. A yield strength of a minimum 200MPa is guaranteed after 2% prestrain and simulation at 185°C for 20 minutes (typically 220MPa).

In the USA, alloy 6111 is commonly used for ABS applications. This alloy has the advantage that the strength after paint bake simulation is higher than for the regular European pre-bake grades and therefore has higher dent resistance. The final gauge can be reduced or paint bake temperatures can be decreased further.

The graph below shows typical tensile properties before and after paint bake simulation at different temperatures.



NEW MATERIAL GRADE FOR STRUCTURAL PARTS

The aluminium alloy AA 6016-T4 is currently in use at almost all European Car Producers for outer body panels. A few years ago the "pre-bake" grades (AA6016 T4"P") were developed in order to obtain higher strengths after the paint-baking in the automotive paint-shop. These material qualities (Corus Duffel, Superlite® grades) made it possible to eliminate an additional heat treatment in the body shop. The main reason for the requirement of high mechanical properties in outer parts is the dent resistance of the final panels (hail-, stone chipping-resistance)

For inner body panels Corus Duffel developed a 6xxx-alloy, Ecolite™, which is, in its chemical composition, fully compatible with the AA6016

outer panel alloys. Ecolite™ is the answer to a real "Automotive Body Uni-Alloy" concept and is currently used for several applications in the Body In White of many European cars.

For the inner panels a higher strength level is advantageous in crash sensitive areas and provides room for down-gauging of strength related parts. Recently Corus Duffel developed and successfully introduced the new "Ecolite™ pre-bake" grade. This development made it possible to guarantee a minimal Yield Strength of 210 MPa after a 2% pre-strain and an exposure to 185°C for 20 minutes (these are typical E-coat drying conditions in the automotive paint-shop, also here eventual extra thermal treatments are therefore made redundant).

The down-gauging potential of the pre-bake grade is in the order of magnitude of 10% compared to the non prebaked version. During the development also much attention was paid to the formability in the as supplied condition. It was proven that the new "Ecolite™ pre-bake" material has a formabil-

ity level (deep-drawing, stretching and hemming capabilities) at the same high level known for the regular Ecolite™ material. "Ecolite™ pre-bake" will be introduced for inner panels in different European cars due to be launched in 2006/2007.

HIGHER-STRENGTH OUTER BODY SHEET MATERIAL CAN REDUCE GAUGE

The search for higher strength materials with good formability is a perpetual challenge for Researchers within the aluminium industry. The new alloy Anticorodal®-140 PX has been developed by Novelis as a higher strength variant complementing the established standard outer body quality Anticorodal®-121 for strength dominated applications such as hoods, fenders, roofs, etc..

The alloy composition of Anticorodal®-140 PX is within the same alloy composition range as Anticorodal®-121 (EN-AW 6016), but optimisation of the concentrations of the individual alloying elements and a specifically adapted processing procedure allow it to achieve a 15 % higher

strength level after lacquer bake hardening than with Anticorodal®-121 while maintaining the excellent forming characteristics of this alloy. The higher strength offers a significant gauge reduction potential, i.e. less material consumption and reduced weight.

Substitution of existing aluminium sheet applications is a straightforward process since the basic alloy specification is unchanged and there is no need for additional material qualification tests. Anticorodal®-140 PX is used by BMW for the 7xx series hood and fenders and has also been introduced for the 5xx series.

SURFACE-TREATED ALUMINIUM AUTOMOTIVE SHEETS FOR SYSTEM COST REDUCTION

While sustainability of individual transportation is the top priority goal, the automotive industry is faced with intensive pressure for cost reduction. One possibility for an overall system cost reduction is the application-oriented surface treatment of the aluminium sheets in the rolling mill. The goal of such a surface treatment is the facilitation and/or even elimination of subsequent process steps in the press shop, the assembly plant or during surface finishing.

The coil conversion pre-treatment process is already established for a significant part of the supplied aluminium automotive materials. The natural oxide layer on the sheet surface – which can be fairly unhomogeneous as a result of the various processing steps – is removed and replaced by a new, closely controlled mixed oxide layer with incorporated Ti or Ti/Zr ions. This layer provides an excellent basis for subsequent joining and lacquering

processes and ensures, in particular, the long-term stability of adhesive bonds even under the most unfavourable service conditions.

In addition, a dry lubricant is often applied which protects the aluminium surface during transport and handling, but also offers optimum lubrication during stamping. In a lean production process, the dry lubricant is only removed during alkaline cleaning of the body-in-white, immediately in front of the zinc phosphating step. Thus, it must be absolutely assured that the applied dry lubricant is compatible with the applied joining methods and that the possible presence of dry lubricant residues will not disturb the lacquering quality. Today, there is a clear move from the water-soluble to the water-free, mineral oil-based dry lubricants which can also be applied on steel. For example, both Opel and Saab have recently changed to the Gardobond X4591 (Chemetall) conversion treatment and the Multidraw Drylube E1 (Zeller+Gmelin).

Novelis operates with its plants in Sierre (Switzerland) and Nachterstedt (Germany) in Europe two totally independent production lines which are both equipped with combined continuous coil treatment lines for heat and surface treatment. The selection of the chemicals for conversion treatment and the dry lubricant is generally made by the car producer. It is, however, a joint task of the material supplier and the car producer to ensure that the chosen system is fully compatible with the OEM's process chain, especially with the applied adhesives and, most important, does not interfere with the established body-in-white lacquering processes.



ALUMINIUM WHEELS THAT NEVER NEED POLISHING

The Dura-Bright® process developed and patented by *Alcoa* was originally conceived for *Alcoa* Commercial Vehicle Wheels and had three main objectives: to eliminate mechanical polishing during the production process, to eliminate the periodic manual cleaning by customers and to ensure the life-long durability of the brightness.

Dura-Bright® is neither a coating, nor a finish. It's a treatment that penetrates the aluminium. It prevents brake dust penetration and eliminates filiform corrosion, mechanical polish operations and manual cleaning. The treated aluminium wheels are easily cleaned and maintain a high quality bright finish throughout the wheel's life. Every *Alcoa* Dura-Bright® wheel comes with a five-year warranty.

The new wheel type has been so well accepted by the market that *Alcoa* has expanded the capacity with two additional plants, one in North America and one in Europe.



Currently *Alcoa* is working on the introduction of the first Dura-Bright® wheel for passenger cars. Find out more at www.dontpolish.com

NEW FUEL COOLER FOR DIESEL ENGINES

Increased injection pressure in the new generation of diesel engines and their growing market share led *Hydro* to develop a cooler for lowering temperatures in the diesel return line. These fuel coolers are extruded and molded in one piece, thus avoiding any leaks or aggressive corrosion from joints.

Choosing a long life alloy further enhances corrosion resistance. The application can be bundled with HYCOT PA (corrosion resistant) coated aluminium tubes for other fluid transportation. Brackets and the application's end forming can be designed to customer specifications. Own wind tunnel testing

enables *Hydro* to find the best solution for each customer.



EUROPE LEADS THE WAY FOR ALUMINIUM GROWTH IN AUTOMOTIVE

Europe is the fastest growing region in the world for aluminium use in the automotive market according to a new study. This growth can be attributed to the metal's value in boosting fuel economy, performance and safety. Lightweighting with aluminium can provide auto makers with cost-efficient solutions to help reduce emissions. Also the high value of the aluminium in 'end-of-life' vehicles ensures complete recovery and the recycled aluminium is reused for automotive components.

Today, cars produced in Europe contain on average approximately 120 kg of aluminium. This is a growth rate of 5% per annum over the last six years and it is forecast to continue growing at this rate for the coming period. The comparable numbers are 3.7 % for North America and 3 % for Japan. Europe is also leading on the innovative use of aluminium in closures, body structure and chassis applications, mainly to improve automotive safety and performance.

The study was commissioned by the *North American Aluminum Association* and conducted by *Ducker Worldwide*, a leading business-to-business research and analysis organisation specialising in technically oriented markets.

The *Ducker* study predicts that the global aluminium use of the automotive industry will reach nearly 5.5 million tonnes in 2006. 55 % of this volume will be recycled aluminium. Significant growth is predicted in particular for automotive body sheet. Although only 100,000 vehicles will have a complete aluminium body structure there will be millions of cars with an aluminium content of more than 200 kg.

For more details of the study visit: www.autoaluminium.org

Aludrive is a joint newsletter of Alcan, Alcoa, Amag, Corus, Hydro, Novelis and Sapa, who are all members of the EAA Automotive Market Group.

The EAA, founded in 1981, represents the European aluminium industry. Its members are the European primary aluminium producers, the national associations representing the manufacturers of rolled and extruded products in 17 European countries and the Organisation of European Aluminium Refiners and Remelters (OEA) and the European Aluminium Foil Association (EAFA). The European aluminium industry directly offers jobs to about 236.000 people.