ALUMINIUM FEDERATION: ALL-PARTY PARLIAMENTARY GROUP FOR THE ALUMINIUM INDUSTRY

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Green Aluminium: The Importance of Innovation

Geoff Scamans, Chief Technology Officer, Innoval Technology

Baroness Gardner, My Lords, Ladies and Gentlemen

My background is more than 30 years of industrial experience working in R&D in the aluminium industry from a UK base mainly for Alcan and for the past four years for Innoval Technology. My role during most of that time has been to identify and bring new technology into the aluminium industry, with the emphasis on step change or so-called disruptive technology. To use an analogy: my work has all been about laying new track, rather than following the railroad.

Innovation in processes and products is vital for the UK aluminium industry to remain globally competitive and to contribute meaningfully to the development of low-carbon options for the widest range of applications, particularly those involving transport.

Innovative technologies that I have been involved with have been diverse and include spray casting for the manufacture of aluminium based metal matrix composites for automotive and aerospace applications, rechargeable lithium-ion batteries for portable electronics and electric vehicle propulsion and stripped anodic films for filtration, biotechnology and electronic applications.

Many innovative technologies come from university materials research departments particularly in the UK and North America. Maintenance of this academic network and stimulation of industrial interaction is essential for the continuation of the flow of innovative technologies.

Notable recent examples of UK-developed innovations are the Frey process for titanium from Cambridge University and aluminium and magnesium high shear melt conditioning from Brunel University. The latter project has received excellent support from EPSRC (3 grants) and from the DTI Innovations programme (3 active collaborative projects). Innoval are the lead partner in each of these projects that, if successful, could potentially transform the aluminium and magnesium industries by improving the performance of castings, by reducing the complexity of rolling and extrusion processes and by increasing the capability for using recycled metal to make high performance products. Step change technologies of such potential impact are rare.

The most significant innovation project that I have been involved with since 1982 is the use of aluminium sheet as an alternative to steel sheet for the mass production of cars using conventional pressing and joining technologies. The technical hurdles to using aluminium sheet as an alternative to steel sheet have all been overcome as exemplified by the innovative technologies combined in the Jaguar XJ saloon. However, this vehicle uses steel self-piercing rivets rather than spot welds as the simple advance of electrode buffing that makes aluminium sheet spot weldable was developed (in Alcan's Banbury Research centre) after the build decisions had been taken by Jaguar. Hopefully the next vehicle of this type will be spot welded and will confirm that aluminium is just as easy to make into mass produced cars as steel.

Aluminium intensive vehicles (AIVs) can be especially fuel efficient. The Audi A2 demonstrated a fuel consumption of less than 3 litres/100km. This is equivalent to a CO_2 emission of 80g/km, which compares very favourably with the proposed EU limit of 130g/km by 2012. Indeed, increased use of aluminium in automotive applications will go a long way to achieving future emission reduction targets.

This route to the provision of fuel-efficient lightweight and affordable vehicles should be seen as an alternative or an adjunct to the production of hybrid vehicles. For example, if the Toyota Prius was no longer a hybrid vehicle but an Aluminium Intensive Vehicle powered by a small efficient diesel engine its weight could be reduced by over a third and this would correspond to a CO_2 emission of less than 100g/km compared to that of the present hybrid Prius of 104 g/km. This shows that the advantage of using an electric drive system in hybrid with a conventional internal combustion engine is about the same as that gained by replacing the steel sheet with aluminium sheet and using a smaller engine. This is a much more straightforward and lower cost option. The fuel consumption of a car is directly related to its weight and if the weight of the vehicle structure is reduced then a smaller engine and lighter weight components can be used to achieve outstanding fuel efficiency and performance as shown by vehicles like the Audi A2. This represents the simplest route to providing vehicles with CO_2 emissions of less than 100g/km. The savings in mass transport applications such as buses and trains are even greater on a vehicle by vehicle basis.

In all aspects aluminium is attractive as an alternative to steel for mass automobile production. Add to that, the high energy savings achieved by recycling aluminium and the full life cycle picture is very positive. Aluminium in cars needs to be considered as a similar packing application to aluminium in cans although much better care has to be taken of the contents and the lifecycle is measured in years rather than weeks or months. The key is getting an appreciable tonnage of recycled aluminium into automotive applications.

If, for example, 150,000 aluminium intensive vehicles (approximately the number of Ford Focus cars of all models sold in the UK each year) used only recycled aluminium based sheet, for the next ten years this could represent a carbon saving of nearly two million tonnes of CO_2/annum by 2017. This is roughly a six percent reduction in the estimated carbon emission from personal transport by 2017 (31.5Mt). The savings scale with the number of vehicles made so potentially could be much larger.

The benefits are all the greater if relatively low-grade types of used aluminium can recycled into high performance products such as extrusions and sheet used in automotive applications. The Brunel University work that I mentioned earlier could be highly significant as a critical enabling technology for this and will complement the excellent aluminium recycling achievements already in place.

This is a prime example of innovative materials technologies developed in the UK universities having the potential to improve the competitiveness of the aluminium supply chain, promote UK recycling of secondary materials into high grade products, and further reducing our carbon footprint.

It demonstrates the huge potential for our lightweight material to help meet targets for CO_2 reduction, whilst at the same time enhancing the overall competitiveness of our material.

The ability to innovate is key to achieving goals such as these and I would encourage parliamentarians to continue their practical support for joint industry / academic research so that more disruptive technologies are available for exploitation for the benefit of UK based industry.

Geoff Scamans
Chief Technology Officer
Innoval Technology