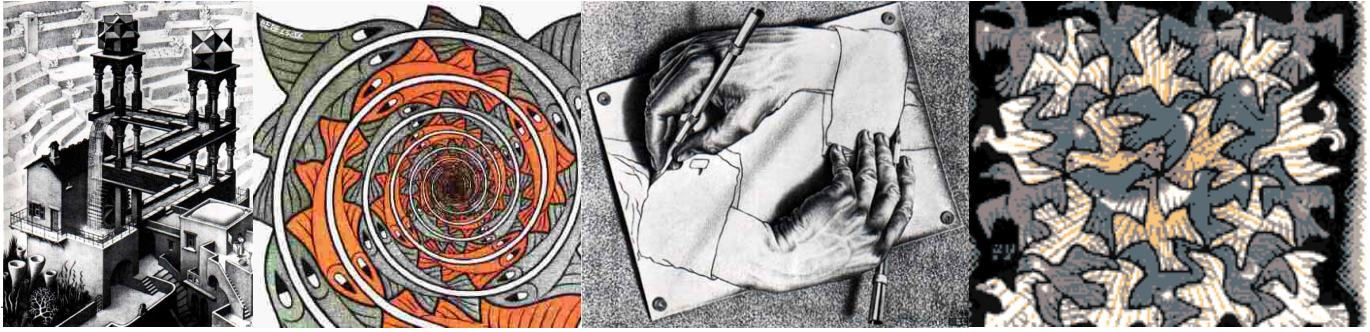


Technology Strategy Consultants (tsc) aim to promote thinking and innovation within the aluminium industry.

During the course of our research we often encounter items of interest to the world of semi-fabricated aluminium products which, on their own, may seem insignificant but, when added together, could be seen as a step-change in their field of technology.



Cheap Automotive Aluminium

Energy efficiency

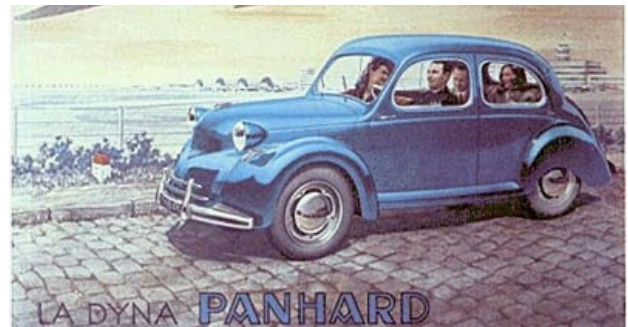
Energy consumption will be on just about everyone's mind soon if it isn't already. We are now approaching the end of an era which has allowed cheap, carbon based, energy to dominate our approach to heating, lighting, manufacturing and transport. There is now a growing recognition that this will change. Taxation and the sheer cost of fuel will provide the focus for energy efficiency and this will be market driven as the extra costs impact on all types of consumer. To meet these needs manufacturing will need to change in order to provide the fuel efficiency which will be demanded by those consumers.

Transportation

Consider transport, and let's focus on the private car. We are all content with the idea of car ownership: your own form of transport which can take you, and your family or colleagues, where you want to go, door to door, when it suits you. Except in large cities, this degree of freedom is going to be very difficult to remove from existing car owners so we might conclude that private car ownership is here to stay. Which means that cars are going to have to be much more fuel efficient than we are used to today. And this fuel efficiency must be real – alternative fuels such as hydrogen and electricity might look attractive but the real cost of their provision must be taken into account.

Weight reduction

Of course there are many technology packages on the manufacturer's shelf which will provide some of the change expected by the consumer.



Not new – aluminium Panhard Dyna ca 1950

But the real step change will be in weight reduction. Aluminium is just about ideal for this: plentiful, recyclable, available and relatively cheap. But compared to steel it is actually relatively expensive, and the car makers really want cheap aluminium. Unfortunately, the aluminium industry has invested heavily in the equipment needed to make the high quality alloys and surfaces demanded of the high quality car makers, who can pass off the additional costs to their well heeled clientele. This approach is usually based on an improvement in the car's performance and all too often the resultant vehicle is fitted with an enormous engine which doesn't deliver anything in terms of improved fuel efficiency because the owner doesn't want it.

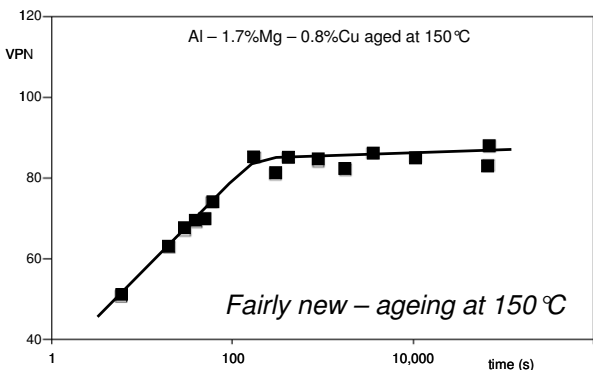
All change

So how do you break this quality cycle which drives up the cost of aluminium adoption in the car industry? Once again it might come about by combining various technology developments which

are out there but might not be in the best interests of the existing suppliers. Consider first the alloys being used. Most aluminium sheet is used on the outer (closure) panels of cars. These need to be strong to avoid denting, and formable to allow the panels to be made - 6xxx alloys are universal today and are supplied in the soft condition (for formability) and rely on the paint cycle for age hardening to provide the necessary strength. Unfortunately, another change in the car companies' agenda is to reduce the paint bake temperatures, first for energy savings but ultimately for the introduction of water based paints to reduce emissions. With paint bake temperatures up at 180°C the present alloys can be developed to respond and be fit for purpose. As temperatures descend to 160°C this will be very difficult to achieve and if paint bake temperatures plummet to 120°C as some forecast with water based paints there will be no age hardening of these alloys.

New alloys

There is a new breed of alloys out there based on Al - Mg - Cu which can age harden at very low temperatures (100 - 150°C) and in realistic time scales can develop interesting strength levels. Of some interest is the fact that the same alloy type could find application in body structures where the existing Al - Mg alloys may not have sufficient strength - leading to the thought that the "uni - alloy" car might be truly recyclable - not true today



where different alloy types are used for structures and closures. These alloys are thought to develop their strength by a process of short range ordering, a strengthening mechanism not exploited before in any commercial aluminium alloy.

Twin roll casting

But the other intriguing thing about these alloys is they could be dilute enough to be processed by twin roll casting. Now that would be a step change in the cost structure of the raw materials and might even lead to the required reduction in cost which most analysts see as the requirement for aluminium to make it big in the car industry.



Not new either - twin roll casting ca 1956

So if the alloys are out there and twin roll casting is an established technology, why isn't someone putting the two together for all of us to benefit? Well the alloys are still at the scientific curiosity stage, and those companies with the resources to explore further are the very same companies who have made the investment in hot mills, cold mills, continuous heat treatment facilities etc. and want to recoup some of their costs before incurring more. And the last thing they need is a disruptive technology which allows many smaller, cost competitive players to enter the market which they have so successfully steered towards their conventional process requirements. You would think, given this scenario, someone in the public sector might stump up the cash to break this deadlock - makes you think doesn't it?

This "what if" scenario has been brought to you by **tsc**, to help relieve us of the here and now, and promote thinking and innovation within the industry.

tsc assists clients to develop all aspects of their technology strategy, including:

Knowledge Management

Competitive Intelligence

Project Management

Technology Support in Materials Science and Surface Critical Products

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