

## TRAVEL LIGHT, SAVE AT THE PUMP: MAGNESIUM TAKES THE WEIGHT OFF CARS

As the price of petrol fluctuates dramatically and consumers become increasingly environmentally savvy, the automotive industry is searching for new ways to make cars lighter and more fuel-efficient.

Among those working to find a solution is Deakin University's light metals group, which has developed a new lightweight magnesium alloy it believes is ideally suited to replace aluminium parts.

Although magnesium is the lightest metal available for use in structural applications, with a density two-thirds that of aluminium, the latter is preferred by industry as it is easier to use in production.

In particular, for the process known as extrusion – when a large block of metal is squeezed through a hole to produce rods, tubes and other shapes – it works five times faster with aluminium than magnesium, making aluminium a cheaper option.

The challenge for researchers hoping to speed up extrusion times for magnesium is that doing so can affect its properties, such as strength and ductility (how much it can stretch).

But as part of a project funded by the CAST Cooperative Research Centre, Deakin researchers have developed a new magnesium alloy which performs better than its predecessors. Compared with the common magnesium alloy, the new alloy can extrude three times faster, and it has similar strength and double the ductility, which means it can be stretched twice as much before it breaks. The new alloy's extrusion time, strength and ductility were comparable to that of a common aluminium alloy.

Project leader Dr Aiden Beer says the results were achieved by reducing the alloy content to make the new alloy a 'lean' one. "If you take pure magnesium you can extrude it just as fast as pure aluminium," Aiden says.

"So we took everything out and worked out what could be added in very small amounts to make it stronger and more ductile."

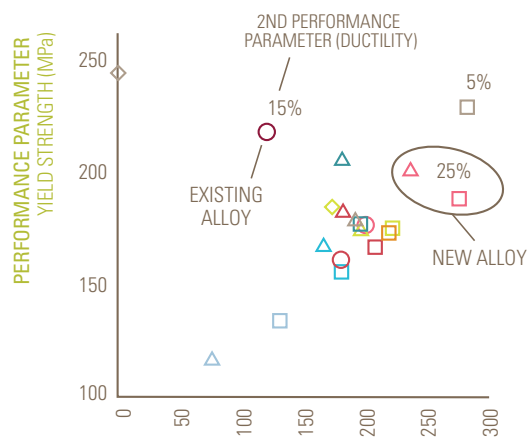
Besides the car industry, there is also strong interest from the electronics sector in materials that could lead to lighter products such as mobile phones, cameras and laptops.

A patent is pending on the new magnesium alloy, which has been licensed to Advanced Magnesium Technologies. Industrial-scale trials of the new alloy are scheduled to take place in countries including China, Japan and the US.

**'We worked out what could be added to magnesium in very small amounts to make it stronger and more ductile.'**



Dr Aiden Beer



**MANUFACTURABILITY PARAMETER**  
WIDTH OF EXTRUSION WINDOW (°C)

Properties of prototype magnesium alloys compared with the existing alloy AZ31 (red circle). The new alloy shows much higher manufacturability of 25 percent.

### REFERENCES:

*Microstructure evolution in hot worked and annealed magnesium alloy AZ31*. 2008. A G Beer, M R Barnett. *Materials Science and Engineering A* 485, 318–324

### FURTHER INFORMATION:

Dr Aiden Beer, Centre for Material and Fibre Innovation  
E: [aiden.beer@deakin.edu.au](mailto:aiden.beer@deakin.edu.au)  
[www.deakin.edu.au/itri/cmfi/staff/stafflistdetails.php?username=abeer](http://www.deakin.edu.au/itri/cmfi/staff/stafflistdetails.php?username=abeer)