

# Magnesium alloys go lightly on the road

An Australian-developed magnesium alloy is a strong competitor in the race to displace a major part of the aluminium diet in engine assembly lines.

Dr Colleen Bettles and colleagues at the Cooperative Research Centre for Cast Metals Manufacturing (CAST) – in partnership with the Australian Magnesium Corporation – have developed AMC-SC1, a magnesium alloy that they expect to be part of the next breakthrough for engine design and manufacturing.

Very light magnesium alloy engines are likely to be the ultimate materials

achievement in the long quest for lighter and lighter internal combustion engines. Magnesium alloy engine blocks will be featherweights compared with the cast iron that ruled for most of the 20th century and which is still used for the majority of internal combustion engines.

Although magnesium sits right beside aluminium in the periodic table of the elements, magnesium alloys are about 33% lighter than aluminium alloys. In their pure form, both are soft, relatively weak materials and they have similar, relatively low, melting points. But aluminium and

magnesium alloys containing small percentages of other elements can have vastly different properties from the pure materials.

Aluminium alloys that could cope with the high temperatures and high mechanical stress demands of internal combustion engines were developed half a century ago. For decades they have been slowly replacing cast iron, the traditional engine-building material from the time of Henry Ford. They have enabled the production of engine blocks that weigh about 66% less than their cast iron counterparts.

But while the aluminium alloys were a major breakthrough, magnesium is even better, weighing in at up to 75% lighter than cast iron. And as well as being lighter, magnesium alloys have other benefits such as high shock and dent resistance, and a greater ability than aluminium to dampen noise and vibration.

'Losing weight can help cars reduce both fuel consumption and greenhouse gas emissions,' CAST chief executive officer, Professor David St John says. 'The heaviest part of a car is its engine and the engine block makes up to 20–25% of the total engine weight.'

'Developing a magnesium alloy that can be used in the high temperature conditions found in modern car engines has been the goal of researchers for many years.'

'An engine using the new magnesium alloy would reduce carbon dioxide gas emissions by about 200 kilograms over the full life of the vehicle.'

The magnesium alloys have been developed over four years by CAST's alloy development research team, which was sourced from CSIRO, The University of Queensland and Monash University. Their commercial development is in the hands of Australian Magnesium Corporation.

Contact: Dr Colleen Bettles, (03) 9545 2863, [colleen.bettles@csiro.au](mailto:colleen.bettles@csiro.au). More articles on innovations in manufacturing technology can be found in Building Innovation, the online newsletter produced by CSIRO Manufacturing and Infrastructure Technology, at [www.cmit.csiro.au/innovation/2002-12/](http://www.cmit.csiro.au/innovation/2002-12/).



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