

At last, metal alloys that behave like plastics

Anne Eisenberg NEW YORK

It's hard to beat the versatility of plastic on a production line. Melt and inject it into moulds, let it cool and harden, and out comes an endless variety of parts at high rates of speed.

Metals can't always compete — except, perhaps, in the movie *Terminator 2*, where an evil android can promptly transform molten metal into whatever shape is needed to challenge Arnold Schwarzenegger.

But now, off screen in a laboratory at the California Institute of Technol-

ogy, researchers have found an ingenious way to coax metal alloys to solidify into a range of shapes as though they were plastics being moulded — and thus create stronger products.

And, as such, moulded metal might someday be useful as structural components or as casings to protect laptops or smartphones.

In the magazine *Science*, William Johnson, a professor of engineering and applied science at Caltech in Pasadena, along with colleagues, published a new, ultrafast method for heating and injecting a metallic alloy

into a mould to create shapes. "We use the method to create precision parts," he said. "The alloy can be squeezed into just about any shape you want, and it will be far stronger and stiffer than plastic."

Dr Johnson and a co-author, Marios Demetriou, a senior research fellow at Caltech, have formed a company, Glassmetal Technology, and are setting up an engineering and prototype centre in Pasadena to demonstrate the process.

The name "Glassmetal" refers to the alloys called metallic glasses or

glassy metals the company uses in its manufacturing process. These were invented at Caltech just over 50 years ago, said Lindsay Greer, a professor of materials science at Cambridge University in England.

"Metallic glasses are materials with striking properties," he said. "They are quite hard, but also rather formable like plastics — an attractive combination."

Dr Greer said the alloys had the disorderly atomic structure of glass, rather than the orderly one of conventional metals. This microstructure

means that the alloys can do what glass does — congeal into a solid without crystallising first, a property that gives both glass and these glassy alloys great inherent strength.

One company using glassy metals for its products is Metglas, a unit of Hitachi Metals America.

Metglas supplies ribbon made of metallic glass used inside distribution transformers for electrical utilities, and within anti-theft devices placed on goods to set off an alarm at store exits.

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