BREAK THROUGH

CUTTING EDGE RESEARCH FROM THE GEELONG REGION

New alloys designed fast

DEAKIN University research has resulted in a start-up company specialising in adaptive experimental design for use by industries such as aerospace, automotive and mining.

A multi-disciplinary team of Deakin researchers in metallurgy, materials and data analytics has created cutting-edge software that accelerates alloy design and optimises alloy processes.

Alloys are metals made by mixing more than one type of metal together and are used in engineering structures or components requiring light weight or corrosion resistance.

The potential of the software to accelerate the development and processing of new, purpose-specific alloys has been demonstrated over the past year, and a spin-off company, RAPID, has been established with seed funding from Deakin to commercialise the technology.

To be based at Deakin's Institute for Frontier Materials on the Waurn Ponds campus, RAPID has four staff with metallurgy, materials and computational analysis expertise and has the potential to recruit an additional 20 over the next two years.

A joint venture between Deakin and Michigan Tech University in the US, RAPID, or Rapid Alloy Process, Innovation and Design, has proven it can reduce production time and costs in alloy manufacturing, while improving properties such as light weight and strength.

"Traditional alloys are complex systems of up to 15 elements and the processing route can include up to 10 different thermo-mechanical stages," said Thomas Dorin, a metallurgist at IFM.

"This results in an extremely complex system and the best solution is unlikely to be found with traditional trial and error (iterative) methods.

"RAPID's software uses adaptive experimental design to efficiently navigate these complex systems and attain the best solution in a significantly shorter time."

The software, based on an algorithm developed by Deakin's Centre for Pattern Recognition and Data Analytics, allows for limitless parameters in the development process.

Dr Dorin said creating a nickel super alloy using traditional trial and error methods would take about 2½ years.

FAST WORK: Deakin metallurgists Dr Thomas Dorin (left) and PhD student Steven Babaniaris.

In contrast, by using the new software, an alloy was achieved with a 13 per cent improvement in properties within six weeks.

RAPID has worked with US firm Universal Alloy Corporation to improve heat treatment and optimise time in creating alloys. It is also working with West Australian company Callidus Group to develop a titanium alloy for use as agitator blades within nickel processing plants — a high temperature, abrasive environment.

Another project is developing the next generation of the 6XXX series automotive aluminium alloys, as a means of reducing the weight of vehicles and meeting emissions requirements.

"Lighter vehicles use less fuel, and for electric vehicles, lighter weight means going further without using as much battery power. For both, it means being able to carry heavier loads or more people,," Dr Dorin said.

For more information, contact Deakin's industry engagement and commercial manager, Andrew Rau: Andrew.rau@deakin.edu.au.