



## Award Success for Innoval Technology

**Congratulations to Douglas Boomer, Innoval Technology's joining expert, who has been presented with the Arch T. Colwell Merit Award by the Society of Automotive Engineers (SAE).**

The Arch T. Colwell Merit Award was established to recognise authors of outstanding papers presented at SAE meetings. Papers are judged for their value as contributions to existing knowledge of mobility engineering, and primarily with respect to their value as an original contribution to the subject matter.

Doug's paper 'A New Approach for Robust High-Productivity Resistance Spot Welding of Aluminium' was selected from 2,492 papers which were published for SAE conferences and meetings during 2003.

The winning paper was written in response to the reluctance of the automotive industry to embrace spot welding for high-volume production of aluminium vehicles. It addresses the concerns voiced by the industry and describes a low-cost joining method which offers increased electrode-life and

improved joint consistency, as well as significantly reduced weld failure rates (below 1%).

Doug and his Alcan co-authors received the award at the Honors Convocation during the SAE 2005 World Congress in Detroit in April.



Doug receives his award

If you would like more information about the joining technique described in the winning paper, please contact Doug Boomer on 01295 702804. A copy of the paper (2003-01-0575) can be obtained directly from SAE.

## ISO 17025 Achievement

In March Innoval Technology was awarded ISO 17025 certification. This standard applies to laboratories providing testing services, and addresses every aspect of laboratory management.

The achievement of ISO 17025 has been an important goal for Innoval, and we will now offer our comprehensive test portfolio to new automotive and aerospace customers.

"Achieving ISO 17025 demonstrates Innoval's commitment to the automotive and aerospace industries. Before we obtained ISO 17025, the analytical support we could offer to companies in these sectors was limited. We now hope to offer our materials characterisation and testing services, together with our knowledge of end user applications, to many new customers. The 17025 methodology is very similar to our existing operating practices, which has allowed us to easily adopt it as the quality system for our specialist testing portfolio."

Says Alan Gray, Technical Manager.

### Inside this issue...

New Rheo-die Casting Method	page 2	Low-Cost Line Trials	page 3
Exciting Development Opportunities	page 3	Textile Modelling, Stop Press! & Conference Papers	page 4



# New rheo-die casting method holds the key to low cost automotive components – Innoval to lead £2 million project

One of the barriers to the increased use of aluminium in automotive applications is its cost – aluminium automotive sheet is four to five times more expensive than its steel equivalent. However, as with automotive steel sheet, the route to lower cost aluminium sheet is by continuous casting.

Unfortunately, with continuous casting there can be problems with microstructural uniformity and surface quality. However, the BCAST (Brunel Centre for Advanced Solidification Technology) team led by Professor Zhongyun Fan at Brunel University has developed a novel approach to rheocasting, which produces cast alloys with exceptional mechanical properties and without segregation and porosity. They achieve this by conditioning the melt before casting using a high shear slurry maker. So far the conditioning method has been applied successfully to high-pressure die castings.



Rheo-die cast magnesium component

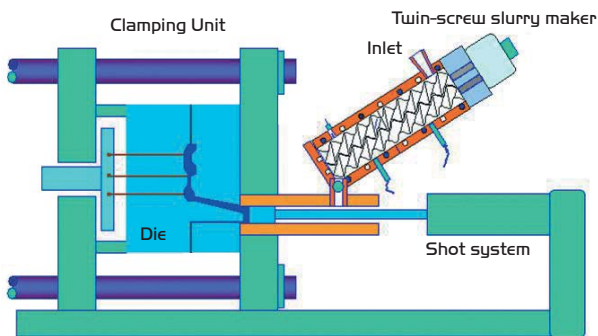
“This is precisely the breakthrough technology that Jaguar and Ford are looking for to make mass-producible aluminium structured vehicles to have a major impact on reduction of greenhouse gas emissions from transportation. Innoval is privileged to lead such an exciting project which has potential benefits for the OEMs, their suppliers and ultimately the environment.”

Says Dr Geoff Scamans, Rheocasting Project Manager, Innoval Technology

“BCAST selected Innoval to lead the development team based on their extensive experience of aluminium alloys in automotive applications and in-depth knowledge of continuous casting. Innoval’s role is vital to transfer this technology from its university base to commercial application.”

Says Professor Zhongyun Fan, Director, BCAST, Brunel University.

For more information about this project please contact Geoff Scamans on 01295 702826



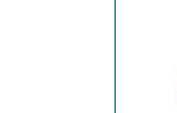
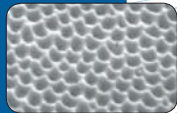
Schematic of the rheo-die casting process

advances based on the use of the slurry maker that have the potential to make a step change in both the cost and performance of light metals in transportation applications. The DTI, through its Technology Strategy Funding initiative, has allocated £2 million to industrialise the Brunel idea to produce high performance, lightweight magnesium and aluminium automotive castings. The project team represents the entire manufacturing supply chain, together with automotive end users, and includes Ford, Brunel University, Metal Castings Ltd, Meridian Technologies Inc, Magnesium Elektron Ltd and NAMTEC. Innoval Technology will manage the project and be the lead organisation.

The next phase of work will be to introduce a conditioned melt into a twin roll continuous caster using a new process called Twin Roll Rheocasting (TRRC). This should make it possible to successfully twin roll cast automotive alloys like AA5754, the current Jaguar XJ structural alloy, and AA6111 the present external panel alloy, without segregation or cracking issues. Innoval Technology is supporting this exciting project with alloy development and process modelling of slurry making and die-casting.



Jaguar XJ with Aluminium body and panels





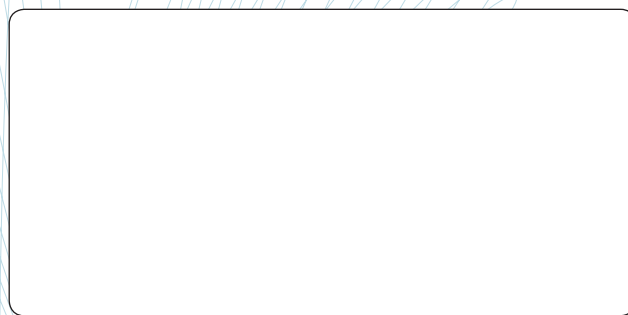
# Every Plant Manager's Dream - Low Cost Line Trials!



- Have you ever wondered how altering the speed of your line, or changing one of the raw materials could affect your process?
- Do you have ideas about improving the efficiency of your processes, but production pressures and process constraints prevent you from trying them out?
- Are you considering installing a new line, and do you want to know the likely operating costs, material and energy consumptions and effluent discharges?

ECCA, the European Coil Coating Association, recognised these situations within their membership and approached Innoval to design and build a computer model of a sheet metal coating line to provide answers to all these questions, and more besides.

The model, being developed by Innoval's Andy Darby, runs from 'uncoil' to 'recoil', and incorporates a total of 30 main and ancillary processes, including cleaning, pretreatment, laminating, curing and waste treatment. The processes to be included in the model are chosen from this list by the user, who also selects equipment options and inputs the operating conditions of the line. The model then calculates the usage and associated costs of all the materials, water, energy and effluent. The results can be viewed across the whole line, as well as for each individual stage, thereby revealing critical processes.

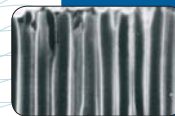


Andy has designed the software to be very simple to use. It uses the Microsoft Excel™ spreadsheet format - a widely available and familiar office tool. With this as the basis, it is easy (and inexpensive) to experiment with different parameters, sequences and materials to establish the optimum set-up of the process. Furthermore, Andy is able to generate similar models for any manufacturing process, not just coil coating.

"Innoval's model represents a significant technological advancement for the coil coating industry. ECCA is delighted to provide this tool to its members, which we hope will greatly reduce process improvement costs and ultimately lead to serious competitive advantage."

Says Peter Mitchell, Chairman, TC12, ECCA.

For more information about cost modelling please contact Andy Darby on 01295 702810



# Alumina Nanotemplates offer Exciting Development Opportunities

The material scientists at Innoval have taken existing filtration technology and developed it to produce a variety of new products.

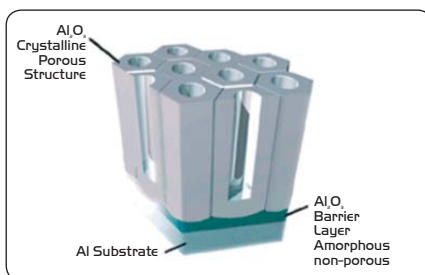


Fig. 1 Aluminium anodic film

When aluminium is electrochemically oxidised under certain conditions, the resulting anodic film contains regular, submicron, hexagonal prism-shaped pores which extend upwards from the aluminium surface forming a regular 3-D structure,

figure 1. By removing the anodic film from the aluminium substrate, you are left with a freestanding filtration device with precise pore size and distribution. However, this is not the only use for anodic films. They can be used as templates to produce nanotubes and nanowires, and also to manufacture biosensors, solar cells and catalysts, figure 2. Unfortunately, developments in these areas have been limited by the availability of the anodic film, which is only produced commercially as filtration membrane with a limited range of pore size, density and film thickness.

The Material Science team at Innoval Technology has overcome this problem by developing a process to tailor the anodic film to particular applications. A wide range of pore sizes, shapes and

geometries can be produced if the anodising conditions are precisely controlled. Furthermore, the team has identified how the film can be manufactured in large, commercial quantities using a continuous, high-speed process. They are now looking for industrial partners to develop their ideas further, and make the transition of this exciting technology from laboratory to industrial scale.

For further information and for a copy of the paper 'Anodic Alumina Templates for Nano-fabrication', please contact Colin Butler on 01295 702807

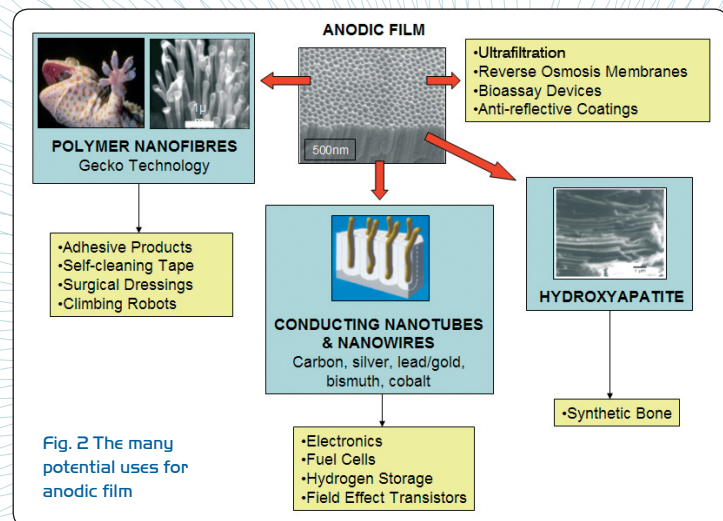


Fig. 2 The many potential uses for anodic film

# Not just aluminium.....



Due to the innovative thinking of one engineer, computer modelling at Innoval could soon move away from the rolling mill and into the textile mill.

One of the many services offered by Innoval is computer simulation and modelling. We have a team of specialists who constantly work on rolling-related problems such as sheet flatness and mill vibration.

Rade Ognjanovic, one of Innoval's process engineering team, had the idea of using finite element analysis (FEA) to simulate textiles. Rade's idea starts by modelling a single textile fibre, such as nylon, and then turning this into a bundle of fibres, or a yarn. Several yarns are then woven together virtually to form a fabric unit cell, which can then be multiplied to form a complete body of fabric. Rade, who has over ten year's experience working in the textile industry, expects the simulations to be very accurate and true-to-life because they start from an individual fibre.

The fabric simulations can be used to predict the mechanical properties of a fabric, such as tear strength, tensile strength,

air permeability and weight. They can also be used to investigate how changes to the fabric construction, such as by altering the weave pattern or constituent fibres, affect its properties. Consequently, this novel approach to fabric simulation could be used to dramatically reduce the development time and cost of a new fabric.

There are many applications for this type of technology where the mechanical properties of a fabric are important, such as automotive airbags, soft body armour and tensile structures. Innoval is now looking for industrial partners to test the simulations and develop their ideas further.

For more information, please contact Rade Ognjanovic on 01295 702822



## Innoval takes Knowledge Mapping to the Chemicals Industry

As part of an initiative to evaluate knowledge mapping outside of the metals sector, Innoval will be using K-Maps to capture the knowledge of several chemical companies in the UK. The aim of the project, which is running in association with PICME (Process Industry Centre for Manufacturing Excellence), NEPIC (North East Process Industry Cluster) and One North East, is to demonstrate that knowledge mapping can make a measurable contribution to improving business performance. The first company to benefit from K-Maps will be Oxford Chemicals Ltd, who manufacture high impact aroma chemicals used predominantly in the Flavour & Fragrance industries. For more information on knowledge mapping and this project contact Gary Mahon on 01295 702818

## Stop Press...Stop Press...

Innoval will be exhibiting at Vehicle Thermal Management Systems (VTMS7) in Toronto, Canada on 10th to 12th May 2005. Please come along and meet us - our stand number is 210. Find out more about VTMS7 at [www.sae.org/events/vtm/](http://www.sae.org/events/vtm/)



## Essen Debut for Innoval

Thank you to everyone who visited the Innoval exhibition stand at Aluminium 2004 in Essen last September. We were delighted to meet so many potential new customers, as well as old friends and colleagues, at this important industry event. We have already secured our stand for Aluminium 2006. See you there!

## MSc Success

Congratulations to Paul Martin, Nick Martin's son, who has been awarded a distinction for his MSc in Software Engineering by Bristol University. Paul spent last summer working with the process engineering team at Innoval writing part of a spray modelling program for his MSc project. Paul's work won him the University Software Engineering prize sponsored by Trayport Ltd. Well done!

## Forthcoming Publications & Events

Title	Author/presenter	Publication/Event	Location	Date
The influence of silicon particle morphology on the melting mechanism of aluminium brazing sheet	Doug Hawksworth (Dana Corporation, Long Manufacturing) Alan Gray (Innoval)	Vehicle Thermal Management Systems (VTMS7)	Toronto, Canada	10-12 May 2005
Myths, Legends and Economics of Aluminium Intensive Vehicle Structures	G Scamans	AUTOMAN Europe	Leipzig, Germany	7-9 June 2005
Various Technical and Business Presentations	C Davenport, G Mahon	The Science and Technology of Flat Rolling	University of Sheffield	5-16 September 2005
Evolution of Matt Surface Topography in Aluminium Pack Rolling	Dan Miller	World Tribology Congress III	Washington DC	12-16 September 2005
Low temperature brazing - fact or fiction?	A Gray	10th AFC Holcroft Brazing Seminar	Dearborn, Michigan, USA	25-27 Oct 2005
TBC	Nigel Davies, Andy Darby	ECCA Annual Congress	Brussels, Belgium	27-29 Nov 2005

For more information on all our past and forthcoming conferences and papers, please visit our website at [www.innovaltec.com](http://www.innovaltec.com)