

Collaboration is Key

One of the most important aspects of our business is the relationship we have with our clients. This is most productive when we operate as a genuine partnership alongside our clients to help them achieve their strategic technical objectives.

We're often called upon to help shorten a client's product development time and increase their speed to market. As part of commissioning support on Danieli equipment, our Process Group assists in getting new equipment up and running to world-class standards in as short a time as possible. We add our industry knowledge to investment projects to make sure our clients make the right decisions. We often immerse ourselves in our client's operations for weeks on end and, sometimes, the product development projects we're involved with can take several years to reach fruition. These are typical projects that benefit from genuine partnerships.

In this issue of our newsletter, we highlight several examples of recent collaborations. There's a new product development project with Constellium for which we received an award, an on-going

training programme with Aleris and a joint research paper with AMAG.

Collaboration has never been more key than with the research projects we've participated in through the Innovate UK framework. The consortia involved in these often ground-breaking projects comprise a mixture of groups from industry and academia. A recent project, CAAHS (Carbon Aluminium Automotive Hybrid Structures), was shortlisted for an award which you can read about on page 2.

The last year has seen some very positive changes at Innoval. We've welcomed three new people to our team; Michael Kenyon joins our Materials Development Group, Rachel Wiffen joins our Process Group and Steve Montisci takes up the new role of Business Development Manager. You can read more about them on the back page. These new recruits mark a milestone in the life of Innoval where we now have more 'new' people in the company than those of us who were here when Innoval was formed in 2003.

As we look forward, one of the most significant highlights over the last year has been the development of Innoval's 5-Year Strategic

Plan which will be a key part of our continuing success story. Everyone at Innoval contributed to this process and you can see the high-level output here. We are excited about the many opportunities we are now working on in our three strategic themes; 'Aluminium Automotive Solutions', 'Future Manufacturing & Digitalisation' and 'Industry Growth & Sustainability'. I'm sure we will be telling you more about the specifics in the coming years.

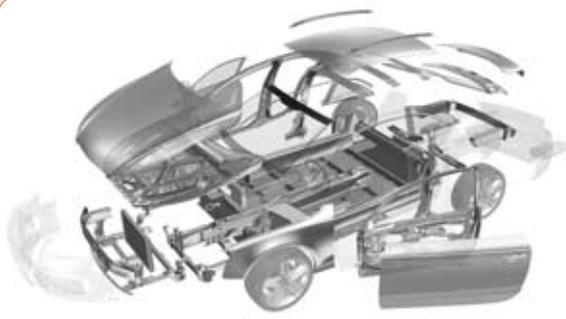
Dr Gary Mahon
Managing Director
Innoval Technology Ltd



Gold THANK YOU AWARD for Alloy Development



Constellium



HSA6™ is in production on automotive programs throughout Constellium

AA6xxx alloy on the market for lightweight automotive structures. HSA6 is already in production on automotive programs in both Europe and North America.

The success of the HSA6 alloy development project comes from the strong partnership we've forged over the years with Constellium and BCAST. It's proof that partnerships such as this can deliver game-changing commercial results.

"Innoval has been a key member of the team for the Constellium HSA6™ alloy development project from its inception and proof of concept phase, through all the technology and manufacturing readiness levels, to commercialisation."

Paul Warton, Managing Director, Automotive Structures and Industry, Constellium



Our THANK YOU AWARD

Lightweighting Project Shortlisted for a Collaboration Award

the ENGINEER
collaborate to innovate

Collaborative research projects, funded by the UK Government's Innovate UK framework, make up a significant part of Innoval's R&D portfolio. They're an important part of our business as they strengthen our interactions with the UK Science base and OEMs.

One of these projects, CAAHS (Carbon Aluminium Automotive Hybrid Structures) was shortlisted for an award within the Manufacturing Technology category of The Engineer's Collaborate to Innovate Awards. The CAAHS project, which finished in November 2018, was a research based collaboration between 5 partners; Gordon Murray Design, Constellium, Brunel University London, Bentley Motors and Innoval Technology.

The project centred around Gordon Murray Design's innovative and ground breaking iStream® automotive manufacturing technology. CAAHS aimed to develop an iStream monocoque that was lighter than the incumbent steel/glass fibre composite structure. As consortium members, the Innoval team was involved in the replacement of the steel tubing with tubing made from a novel high strength extrusion alloy. We contributed, amongst other things, welding expertise, metallurgical analysis and cost modelling to the project.

In the end, CAAHS delivered a weight saving of 35% compared to the current iStream technology. iStream Superlight®, as the technology is referred to, represents a major step towards a new generation of lightweight vehicles for the UK market that can have a major impact on the UK government's carbon reduction targets.

"I found the level of collaboration quite astonishing – the other thing that comes out is the cross-fertilisation of techniques and technologies from one sector to another."

*John Halton,
Director Business & Industry, Engineering UK*



iStream Superlight® monocoque showing the extruded aluminium tubing

Operator Workshops Deliver Measurable Benefits



The 2018 edition of 'inform' featured our two-day Executive Rolling Course which we developed for the Senior Management Team at Aleris Rolled Products North America. In this edition, we're focusing on another iteration of our well-known Aluminium Rolling Technology Course; the four-day Operator Workshop.

Developed specifically for Aleris Rolled Products North America to train their shop floor operators, the course takes theoretical concepts and then applies them in a workshop environment to solve a current production issue. To date, we've run this course at several Aleris sites including The Clayton Rolling Mill.

Our Operator Workshops always start with an objective, and at Aleris Clayton this was to increase the speed and productivity of their cold mill and foil mill. Dan Miller and Vicente Martin taught a group of around 15 mill operators, supervisors and engineers the fundamentals of rolling, including which parameters are critical to monitor and control. The aim was to provide the team with the explanations behind their standard operating practices, so they fully understand why tasks must be done in a certain way. This also gives the operators the understanding and confidence to deal with any non-standard situations. Following the classroom sessions, Vicente and Dan demonstrated techniques, including the thermal management of rolls and the optimisation of rolling loads, on the mills.

The feedback from the course, from both operators and management alike, was very positive. In fact, the mills recorded their most productive month ever immediately after the course.



Process improvement workshops have brought measurable results at Aleris Clayton

"We have experienced a significant increase in sustained productivity performance on both mills. For the month of October both mills exceeded their shift average finish pounds performance goals. The workshop also increased the knowledge and experiences of my current rolling mill teams. Your assistance in our collective efforts is greatly appreciated and cannot be overstated. Thank you."

*Member of the Senior Management Team,
Aleris Clayton*

"I was impressed how engaged my team was during the training session considering they do not spend a lot of time in a classroom. I don't think this would have been the case if the presentation and training material was not relevant to what they experience on a day to day basis."

Directly after the training session, a fairly new operator utilized what he had learned in the class to improve his ability to start up on a cold set up. He was amazed at the outcome and I am sure he will be sharing his experience with fellow co-workers!"

*Kris Baum, Operations Manager,
Aleris Richmond*

Our next public Aluminium Rolling Technology Course will take place in Banbury, UK, on 18th-22nd November 2019. Please contact us for a registration form.

Strategic Partnerships with UK Universities

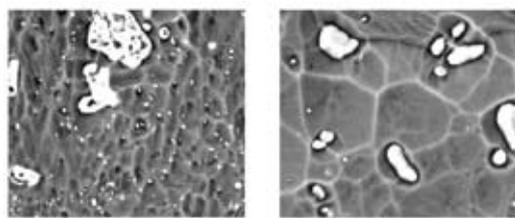
Carrying on our theme of collaboration, we're pleased to announce that we've recently signed MoU's with several UK universities to embark on strategic partnerships. Those universities are Brunel University London, The University of Manchester and Loughborough University. All three universities have world class facilities and expertise that are very relevant to our strategic themes. We're very much looking forward to working more closely with them going forward.



Collaborative research for Improved Heat Exchanger Alloys



A large part of our work is helping our clients to develop new products. Whilst this is always carried out under a Non-Disclosure Agreement, sometimes we're able to report our findings at industry events. In June 2018 we presented a joint paper with AMAG rolling GmbH (AMAG) at the 10th Aluminium Brazing Congress in Düsseldorf. This paper summarised research into the creation of a higher strength vacuum brazed AA3xxx series alloy with a sacrificial 'brown band'.



'brown band' region

core alloy

'Brown Band' Microstructure (CAB)

Historically, the aerospace industry uses the vacuum brazing (VB) process and clad AA6xxx series alloys for their aluminium heat exchangers. This gives a high strength T6 product, but requires additional surface protection to achieve the required level of corrosion protection. AA3xxx alloys are usually processed using controlled atmosphere brazing (CAB). A high strength VB AA3xxx series alloy with good corrosion resistance could lead to new opportunities in aerospace applications.

The research centred around increasing strength with a two-stage homogenisation while retaining the sacrificial 'brown band' region which is a feature of many controlled atmosphere brazing (CAB) alloys. The brown band forms during brazing and consists of densely precipitated particles containing aluminium, manganese and silicon (AlMnSi). This band is typically a few tens of microns thick at the surface of the core, adjacent to the cladding layer. It impedes corrosion by containing it within the brown band region, rather than allowing it to penetrate the bulk structure along the grain boundaries.

For this project, AMAG modified the composition of an AA3xxx alloy to increase the strength and supplied us with rolled material. Using our lab-based aluminium brazing furnace to produce both VB and CAB samples, we analysed the diffusion profiles for silicon, manganese and magnesium. We also characterised the microstructure of the brown band in both sets of samples by scanning electron microscopy.

Amongst other things, the trials showed that the VB AA3xxx material was stronger than CAB material. Furthermore, the brown band in the VB material was consistent with that found in the CAB material in terms of thickness and microstructure, though homogenisation decreased the effectiveness of the brown band.

Following these positive results, future work could determine the effect on strength and corrosion resistance of adjusting the copper levels in the core alloy.

"In Innoval we found a valuable sparring partner in addition to AMAG's R&D team. The longtime expertise of Innoval is beneficial for our strategic projects."

Gerhard Hanko, Head of Technology Heat Exchanger Materials, AMAG rolling GmbH

MORE NEWS... MORE NEWS... MORE NEWS...

Autosheet training in the US



Innoval's training courses are still proving popular.

However, recognising that it may be difficult for clients in the US to travel to the UK for a short course, we're planning to partner with SECAT in the US to hold our Aluminium Automotive Sheet Training Course as a public event over there. Please keep an eye on our web site and social media feeds for the dates.

New Recruits

Rachel Wiffen, a Mechanical Engineer, is the latest addition to our Process Improvement team. She joins us from Bridgnorth Aluminium where she worked as a Process Engineer in the Finishing area.

Michael Kenyon joined us immediately after completing his PhD from the Advanced Metallic Systems Centre for Doctoral Training at the University of Manchester. As a member of our Materials Development group, Michael is heavily involved in our Innovate UK-funded collaborative R&D projects.

Steve Montisci is our Business Development Manager, which is a new role for Innoval. Steve started his working life as an R&D metallurgist before moving into technical sales some 30 years ago. Since then he has worked in a technical sales/business development environment in a diverse range of market sectors.



Rachel Wiffen



Michael Kenyon



Steve Montisci

