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The Newsletter of Innoval Technology Ltd

CONSULTANCY AND TECHNICAL SUPPORT TO THE ALUMINIUM INDUSTRY ISSUE 16 2020

Adapting to challenging times

Photo credit: Impol

2020 has been a year like no other as we've all had to respond to the challenges posed by the global pandemic. As it draws to a close, I'd like to focus on the positives and tell you about some of the good things that have happened in 2020.

Like everyone, we've had to change how we work. Our experimental teams have continued in our laboratories, but with COVID-safe working practices implemented. For our consultancy business, not being able to visit our clients could have spelt disaster but, thanks to the creativity and flexibility of both the Innoval team and our clients, we've managed to continue with most of our projects and moved our training courses online.

We've also become aware of, and adapted to, a change in the markets that our clients serve. 2020 has seen a reduction in support to our automotive and aerospace clients, which we hope is temporary. On the other hand, our packaging clients have kept us extremely busy! This shows the benefit of having a large breadth of expertise within Innoval and an adaptable workforce.

2020 has been an busy year for our InnovateUK collaborative research projects which focus on future technology development. We saw two projects, REALITY and RACEForm, come to an end. However, two exciting new projects started in the second half of 2020, and we have another proposal in the pipeline.

The REALITY (Recycled Aluminium through Innovative Technology) project examined advanced scrap sorting technologies and evaluated next generation automotive aluminium alloys for greater recyclability. 'Closed-loop' automotive recycling systems are helping to develop the circular economy to deliver both financial and environmental benefits.

The RACEForm (Rapid Aluminium Cost Effective Forming) project focused on validating HFQ® (Hot Form Quench) Technology for the mass production of complex, deep drawn, high strength aluminium structures for body in white and chassis applications. The HFQ® Technology offers OEMs significant savings in weight, cost and system complexity.

One of the new projects, Torch2, is in the packaging sector and it aims to bring about significant efficiency improvements in beverage can manufacture. With high-speed canning lines producing up to 2,400 cans/minute, 24/7, even small improvements in efficiencies and material usage can generate significant savings. This project will see us working with Unimaq to develop a novel manufacturing process.

To end on another positive note, we recently sent out a Client Survey. This went to everyone who has received an invoice or a report from us over the last two years. The survey has just closed, and I am very happy to report that the results are excellent. Thank you to everyone who took part – we really value your feedback.

Finally, I would like to wish you and your families a happy and healthy 2021.

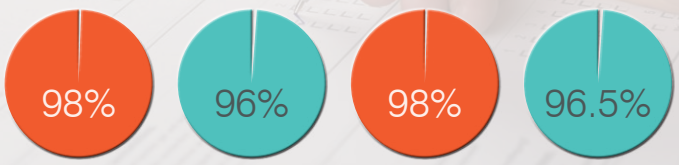
Dr Gary Mahon
Managing Director
Innoval Technology Ltd

98% said they were satisfied with the work carried out by Innoval

96% said that working with Innoval adds value to their business

98% said that they would definitely use Innoval again

96.5% would be happy to recommend Innoval to others.



A snapshot of some of the results from our 2020 Client Survey

A step change in quality

The Impol Group produces semi-finished rolled products at three sites in Slovenia, Croatia and Serbia. The company is Slovenia's biggest producer of flat rolled products and it serves markets as diverse as automotive, pharmacy, food and beverage, construction and renewable energy. At Impol's plant in Slovenska Bistrica, thin and thick foil is one of the most important products.

Innoval has been working with Impol for over ten years, and we're proud to have them as a long-term client. Recently the technical team at Impol contacted us to help them improve the quality of their feedstock to further increase the world-class quality of their foil products. Consequently, two of our light-gauge product experts, Vicente Martin and Dan Miller, visited the site in Slovenia for three days.

Impol's technical team with Innoval's consultants

Prior to their visit, and in common with many of our improvement projects, Vicente and Dan requested some process data to provide background information, and to help them understand what had already been explored by Impol's staff. This ensured Vicente and Dan were well prepared to focus on the key issues during their time on site.

At the plant Vicente and Dan assessed the quality of the incoming coils, including their packaging. They then conducted a thorough process audit by following the material flow through the plant, concentrating on key areas where defects might originate. In addition to this, they reviewed the automation of the cold mills.

Following the implementation of Vicente and Dan's recommendations, which resulted in changes to the software of the control system amongst other things, the team at Impol observed a step change in the quality of their foil products.

We are continuing to support Impol in their strategic developments and look forward to working together on future projects.

"Dan and Vicente create an interdisciplinary team that allows us to make step changes in quality. It is not possible to get the same value from a single person so Innoval always brings different skills together. It is an outstanding capability that we can't find anywhere else."

Dr. Darja Volšak,
Technology and Development Director, Rolled Products & Foils, Impol

One of our training sessions at Impol

Impol's aluminium rolling plant in Slovenska Bistrica, Slovenia

Aluminium coils awaiting shipment

Adapting to the 'New Normal'

With COVID travel restrictions in place throughout 2020, we've all had to adapt to new ways of working, and Innoval is no exception. We're a consultancy business so, for many of us, our time is usually spent on-site with our clients helping to improve their products and processes. As you can imagine, in 2020 this has been almost impossible. However, we've risen to the challenge and devised new ways of supporting our clients.

Our experimental team have been the heroes of the day by continuing to work throughout the pandemic, but under strict COVID distancing and hygiene rules. This has meant we've been able to serve the materials characterisation and testing needs of our clients without interruption.

Kyle Smith takes part in a live rolling mill trial from home.

For our Process Team, as with most businesses, technology has come to our rescue. Through innovative use of video cameras and regular conference calls, our Process Engineers have managed to successfully take part in plant trials on the other side of the world.

"Despite not being present in person, the team at Innoval has provided excellent support to us on a recent project. Through video calls in the plant, where the Innoval engineers could clearly observe the equipment, and regular online meetings, we've managed to significantly enhance our understanding of the process and prioritize needed improvements."

Paul Platek, Director, Technology, Novelis Inc.

After our summer of twice-weekly webinars (which attracted 1500 registrations from 234 companies across 50 countries), we felt ready to launch our training courses online. Online training offers many advantages to our clients, so it was something we were considering even before the pandemic hit. Since September we've held several private training courses, including one on **Foil Rolling & Separating**. This was held in association with our friends at Secat in the USA, with whom we're working to develop a full programme of training for 2021.

"We were very happy with the quality of the training program from Innoval. Having the course online was seamless and extremely convenient for our team. I appreciate working with everyone at Innoval and look forward to more opportunities for collaboration in the future!"

Todd Boggess, President, Secat Inc.

"Thanks for having it remotely. I think it worked really well! We were able to coordinate with production schedules to allow lots of participation."

Foil Rolling & Separating Course delegate

Vicente Martin presents to a group of delegates during a live online training course.

In November we delivered the first online **Aluminium Rolling Technology Course**. We've been holding this course successfully in Banbury for over 15 years, so we were a little nervous about transferring it online. However, we needn't have worried, as the course quickly sold out and our delegates rated it 4.7/5!

We plan to run the next one online from **15-26th February 2021**. You can download a registration form from our website now.

Finally, we wrote a brand-new online training course; **'Introduction to Aluminium Metallurgy'** which we delivered in November. This course covers aluminium microstructure, deformation and annealing mechanisms and thermal treatment. As well as metallurgy, it includes surface control and experimental techniques for problem solving.

Next course dates: **13-15 April 21** and **22-24 June 21**.

If you'd like to explore training opportunities with us, please contact us at enquiries@innovaltec.com

"It has really helped me to get a full understanding of the rolling process and I am convinced I will make some improvements in our mills thanks to this course."

Mr Ali Alyas, Process Development Engineer, GARMCO

"The experience and knowledge you shared with us is invaluable."

Stefania Koursari, Metallurgical Engineer, ElvalHalcor - aluminium rolling division

Advantages of online training:

- Safe, within COVID restrictions.
- No travel expenses for delegates.
- No jet lag to hinder learning.
- Cheaper than on-site versions as no consultant travel.
- Delegate is available in the plant for half of each day.
- Delegate can put into practice the previous day's learning, and then return to the course with questions.
- Investment in employees during uncertain times improves morale.

A simple and inexpensive way to measure the surface cleanliness of sheet

Surface cleanliness is critical to the performance of many aluminium products. This is especially true for automotive sheet where surface cleanliness influences the effectiveness of the pretreatment and ultimately the adhesion of the final coating. Therefore, it's vitally important for a sheet supplier to be able to measure how clean their sheet surface is after it leaves the continuous cleaning and pretreatment line.

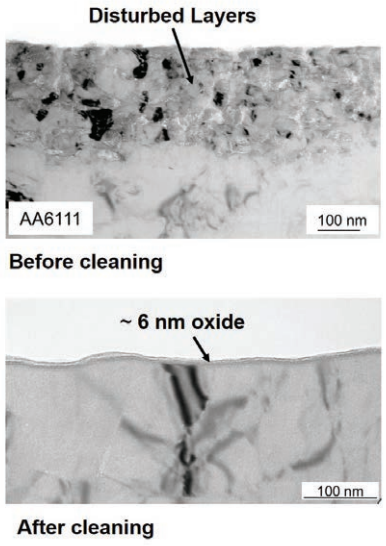
Dr Junjie Wang, one of Innoval's Materials Consultants, works with many automotive sheet suppliers. Some of his work involves evaluating the effectiveness of cleaning and pretreatment systems, and recommending changes to processing parameters to produce the best surface at the fastest line speed.

As part of his work, Junjie has developed a new way to measure the surface cleanliness of aluminium sheet in a production environment. His method is relatively cheap to set-up, requires little training and produces readings in a matter of seconds.

The key purpose of cleaning is to remove an active disturbed layer from the aluminium sheet surface, as shown in the picture to the right. The disturbed layer is present in all rolled aluminium sheet. The technique Junjie uses exploits the optical characteristics of this layer.

The disturbed layer reduces the reflectivity of the sheet surface to visible light, particularly in the short wavelength range. As the surface is cleaned and the disturbed layer removed, the reflectivity (measured as total reflectance, TR) increases.

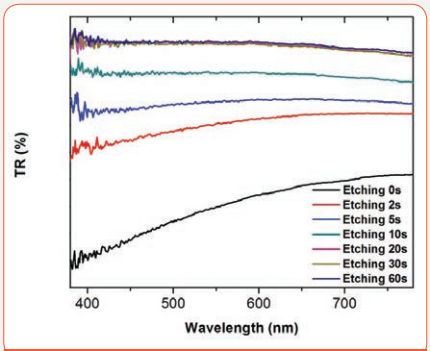
The graph below shows the TR measurements vs the incident visible light wavelength for different cleaning times on AA5XXX sheet. We can see that, in this case, 20 seconds of cleaning is enough to remove all disturbed layers from the sheet sample. This is because further cleaning does not change the TR value.



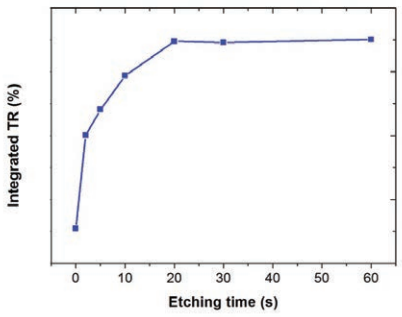
Aluminium sheet surface before & after cleaning

The chart (far right) illustrates the increase in integrated TR value with progressive cleaning. Consequently, it's possible to set a target value (70 % TR against Spectralon diffuse white 99% reflectance standard in this case) to ensure good surface cleaning in production. Minimum, maximum, and average reflectance can be go/no-go tested over any number of user defined total reflectance ranges.

The equipment used to take TR measurements is simply a reflectometer with an integrating sphere. However, it contains several proprietary advances that allow line operators to make conclusive readings in seconds.



TR measurements vs the incident visible light wavelength for different cleaning times on AA5XXX sheet



The increase in integrated TR value with progressive cleaning.

If you'd like more information about Junjie's Total Reflectance surface cleanliness measurement technique, please contact him at junjie.wang@innovaltec.com

More News... More News... More News...

New Recruits

Harry Campbell-Prior joins our Materials Development Group where he works in materials characterisation and analysis, his specialism being in DSC, surface and interface analysis. Harry holds an MEng in Materials Science and Engineering.

Harry Campbell-Prior

Sunil Khosla joins us as a Senior Consultant bringing a wealth of experience in alloy development, product qualification with aerospace OEM's, technology transfer and training. Sunil has 25 years of experience within the aluminium industry working in both production and R&D positions.

Sunil Khosla