International Syalons: CALSITHERM Invests in British Advanced Ceramics Manufacturer

2018 was an exciting year at International Syalons (Newcastle) Ltd./GB following the acquisition of the business by the CALSITHERM-Group/DE.

International Syalons is renowned for having produced and developed high-quality advanced silicon nitride-based technical ceramics on the same site in Newcastle upon Tyne/GB for over 35 years.

SiAlON (Si–Al–O–N) ceramics were discovered independently by academics in Japan and at the University of Newcastle/GB in the 1970s and are high-performance advanced ceramics which share the same crystallographic structure and hence many of the same thermomechanical properties of silicon nitride (Si_3N_4). Over many years, Syalons has quietly become expert in advanced ceramics and perfected a range of SiAlON grades whose high temperature stability, strength, toughness, as well as wear and corrosion resistance have been utilised across many industries to allow its customers to continually improve their own applications.

CALSITHERM is best known for its 40 years of production of outstanding high- and low-density calcium silicate products, for a range of applications including; internal insulation, thermal insulation, non-ferrous metal casting, fire protection, domestic fireplaces, and plant construction.

Having been a family run business since 1977, CALSITHERM is the only German producer of calcium silicate thermal insulation products. With its headquarters located in Paderborn, the Group also has production and sales companies under the SILCA brand name in Mettmann/DE, Amsterdam/NL, Scorze/IT, Dowerglen/ZA, Querétaro/MX, and Kuala Lumpur/MY, as well as strategic partners in Brazil, Denmark and USA.

Keywords
SiAlONs, silicon nitride, composites

Upon receiving news of the successful acquisition of Syalons, CALSITHERM Group Managing Director, Dr Tobias Hölscher (Fig. 1) said: "we are extremely excited to welcome International Syalons into the CALSITHERM Group. We have long felt that it would be very positive to have a presence in Great Britain, which has a rich history of ceramic manufacturing and a reputation for high quality products. This acquisition enables us to secure our supply chain of silicon nitride products to customers in the aluminium industry, and to now offer advanced ceramics to new applications for the Group. We have already identified areas where we wish to invest in Syalons in order to continue the company's growth, which is already in a very good position thanks to strong foundations built over many years by the previous management."

Group thinking

At first sight, calcium silicate and silicon nitride share very few of the same fundamental properties, however there is a strong synergy between many of the material's industrial customers. One industry where both materials are commonly found to excel is in the processing and handling of molten non-ferrous metals. High-density calcium silicate and SiAlON both offer superior thermal shock, wear, and corrosion resistance, as well as exceptional, thermal stability, and non-wetting properties over conventional low-cost materials.

While the mechanical properties of the two materials differ greatly, both are regularly used during the molten aluminium casting process; for example, Syalons 101 silicon nitride-based thermocouple protection sheaths and heater tubes allow accurate and efficient furnace temperature control

Fig. 1
Dr-Ing. Tobias Hölscher, MBA

during the melting and holding of molten aluminium, while the newly developed calcium silicate/carbon fibre composite material CALCAST CC60 is used for transition plates and feeder boxes to allow foundries

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Fig. 2
Syalons 101 thermocouple protection sheath used in aluminium casting

Fig. 3
Syalons products

to continuously cast high-quality billets and intricate castings. When used correctly, these two materials alone can dramatically increase production efficiency by reducing system down-time caused by having to replace failed or worn consumable parts, and increase overall productivity by reducing set-up time, allowing foundry owners to confidently reduce production costs.

Alain Ennen, CALSITHERM Group Operations Manager and Syalons newly appointed General Manager, is responsible for overseeing the successful integration of Syalons into the Group has found that "we are already seeing new opportunities for SILCA's experienced sales engineers to now offer SiAlON materials to our customers who require material solutions for demanding high-temperature, corrosive, and abrasive applications such as; for tubes used in chemical processing, and nozzles for shot-blasting in metal surface finishing, or location pins for robotic welding on automotive production lines, and dies for the extrusion of copper and other non-ferrous metals".

Future capabilities

It is somewhat difficult to discuss the future of Syalons without first a brief mention of GB's decision to leave the European Union. While Syalons shares the general view of most British manufacturers, that leaving the European Union would be unlikely to bring about the benefits which were assured by pro-Brexit campaigners, the company will simply overcome the inevitable administrative and logistical disruption and continue to supply high quality products globally.

On the topic of Brexit, Mick Bell, Syalons Operations Director, is confident: "we have implemented every possible measure to cope with a "hard-Brexit", despite little or no guidance from GB government who have been unable to offer a structured plan for leaving the EU. We have ensured adequate raw material, equipment and energy supplies, and have been planning accordingly with our courier and logistics providers, as well as doing our best to remain well-informed of import and export policy changes. We are anticipating some minor disruption and have advised our customers accordingly; however, we will endeavour to maintain the status-quo."

Looking beyond the turmoil of GB and EU politics, Syalons with the backing of the CALSITHERM Group is investing significantly in order increase both production capacity and capabilities. With proposals in place to expand the current manufacturing facility, the company also plans to install additional state-of-the-art equipment to enable it to meet the ever-increasing demands that advanced ceramics face in new high-tech applications for use in industries such as aerospace, defence, power-generation, and robotics. Such demands are driven by requirements for ceramics with improved properties to enable higher operational temperatures, speeds or efficiencies, as well as extremely complex shaped components which are now possible thanks to novel manufacturing routes such as Additive Manufacturing.

Focussed on development

Despite its modest size, Syalons has always remained extremely R&D driven; regularly contributing ceramics expertise and materials knowledge on privately and publicly funded research projects for innovative applications. Motivated by industry demand, the company continues to invest and grow its research and development capabilities as it looks to develop new advanced

ceramic materials and manufacturing routes.

As a result of the recent EU (Horizon 2020) funded TOMAX Project, and thanks to well established industrial partnerships, Syalons is now able to offer extremely complex 3D-printed SiAlON ceramic components with the same surface finish, dimensional tolerances, and thermomechanical properties of conventionally machined parts. Such complex components allow the properties of advanced ceramics to be maximised in areas such as higher temperature turbines, high strength substrates for chemical reactions, or intricate nozzles for better flow control.

Syalons has also recently released Zircalon 30, a newly available composite ceramic material with a co-stabilised zirconium oxide (ZrO_2) and alumina (Al_2O_3) matrix reinforced with alumina-based platelets. Zircalon 30 offers improved mechanical properties over a typical Yttria Stabilised Zirconia (YSZ), with outstanding fracture toughness of 14–15 MPam^{½}. These improved properties give the material a significant advantage in applications such as for location pins used in the welding where high strength, wear resistance, and fracture toughness are essential for maintaining production efficiency.

One of the greatest challenges which has always faced the advanced ceramics industry is teaching engineers and inventors how to design with ceramics to get the best out of the material and pass on cost savings wherever possible by removing undesirable or unnecessary features and material. Syalons is proudly committed to working with customers by offering advice on how advanced ceramics can be used to provide engineering solutions.

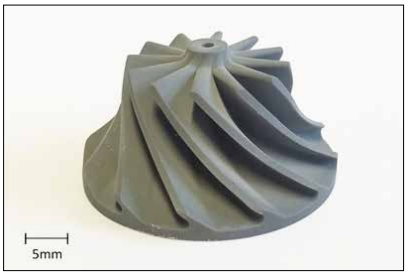

Fig. 4
3D-printed Syalons 050 impeller