Developing innovative casthouse solutions

MQP was formed in the year 2000, and in shaping the new company I set out to take advantage of the experience gained from working for 32 years with Foseco in a remarkably successful innovative worldwide cultural environment.

An opportunity to contribute to First Words and follow in the footsteps of a number of interesting and knowledgeable individuals from major aluminium producers and suppliers was too good to miss for me and my company.

The guiding philosophy of MQP at its formation on the millennium would be to focus on innovation and development and introduce innovative technology for casthouses worldwide, with the overall aim of improving quality and reducing operating costs. The MQP company mission statement endorses this firm commitment to innovation and emphasises the need to develop close partnerships with key customers and academic institutions to progress the technical programmes involved.

Which brings me to what is innovation? How could it be achieved in a new, small, and close knit company such as MQP? Our answer, to paraphrase Shakespeare’s character Malvolio in Twelfth Night, was “Be not afraid of innovation. Some are born to innovate, some achieve innovation and some have innovation thrust upon them”. MQP was born to innovate: It’s in our genes.

Firstly however, as Jack Clark, Senior Vice President and I’ll mention two examples of how we identified needs and the steps we took to pursue programmes which led to innovative solutions.

Birth of Batchpilot

The first example is Batchpilot, an innovative system for accurate electronic measurement of furnace heel weights and transfer weights. The system is based on the principle of measuring changes in the furnace hydraulic cylinder pressure with furnace tilt angle.

The starting point for the development of Batchpilot was the identification by MQP of a genuine problem in casthouses with knowing accurately the weights of liquid aluminium in a furnace. Existing measurement systems, based on lasers and radar beams or load cells, could be inaccurate and did not solve the problem. They could measure either the furnace metal level, in the case of beam technologies, or the total furnace weight in the case of load cells, but neither of these methods could accurately determine the amount of build-up on the hearth below the metal level, making any accurate measurement of furnace heel weight impossible.

Having identified this need we sought expert help and engaged Daniel Audet, Professor of Engineering at UQAC, Quebec, and a specialist in industrial instrumentation. The outcome was a detailed 2004 TMS paper (2) describing a novel weighing system which elegantly solved the problem by the creation of a unique algorithm and met the identified need. Today Batchpilot is established as a reliable means of accurately measuring liquid metal heel and full furnace weight in tilting furnaces with an accuracy of...
+- 250 kg, and fifty-five systems are currently in operation worldwide.

**Origins of Optifilter**

The second example is Optifilter. We recognised that within the aluminium casthouse industry there was a need for an efficient, low hold up volume, small footprint filtration process capable of treating high flow metal rates. Our development programme resulted in Optifilter, a three chamber system with a ceramic foam filter as the first stage, TiBAl grain refiner added in the second stage, and filtration completed in the third stage by using an efficient cyclone.

The process to our development of Optifilter followed a similar path to that for BatchPilot. We had been interested in finding a solution to the industry need for enhanced filtration but at an affordable cost, which meant in particular low hold up volume and a small footprint to allow frequent alloy changes and operation in a confined space. The benchmark for high efficiency is set by deep bed filters and tube filters, but these systems do not meet the cost and space criteria. MQP became involved in a filtration development programme led by Professor Wolfgang Schneider of the former VAW R&D centre in Bonn. We learned of the negative influence which the addition of TiBAl grain refiners could have on ceramic foam filtration and incorporated that knowledge into an innovative new three chamber design, the XC filter, where the final stage of the filtration system utilised a small bed filter. Despite extensive proving trials having been carried out at the R&D casting pit in the Rheinwerk plant, we found commercialisation difficult due to the reluctance of potential users to adopt the use of the small bed filter in the device.

Fortunately however, whilst I was attending the Cast Shop Technology sessions at the 2005 TMS conference, I listened to a paper dealing with computer modelling of fluid flow particle removal by Professor Laurens Katgerman (3) of Delft University of Technology. As a result we funded a programme at TU Delft involving water modelling and computer modelling which led to an effective small cyclone being included as the third stage in our filtration system, which is now completing industrial trials.

Summing up, for MQP innovation is a process which always starts with identification of a technical need. It then usually entails locating external expertise and funding a programme which will identify a solution and enable us to establish ownership of the intellectual property rights of an innovation. We ultimately reach the proof of concept stage to establish the new technology with a potential customer, as we successfully did with Aleris, Duffel in the case of Batchpilot, and are in the process of doing with Trimet in the case of Optifilter.

Another good example of this process was the commercialisation of the Opticast technology developed by Professor Lennart Backerud, which we did together with AMAG Rolling at Ranshofen. In both cases another final initiative was the presenting of co-authored technical papers with our external technical experts and customers describing the innovations at the annual TMS Conference in the USA.

Some final thoughts on innovation: Peter Drucker, the renowned Management Consultant, once said “Innovation is the specific instrument of entrepreneurship”. In a similar vein Jack Clark of Novelis concluded his recent article with “It's worth it, because, in the end, innovation is a key differentiator in the marketplace”.

Everything I’ve seen related to innovation in my working life, firstly in Foseco, a truly entrepreneurial organisation in its heydays, and now in my own company MQP, leads me to say how much I wholeheartedly agree with these conclusions.

**References**

(1) Jack Clark, Aluminium International Today, March/April 2015, p 50
(2) Daniel Audet, Luc Parent, Marlene Desuane and John Courtenay, Light Metals, 2004, pp 775-778
(3) L. Katgerman and J. Zuidema, jr, Light Metals 2005, pp 927-931

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