Paper to Standing Committee on Science and Innovation

Submission by Cooperative Research Centre for Cast Metals Manufacturing

The Cooperative Research Centre for Cast Metals Manufacturing (CAST) has developed and commercialised a number of technologies. This paper presents one of these technologies as a case study that addresses the key issues of interest to the Standing Committee.

CAST has developed a technology called AM-cover, a gas system that prevents molten magnesium from oxidising and burning when in contact with air. The key commercial drivers for the development of the technology were:

1. the entry of Australian Magnesium Corporation in the Australian market, providing a commercial interest in cover gas technology.
2. the rapidly rising cost of alternative gas systems.
3. the emergence of greenhouse gas issues. The main competitive technology is sulphur hexafluoride, the world's "worst" greenhouse gas, with a greenhouse warming effect 24,000 times that of carbon dioxide.

To develop an alternative technology CAST needed to understand the fundamental mechanism that enables sulphur hexafluoride to protect magnesium melts. A research student commenced a PhD with CAST at The University of Queensland to research cover gases and understand the mechanism through which they provide protection. The selection of this student was critical to the successful development of the technology as he was able to undertake focused research and also later effectively engage with industry to support technology adoption.

As a result of the knowledge developed by the PhD program, CAST researchers at CSIRO identified a family of gases that might provide protection as cover gases. A CAST project then commenced to develop the technology. Intellectual property was identified and protected through international patents.

CAST considered a number of routes to market for the technology based around licensing the technology to either end users directly or companies that worked with the end users and therefore had market access. AMC, a Participant in the CRC, proposed to CAST that it commercialise the technology. AMC could use the technology as a way of promoting sales of its magnesium and CAST would receive income from the technology. The technology was licensed to AMC under an arms-length agreement.

When AMC prepared a commercialisation strategy two issues were identified that needed to be overcome prior to successful commercialisation. The first was that the occupational health and safety issues of the gas system had not been adequately addressed and there was a potential risk to technology users. An analysis of the health risks and implications was undertaken that lasted for more than one year and a set of safe operating conditions were defined. The second issue was the preparation of documentation that

effectively transferred the technology from CAST and AMC to end users. The time requirement to complete this documentation was significant, about six months. The value of the intellectual property held within this documentation is significant and access is restricted. This document provides the "know-how" to make the technology that is protected by the patent work.

During this period the technology was being promoted to end users through conferences and industry trials and received widespread publicity within the industry. CAST worked with the Australian Greenhouse Office that led to collaboration with the US Environmental Protection Agency (EPA) leading to the independent conclusion that the technology reduced greenhouse gas emissions by 99%.

AMC identified that the key initial users would be in the USA and Europe. By using their staff in these countries, relationships with end users were established and this supported industry to test the technology in their own plants. Access to these plants was based on the personal relationships established by AMC.

At this time AMC's business changed with the cessation of construction activity for their planned magnesium smelter at Gladstone. AMC became a technology company focusing on market opportunities in the magnesium sector. AM-cover fitted their product profile, however, the technology changed from being a means of promoting magnesium sales to a product in its own right. To reflect these changes, the licence agreement was renegotiated and modified.

The technology has now reached the stage that licenses are being entered into between AMC and individual casting companies.

Key Learnings

Pathways to commercialisation – CAST itself did not have the ability to take the technology directly to end users in the global market as CAST did not have direct relationships with these companies. CAST used its existing relationship with AMC to access these end users. This has enabled CAST to be a technology supplier to AMC and AMC to use CAST as its key technology provider. This two-way relationship is one of the great strengths of CRCs. AMC have accessed a number of other CAST technologies. By having this relationship within the CRC, CAST can license technologies in an efficient manner, much more rapidly than when CAST courts new companies and no prior relationship exists.

The licensing route is an effective way for CAST to get technologies into the market. As light metals is a relatively mature industry sector there is considerable existing infrastructure in terms of companies currently operating within the field with substantial capability. If CAST was to progress down a start up company route it would be competing with existing market players.

CAST's approach has been to use its Participants as the route to commercialise technologies when possible.

Intellectual Property and Patents – For CAST to extract value from the intellectual property (IP) that it develops it is essential to protect the intellectual property. When the IP is to be licensed to a third party, it is essential for the IP to be protected, at least in part, by a patent. Without patent protection third parties are not interested in entering into a substantive commercial agreement. In reality, much of the IP associated with a technology is not patented nor is patentable and needs to be effectively transferred for the technology to be a commercial success. This is often a significant cost in terms of time and effort.

Skills and Business Knowledge – Highly skilled and knowledgeable researchers are required to develop the technology. To effectively engage with industry these researchers must have the "right attitude" and be able to operate outside an academic environment to meet the outcomes and deadlines required by industry. To negotiate commercial deals external support is accessed through providers such as IP lawyers. CAST has a commercialisation manager to manage the process and contracts.

Research and Market Linkages – in order to undertake relevant research and develop commercial technologies CAST has found it is necessary to have close linkages with industry and end users. The CRC program has facilitated these relationships and all R&D projects have industry participation.

Factors Determining Success:

- strong market drivers for the technology
- industry participation
- willingness of researchers to be involved in the commercialisation phase
- adequate resourcing – development and commercialisation is a more costly exercise than research
- patent protected IP
- effective transfer of IP
- a committed licencee

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