

**Comments on the Research and Networking Roles of CRC's from the
CAST Metals Manufacturing CRC's Perspective.**

Executive Summary:

The Cooperative Research Centre Program is favourably placed to provide significant direction, leadership and benefit to the research and education fields in Australia. The benefits are the result of the networking opportunities, the potential for detailed industry guidance, the enthusiasm of talented postgraduate candidates selected and mentored by a cooperative group of senior researchers drawn from a range of PFRA's and Industry.

A well-managed CRC draws on the significant expertise resident in the member organizations and utilizes the existing systems and procedures in a flexible and responsive manner. There are existing procedural and auditing activities that ensure the effectiveness of each CRC. Coping with the wide variety of interpretations, needs and desires of the more than 60 CRC's is a significant challenge for the Commonwealth and State Governments – but is an aspect that is appropriate and adequate at present.

The main aspect that the CAST CRC offers as a suggestion to the Education and Research Review Committees for a broader benefit to Australia is the streamlining of funding models and to consider the longer term/ continuity of funding models. At the core of the suggestion is to foster a stability of research and education in order to cater for both:

- Developing industries/ technologies that require an incubation period in order to develop educational course content and commercialize new technologies.
- Existing education and research fields of national significance but financially hindered by a dispersed student base, high costs of

“demonstration” courses and large entry costs for new industry partners.

The CAST CRC operates in the later environment while the Photonics and Microtechnology CRC's are good examples of CRC's working in the developing industry environment.

The intimate involvement of industry, education and research providers with government auditing is a model that in our experience works well. In order to promote greater cooperation and more effective utilization of resources a larger proportion of research and education funds is recommended to be channeled through the competitive CRC program. Thus enabling a greater proportion of strategic planning and certainty of funding into the future.

A greater emphasis during the selection criteria should also be placed on the linkages of leading research and commercialization programs to undergraduate and VET education programs.

Introduction:

CAST brings together world-class people, facilities and ideas with the goal of being the partner of choice for the creation of innovative light metals technology for the benefit of Australia. We firmly believe that within the sphere of light metals CAST is a beacon of success. Being a cooperative venture the management of CAST are able to comment on the wide range of systems and procedures that are involved with the Australian and International light metals industry.

As CAST deals with the three pillars of:

- Conducting research and development that is utilized by industry,
- Managing and commercialising intellectual property effectively; and
- Educating and training people in world leading light metals technology

We feel that we can make a positive contribution to the discussions on the direction of Australia's Education and Research Infrastructure, Procedures and Systems.

Although our experience and expertise is focused on the light metals industry from smelters to automotive components, a number of parallels can be drawn with other industries and CRC's. This is particularly true for other manufacturing industries competing globally, dispersed widely geographically and serviced by a range of educational and research institutions.

Environment in which CAST operates:

The Light Metals Industry in Australia through the efforts of many thousand employees, domestic and foreign investment and various

Government initiatives provides a large export income to Australia. The industry is a significant player on the world stage from Bauxite Mines to Aluminium Smelters. Australia is also on the verge of developing a Magnesium Industry and has potential to develop a Titanium industry. The Light Metals Industry is also intimately connected to the fortunes of the automotive industry, particularly with the growing emphasis on environmental and safety concerns associated with passenger vehicles.

Downstream activities although less significant on a worldwide perspective provide a solid backbone for domestic foundry, die casting, extrusion, fabrication and automotive industries. Many of these industries are scattered around the continent and are of greater significance to a number of regional communities.

This blend of global competitiveness and domestic fragility is supported by a diverse range of education providers who are suffering from a diminishing number of students in the Light Metals field. The geographical spread of a technically diverse downstream group of industries has resulted in many local interpretations of what educational activities are required. Coupled with this the mix of large “upstream/commodity” company in-house training, which has evolved out of the need to continuously improve staff in order to compete, has diluted any national approach to Light Metals education.

The research activities focusing on the light metals industries are concentrated in a handful of key University departments and CSIRO nodes. The Victorian and Queensland State Governments have actively supported Light Metals Technology Transfer initiatives through the CAST CRC. The result of coordinating these activities under the CAST CRC umbrella is that over the ten year life of the CRC CAST has grown into a “Centre of Excellence” held in high regard both nationally and

internationally. This recognition is for a range of activities but notably the education of postgraduates and the technical excellence and industrial relevance of the research programs.

Education and Research Providers

Through the CAST CRC a significant proportion of Australia's Light Metals University Education and Research is provided. The University of Queensland and Monash University both operate a Materials Engineering course. Swinburne University and Deakin University conduct Manufacturing Engineering courses. The CSIRO Minerals and Manufacturing Infrastructure Divisions coupled with the recent Flagship program have significant Light Metals activities involved in CAST.

Metallurgy orientated courses nationally have undergone significant change over the last fifteen years. Courses have either merged with Chemical Engineering courses or taken on aspects of polymers and ceramics and evolved into Materials Engineering courses. The more mining orientated Metallurgy courses have generally moved into Mining schools. The effect of the split in traditional metallurgy courses has left a void nationally when dealing in the education of Smelting (ores to metal) operations and a dilution of Extractive (mineral processing) and Secondary (casting and further processing) Metallurgy courses. A number of courses have also ceased to exist. The number of students enrolled nationally is of the order of 250 across all years. It is estimated that approximately one third of these students will be employed in the Light Metals field in one form or another. Approximately 30% go on to study further degrees.

TAFE/ VET activities on a national level are far smaller. There is a Die Casting course at RMIT, which has been running for ten years. However,

RMIT have also signalled the closure of the Pattern-making/ Foundry course. Course participants are generally employed and are further developing their knowledge and skills. There is no nationally run course servicing the Smelting industry at the TAFE/ VET level in Australia – the CAST CRC is currently developing a course with industry guidance and working within the established TAFE systems. The content development and combination of leading edge research and educational content delivery methods will result in a well-focused Technology Transfer program.

Clusters and Collaborations:

The collaboration of CAST members extends beyond Australia's shores in a number of manners – with international collaboration with a number of industry and academic partners. LSM and Icelandic Magnesium are core members of the CRC. The “domestic” members Comalco, Australian Magnesium and a number of the SME die casters are competing daily in the global market. The CRC offers these large and small companies a workable conduit to the international Light Metals Clusters and networks. The rallying of like minds under the CRC flag assists in facilitating the resulting direction of the CRC and the relative emphasis and balance of research, education, technology transfer, commercialisation and industry wide programs

The collaboration of industry, educators and publicly funded research groups in the light metals industry has allowed a critical mass of researchers and educators to develop and extend their individual reputations and spheres of influence. The critical mass of staff, students and resources is what allows the overall program to blend short, medium and long-term projects into a flexible and responsive coherent program. The relative certainty of funding provided by a CRC program is a distinct

benefit of the program compared to the alternative education and research funding models.

Production Engineering Certificate/ University Elective Program

The CAST CRC Light Metals educational program being developed is an example of the benefits of an extensive teaching staff cooperation, industry linkages and the continuity of funding. Over the life of the CAST CRC a number of industry short courses have been conducted in direct response to industry requests as well as a means of communicating the research results generated within the CRC. The quantity of educational material generated although significant lacked a coordinating systems approach for reaping continued benefits over the years. The continuity of funding coupled with a broad industry guidance allowed a model to be developed within the existing TAFE and University systems to coordinate the educational content in a self sustaining manner (or an archived fee for service format).

The resulting TAFE Certificate program and University Engineering elective program has linkages to the existing PhD programs, summer vacation programs and has the ability to link loosely to high school curriculum. The broad benefits of such a model are not readily achieved through the current research grant allocations. In order for a teaching department to commit to the development of such a program a significant commitment of funds needs to be allocated from a strategic fund. Departments with both the strategic funds available and with the breadth of teaching/ research staff within the one institute is indeed rare.

The CRC model combines the ability to set national research (and teaching) priorities on a competitive basis. Whilst at the same time

fostering cooperation across clusters of researchers, lecturers and industry participants. The relative certainty of several years of funding is the third pillar of the model.

Funding continuity/ uncertainty:

There are however, issues associated with the research, funding and taxation issues associated with the CRC program. The impacts of which vary from CRC member to CRC member. There are a number of funding and IP issues that affect divisions of CSIRO and University Departments in slightly different but essentially similar manners. The principal funding advantage of the CRC program is the relative continuity of the funds over the seven year life. As this period is greater than the three year CSIRO budget process and the variable University cycles (up to five years for ARC centre's of excellence) there is greater opportunity for clusters to collaborate. The critical mass of researchers, lecturing staff and industry implementation that develops from the collaboration has a greater opportunity to grow and reap benefit.

A consideration for all research and education providers affiliated with a CRC program is the non-indexed nature of the core federal grant. A combination of an indexed grant and a mixture of base allocated load and a flexible/ reviewed budget allocation described in the CRC business plan would assist in streamlining the administration of the CRC's finances.

Recommendation:

The streamlining of the CRC funding models coupled with an increased emphasis on utilizing the model for combined research and educational programs resulting in technology transfer benefits for Australia will build

on the current success of the CRC program. This success is most definitely driven by the networking of industry, research and education providers. Each group brings to the cooperative specific skills, perspectives and guidance. A blend that when well managed within the current infrastructure and procedural environment can deliver a return on investment far greater than the sum of investments over the life of the CRC.

Rewarding cooperations of industry guidance, research excellence and educational thoroughness with a continuity and certainty of funding will deepen and build on the existing CRC program.

The CAST CRC strongly supports the networking of Industry, Research and Education providers and encourages an increased allocation of Research Grant and Education Course Development funds through the CRC program. This well managed and accountable funding route is the most appropriate national funding model for sustaining nationally significant education and research programs as well as offering a viable model for the establishment of new industry research and education programs across the whole spectrum of Australian society.

The CRC model forces tangible managed collaboration and its track record shows that it produces many of the desired outcomes. The CRC program is thus a key enabling platform for innovation in both research and education programs of national significance that require collaborative efforts to be successfully established. With further support and clear policies set by Government, the CRC program can be a catalyst for implementing these policies.