

POWDER INJECTION MOULDING



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ISS Institute/Italy (Veneto) Fellowship

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Executive Summary

Powder Injection Moulding PIM is a growing technology widely practised around the world over the past three decades but in Australia only by only one company. Ceramet Technologies based in Ballarat (Victoria), is growing quickly by aggressively pursuing PIM technology and exporting the vast majority of its product.

The adoption of PIM technology has been slow in Australia with local design engineers being limited by only designing for traditional methods of manufacture and additionally, not perceiving themselves as potential players in global markets. This lack of knowledge and 'know-how' locks Australian firms out of competitive capabilities and commercial opportunities. Industry estimates of the annual growth of PIM internationally over the last decade are up to 30%, an indication of its significance for engineering and the economy. The growth is expected to continue in the 21st century.

The aim of this fellowship is to identify and acquire the skills and knowledge critical to enable the greater take up and employment of Powder Injection Moulding technology in Australia to satisfy existing global demand and potential local demand.

Specific areas of study and development for the current study:

- Material selection procedure for specific parts
- Observation of the equipment used and the process for feedstock formulation
- Acquire knowledge of injection moulding machine characteristics and configuration for PIM applications
- Investigate how the PIM process affects part design
- Observe the differences between PIM and plastic mould design
- Observe debinding equipment in operation and the processing steps
- Understand sintering equipment and associated processing
- Engage in discussion of toolmaking education and skill availability
- Observe the layout and equipment involved in a research facility setup

The overseas program was designed to explore the identified skills and knowledge gaps and to obtain the information necessary to return to Australia equipped with the knowledge and ideas essential to ensuring enhanced teaching practices and content delivery. It was essential that the study tour provided a platform for Rowntree to develop effective experiences and opportunities for others to maximize their learning; experiences essential to promoting and improving the overall acceptance of Powder Injection Moulding in this country.

In order to meet the fellowship aims and objectives the following sites were visited:

Singapore:	Singapore Institute of Manufacturing Technology
Italy:	Veneto Innovazione, Assindustria Rovigo, Padua University
Austria:	Battenfeld
Germany:	BASF, Arburg
USA:	Pennsylvania University, Small Precision Tools

Key Findings

- In the Veneto and elsewhere in Italy the business landscape is primarily made up of small to medium sized firms. In this respect, Italy is similar to Australia and as such provides a valuable model for comparison.
- Industry assistance by government in Italy is apparently targeted to support innovation and technology transfer.

Executive Summary

- In each of the three universities where ground-breaking research is being carried out in Singapore, Italy and the USA, financing is provided mainly by industry, with minimal contributions by government. The research in each case was therefore predominantly commercial in nature.
- Italian culture values industry associations more highly than in Australia. Italians demonstrate this by resourcing and supporting their professional associations well and then in turn, the industry associations exert significant influence on government policy and on academic priorities.
- Small, high value added items can be delivered quickly and cost effectively to any destination serviced by an international airport.
- A research priority in each of the universities and in the research labs of the supplier companies was miniaturization. This trend is in response to the recent growth of the micro-technology industry.
- Experts in the USA indicated that there are still backyarders and micro sized players, and that indicates that the industry is in an early stage of development with generous margins.

Maximising the outcomes:

It is essential that the message that PIM is feasible and achievable must get through to Australian manufacturers. Design guides for PIM need to be communicated along with potential cost savings and other benefits. Core to ensuring this occurs is engagement within the tertiary and higher education sector. Engineering students at TAFE colleges and universities are the first groups who need to hear about these benefits and the feasibility of PIM. The TAFE engineering teachers convention would be an appropriate occasion to make a presentation on the technology and there would likely be a higher education equivalent where a similar presentation could be made to a gathering of engineering lecturers.

Furthermore, the three universities visited were involved in commercial research projects in order to survive. TAFE colleges are ideally placed to participate in this kind of commercial development or technology diffusion projects and to benefit from private sector funding, professional development for teachers and project learning opportunities for students. Where necessary the facilities and capabilities of higher education institutions can be engaged in dual sector projects.

For example, as mentioned in the following report, in the Galileo Science and Technology Park, there are four major parts; one focusing on research and innovation, the second on design and new materials, the third on quality and certification and the fourth on incubating new enterprises. All four services in one place help reduce the costs, the regulatory burdens and the practical difficulties of developing and bringing innovative products to market in Europe. A similar service could operate in Australia.

In fact the TAFE colleges are natural concentrations of all of these skills and more. A shop front presented as a technology park backed by all the resources of a TAFE college would be an innovation driver and would help business engage with TAFE.

In addition to the above, following an overview of the fellowship experience, a comprehensive series of recommendations are made to Government, Industry, and the Business sector, Professional Associations, Education and Training Providers, our Community and the ISS Institute.