

# RAPID MANUFACTURING

## Techniques and Applications for the Australian Manufacturing Industry



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# Executive Summary

Rapid Manufacturing (RM) is the latest approach for the manufacture of small quantities or complex individual items such as prostheses and hip replacement components. RM is a process that employs additive fabrication technology to produce end-use items, directly from Computer Aided Design (CAD) data. Components are manufactured without moulding, casting or machining. The impact of RM is far-reaching and the opportunities and advantages are extensive. Implications are significant for the medical field which is ready to take advantage of developments in the use of RM.

The Fellowship provided a valuable opportunity to undertake a comprehensive investigation of skills and processes required to maximise the potential of RM within the Australian context. Key areas of study included:

- RM processes used for specific products by specific industry sectors including aspects of design, innovation and quality, from concept to prototyping and manufacture.
- The implementation of basic to post apprenticeship options for high level specialisations into vocational education and training programs. Learning pathways for gaining knowledge regarding the use of RM processing skills to produce parts suitable for immediate use to be a key area of investigation.
- Possibilities for producing tailored and individualised components to accommodate individual requirements.

The Fellowship enabled the Fellow to attend the 'Third International Rapid Manufacturing Conference' at Loughborough University, followed by participation in a master class offered as part of the conference program. A number of industry visits to discuss operational processes associated with RM were also arranged.

Barnett believes that RM is one of the most exciting emerging technologies available to global industry today and that it will be regarded by many as the next industrial revolution.

RM uses 3D CAD data to directly 'print' or 'grow' parts in a variety of polymeric, metallic, ceramic and organic materials. RM allows companies to manufacture ever more complex and optimised components at very low unit volumes.

The Fellow suggests that with the ability of designers in Australia to be innovative, RM could enable a change for manufacturers that will ultimately result in manufacturing being maintained in high wage economies with high level of sophistication. Production would be given to the countries of lowest manufacturing cost (suggested by Barnett, based on observations arising from this Fellowship).

The advantages that RM brings are already being commercially exploited by organisations such as Holden, Ford, Boeing, Cochlear, Royal Perth Hospital, Rolls Royce and many others are seeking to gain commercial advantage in today's markets.

Following an overview of the international experience, a series of findings are made regarding a range of initiatives and activities that the Fellow identifies as central to knowledge transfer and furthering opportunities for the RM industry. The report concludes with a series of recommendations for government bodies, professional associations, education and training providers, industry, and the community.