Chapter 11
Rapid Product Development and Application in Ceramics Production

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ABSTRACT
This chapter practically investigates how rapid prototyping technology can be effectively adopted to enhance ceramics production. The researcher used an experimental approach that analysed the conventional methods used in ceramics production and then introduced computer-aided design tools (CAD) and rapid prototyping technology into the development process. After that, four ceramic products were developed to test the viability of the rapid production process. Finally, the process was evaluated and compared to the conventional methods. The findings revealed that the introduction of CAD and rapid prototyping technology into the development process reduces the development time and also helps to ensure the accuracy of the prototypes produced. Besides, visualising and validating the design digitally (CAD models) also helps to identify possible faults at the early stage of the development process. Therefore, the ideas explored in this chapter will give insight to ceramics designers and artisans on how they can effectively eliminate bottlenecks in the production process.


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INTRODUCTION

Physical prototyping can be a major bottleneck, slowing down the product development process and seriously constraining the number of design alternatives that can be examined. According to Gary Hawley, the conventional process of physical prototyping (Hand carving and turning) is time consuming and never produced 100 percent, accurate models. As a result, it is hard for the clients to understand the concepts being proposed fully. Also, ceramics companies are too careful about introducing new products because it takes as long as four weeks to create prototypes (Gary 2012). Hence, many manufacturers easily accept that eliminating physical prototypes equates to shorter or shortened product development cycle time and also a competitive strategy for reducing development cycles and getting products to market faster. However, the reality is that product development teams are still forced to include physical prototyping in the design loop to verify proper functionality, ease of assembly and also use it to create mould for mass production.

Lately, the evolution of rapid product development has provided extraordinary opportunities for new product development and manufacturing improvement. Research from the Aberdeen Group shows that manufacturers that use rapid product development build half of the number of physical prototypes as the average manufacturer, get to market 58 days faster than average, and experience 48 percent lower prototyping cost (Aberdeen 2006). Instead of building multiple physical prototypes and then testing them to see if they’ll work, companies can conduct testing digitally throughout the process by using digital prototyping to catch design problems up front. Therefore manufacturers can reduce the number of physical prototypes they need to create before manufacturing a product, which also reduces the cost and time needed for physical prototyping (Aberdeen 2006). Against this backdrop, this chapter seeks to explore the effectiveness of the rapid product development in ceramics production.

RAPID PROTOTYPING TECHNOLOGY

Prototyping is a fundamental design initiation, which involves the construction of working models of conceived products for mass production. A prototype is the first or original example of a product that has been or will be copied or developed; it is a model or preliminary version (Chua, Leong, and Lim 2010). According to Soegaard (2010), a prototype is often used as part of product design process to allow engineers and designer the ability to explore design alternatives, test theories and confirm performances before starting production of a new product. For example, some prototypes are used to confirm and verify consumer interest in a proposed design whereas other prototypes will attempt to verify the performance or suitability of a
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