Chapter 5
Integrating 'Designerly' Ways with Engineering Science:
A Catalyst for Change within Product Design and Development

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ABSTRACT

The fields of design and engineering both contribute to product design and development. Increasingly design teams require an integrated approach in environments where mutual understanding and respect replace traditional professional rivalries. These new synergies both enhance communication and understanding between designers and engineers and lead engineering into new areas of professional activity. Engineers are integral to the product development process, but change in product development and manufacturing requires new responsibilities; design engineers must assume a greater role to achieve successful product realisation. However, to be effective engineers must develop new skills; creative design ability, understanding of societal and environmental impacts and a human-centred approach. These themes, not typically addressed by engineering curricula are evident in a new approach to engineering education - product design engineering. This chapter addresses issues confronting product design and development and examines the emergence of this new engineering professional in response.

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INTRODUCTION

Product design and development (PDD) responsibilities have changed. There is greater focus on sustainable design, socially responsible design and design for need. Opportunities exist for design teams to make a positive commitment to the welfare of global communities whilst advancing technologies that support sustainable development. It is no longer appropriate for designers and engineers to serve solely the interests of business; instead PDD teams must understand the potential for design to make a greater contribution to lives and society.

As the roles and responsibilities of product design and development teams are reformed, so too are their professional composition. The single discipline purity of the traditional industrial design consultancy has evolved into an interdisciplinary team, where designers and design engineers collaborate harmoniously to provide an extended palette of services. Product design teams require an integrated and collaborative approach in environments of understanding and mutual appreciation. The product design and development process is enhanced by these new synergies between engineers and designers, as is the progression of the engineering designer into new areas of professional activity.

Whilst design engineers have always been an integral part of the product development process, their roles have traditionally been confined to working within constraints and defined parameters to achieve closure to the product realisation stage. However, emerging trends in manufacturing and revised professional responsibilities require design engineers to have a greater role in product design and development, particularly in the conceptual design and embodiment stages. Yet to be effective, they require an extensive palette of new skills; creative design ability, a thorough understanding of the societal and environmental impacts of their professional activities and a human-centred and responsible approach. These attributes are not characteristic outcomes of traditional engineering curricula, but are evident in product design engineering courses.

This new engineering discipline results from the integration of two traditionally disparate professions; mechanical engineering and industrial design. It responds to the need for interdisciplinary professionals and a greater participation in design teams by engineers conversant, indeed accomplished, in the product design and development process. These new engineering pedagogies support the changing role of the engineering designer and are catalysts for significant change in product design and development through greater team synergy, interdisciplinary understanding and communication. "Times of great flux call for those who can cross disciplines, who can see and understand the big picture." (Akay, 2003)

BACKGROUND

It has been observed that the boundaries between the design and engineering can inhibit both innovation and successful product realisation, particularly in the product design and development milieu. "These two mindsets often clash as one seeks to broaden the scope of the problem, while the other is working to achieve closure." (Fry, 2006)

In Engineering Design Methods: Strategies for Product Design, Nigel Cross notes that "the increasing competition for consumer markets and the growing awareness of the importance of design for the market has led to reinforcement of the view that successful design can only be accomplished by an integration of the skills of both engineering and industrial designers." (Cross, 2000)

This trend is evident both in the traditional industrial design consultancy and in the manufacturing sector where there is increased demand for engineers who can operate effectively in a variety of environments within global multidisciplinary teams. Engineers, particularly those in product design and development, are now expected to