POSTGRADUATE PROGRAMME IN PRODUCT DESIGN ENGINEERING: TOWARDS ACCELERATING INDIA'S ECONOMIC GROWTH

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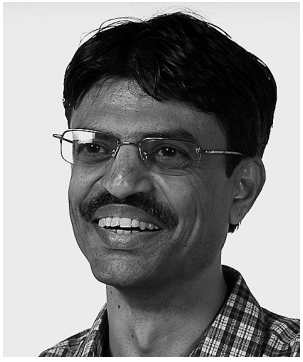

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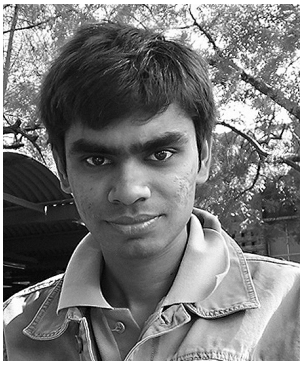

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Abstract

India's aspirations of making a headway into the innovation economy hinges in a major way on the capability of its industries and organisations to design and develop new products and solutions more efficiently, effectively, and rapidly. Product development, it is now well recognised, plays a crucial role in converting new ideas/inventions into commercially viable products. The traditional drawing centric and linear process of research and development has now transformed into a collaborative, intensive, integrated, and concurrent product development process. A singular entity/person with holistic understanding of the entire product development process and ability to coordinate the multidisciplinary and cross functional team is thus the need of the hour. Product Design Engineering has now emerged as the new technology of the future and a cutting edge discipline. The proposed postgraduate programme shall address critical industrial needs for product development, while at the same time synthesizing technology and aesthetics.

Keywords: *curriculum, Indian industries, product development*

Introduction

An expanding economy, increasing employment opportunities, and rising incomes show that today India is one of the largest consumer markets in the world. Currently, powered by the sustained and robust growth of its key economic sectors, India has become one of the fastest growing economies in the world. By the year 2020, it is expected to be the third largest economy after the United States and China.[1] It is, therefore, not surprising that today India offers the most lucrative market for any business. This has attracted international companies to scout for business opportunities in India. The entry of multinationals with their sleek and cost effective products has changed the rules of the game for the Indian industry.

Highly saturated and rapidly changing global markets, ever changing customer needs, and rapid advances in science and technology have resulted in shortening the shelf life of products. In such a scenario, industries have to develop their capabilities

to design and develop new products more rapidly, regularly, and more effectively. The entire product lifecycle needs to be visualised at an early stage of the product development process in order to make it independent of any further support once launched. The advancement of information technology has influenced business significantly. The intellectual as well as other tangible resources are now sourced from across the world. Emergence of cutting edge software solutions has made design, analysis, and testing a lot easier. The traditional drawing centric and linear process of research and development has now moved to a more collaborative, intensive, integrated, and concurrent product development process.

Product Design Engineering (PDE)

In the present economic situation, India needs professionals who can collaborate, monitor, and control the entire product design and development chain—from conceptualisation and detailing, right upto mass production and the possibility of any compromise on design intent must be eliminated.

A product design engineer has a critical role to play in the modern product development process. With holistic understanding of the product development process and the ability to coordinate a multidisciplinary and cross functional team, the time is just perfect for nurturing product design engineers who can meet the requirements of the nation. Adopting a systematic approach to the product development process, a product design engineer is in a unique position to integrate creative skills in engineering (inventiveness and project management), industrial design (aesthetics, manufacturing technologies, and graphics), intellectual skills (design thinking ability) and empathetic understanding of the user in order to generate design engineering solutions for the innovation era.

Opportunities for Product Design Engineers in India

Most Indian industries that were successful in selling their products in protected markets had hitherto not realised the need for research and development and newer product developments. In the past, many Indian companies had collaborated with foreign companies and were engaged in technology transfers that largely required reverse engineering, indigenisation, and optimisation of the products and processes. Today, very few companies in India focus on generating innovative solutions based on industrial design. Therefore, these industries hardly have any exposure to research and development initiatives. By and large, Indian industries have lacked the much needed exposure and expertise of today's cutting edge methods and techniques of product design and development. Product design engineers have the capability to systematically approach and execute the entire project—right from ideation to product realisation. Their services are indeed necessary to meet the growing requirements of the Indian industry. India's large Small and Medium Enterprises (SMEs), owing to their smaller size and scale of operations, are plagued by an inherent limitation of resources. These sectors also suffer due to lack of varied expertise and wider exposure. The product design engineer would be in a better position to handhold such small and medium enterprises to marshal their available resources and expertise, thus converting their ideas into marketable products. Also, a majority of the projects from these enterprises are related to redesigning, refinement and/improvement of products and processes, and product design engineers who have been trained in creative engineering processes would be the right professionals to deliver the results. Product design engineers can usher in new changes and the much needed reforms through their systematic approach to product development.

Due to the very nature of its composition, Indian society encourages development of indigenous and ingenious solutions/ideas that meet and solve the specific needs and requirements of the person/s or region. Such ideas are ideally suited to meet the regional needs and thus bear the potential to replicate their usage in similar environs.[2] Product design engineers can play a crucial role in the development of such ideas and in promotion of contemporary applications of traditional knowledge for local solutions; thus, creating business successes at the local level. This strategy would generate regional employment opportunities, and in turn provide a vital direction for a country like India that is poised for transit into an innovation-driven economy.

National Design Policy

The Government of India, on realising the increasing importance of design in the country's economic and social development, announced its National Design Policy in the year 2007. With the vision of entering into a design-enabled innovation economy, the design policy recommends creation of original Indian designs in products and services, and drawing upon India's rich craft traditions and cultural heritage. It has envisioned a roadmap for introducing design at multi tiered levels of education. The policy stresses on establishment of Departments of Design in all Indian Institutes of Technology (IITs) and all National Institutes of Technology (NITs) as well as in prestigious private colleges of engineering and architecture. The policy envisages that this would help upgrade quality of engineering design, machinery design, process design, design materials; thus, creating design that is socially, culturally, and environmentally relevant. The policy clearly acknowledges that if technology and management were the driving tenets of business and industry in the past, the future clearly belongs to design-led innovation.[3]

Facilities and Strength of Engineering Colleges in India

As a profession, engineering is closely associated with the shelf life of a product. Engineering graduates are therefore the most ideal candidates for the postgraduate programme in Product Design Engineering. Engineering colleges, while offering this two-year postgraduate course to its graduates, can also offer design based elective modules to various disciplines/branches at the undergraduate level.

Besides developing professionals with specialisation in product development, exposure to the theory and practice of design will enable engineering students to imbibe the spirit of holistic design and innovation in their practice. This value addition is expected to translate into a conscious effort to improve competitiveness through improvement in product quality, and thereby considerably benefit the industrial sector and the country as a whole.

Given the facilities and expertise that already exists in our engineering colleges in terms of infrastructure, faculties, library resources, equipment and laboratories/workshops, it is evident that an additional course in Product Design Engineering can easily be introduced by sharing the existing resources. Over 2000 AICTE approved engineering colleges in the country would therefore be ideally placed to offer this postgraduate programme in Product Design Engineering. The department may initially begin with one or two full time faculty members. Technical inputs could be delivered by in house faculty members from other departments; while, visiting experts may be invited for inputs in other subject domains.

Product Design Engineering: Approach, Curriculum, and Structure

The pedagogy of Product Design Engineering education focuses strongly on the principles of hands-on experience, reflection through action, and reflection on action. Founded in the department that constantly thrives to promote a learning culture and encourages systematic innovation and zeal to experiment and bring the best for the real world, the curriculum creatively blends design theory with hands-on practice. Elements and theory of design, management, human factor-related engineering, science and liberal arts, advanced manufacturing, information technology and its applications, concurrent engineering, and prototyping methods will be some of the core contents integrated within the curriculum. Individual and group projects, seminars, workshops, exhibitions, conferences, and industry visits will form the core of the curriculum methodology. Live industry projects will be undertaken as classroom projects with an aim to provide real life challenges and feedback to the students. Suitable industry exposure in terms of internships, training, design audit, and industry visits will also be integrated into the curriculum. A semester long project at the final stage of the programme (the thesis project) will provide an opportunity to the student to undertake real life design engineering projects and test his/her ability to operate as a professional product design engineer.

Profile of a Product Design Engineering Graduate

At the end of this professional education programme, the Product Design Engineering graduate would acquire the capability to work on professional design engineering projects, either independently or as member of the design engineering team. Enhanced technical and managerial skills will supplement his/her core design engineering skills. He/she will also have the ability to undertake research and explore a wide range of issues with a user centric approach. The graduate would have the ability to thoroughly dissect and analyse design engineering issues and generate innovative solutions and versatility that can develop products for mass production as well as for small scale/crafts/cottage industry sectors. He/she would have deep empathy towards socio cultural and environmental issues and the capability to integrate these aspects through a holistic approach to Product Design Engineering.

Career Prospects for a Product Design Engineering Graduate

Today, the Indian economy is witnessing fast-paced growth in the industrial and services sectors, so graduates in Product Design Engineering have a wide scope for employment or independent practice. They will have opportunities to develop a professional career as product designers, product engineers, creative engineers, human factors engineers, design engineers, or design project managers in the product development process/research and development department. The graduate may function as a product manager, customer support manager, or a quality manager. A graduate in Product Design Engineering will be an ideal candidate as the team leader or project coordinator. As graduates with the professional ability to translate concepts into products and systems, they can seek employment with design engineering departments of manufacturing industries. They may set up their own design studios to work independently on integrated design engineering projects or choose to offer consultancy services as freelance design engineering professionals.

Conclusion

Most of the Indian industries, so far not realising the need for research and product development, have lacked this much needed exposure and expertise of today's cutting-edge methods and techniques of

product development. The product design engineer will bring in systematic approach to execute the entire project, from ideation to product realisation. The proposed postgraduate programme in Product Design Engineering can be easily introduced in more than 2000 engineering colleges of India who can share their existing resources. By addressing the critical industrial needs for systematic and concurrent product development, the proposed programme shall accelerate India's economic growth, and thereby its aspirations to move into the innovation economy.

Notes

[1] Mehta, Shashank, and Ravi Mokashi-Punekar. "Exploring Indigenous Innovations: Ascertaining the Scope for Design Interventions for their Successful Commercialisation." 25 Aug 2009. < http://www.shashankmehta.com/>.

[2] National Institute of Design. "National Design Policy." 25 Aug 2009. <http://www.nid.edu/download/national_design_policy.pdf>.

[3] The Banyan Tree. Home page. "Indian Economic Overview." 25 Aug 2009. <http://www.thebanyantree.co.in/economic_overview.htm>.

RAINDROPS AND FOOTPRINTS: REFLECTIONS ON DESIGN ENABLED DEVELOPMENT MODELS FOR INDIA

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Abstract

The subject of this conference gives us the opportunity to reflect on these series of insights and to map out the contours of the theory of design based crafts interventions that emerged from the National Institute of Design over the past fifty years of exploration and design action in the field. Learning from the field has been a much repeated mantra at the NID and its education slogan has always been learning