

The Role of Design Engineers in Product Innovation

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Michael Aro Flores is an Industrial Engineer with over 10 years of experience in project management, Design Engineering, and Management positions. Proven expertise in Wire Harness design and Manufacturing, vehicle dynamics, and product development lifecycles. He also has a degree in Management Engineering from the University of San Jose-Recoletos (USJR). He successfully led multiple high-profile projects from conception to completion. Michael Aro Flores is also the owner of Cartets Trading, a single proprietorship specializing in selling of high-quality pre-owned vehicles. As Managing Owner, He focuses on conducting thorough

vehicle evaluations, negotiating fair deals, and guiding clients through financing options. Cartets Trading is known for its transparent communication and personalized service, and has received an award from Asia's Golden Icon Awards as one of Asia's Trusted and Excellent Car Traders for the year 2023.

Introduction

The role of Design engineers who specialize in Product Innovation is typically to collaborate with product developers and manufacturing to further improve and conceptualize detailed designs that ensure product functionality, cost-effectiveness, production efficiency, and performance.

The increasing significance of design engineers as innovators in the development of new products has been noteworthy for a couple of years. The designer's creative imagination will generate functional, aesthetically

appealing designs for new products, serving as a bridge between what can actually be produced (technical feasibility) and what users want (user needs). Design engineers help businesses create innovative products that meet market demand while delivering enhanced value to users. Because of advances in technology and changing consumer preferences, designer engineers will continue to play an even more important role in developing innovation. For example, the use of sustainable materials in products and the incorporation of smart technologies into product design offer insight into how design engineers are rising to meet today's challenges.

Innovation is prevalent across most industries, from consumer electronics to automotive design. As businesses pursue ways to differentiate themselves from competitors in a highly saturated marketplace, collaborating with designers will be critical to their overall success. The designer's work, collaborating with many other professionals (including marketers and product managers), fosters the development of new ideas through synergies; therefore, they have the potential to develop innovative products that create a paradigm shift in what is possible.

To fully understand and appreciate the importance of design engineers to product innovation, it is necessary to understand how innovative product concepts are developed, designed, and marketed. By looking into the methods by which innovative products are generated, developed, and brought to market, one would gain a much better understanding of how important designer engineers will be in shaping the future of industries and enhancing everyday life.

Exploring the Landscape of Product Innovation

Product innovation is the development and implementation of new or improved products to meet consumer needs and create value in the marketplace. This is an important process within today's industries because many businesses attempt to remain competitive by responding to

new consumer trends. When businesses successfully innovate, they create products that differ from what is currently on the market, thereby increasing their market share.

There are several noteworthy examples of how product innovation has changed the way consumers live. One such example is the growing popularity of electric vehicles (EVs), spurred by consumer demand for sustainability and advanced technology integration, which represents a fundamental shift in consumer expectations of automobile manufacturers. Another example of innovation taking place and changing everyday life is within the smart home market, where consumer demand for an easier way of living through convenience and energy savings has produced /will continue to produce significant and impactful improvements in terms of products that utilize and control energy use and consumption within the home.

As discussed above, understanding product innovation also demonstrates how critical design engineers are to its success, as they possess the skills to connect user needs with a product that is feasible from a manufacturing perspective. When analyzing the design engineer's role in the product innovation process, the contributions of design engineers will be revealed to be focused not only on the functional aspects and/or look of the products but also on creating an environment that enables a culture of innovation which *Design Engineers* perform an integral function in product creation because they serve as a bridge between both the technical and creative aspects of the design process. In many ways, design engineers create designs that meet users' needs, both from a functional standpoint and an aesthetic perspective. Their primary function is to create product designs that can be manufactured efficiently and effectively, while also meeting customer needs.

To be successful in their roles as design engineers, they must possess a unique combination of technical conformity within their engineering

discipline along with creativity in their designs. Design engineers must also have a high level of proficiency in design tools and software, which is critical to creating the digital models required for the design process. Additionally, design engineers must be able to collaborate with diverse workgroups, including engineers and marketing personnel, and possess excellent verbal communication skills.

Collaboration is an essential component of the design engineer's role, as design engineers are viewed as the link between engineers who design to create functional products and designers who develop products based solely on visual appeal. Due to the team's collaborative nature, innovation results from the combined knowledge, skills, and experience of all team members, enabling them to develop new, efficient solutions to existing problems through creative, original ideas.

The importance of the design engineer's role does not decrease as product concepts progress into research and development; rather, the design engineer's contribution lays the groundwork for turning the concept into a tangible product that satisfies both the technical requirements of the engineering function and the market requirements for the product. The process of converting concepts into physical products requires continuous collaboration among team members, which is paramount to successful product innovation.

Development and Research

The Research and Development (R&D) process is essential to product innovation. The R&D process includes an organized study and exploration of ways in which to develop or enhance a product. Design Engineers play an integral role in working on the R&D process as they utilize their technical expertise and imagination to help develop a product idea that is not only possible but also meets users' needs.

A significant way in which Design Engineers participate in the R&D process is through team collaboration. Design Engineers work with members of different departments, such as marketing, manufacturing, and the user experience team, to receive input from a range of perspectives to develop better product ideas. Through case studies involving the production of consumer electronics, we have witnessed the teamwork between Design Engineers and other professionals transform an idea into a marketable product. For instance, the redesign of a popular mobile phone involved Design Engineers creating prototypes and testing them with users to obtain feedback on both the product's design and usability. Using both feedback methods, the product development team made informed decisions at all stages of the design and development process. Ultimately, the team's work resulted in a product that met consumer expectations and needs.

In addition to using user feedback to help Design Engineers develop products during the R&D process, it helps them understand how the product will be used in the real world. Understanding the user's perspective on how a product fits into their daily routine enables Designers not only to meet users' current needs and expectations but also to plan for their future needs and expectations. When the design and development phases of a project are complete, Design Engineers transition to designing based on the information they gained from R&D, with the goal of creating a product that is easy for the user to use, visually appealing, and provides the user with an overall positive experience. User-Centered Design is an approach that focuses on understanding how users can be involved in the creation of a product so that it meets their needs, and on creating products that integrate with those needs.

For a *Design Engineer*, User-Centered Design requires them to actively engage with users to understand their needs, preferences, and pain points to make better design decisions. When user-centered design principles are applied, design thinking is the norm, as using empathetic approaches,

iterative prototypes, and testing with actual users will lead to more user-centered designs.

Rapid prototyping is an integral part of the User-Centered Design approach, and it allows Design Engineers to create a tangible representation of their prototype and for actual users to interact with the prototype in the earlier developmental stage of the product. Consequently, the rapid prototyping process yields valuable feedback from actual users on the design and usability of the product and improves the accuracy of the final product to meet the goal of an intuitive user experience.

Testing prototypes with actual users through an iterative prototyping process will yield insights into the usability and functionality of the end product that would not be apparent through theoretical design approaches alone.

In addition, Design Engineers are beginning to incorporate principles of User-Centered Design into their work as Design Engineers are becoming more aware of user consideration for environmentally responsible products and how such consumer demands for environmentally responsible products are changing the way that Designers think about the use of materials and processes to develop future products with low ecological footprints. Moving forward, the incorporation of sustainable principles into Design Engineers' design practices will be significant. Designing products and services with sustainability in mind is of high importance today, as consumers are demanding that the products and services they purchase be both functional and environmentally responsible. Design engineers are seeking ways to meet this demand by focusing on sustainable/eco-friendly materials and processes at every stage of product development. The focus on sustainability means that the materials used to build products will have reduced environmental impact. Depending on the use, these materials may include (but are not limited to)

recycled material, organic, biodegradable, renewable, and/or reusable resources.

In addition to reducing waste produced during product development, eco-friendly materials can also provide performance enhancements. For example, when using natural fibers as an additive in composite materials, they typically increase the overall strength and durability of the finished product. As many of these eco-friendly materials continue to gain popularity, design engineers will be challenged to find innovative ways to incorporate them into consumer products that are user-friendly and reduce the overall environmental impact. The commitment to sustainability can create new business opportunities through marketing and product differentiation.

Innovation is greatly influenced by sustainability. Sustainability is forcing design engineers to abandon their usual product-design methods and use life-cycle assessments of a product's environmental impact throughout its life cycle. In considering the product's total life cycle, this approach enables design engineers to make better-informed decisions and supply products that last longer while using fewer resources.

In conjunction with the continued integration of smart technologies into manufactured products, design engineers can continue to produce products that fulfill consumer needs and support a sustainable global environment. As design engineers integrate technology into their work and create innovative products through the continued integration of technology and design, they will lead the way in developing products that consider the needs of users and the environment.

Integration of Digital Technology

In recent years, electronic technology integration has been one area where design engineers have contributed significantly to product innovation. The rapid growth of emerging technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), Augmented Reality (AR), etc., together

with the availability of digital tools, has improved the design process. The availability of digital tools enables designers to work faster and make rapid iterations of design concepts while learning how users will interact with the designs.

An example of digital tools being used by design engineers is the use of computer aided design (CAD) software.



Reflections

As an Engineering Designer, I consider my professional experience a strong example of how an individual with all three of these attributes can have a long-term impact on society. My 10-plus years of experience in project management, design engineering, and managerial roles demonstrate that engineering is much more than designing technical documents and manufacturing production systems. In my opinion, engineering is also about finding solutions to problems that face the world today, leading others through effective leadership, and creating value through innovation.

The aspect of my career that impresses me most is my credibility in wire harness engineering and manufacturing, vehicle dynamics and development, and product development cycles. Each of these fields requires precise measurements, analytical reasoning, and an extensive knowledge of how each component plays a critical role in the performance, reliability, and safety of the end product. I draw upon my career as a source of encouragement and realize that my ability to succeed as an Engineering Designer is directly related to my ability to be detail-oriented, to continue finding ways to improve my work, and to take an idea and turn it into a practical, efficient, and effective solution. His ability to lead a number of high-profile projects from concept through implementation is another reminder of the need to couple technical aptitude with strategic planning, teamwork, and collaboration.

In addition, I am encouraged and motivated to reach out to other engineers throughout our organization who possess diverse backgrounds in Management Engineering from the University of San Jose – Recoletos. The integrated engineering with business and management skills demonstrated in my education presents how, even in such a competitive

environment today, there exists an expectation that engineers will design all systems and products with an emphasis on providing cost-effective, operationally efficient, and organizationally aligned solutions. I now view engineering as a multidisciplinary field with an increasing emphasis on combining superior technical knowledge with strong leadership and good decision-making skills.

The recognition of Cartets Trading as one of the most trusted and excellent car merchants in Asia for 2023 further supports my view that ethical behavior and customer satisfaction are the cornerstones of sustainable success.

Overall, I view my experiences as a Design Engineer as very encouraging. It provides me with the recognition that engineering is not just about developing systems and products, but also about building trust-based relationships, generating new ideas through innovation, and opening new paths to opportunity beyond traditional career choices. I want to continue to inspire and grow professionally, develop into a more effective leader, and use my engineering knowledge as motivation to achieve greater success in both corporate and entrepreneurial settings.