MECHATRONICS IN DESIGN

FRESH IDEAS ON INTEGRATING MECHANICAL SYSTEMS, ELECTRONICS, CONTROL SYSTEMS, AND SOFTWARE IN DESIGN

PLM and mechatronics

Product-life-cycle management enables the mechatronics-design philosophy.

Mechatronics is a design philosophy that emphasizes multidisciplinary, model-based communication, collaboration, and integration from the start. Sustainability has further challenged mechatronics to transform itself into a closed-loop, cradle-to-cradle design approach. PLM (product-life-cycle management) is a process of managing the entire engineering life cycle of a product, along with the software tools to synchronize information. Just as in mechatronics, we now view this life cycle as one that stretches from conception; through design and manufacturing; to service, disposal, and recycling. Just as a key element in mechatronics is human-centered design, PLM is becoming more human-centered, in addition to being information-centered.

Recently, I gave a speech about mechatronics and innovation at the Product Lifecycle Management 2010 Conference in Detroit. PLM is certainly not new, having made its debut 25 years ago, but it was my first exposure to the world of PLM, and major companies from many industries were there. With the need to manage increasingly complex designs, along with the imperatives for energy-efficient, sustainable, and environmentally responsible design, PLM is clearly a subject of great interest worldwide.

How are mechatronics and PLM related? Does PLM take over when the mechatronics effort ends, or are they becoming integrated so that both become better? To better understand the world of PLM today and in the future, I spent considerable time with John Bayless, the director of strategy and program management for Mercury Marine and the practice director for Mercury Marine PLM Services, a PLM-consulting business within Mercury Marine. Bayless is a graduate of the US Naval Academy (Annapolis, MD), who served as a US Navy fighter pilot. He holds a master's degree in business administration from the University of Michigan’s Ross School of Business (Ann Arbor, MI).

In Bayless’ view, the link between a mechatronics approach and PLM is the need for collaboration during product development. A mechatronics approach calls for a cross-functional team to come together in a way that encourages specialists to make mutual design adjustments to reach a better final design. The execution of a mechatronics approach creates a need for PLM.

Part of mechatronics’ need for PLM stems from the difficulty specialists, often in disparate locations, have coming together early and often enough to collaborate on the latest design information. A PLM system eases collaboration by connecting engineers and cross-functional team members, such as manufacturing, procurement, and marketing, almost in real time. For example, by creating one database that serves as the central source of information, PLM reduces rework due to confusion over data from multiple databases. When engineers use this approach to its fullest potential, PLM saves time—time that they could better use creating innovations for new products.

From my discussion with Bayless, I learned that the scope of PLM implementation varies by company. For example, some Mercury PLM Services clients are considering their first investment in PLM and are looking for reliable information. Other clients use PLM only to store CAD data but are interested in deploying the tools in more value-added ways across the enterprise. Mercury PLM Services provides best practices that bring PLM benefits to the organization, not just one discipline, making it ideal for mechatronics.

Communication, collaboration, and integration are the key attributes of mechatronics design that lead to innovation. PLM—managing all the information from the start of the design to the eventual disassembling and recycling of the product—can facilitate that process. We must first, however, define and widely embrace mechatronics design for the organization. Each individual’s ownership of the process, not just a consensus, is essential to reaping the full benefits of PLM.