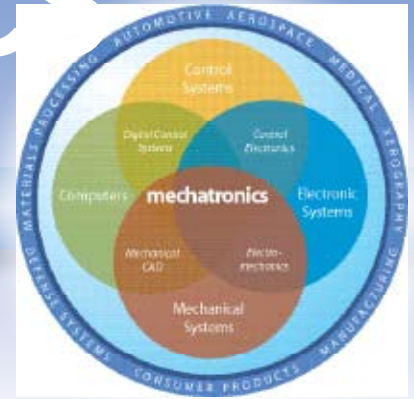


# MECHATRONICS IN DESIGN

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

## Changing the Culture for Mechatronics



In “Who Says Elephants Can’t Dance?” former IBM CEO Lou Gerstner recalls, when it came to turning Big Blue around, “culture wasn’t just one aspect of the game — it was the game.”

The same can be said of many engineering-driven companies as they shift to a mechatronics’ approach to design. This move often entails a change in corporate culture. Take Procter & Gamble, for instance. The consumer goods giant makes a raft of products families all over the world depend on. But underlying its success are engineering innovations that help the firm beat the competition in a very tough market. In short, the machines making P&G products are modern marvels of engineering design — mechatronic system design.

I recently talked to Eric Berg, technical section head for Mechatronics and Intelligent Systems in Cincinnati, where many of the company’s machines are designed, built and tested. What follows are his observations on mechatronics and its impact on P&G.

### Transparent Engineering

“P&G’s purpose is to provide branded products of superior quality and value that improve the lives of consumers. We want consumers to identify with our products and brands, not our engineering. So, the engineering that goes into delivering our products must be transparent. However, internally within P&G, engineering gets a lot of attention and we are under constant pressure to improve quality, reduce cost and accelerate speed to market.”

### Big-Time Savings

“Mechatronics got P&G leadership’s attention when a handful of engineers, using mechatronics’ models, stopped one major program headed in the wrong direction and got a few other programs back on track, saving millions of dollars and years of development effort. A common element in early mechatronics’ models was the

holistic approach to modeling the system dynamics, a relatively modest investment in time, but with a conclusive result.”

### Going to School on It

“P&G has instituted a formal mechatronics’ training program. Engineers are instructed in the analysis and synthesis (modeling) of systems, as well as the skills needed to convert models into commercial hardware and software. On the front end, engineers learn that the dynamics of most production systems can be described by a handful of ideal elements that have analogous behavior, regardless of whether the system is electrical, mechanical, thermal, gas or liquid flow. The four common analogous elements are: capacitance, resistance, inertia and dead-time lag. Engineers soon discover that most of the systems they care about are governed by the first-order lag transfer function. As a result, they quickly realize the benefits of re-application from one project to the next.”

### Practical Approach

“The key to engineers becoming proficient at mechatronics’ analysis is to connect their industry experience with their academic skills. They also need to implement their designs using commercial components. What we really teach our mechatronics’ engineers at P&G is how to reduce theory to practice.”

### Leveraging the Effort.

“The fact that most dynamic processes we work with are governed by the first-order lag transfer function makes broad re-application throughout P&G’s manufacturing enterprise straightforward. For technicians on the factory floor, the underlying theory is not important as long as they understand the process characteristics. Over the years, we’ve also found a number of applications that are governed by higher-order, multiple-input, multiple-output, coupled, linear and non-linear models. However, these applications are the exception and we can handle these problems with a handful of engineers who have advanced mechatronics’ skills.”

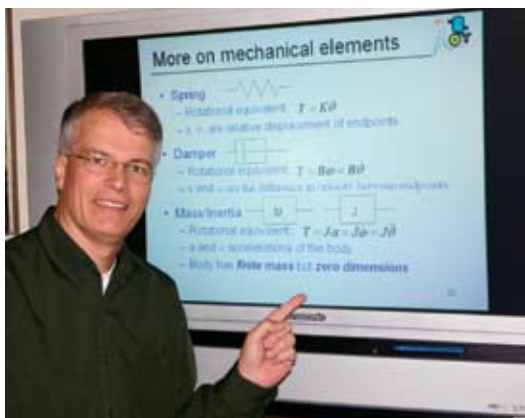
The bottom line from Berg’s experience is mechatronics has helped P&G make significant gains in engineering productivity. What’s more, the company has achieved these results by teaching engineers how to make the most of their academic skills.

BY KEVIN CRAIG



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Engineer Eric Berg teaches regular classes on mechatronics at Procter & Gamble, where machinery innovations are just as important as new product introductions.



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