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Aaron Dietrich
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Tolomatic is a leading supplier of linear actuators, both electric and pneumatically driven. Tolomatic's expertise includes linear actuators, servo driven high thrust actuators, servo and stepper motors, drives, and configured linear systems. Standard products are built-to-order and shipped in 5 days or less. Tolomatic also manufactures right-angle gear drives, caliper disc brakes, and clutches.

Tolomatic has earned an industry-wide reputation for designing and manufacturing highly durable and reliable actuators for a variety of industries, including packaging, material handling, medical, food processing, automotive, semiconductor, and general automation.

COMMENTARY:

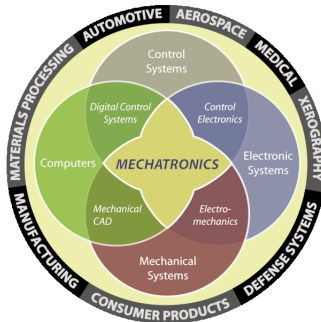
The Influence of Mechatronics on New Product Design

By Gary Rosengren and Aaron Dietrich

From the development of strictly mechanical products (such as gearboxes and brakes) to complete electric linear motion control systems, the landscape has changed dramatically for design engineers looking to bring new products to the market. Manufacturers have had to respond to these changes as they continue to develop new products for solving linear or rotary motion control problems. Today's automation solutions need to be faster, smarter, and communicate better.

How does today's design engineer deal with these demands when designing new products or complete motion control systems? We interviewed Tolomatic's Director of Engineering, Gary Rosengren and Electric Product Manager, Aaron Dietrich to find out how the advent of mechatronics is affecting product design.

How has the integration of mechanical, electrical, control and software devices (basically the concept of mechatronics), affected the design process for today's design engineers who bring new products to market?



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Gary: Clearly the recent advancements in "Mechatronics" have brought new capabilities to the design engineer tasked with developing new products. Today's design engineer has an abundance of choices that all are intended to facilitate machine and/or system design. Higher linear speeds, smaller physical envelopes, higher degrees of positional repeatability, higher mechanical capacities, longer travel life, easier programming, easier and more flexible communication, and many other attributes are the current norm rather than the exception. These attributes allow the design engineer substantial freedom in design to achieve the best possible solution that fits process, productivity and budget.

Motion component suppliers are also providing better tools for selecting these components. For example, sizing software assists engineers in selecting the components for a successful installation based upon the specific application parameters. Some of these tools will actually estimate life as well.

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Aaron: Mechatronics has affected the design process in some very profound ways. In a fully integrated solution using mechanical, electrical, control, and software devices in one product, design considerations such as heat dissipation become very important. Heat generation from a motor can greatly affect the accuracy of the mechanical components and operation of the control/drive system. Electrical noise from drive electronics can affect other electrical devices in the system such as encoders and communication. Although fully integrated mechatronics solutions make design projects much more complex and difficult to execute, the end result (if executed properly) is a product much simpler to integrate and use for the customer.

Speaking specifically about linear actuators, a possible component of a mechatronics system, what types of design considerations or system restraints have provided the biggest challenges in designing new actuator products?

Gary: Useful life is typically the main challenge. Linear actuator suppliers are faced with the challenge of putting the maximum capability in the smallest possible envelope. Often a trade-off must occur, particularly when the linear actuator is also required to guide and/or support as part of its function. All of the elements in the linear actuator must be robust enough to accomplish the task in addition to providing meaningful useful life. This has a direct influence on physical envelope as well as cost of the actuator.

When specific environmental conditions exist such as temperature extremes, contamination, wash down requirements or very clean environments, determining actuator life and cost becomes even more complex. Each of these factors may require a different

component selection. The linear actuator supplier will need to understand these variables in order to recommend the proper solution. Linear actuator suppliers who are capable of providing a system inclusive of all mechanical and electrical components will also be challenged with communication protocol.

Engineers need to have a very good understanding of their application as well as the behavior of the selected linear component.

Based on these challenges, what do you feel are the most important engineering disciplines that need to be employed when designing a product component of a Mechatronics system to ensure success?

Gary: Engineers need to have a very good understanding of their application as well as the behavior of the selected linear component. Having all static and dynamic application parameters accurately defined will greatly enhance success in applying a linear actuator. The selection of the actuator is based upon these known parameters. Keep in mind that the linear actuator will be capable of a finite level of performance for a finite number of cycles. Knowing exactly what the application parameters need to be will allow proper selection.

What advice can you offer the design engineer who is faced with developing a mechatronics motion control system that requires the outsourcing of many components and manufacturers to reduce obstacles and increase productivity?

Gary: First, have all your application parameters well defined. Then look for a supplier who has the capability to provide a number of system components and be realistic about system performance and budget.

Search out and qualify potential suppliers as early on in the project as possible.

Aaron: I would also search out and qualify potential suppliers as early on in the project as possible. It is important to work with these suppliers throughout the project to get feedback and advice on the integration of their products into the mechatronics system.

The past decade has brought a huge increase in the demand for integrated, efficient control systems with optimal performance. What is the biggest engineering challenge you see in the future and how will it affect the product development process?

Gary: From a supplier's perspective, improving all the elements used in a mechatronics system will be the biggest challenge. Suppliers will need to continuously drive costs lower while increasing functionality and user friendliness. Communicating closely with the consumer will be imperative to assure the equipment is serving the market needs.

From a user's perspective, the biggest challenge will be making the migration from conventional mechatronics systems to those which are integrated solutions. The design engineer will be able to squeeze additional functionality into the equipment as supplier offerings are enhanced.

Aaron: I believe the biggest challenge for future product development is building and retaining talented cross-functional engineering teams with a good understanding of individual mechatronic components and how they interact and affect each other. Without a solid foundation and understanding in these areas, the success of the entire project can be at risk.

Do you have a question or a topic that you would like our experts to answer?

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