As machine builders continue to tap the benefits offered by today’s advanced automation, they are looking for ways to more effectively link the mechanical and control worlds. One approach that continues to gain momentum is mechatronics – the combination of mechanical and electrical engineering. The fundamental attraction behind this design approach is that it addresses the key desires of machine builders, including the need for greater innovation, more optimized performance, faster time to market and reduced business risk.

Motion Analyzer software from Rockwell Automation can help machine builders reap the full benefits of mechatronics by making it faster and easier to select, size and optimize motion control systems. With Motion Analyzer, engineers simply enter information about the load and how it needs to be moved. From a pull-down menu, designers can then select an actuator, for instance, without having to figure out complex calculations or look up specifications in the manufacturer’s data sheets.

The software also provides performance and simulation analysis that helps engineers more effectively investigate machine behavior and select a mechanical design – along with the optimum controls and software – that will help maximize machine performance.

These simulation tools not only help reduce design time, but also help minimize errors that otherwise might come to light much later in the development process. More importantly, the improved reliability, optimized performance and faster time to market that Motion Analyzer can deliver means more satisfied customers and a more favorable bottom line.
System Thermal Modeling
Motion Analyzer uses a dynamic thermal model of the motor and drive to verify system performance. Model takes into account motor ambient temperature and is especially useful for machine builders exporting to countries with hot weather.

Ratio Design Analysis
Ratio analysis is a tool that helps mechanical design engineers select gearboxes, timing belts and ball screws. It provides an ‘at-a-glance’ view of the tradeoffs associated with altering the mechanical advantage between motor and load, and helps guide the user to an optimized solution.

Supply Voltage Tolerance Analysis
Especially useful for machine builders exporting machines abroad, the tolerance analysis feature helps ensure machine operation with varying supply voltages. Reduces chance of machine issues in the field that result in costly support.

System Efficiency Analysis
System Efficiency Analysis shows where power produced by the motor is consumed. If the majority is being to move the load, the design is sound; if most is being in transmission, it may be back to the drawing board. Using the tool in several ‘what if?’ scenarios helps an optimized mechanical design that can boost performance and reduce energy consumption.

3D CAD Integration
Linking Motion Analyzer with a SolidWorks into the behavior of the load and mechanical profiles. This process can be made even six Allen-Bradley® stages and actuators. Finally be exported to RSLogix™ 5000 to further machine design process.

Supply Voltage Tolerance Analysis
Especially useful for machine builders exporting machines abroad, the tolerance analysis feature helps ensure machine operation with varying supply voltages. Reduces chance of machine issues in the field that result in costly support.
Emergency Stop Analysis

One of the greatest challenges for machine designers is to combine performance with safety. Emergency stop analysis in Motion Analyzer helps take the guess work out of understanding safe stop distances and times, allowing designers the freedom to pursue output without compromising safety.

System Tolerance Analysis

Tolerance Analysis allows application data such as move time, mass, losses and ambient temperature to be plotted against ‘health parameters’ for the system. This provides an insight into a machine's ability to cope with change, identifies the weakest link and estimates the system envelope.

System Tuning Simulation

Tuning simulation is a tool to help predict how your machine will perform in the real world. Emulates tuning an axis in RSLogix 5000 (including ‘Auto-tune’) and then simulates the behavior of the load, motor and drive while factoring in mechanical compliance or backlash to give a realistic result. Helps to reduce design error and save time during machine commissioning.

Lifetime Estimation

Motion Analyzer features Allen-Bradley integrated linear stages that combine off-the-shelf convenience with the reassurance of a service life estimation. Rather than searching through catalogs looking for suitable ball screws, timing belts, pulleys and bearings, simply input load information and a move profile; Motion Analyzer will automatically size the system and also provide an L10 lifetime estimation.
Motion Analyzer Mechatronic System Overview

- **Load**
  - Move profiles are created and analyzed during machine design. The move profiles can then be exported to RSLogix 5000 to assist with machine commissioning.

- **Mechanism**
  - Lead Screw
  - Rack and Pinion
  - Linear Stage
  - Belt
  - Chain
  - Spur Gear
  - Coupling

- **Transmission**
  - Belt
  - Chain
  - Spur Gear
  - Coupling

- **Gearbox**
  - Complex loss model can be used to compute power requirements across the entire speed range.

- **Motor**
  - Support for MP-Series™ Low Inertia, Food Grade and Stainless Steel motors (Bulletin MPL, MPF, MIFS), and TL-Series™ (TLY), 1326AB and HPK-Series™ Motors.

- **Drive / Power Supply**
  - Support for Kinetix® Servo and PowerFlex® Architecture Class Drives.

- **Logix Controller and Network**
  - Simulation of the move profile, mechanical coupling, backlash, drive/motor tuning, network and controller parameters.

Motion Analyzer is available as a free download at: [http://www.ab.com/motion/software/analyzer.html](http://www.ab.com/motion/software/analyzer.html)

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