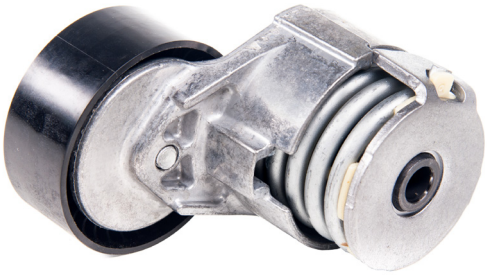
CASE STUDY #1725 | REMAP

# AUTOMOTIVE BELT TENSIONER

## Challenge



Producing automotive belt tensioners requires an assembly system that can monitor and control both linear and rotational motions in real-time to achieve the proper assembly sequence. The tensioner consists of a spring inside a housing which must be wound either to a specified location or to a specified torque. Once the spring is positioned inside the housing the linear actuator presses everything together with a controlled force that is light enough to allow the spring to turn while still being sufficient to hold the assembly together. At that point, the rotary axis is actuated to wind the spring to the specified position or torque, depending on the model being assembled.

Control is then returned to the linear axis which applies enough force to hold the assembly together while a riveting head seals the finished tensioner. The final step is a controlled "unwinding" of the spring by the rotary axis to return the assembly to the "home" position without allowing the spring to snap back violently and potentially damage the completed tensioner.

Performing this assembly process with discrete rotary and linear actuators creates a very difficult control system design challenge.

## Solution

The manufacturer installed a system based on the Promess Rotational Electro-Mechanical Assembly Press (REMAP) which combines fully programmable, servo-controlled and instrumented rotary and linear axes in a single device. Integrated force, position, torque and angle sensors allow the REMAP to determine when the initial holding force has been reached, then wind the spring to its specified torque or position.

The Promess motion controller used in the system can store a number of different programs to allow virtually any combination of spring winding characteristics to be accommodated. The motion controller's built-in data collection capability provides a full record of each part that can be stored for future analysis and tracing.

**Results:**

The servo control and coordinated axial-rotational motion of the Promess REMAP allows automotive belt tensioners to be assembled to spec, every time. The use of a single system eliminates the difficulty of inter-system communication among multiple systems. The standard, pre-engineered Promess system also simplifies machine building and maintenance compared to an ad-hoc "science project" solution. Finally, the built-in data collection capability allows vital process characteristics to be stored, providing traceability for each part.

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