Case History

Colombi In-Line Spring Coiling and Delivery System for Challenging Spring Application

Product:
Special purpose automotive fuel system valve spring

Objective:
Provide a cost efficient alternative for the supply of 4 currently purchased springs that have historically proven to be very difficult and expensive to inspect, feed and orient for installation in an existing automated assembly line. The customer had been purchasing these springs packaged on manually loaded individual pallets.

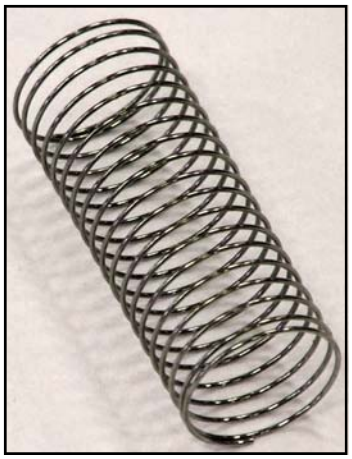
Spring parameters:

Outside diameter	= 20.5 mm (.807")
Wire diameter	= 0.25 mm (.010")
Free length	= 68 mm (2.677") to 120 mm (4.725")
Number of coils	= 23 to 35
Coil ratio	= 41
Material	= 302 SS spring wire
Spring forces	= tolerances from +/- .7 to +/- .9 grams.

The tight force tolerances coupled with a relatively large OD, small pitch and high spring ratio could prove to make these springs very challenging to coil, stress relieve and inspect in-line. The **COLOMBI** engineers accepted the challenge.

Solution:
Managing these very tight spring force tolerances in a machine with moving parts turned out to be the challenge. During the force measurement cycle, vibrations from the machine and the hysteresis characteristics of the load cell were causing readouts that were greater than the tolerances allowed. The solution to avoiding vibrations was to modify the sequence of the machine cycle such that no other motions where occurring during the spring force measuring cycle. The solution to minimizing the problem with the load cell hysteresis was to substitute the standard pneumatic slide utilized to compress the spring to its working height with a servo-pneumatic positioning system.

Conclusion:
Coiling these delicate springs in-line proved to be a far better solution than attempting to handle them manually. Three coiling systems for similar springs have now been running for several years, producing in-spec springs at an output rate of 30 springs per minute. The benefits realized after installation of the **COLOMBI** in-line system are substantial, and have resulted in providing the customer with a competitive advantage in both pricing and quality. Prior to the installation of the **COLOMBI** system, the former supplier of the springs had expressed that in-line spring coiling was not possible with these extreme spring parameters. The spring vendor has since witnessed the system in operation and confirmed that contrary to what they had expected, in-line coiling has proven to be an excellent solution.



Automotive Valve Spring with Extreme Load Tolerance Specs

The Colombi Orbit inspects each spring for load value and delivers only good springs

Colombi Model C4 CNC Spring Coiling, Stress Relieving, Inspection and Delivery System

For more information and videos of the Colombi In-Line Coiling Systems, Click on the following link:
http://www.novoprecision.com/products/spring-coiling/