

## **CASE STUDY #1**

### **Scope:**

Special purpose valve for the automotive industry

### **Request:**

The requested solution from the customer was to substitute a time and logistics consuming feeding solution for four different, very delicate, springs to their assembly line.

### **Spring parameters:**

- Outside diameter ( $D_e$ ) = 20,5 mm
- Wire diameter ( $d$ ) = 0,25 mm
- Free length ( $L_0$ ) = 68 – 120 mm
- Number of coils ( $N_t$ ) = 23 – 35
- Coil ratio ( $w$ ) = 41
- Material = 302 Stainless steel spring wire
- Spring forces with tolerances from +/- 0,7 to +/- 0,9 grams.

### **Extreme springs with:**

- Narrow force tolerances
- Large diameter
- Small pitch
- High spring ratio

Coiling these delicate springs in-line is a far better solution than handling them in another way. The solution the customer used before the installation of the COLOMBI spring coiling system was to purchase them on a palletizing system packed individually.

### **Solution:**

Managing these narrow spring force tolerances in a machine with moving parts turned out to be a challenge. During the force measuring vibrations from the machine and also the hysteresis of the load cell was causing readouts that were greater than the tolerances. The solution to avoid vibrations was to modify the sequence of the machine so that no other motions were running during force measuring. The solution to minimize the problem with the load cell hysteresis was to substitute the standard slide with a servo-pneumatic positioning system (FESTO) for the compression of the spring.

### **Conclusion:**

Three coiling systems with similar solution have now been running for several years producing springs at an output rate of 30 springs per minute.

The economical benefits of coiling the springs in-line with the COLOMBI system are substantial, and have given the customer a significant competitive advantage over competitors.

### **Curiosa:**

The former supplier of the springs prior to the installation of the COLOMBI system has been at the customer and confirmed that contrary to what they had expected, in-line spring coiling was possible with this extreme spring.