

Image Processing System for Production Control

At the First View: Quality in Spring Production

Springs enable the correct movement of mechanical parts in almost all areas of daily life: tension springs, for example, are installed in drawers or compression springs in light switches. Your car contains even around 8000 springs. Therefore, quality and dimensional accuracy are of vital importance in spring production. The Steinbeis-Transferzentrum Qualitätssicherung und Bildverarbeitung Ilmenau and WAFIOS AG Reutlingen have developed an innovative and user-friendly image processing system to enable a 100% quality control of the spring production process for which they were awarded the "Löhn" Award of the Steinbeis Foundation.

WAFIOS AG is specialized in the manufacture of wire-processing machines. To keep the error quote low, innovative image processing systems are used which intervene in the control circuit of the machine during the production process. The Steinbeis-Transferzentrum manufactures small series of cameras - from the mains supply up to the sensor board and adequate housings. These cameras constitute the basis of process control.

A special camera is mounted on the spring coiler. The image processing system checks the geometrical features, like length and diameter, of each one of up to 600 springs/minute by means of camera images. These images are taken by the camera just before the spring is cut off the wire. While the spring drops down, a special evaluation software needs about 50ms to measure the above mentioned spring features in the image and to compare the results with specified limits and tolerances.

If the spring is, for example, longer than required, the software intervenes in the process and corrects the spring length automatically. Thus the next spring is of the correct length again. The rejected spring is removed by a sorting chute.

This highly specialized system is easy to operate. The operator is able to automatically create a new quality control plan for each new spring geometry at the push of an analysis button. No special background knowledge about the image processing system is required.

The complete integration of the hard- and software into the existing machine structure of the WAFIOS AG was particularly challenging. Moreover, interference factors that occur in the high-speed production process, like vibrations or oscillation of the spring, abrasion and dirt or a possible tool breakage, place high demands on the image processing system.

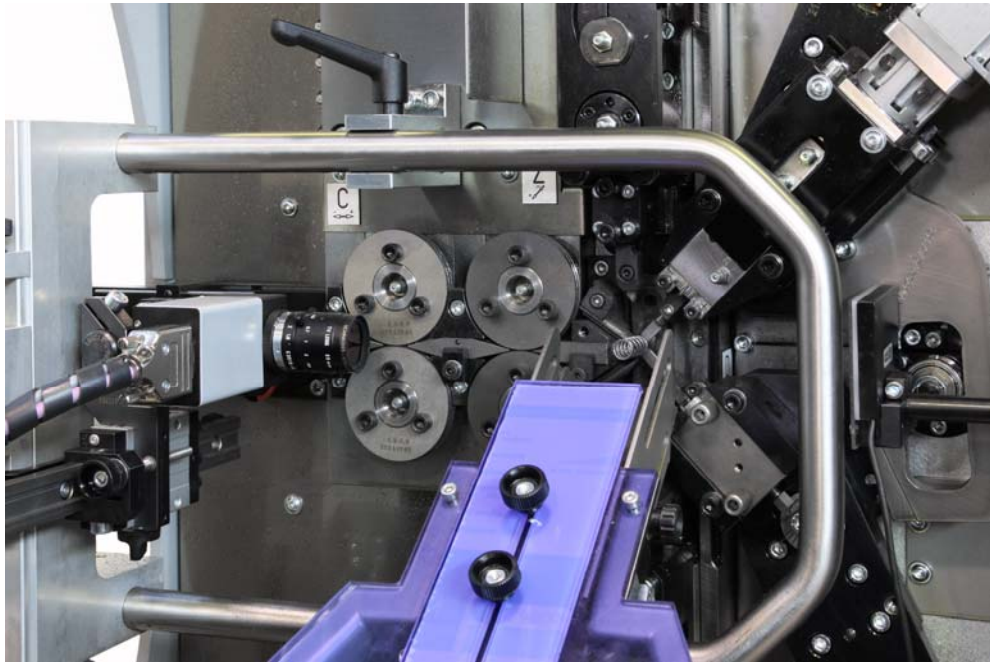
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CNC-controlled spring coiler FUL 25 with image processing system
(camera / lighting / software)