

■ Eldec Schwenk Induction, Germany

Ultra-Dynamic Hardening

Sinumerik 840D and Simodrive 611D comply with the most stringent requirements in terms of dynamics and precision during induction-hardening.



Eldec Schwenk Induction

Eldec Schwenk Induction GmbH in Dornstetten, Germany, uses Sinumerik, Simodrive and Vision sensors in its induction-hardening systems in order to ensure that the best possible procedure is in place for applying significantly increased generator power to components.

If generator power during induction or selective surface hardening is increased, so too is the level of energy that can be applied to components, resulting in a larger hardenable surface. This may also mean that hardening cycle times can be significantly reduced. The pre-condition for this is that the components can be removed from the inductor and cooled quickly enough to prevent heat energy from penetrating the interior of the component too deeply, which may cause uncon-

trollable structural changes. In other words, powerful induction-hardening systems require ultra-dynamic and precise, repeatable movement control.

Eldec specializes in more complex induction-hardening applications such as cogwheels and other uneven surfaces. One of the company's most significant developments is the SDF (Simultaneous Dual Frequency) process, which enables medium-range frequencies (0.5 to 50 kHz) and high-range frequencies (50 to 500 kHz) to be generated simultaneously, in turn enabling individual hardening depths and/or times to be achieved. Additionally, the manufacturer has recently succeeded in increasing the generator power five-fold to three megawatts. This establishes the conditions for further productivity increases.

First “high-performance system” developed

Eldec has now combined the two and developed the EHU 600 2NC, the first three-megawatt system – apart from an experimental system in a laboratory – for selective surface hardening of serial part production. As this procedure is used primarily by automotive manufacturers and their suppliers, Siemens was the only logical supplier for the automation and drive technology. In order to prevent interface problems right from the start, everything had to be supplied from one source. A Sinumerik 840D, in combination with Simodrive 611D series converters and Siemens servomotors can achieve inductor movement times of just a few milliseconds for transfer from the annealing to the quenching position. If even more dynamic levels are required, Eldec uses Siemens linear motors to achieve feed rates of up to 120 m/min. And of course, the Sinumerik control enables processing of extremely precise, freely-programmable curve/hardness profiles should this be required.

In addition, this control system coordinates the movement of the indexing plate, which moves two parts fed in by hand through the system in four steps. The parts are held in exactly the required rotating position by servomotors at the fixtures, which is essential for procedures such as the targeted hardening of grooves. Once the parts have been inserted (and an empty cycle run), a completeness and position check is carried out by VS120 Simatic vision sensors. The two cameras are connected to the Sinumerik CNC via Ethernet and Profibus DP. To reliably prevent damage to components and inductors, these cameras compare previously taught in target images with the actual images at a given time.

After this check, the servo-driven lifting axis moves the inductors into exactly the right hardening position above the parts, which are heated within fractions of a second according to the prescribed “recipe.” It is at this point that the drive performance described above is required. The inductors move upward into the cooling position, where the parts are intensively fluid-cooled so that the material retains the desired structure. In the fourth and final step, an automatic eddy-current crack check is performed on the parts, which are then removed by hand. If required, this step could also be automated. The average cycle time is currently five seconds for two parts. Safety-related requirements such as emergency stop or light curtain monitoring are tackled with great flexibility by the Sinumerik “Safety Integrated” function and decentralized, fail-safe ET 200S Profisafe I/O modules.

Parameterization replaces programming

Bernhard Wilding, application developer in Eldec’s sales department, points out a further benefit of this solution: “We have taken the openness of the Sinumerik system and implemented our own user inter-

face, designed to facilitate the setup, operation and monitoring of the hardening process, and make it as convenient as possible for our customers.” Wilding also tells us: “No NC programming knowledge is required. In all cases, the system can be operated using the parameterization screens.” Access for operators, setup and maintenance personnel is regulated via multiple password levels. The system has been in double-shift operation without any notable faults since it was commissioned in January 2007. Meyer Drehtechnik currently hardens ten different components in rotation using this system. The daily yield is over 8,000 parts – and counting. ■



Meyer Drehtechnik has further extended its range of services with the EHU 600 2NC induction-hardening system from Eldec



Eldec has taken the openness of the Sinumerik 840D and installed its own, easily configured user interface

info

www.siemens.com/sinumerik

contact

www.eldec.de

guenter.krause@siemens.com