

Grinding of chainsaw tracks

Starting point / Task definition

In order to achieve higher quality and shorter cycle times, STIHL wanted an automated solution for the grinding and deburring of wear protectors welded onto the bars of its chain saws, thus replacing the existing manual work stations.

Implementation / Solution



The grinding process could only be automated through the use of a six-axis jointed-arm robot, since this was the only way to meet the requirement for a 23% shorter cycle time. STIHL thus decided in favor of a compact robotic cell with a KUKA KR 30 HA robot, which thanks to its high repeatability achieves very smooth weld seams with no transitions. Absolute calibration is carried out on the robot before operation, thus ensuring extraordinary precision.

The welded chain saw bars move along a roller conveyor to the robotic cell, where an automatic handling device positions them in a locating station. This system reduces the load on the robot and further shortens the already quick cycle time of the cell. The KR 30 HA takes the bars, which are at about 140°C, from the locating station one at a time. To do this, it grasps the part using the clamping jaws of its pneumatic gripper, which will continue to hold the bars even if there is a drop in air pressure. The robot then uses two grinding units to create a smooth transition to the weld seam on both sides of the bar. After that it moves the part to its vision system, which measures its quality on the basis of gray-scale images. Then comes a double brush unit for deburring of the ground surfaces. Finally, the KR 30 HA stacks the bars on one of two europallets in a nearby locating fixture. The robot can continue to work while a pallet is being exchanged, and without endangering the safety of the operating personnel. Bars which do not meet the user's standards are segregated by the robot by placing them in an open drawer for manual unloading.

Because the robotic cell is used to grind chain saw bars with various dimensions, the KR 30 HA always has to know which type is being processed. Its controller therefore communicates with the welding system, which gives the robot the item number of the bar in question. This number indicates to the robot which program is to be used to process the bar.

System components / Scope of supply

- :: KUKA KR 30 HA robot
- :: PC-based KUKA robot controller, including control panel with familiar Windows interface
- :: Engineering of the robotic cell
- :: Linear handling system
- :: Two grinding units
- :: Double brush unit
- :: Pallet locating fixture
- :: Installation of the vision system
- :: Robot programming
- :: Safeguards
- :: Installation and commissioning of the robotic cell
- :: Emergency program which, in the event of a failure of the welding system, enables the robot to grind chain saw bars which have already been welded, and are available in a buffer.
- :: Overall responsibility
- :: Training of STIHL employees at a KUKA College partner program in Böttingen

Lieferung durch den KUKA-Systempartner SHL Automatisierungstechnik AG, Böttingen.



Number of report:
R 244

Industry:
Metal products

Application:
Machining
Polishing, grinding and
deburring

Product:
Controller
KR C (Robot Controller)
Robots
Medium payloads (30-60
kg)

Implementation:
30.10.2003

Customer:
ANDREAS STIHL AG &
Co. KG, Waiblingen,
Germany

Results / Success

:: More consistent quality

The robot's excellent repeatability means that STIHL achieves higher and more consistent quality than before.

:: Economic advantages

STIHL now uses four KUKA robots in the manufacture of its chain saw bars. Concentration on a single brand of robot provides advantages with regard to costs. For example, the maintenance and servicing costs are lower, and the company's employees require less training. Moreover, since the cycle time of the robotic cell is linked with that of the welding system, STIHL has been able to reduce not only the number of job steps, but also the number of employees. Furthermore, the remaining employees benefit from improved working conditions. What is more, inventories could be reduced, since the associated buffers at each of the individual stations were no longer required, and the entire process has been accelerated.

:: Longer service life for the abrasive belts

Another economic benefit of the automation solution is the significantly longer service life of the abrasive belts, resulting from the use of fused corundum as the grinding element. It was not previously possible to use this material, since only a robot can generate the high contact pressure necessary with this type of coating.



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