Robotic Grinding Center for Surface Finishing

De-gating, de-burring, grinding and polishing – these are the time-intensive mechanical processing activities that, depending on the batch size, are increasingly being handled by robots. Increasingly, companies have turned to these modern robotic grinding centers for greater efficiency and to provide their customers with high quality services.

EDGAR GRUNDLER

“Full service as a competent specialist for all surfaces” is the slogan SGA uses to showcase its capabilities and promise its customers a comprehensive range of services in the fields of barrel finishing, abrasive blasting, de-gating, grinding, polishing and cleaning of metallic parts. In addition, SGA supplements its portfolio with sawing and working on cut parts, as well as material hardening using abrasive blasting techniques. Mr. Steffen Berner, CEO, and his team offer customers the entire process chain in industrial surface finishing.

SGA has a rich history of experience. The company was founded in 1993 and initially began operations with vibratory finishing and associated waste water technology. With the emergence of “closed” barrel finishing systems, the business with waste water technology declined, and the company searched for complementary new business divisions.

The company zeroed in on services in the surface finishing sector, namely in the form of de-burring, grinding and polishing work for all kinds of parts. The demand for these services far exceeded their best expectations, and SGA experienced rapid growth over the years. Their sustained growth which is reflected by its modern corporate buildings and a comprehensive machinery and system park.

Not to mention the 80 circular vibrators, drag finishing, continuous flow, centrifugal, tumble belt and pass-through blast systems, sandblasting cabins and cleaning machines, as well as 50 employees and 30 temporary workers, which make SGA one of the largest service providers in the surface finishing sector. An innovative robotic grinding and polishing center deserves special mention, since with this facility SGA is in a position to optimally serve customers and provide timely and highly flexible services for the de-burring, grinding, and polishing requirements of its growing customer base.
Mr. Steffen Berner adds: “As we were approached time and again by customers, to assist in the finishing of aluminum pressed and forged parts, we looked around for a suitable high-performance solution. This is how we introduced robotic grinding technology in 2000. Triggered by other requests, and a rising demand for a relatively large number of parts (between 40,000 and 200,000) to be processed annually, we finally decided in 2005 to invest in a highly automated grinding and polishing system which was flexible with respect to applications.”

Robotic Grinding Technology
SGA selected SHL as its partner for the implementation of such a flexible and high-performance de-burring, grinding and polishing system, since SHL had been building robotic grinding and polishing cells for years. SHL enjoys the advantage, when compared to so-called robotic system houses, that it not only integrates robots and creates special equipment, but it is also able to supply de-burring, grinding and polishing machines from a single source within its own premises. In addition, SHL also takes care of the material flow and material handling peripheral devices, including service, so that the customer gets a complete, secure and safe system for handling the process from a one-stop shop resource. Mr. Steffen Berner and his colleagues first placed an order in 2005 for a SHL robotic grinding system with one robot. The system primarily consisted of one 6-axis industrial robot, Kuka KR 30/3, for handling loads up to 30 kg, two SHL belt conveyor and contact wheel grinding machines, FKS 250/450 ROB, specially designed for aluminum processing, and correspondingly certified by TÜV, one scotch assembly, P550 ROB, clamping devices, tool change set, one pallet and positioning system, various pallets with fixtures for specific parts, one dust-protected enclosure, the controller, software and processing programs for various workpieces. After a brief period in which SGA became familiar with the new system, it developed the robotic system into an “endurance runner”, which is capable of operating in three shifts for producing highly productive, high-quality and economically finished customer parts.

It worked so well that both existing and new customers expressed the need for additional requirements and demanded higher handling capacity. As a result, this led to substantial plant and system expansion in the year 2006 with the addition of another robotic finishing station. This reaffirmed SHL’s competence for the engineering, construction and integration of robotic systems. The modular design permitted the installation of another robotic cell without having to revamp the entire plant all over again.

Modular Design
The modification and expansion program included another 6-axis industrial robot, Kuka KR 30/3, the extension and adaptation of the pallet conveyor system, other product-specific grippers, an additional switching cabinet and mechanical as well as controller-specific adaptation.

Consequently, the robotic plant represents the robotic de-burring, grinding and finishing system...
today with the two cells for de-burring / grinding and finishing, whereby both cells can operate jointly or separately as required. The pallet conveyor system acts as the link, which allows specifically coded pallets to be linked with specific cells and operations.

Based on this design, the robot fetches one part, takes it to the de-burring and grinding station, and puts it back in its original location after processing it. Once it has processed all of the parts in the pallet, it sends the parts on the conveyor to the finishing cell where the parts undergo the finishing process. Alternatively, both cells can be fed with different parts, which provides a higher degree of flexibility in terms of application and utilization. Using the combination of robot flexibility and the de-burring / grinding and finishing services, it is possible to work and produce in three shifts either with a skeleton workforce or with no manpower at all.

With this in mind, Mr. Steffen Berner said: “We work from 5:00 AM in the morning to 11:00 PM in the evening under supervision. In the night, the robotic plant works completely self-sufficiently. Since we have throughput times of 70 or even 140 seconds per part (in the case of complex and time-consuming parts), process and operational safety and security are of great significance. Using the robotic technology, we are not only highly flexible in terms of universal processing capability, but we also achieve precise and accurate reproducibility with respect to quality.

When operating sequentially in both cells one after another for complete processing, the two robots are synchronized and run synchronously. This prevents non-productive waiting periods and ensures greater throughput and efficiency per unit of time. Using the SHL system, we have been able to enhance our performance tremendously and expand our customer base remarkably.

The SHL system is not unlike a universal processing center. We have a high-performance based system and only need to change the grippers and fixtures in the pallets and the processing programs of the robots respectively.”