Wheelblast Machine Combined with a Robot

Shot Peening with Utmost Precision and Efficiency

Ever since shot blasting technology was used for the first time, there has been a desire to develop a shot peening system that combines the advantages of contour-controlled, high-precision airblast systems with those of highly efficient wheelblast applications. This combination has now been successfully achieved with a new robot concept.

In a joint project with the Daimler AG plant in Gaggenau, Germany, Wheelabrator has developed a shot peening concept to increase the fatigue strength of drive wheels and crown wheels in axle differentials. The combination of a powerful wheelblast machine with a robot supplied by Kuka (KR 500) allows the tooth roots of the drive and crown wheels to be placed in the ideal position in front of the shot peening machine that is necessary in particular for generating residual compressive stress. The workpieces can be moved to the blast area with millimetre precision and their motion can be precisely controlled during the working process.

This concept is also highly flexible when it comes to the workpieces being

shot peened. The robot can change the workpiece holder in a short time, thus allowing different workpieces to be shot peened in quick succession.

To do this, the robot removes a workpiece holder from a magazine and then takes the workpiece from one of four loading/unloading stations. The workpieces and workpiece holders are selected fully automatically due to the integration of the robot into the production control system.

Flexibility and precision complement each other

The robot is able to pick up two axle differential parts each with a weight of up to 25 kilograms in a single pass. The ability to pick up two workpieces at a

time reduces the cycle time per workpiece. As soon as the workpieces are held in place, the robot arm couples with a flexible sleeve in front of the blast wheel. This specially shaped sleeve provides the robot with the necessary freedom of movement while at the same time preventing the blast media from escaping from the peening area. This protects both the robot arm and the surrounding machine components from damage.

The robot can now place the workpieces in the ideal shot peening position. This position is automatically calculated when the shot peening points are entered and the robot moves to the position automatically. The shot peening point is optimised by the three-dimensional movement possibilities of the robot gripper inside the sleeve. This enables the robot to move the workpiece in such a way during the process that the surfaces to be shot peened maintain precisely defined distances from the blast wheel as well as the specified angle of impact of the blast media. This ensures a constant shot peening result, thus guaranteeing the extension of the products' service life required by the plant operator.

The concept also allows workpieces to be shot peened up to three times faster than with conventional machines while still maintaining the specified level of quality. ■

The new Wheelabrator Robotpeener: a shot peening system developed in a joint project with the customer Daimler AG / Gaggenau plant that combines the advantages of powerful wheelblast machines with highly precise processing.

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