

An Advanced Robotic Shot Peening Cell

INTRODUCING THE ASP 1200 ECO

The FerroECOBlast “ASP1200 ECO” automatic robotized peening cell was designed and built for a customer in Asia who uses it during the service procedure for shot peening aircraft landing gears. The cell satisfies and even exceeds the demanding requirements of various SAE / AMS standards and requirements in aviation industries, which is facilitated by advanced, computer-based systems.

In shot peening, it is important that the cell provides a repeatable process, i.e., peening the same places from the same distance, with the same speed of nozzle movement, the same pressure, and the same flow of the abrasive. A very important additional factor in the whole system is purification, the elimination of inadequate peening material. It is important that there is no waste in the medium, and that the peening beads are not damaged or broken, which is enabled by the use of various components in the recycling tower, such as different vibration screens, magnetic separators, and spiral separators.

Using a spiral separator, we have ensured the separation of damaged or broken beads from the steel beads with correct shapes. With the use of magnetic separators, we can ensure the expulsion of metal inclusions in non-magnetic media (glass beads).

By integrating the automatic dosing system, we ensure the addition of fresh medium to the system in the event of a detected lack of medium. This enables the customer to eliminate downtime due to the need to refill the system. In order to facilitate easier and faster emptying in the event of a change of medium, we have integrated an automatic emptying of the entire system.

This is just a part of the system that makes up the automated robotized shot peening cell that enables the quality machining of this Asian airline’s components and, consequently, safe landings of aircraft.

In the development phase of the automated robotized shot peening cell, the correct development and implementation of the sequence of technological processes with which we perform the peening process on the workpiece are extremely important.

It is necessary to know the material of the workpiece, its behaviour in the process of shot peening, and how this



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process affects the mechanical properties of the workpiece. Therefore, it is important to know beforehand the technology of aeronautical production and the mechanical and chemical properties of materials on which we will perform the shot peening process.

Without knowledge of prior behaviour, the process of shot peening can be performed improperly, and it may also represent a certain risk for the product due to a wrong execution of the shot peening procedure, thus achieving a completely opposite effect. Therefore, the sequence of operations on the workpiece is extremely important.

In addition, the entire system is designed to protect operators during the work process as well as repairers during maintenance. In this case, we use a security key / card technology from Sick, which ensures that the work process can not be started during maintenance. In addition to this system, the equipment includes all other safety warning systems, the so-called security chain, which provides operator safety during the operation, and the safe operation of the entire cell.

UNIQUE FEATURES OF THE ASP 1200 ECO

The ASP 1200 ECO” automatic robotic shot peening cell is special because it is universal and suitable for high-quality

machining of various aircraft components since it has many built-in applications. For example, the peening of long pieces which comprise the chassis, the vertical internal peening unit, the peening of holes with the rotary lance, the automatic tool change with a laser gauge to check the suitability of the selected tool are unique features of the cell.

The mobile cart with a rotating table and eight satellites are important, too. The cart is brought to the outer platform where parts of the chassis are fastened to the rotating table. Large sections of the chassis are usually fastened to the table, and up to eight smaller ones to the satellites. The rotation of the table and the satellites is synchronized with the movement of the robot, which means that we canpeen multiple workpieces at a time, enabling substantial savings of time and, consequently, money.

In addition, the cell has a built-in camera that allows us to record and control the process. The entire cell is operated by the user-friendly SCADA system and it has simplified machine management, thus achieving greater operator and supervisor satisfaction.

The cell is built for peening with two basic abrasives: Glass bead and steel shot, that is, the metallic and non-metallic materials inside one cell, which are rapidly and automatically changed, without operator intervention. Also, the robot itself changes the necessary tools (nozzles), which again results in a shorter peening (processing) time.



Size classification of peening media

The use of advanced control systems (flux on) ensures the fast and efficient regulation of special MagnaValves, with which we can achieve an accuracy of $\pm 2\%$ of the flow of the medium. Integration of the in-line system for the calibration of the MagnaValves ensures the proper flow of medium, both for steel and glass beads.

Software for the direct recording of Almen test results helps help us control the intensity of shot peening. An on-line camera in the workspace records the machining process of each workpiece in order to ensure the traceability of the workpieces and of each workpiece separately. Finally we have a full information recorded for each single workpiece.

OTHER INDUSTRIES SERVED AND OUR GOAL

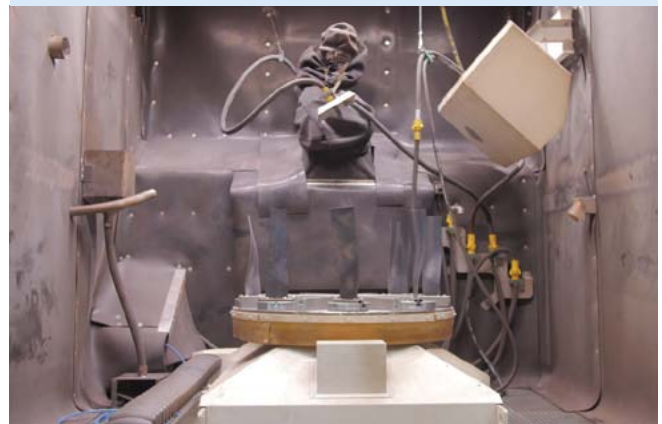
Our shot peening cells are used in the automotive industry, gearboxes and suspension, and in the field of internal combustion engine components. We can boast of our own shot peening cell, with which we offer services of shot peening on various products for customers from both the automobile and aviation industries.

Our goal and long-term vision is to conquer other similar areas where such technology is necessary and important. In the first phase, we want to proceed in the direction of surface peening—laser peening, and shot peening in combination with water, so-called wet peening. Here we also cooperate very closely with our partners, the best world-renowned companies and leaders on this field. In the field of nuclear technology, we can already boast our implemented applications for UHP (Ultra High Pressure) surface decontamination. ●

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Turntable with rotary satellite, synchronized with robot