



# The Modernization of a Shot Peening Machine for Goodrich Krosno

The Goodrich company in Krosno, Poland has received good service from a 36-year-old machine built by Wheelabrator Corporation of Canada. The machine has a large two-wheel blasting cabinet equipped with a 96-inch rotative table and a vertical lance unit for shot peening pipe interiors. The machine was due for a routine renovation and Goodrich decided it was a good time to also update the machine's control and shot flow system. The aim was to improve the efficiency of the machine, reduce production costs, increase its reliability and improve ease-of-use for the operators. Goodrich expected the renovation to simplify the calibration and measurement procedures and reduce the time required to change production parts. Goodrich chose EL-Automatyka in Rzeszow, Poland for the modernization project.

## Scope of the Project

The project, prepared by EL-Automatyka, assumed the complete renovation of mechanical systems of the machine, the improvement of the recovery system, and the installation of a dust collector that would meet the current environmental regulations. The most important goals of the project were to meet Goodrich's requirements for controlling the process.

To better control the machine's wheel blasting functions, the old mechanical shot flow control valves were replaced with a MagnaValve VLP1000 with an amperage controller. The applied PLC controller was equipped with EL-Automatyka's software which converts the given values of the power of the engine charges to the values of the shot flow in pounds/min. The counts are based on the data from the last calibration which is also supported by software. In order to increase the accuracy of the shot flow regulation for the individual wheels, the value of the presently measured power of the wheel charges went under the modernization subtracting the value of the power of no-load run in engines of blast wheels. This step allowed Goodrich to get rid of the nothing-giving information part of the value of the power of the engine charges called as the power of no-load run, and, in this way, to improve the accuracy of indications and

regulations. It has its special meaning in the rate of low rotative speeds (600 to 1200 rpm) where the whole opening (1000 lb/min) of the VLP valve causes a slight increase of the charge power.

The motors of the blast wheels of the 18 kW power are driven from the frequency converters for enabling the regulation of their rotative speeds which were required by the applied Goodrich shot peening technologies. The rotative speeds are measured and displayed on the control panel. Also, the drives of the table rotation, lance rotation and its line movement are powered from the converters.

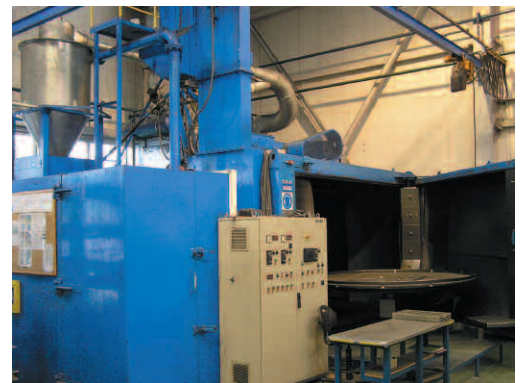
The touch panel control system allows the programming of the parameters of the blasting cycles in the chamber of the two-wheel blasting cabinet and in the air blasting unit of the lance used for shot peening the inside details in the pipe shape. The PLC controller also supervises and controls the dust collector, classifier and the recovery system. All tooling parameters are measured by periodically certified devices as required by the regulations at Goodrich.

## Results

The following information was provided by Wojciech Cmok who is a Special Process Engineer at Goodrich.

## Energy Savings

Thanks to the opportunities available to us because of the precision shot flow control, it is now possible to lower blasting time approximately 15-30%, depending on the dimensions of the part. Moreover, due to getting the proper combination of parameters, (the flow versus



the rotational speed of blasting wheels) the enlargement of the batch was possible.

#### Ease-of-Use

The machine is simple in use because it is controlled from one place—the touch-panel. The operator sees in one place all parameters of the machine including the elapsing time of the process. The setting of the process parameters is very simple and intuitive (i.e., the flow of the shot, speed of the blasting wheels, the rotation and the lance movements). Before the modernization, the change of the shot flow was a time-consuming operation, because it needed the change of the plate position with calibrated openings. Generally, all the steps taken by El-Automatyka resulted in the improvement of the ergonomics of the work and visualization of process parameters.

#### Reduced Shot Usage

The quantity of the shot in the machine did not undergo changes, instead, thanks to the use of the magnetic valves, its usage became better. The possibility of the adjustment of the flow for every wheel in wide limits made it possible, with the maintenance of all qualitative requirements, to shoot both small parts (approx. 2 inches) and large (above 50 inches) easier and quicker. What is more, this adaptation of the value of the flow to the kind of treated material (alloys Al, alloys Ti, and steel) eliminated defects typical for soft metals, such as “rollover” and “bulging”.

#### Reduced Maintenance and Repairs

The modernized system of the shot handling and controlling practically does not demand service. The use of the new dust collector and recovery system improved the quality of the work — the environment is clean and free from dusts. Additionally, we are capable of working parts from alloys of Titan during which inflammable/explosive dusts are created. The periodic calibration shows that the characteristics of the system of the shot administration of the shot does not change—it remains in a field of the tolerance. Also, the PLC software is superbly efficient. Definitely the machine requires less service.

#### Compliance

Thanks to the solutions applied by EL-Automatyka, the shot peening process in Goodrich Krosno meets all the requirements held in the aviation industry and also in Nadcap.

#### About Goodrich - Krosno, Poland

- Small components gear manufacturing
- 98,799 square foot facility
- Employs 198 people

Goodrich designs, manufactures and services complete landing gear systems for commercial, military and business aircraft. With major landing gear facilities in the U.S., Canada and Poland, Goodrich handles jobs worldwide.

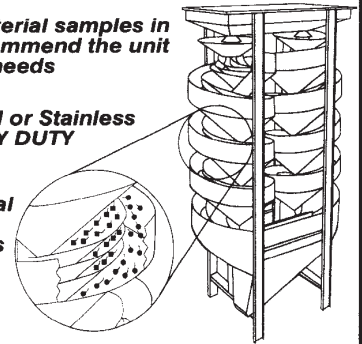
#### About El-Automatyka

El-Automatyka provides control systems and re-engineering to machine tools and other machinery. The company also designs and manufactures control systems for waterworks and pumping-stations. Other services include control systems for shot peening and blast cleaning processes. El-Automatyka distributes Electronics Inc. products including Almen strips and gages. For more information: Telephone (+48 17) 85 47 198 Fax (+48 17) 86 22 539 Email: el@pro.onet.pl www.el-automatyka.pl

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