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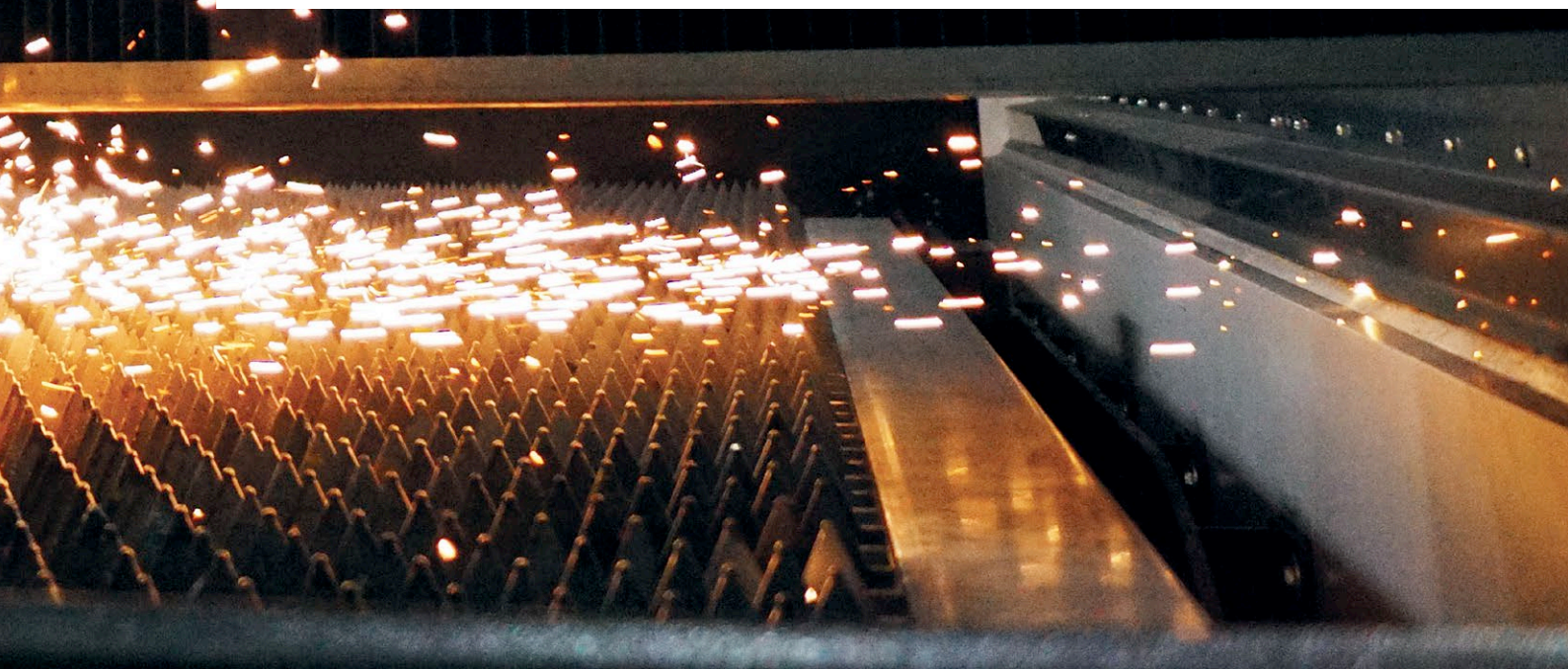




High-tech laser cutters rely on a powerful IPC platform and EtherCAT

## Maximized precision and speed in laser cutting

Due to the outstanding quality characteristics of its beam, the fiber laser has become the technology of choice in the fine cutting of metal sheets. It delivers highly precise cuts with very narrow kerfs and operates with outstanding contouring speed. In order to deliver these features, Polish manufacturer Power-Tech employs fiber lasers in its laser cutting machines and relies on powerful automation technology from Beckhoff for machine control.



The C6930 cabinet PC delivers the computing power that is necessary for the high performance of the Eagle laser cutters.



Eagle laser cutters from Power-Tech can cut virtually any shape out of metal sheets.



Eagle laser cutters can cut virtually any shape out of metal sheets. They use fiber lasers as a light source, which ensure burr-free edges on sheets of varying thicknesses as well as precise and narrow kerfs. Power-Tech makes three variants of laser cutting machines: the Esmart model with a working area of 1,500 × 3,000 mm, as well as the Evision and the Inspire models with working areas of up to 2,500 × 6,000 mm. All cutters feature easy operation, high reliability, and compact dimensions. Equipped with special high-performance Eagle laser heads, they cut through sheets with thicknesses of up to 60 mm. Customers can select the laser power that best fits their needs – the higher the power, the faster the cutting speed.

#### Speeds of up to 150 meters per minute

Power-Tech has continuously improved the performance of its laser cutters. In 2013, the company introduced a machine with a 6 kW laser to the market. In 2016, it followed up with a 12 kW machine, which increased the production efficiency regarding material thickness and cutting speed significantly. "With the Inspire 1530 developed in 2018, we have introduced a laser cutter with a top performance of 15 kW that makes dynamic cutting processes with a speed

of 150 m/min possible," says Power-Tech Managing Director Janusz Marcin Ejma. "We work constantly on making our lasers more powerful, because these improvements have such a decisive impact on a cutter's productivity. A machine with 15 kW cuts out four times as many shapes per hour as a machine with 4 kW, which reduces the manufacturing costs per work piece dramatically." To achieve the necessary machine parameters in terms of motion speed and accuracy, Power-Tech employs powerful control and data communication systems.

#### PC- and EtherCAT-based control as integrated control platform

Power-Tech has worked with Beckhoff since 2010. "After a careful analysis of the market we picked Beckhoff as our control system supplier," says Marcin Masternak, who is in charge of CNC/PLC systems at Power-Tech. "The deciding factor was EtherCAT. The high-speed fieldbus system, which Beckhoff introduced in 2003, has become a global standard because of its performance. Many suppliers of other components used in our machines also use on EtherCAT, which gives us great flexibility in component selection." Furthermore, Power-Tech uses a Beckhoff Industrial PC and TwinCAT automation software as the standard control platform in all its machines. "The openness and modularity of the PC-



The project team in front of an Eagle Inspire laser cutter equipped with a 15 kW laser and an integrated loading and unloading system.

based control system allow us to expand each machine's functionalities with great flexibility, for example by integrating the CNC interpolation. We can also integrate our own solutions, such as the visualization system, which is based on our own proprietary solution," explains Marcin Masternak.

The Inspire 1530 laser cutter uses a C6930 industrial cabinet PC equipped with an Intel® Core™ i7 processor as its control platform. To control the axes via three AX5000 EtherCAT Servo Drives (single- and dual-channel), the X-, Y- and Z-axes are linked via CNC interpolation (the X-axis is implemented as part of the gantry system). Various machine modules such as the laser beam source, cutting head, vacuum suction system, etc. are integrated via analog and digital EtherCAT I/O modules with IP20 and IP67 ratings. Process and machine parameters are processed in real time, with data exchange taking only microseconds. The integrated safety solution was also implemented with Beckhoff components. "With EtherCAT we are able to meet the high requirements regarding the high-speed exchange of large data volumes during laser cutting at speeds of up to 150 m/min. With the great support we received from the Beckhoff control specialists, we were able to achieve a single-axis positioning speed of 4 m/s and

a speed of 5.6 m/s for all axes simultaneously. Our fastest machines feature an acceleration rate of 6 g, which is top-of-the-line in the laser cutting industry," summarizes Marcin Masternak.

#### Trouble-free loading and unloading system integration

The laser cutters are optionally equipped with semi-automatic or fully automatic loading and unloading systems. The Crane Master, a fully automatic and fully integrated system, picks up the sheets via a loading frame and places them on the cutter's pallet changer while the cut parts are removed with a comb conveyor. "The loading and unloading system is connected to the cutter's controller via the EK1100 EtherCAT Coupler, which simplifies data communication," explains Marcin Masternak.

Further information:

[www.eagle-group.eu](http://www.eagle-group.eu)

[www.beckhoff.pl](http://www.beckhoff.pl)