



The CNC waterjet motion system from Jet Edge is capable of advanced 3-dimensional waterjet movement over the work area and can cut complicated components from the most diverse materials with ultra-high precision.

Maximum cutting precision with 5-axis PC-based motion control system

## Ultra-high pressure water cutting heads from Jet Edge master the toughest tasks

Waterjet cutting systems are among the most flexible and precise cutting systems available: they can cut the most diverse materials, from heavy plate to glass to modern composite materials. The advantage of waterjet cutting is that no heat-affected zone is created and the raw materials are not damaged or deformed during cutting. A leading American machine manufacturer, Jet Edge, located in St. Michael, Minnesota, develops and manufactures ultra-high pressure waterjet systems for precision cutting, water blasting and surface preparation. Its latest technological development is the 5-axis EDGE X-5 waterjet system equipped with a Beckhoff PC-based controller that can cut complex components precisely and repeatably.

Jet Edge offers an extensive range of waterjet cutting systems for the most diverse applications: during the Gulf of Mexico oil spill in 2010, the company quickly developed a waterjet system for BP (British Petroleum) to blast away hydrate ice crystals clogging a containment system at a depth of 5,000 ft (1,500 m) underwater. Another high-profile example is the employment of the 5-axis EDGE X-5 waterjet cutting system by Michael Waltrip Racing. The American motor sport team, which assembles about 56 vehicles per year, uses the water-cutting heads to cut more than 1,000 mechanical components for each of the team's NASCAR Sprint Cup cars.

To win such high-profile business, Jet Edge delivers high-pressure waterjet solutions that run from 36,000 psi (248,211 kPa) to 90,000 psi (620,528 kPa),

direct drive pumps that can operate at up to 55,000 psi (379,212 kPa) and innovative motion control systems paired with ultra-high pressure cutting heads. The cutting heads can cut complex, 3-dimensional components from different materials when placed on a flat surface. The cutting heads are suspended on an overhead gantry system that moves over the cutting surface.

### Complex precision cutting made easy with PC-based control

In order to offer high cut edge quality with tolerances of .005 inch (0.127 mm) or less, Jet Edge equips its machines with a fast, precise and reliable motion control system. "Apart from that the system must be flexible," explains Jet Edge Marketing Manager, Nancy Lauseng. "We need an open control system that can integrate the full array of sensors that we use

for our complex motion control system. Our old control platform couldn't keep step with the development of our technology, so we were forced to look for an alternative." Jet Edge chose Beckhoff and developed a solution based on TwinCAT CNC that makes full use of TwinCAT's entire range of CNC functions.

"TwinCAT is now an integral component of our High Rail and Mid Rail gantry systems, which are capable of advanced 3-dimensional waterjet movement over the work area and ultra-high precision cutting," says Nancy Lauseng. Since making the shift to TwinCAT, Jet Edge has observed an improvement in cutting tolerances and cut edge quality. The complete machine controller, including HMI with PLC functions as well as the complex CNC control for execution, is implemented on a C6920-0030 Industrial PC. A CP6912 Control Panel is used for the machine display.

Jet Edge currently uses SERCOS II as the fieldbus, while the Industrial PC is equipped with a Beckhoff SERCOS fieldbus card that connects via fiber optic cables to the SERCOS network that controls the I/O and drive components. Bus Terminal I/O is used to implement various machine functions, such as height sensors and plate mapping, control relays and solenoid valves. The BK7520 Bus Coupler connects the SERCOS bus system to the I/O terminals.

#### Jet Edge waterjet systems to join the EtherCAT industrial Ethernet revolution

"Apart from the extensive product range available from Beckhoff, the long service life of the control products is an important criterion for us," Nancy Lauseng emphasizes. "In 10 years of operating Beckhoff controls in harsh waterjet cutting environments, Jet Edge has never had to replace a Beckhoff controller." Also important for Jet Edge is the openness of the PC-based control platform. "We didn't want to be completely tied to particular vendors. When we replaced our control system we were able to retain the existing motors and drive components."

Delivering flexible waterjet cutting systems that can be easily adapted to the customers' evolving needs has propelled Jet Edge into the leading class of machine builders. In terms of cutting technology, there is no raw material or application for which Jet Edge doesn't have the right tool. This is all done with reliable interfaces between the Jet Edge equipment and customers' factory automation systems.

"With PC-based control we have a control system in our machines that is no longer a limiting factor for speed, accuracy or quality, and moreover we have been able to significantly lower production costs," stresses Nancy Lauseng. "As the next step in the development of the automation system architecture, Jet Edge is evaluating a change from SERCOS to EtherCAT. That would help us extend the limits of machine performance into the foreseeable future."

Further Information:

[www.jetedge.com](http://www.jetedge.com)

[www.beckhoffautomation.com](http://www.beckhoffautomation.com)



Jet Edge, located in St. Michael, Minnesota, is a manufacturer of ultra-high pressure waterjet cutting systems for the most diverse applications.



For the machine display Jet Edge uses a CP6912 Control Panel with DVI/USB extension, which can be installed up to 50 m away from the C6920 Industrial PC.



Michael Waltrip Racing uses the 5-axis waterjet cutting systems from Jet Edge to manufacture high-precision race car parts.