

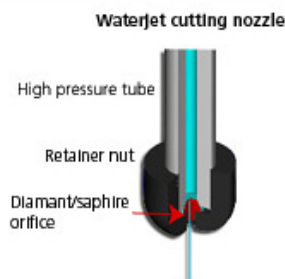
PROCESS INFORMATION

WATERJET CUTTING

Application Process: Robotized Waterjet Cutting



This method, the high pressure waterjet is used as a tool to cut a wide range of materials. The water stream does not cause a heat effect on the kerf edge and hence the material is not subject to heat distortion or stress. The energy required for cutting materials is obtained by pressurising water to ultra-high pressures and forming an intense cutting stream by focusing this high-speed water through a small, precious-stone orifice. The stream moves at a velocity of up to 900 m/s, depending on how the water pressure is exerted.



Working pressure up to 4.000 bar the inlet water is filtered and if necessary treated to reach the recommended quality before entering the High Pressure Pump. An electrically driven hydraulic pump is used to pressurise the process water with a double acting intensifier. The pressure peaks caused by the plunger reversing its direction at the end of each stroke are reduced by the attenuator connected to the high-pressure outlet line. The operating pressure lies between 3.000 and 4.000 bar, depending on the application.

High Pressure Pump



Benefits

- No heat affected zone, hardening or stress in the material.
- Efficient material utilisation, small kerf width.
- Omni-directional cutting of contours.
- Limited cutting force on the part, only simple and cost effective fixtures.
- Rapid and easy prototyping.
- Simple design changes.
- Flexible process allowing just in time manufacturing.
- No secondary finishing is needed.

Limitations of waterjet cutting.

As with any other process, there are limitations that affect the peak efficiency of waterjet cutting:

- The jet starts to break up when cutting hollow profiles
- Multi-layer parts with softer material in between will be "washed out".
- The jet can not drill blind holes or mill flat surfaces on the work piece.

Designing the system around the part. Criteria such as the dimensions and geometry of the part, location and shape of the contour to cut, access for the cutting head, cycle time limitation, fixture interface, handling operations, running costs, etc... need very close attention in order to propose the best possible solution to a customer.

CAD simulations give a competitive edge in the development stage to complete reach studies, path programming and cycle time estimation. Simulation saves time and checks costs to see if a standard solution is suitable or if any optimization is required.

Designing the system

Waterjet cutting is a demanding environment for the mechanical and electrical components of the system. Dynamic Robotic Solutions has great experience in building high quality waterjet systems and we exclusively use robots that meet the IP67 standard. Other critical issues such as the operator's safety, noise levels, part handling, ventilation as well as collecting the water, waste material must be properly addressed to supply the best cutting solution for each individual application. Dynamic Robotic Solutions offers closed cell solutions, Cutting Boxes as "Mono-block".

Cutting Box Original. This flexible cutting solution equipped with a hanging robot and a rotating worktable offers economic cutting of most parts. It is especially suitable for the automotive industry with high volume production. It is also ideal for research and development applications such as rapid prototyping and destructive testing.



Cutting Box Original V

Robotized waterjet cutting offers the great advantage of constant quality when cutting complicated three-dimensional parts. In addition to enhanced quality and efficiency, automating the process with robots avoids hazardous and dirty work, improving employee health and safety. Any material such as composites and fibreglass can easily be cut in three-dimensional shapes.

Typical industrial applications

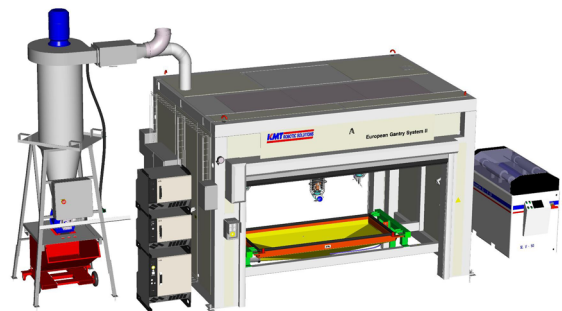
- Trimming plastic materials.
- Cutting interior trim parts in automotive.

Waterjet cutting is now a widely accepted process in industry for trimming plastic, textile and composites.

The major system components

- Cutting Boxes with sound insulated walls
- Robot(s): 1, 2, 3 up to 4 in each Box
- Robot control and Teachpendant
- Optional track motion (7th + 8th axis)
- Worktable with vacuum system
- Part fixture
- Safety devices
- Ventilation system
- Waterjet cutting head and Robot coil system
- Water collecting and separation system
- High pressure pump and tubing
- High pressure gauge and safety valve

Cutting Box EGS. This system is specially designed to cut parts in a process line. The hanging robot is mounted on a gantry equipped with up to four Robots to provide a large work envelope. The front and the back of the sound insulated enclosure open wide to allow access to load large parts onto the fixture mounted above the water collecting tank.



European Gantry System

