



TECHNOLOGY

"Water, which has been filtered and treated, brought from 2,500 to 5,000 bar, is injected through a some tenths of millimeter diameter nozzle. The potential energy is converted into kinetic energy: the nozzle spits a fine jet, coherent over a few centimeter distance, at a supersonic speed of about 1,000 m/s. At the point of impact, the jet pierces the material which is placed at a few millimeter distance away from the cutting head. The head, being held at the end of a robot arm, just needs to be guided along in XY axes to perform linear, circular or even spatial cutting-out. The jet speed is so high that the cutting is performed almost without altering the material or making it wet" (Metal Industries - January 1998)

This is the technology AQUARESE has chosen to develop for most of its processes. The water-jet technique offers many advantages:

- No alteration of the part (no overheating, no burr generated, very little striation, low relief)
- Low material waste (no stress when cut-out)
- Cutting speed (optimum cycle-timing)
- No environmentally harmful fumes or effluent
- Possibility to use several tools out of the same source
- Great adaptability

The pure jet (no abrasive added)

A pump compresses the liquid used (water, oil ...) at a very high pressure, which can reach 5,000 bar. The pressurised liquid is accelerated through a sapphire in which a very fine hole is pierced. A some tenths of millimetre long jet is ejected at a speed of up to 3,000 km/hr.

The abrasive jet

An abrasive jet contains an abrasive added to the pressurized liquid. The mixture is then focused through a tube made of carbide. The abrasive jet (about 1 mm diameter), ejected at a speed of almost 2,000 km/hr, can cut almost all the hardest materials. An adjustment of the focus of the jet makes it possible to transform it into a blasting or machining tool. Consequently, with either of the two processes, it is possible to perform various operations on most materials, whether soft or hard.

Miscellaneous applications

- The cutting of soft or hard materials
- The very energetic blasting of the most adhering surfaces
- The deburring of metal or plastic parts
- Supporting some tooling operations

Miscellaneous examples

- Cutting steel parts up to 200mm thick
- Cutting stone, glass, ceramics, PVC, carbon, rubber...
- Blasting very adhering coatings (ceramic deposits)
- Deburring injectors or car-body parts
- Cutting out nappies
- Cutting out cakes
- Cutting out carpets