

## Wire EDM Gives Way to Dynamic Waterjet Cutting

### Precise cutting process enables radically reduced machining times and lower manufacturing costs in tool manufacture and mould making

**Companies are constantly seeking ways to reduce their manufacturing costs. Practical applications have shown that it is possible to produce precision parts up to nine times faster and reduce manufacturing costs up to 50 percent by using abrasive waterjet cutting instead of wire EDM in tool and mould manufacture.**

**Bretten, August 2003** - Worldwide, an increasing number of manufacturers successfully use both waterjets and wire EDM in their operations, waterjet cutting has already replaced wire EDM in a variety of applications. The Dynamic Waterjet<sup>®</sup> process developed by FLOW can achieve accuracies of +/- 0.04 mm [.002"] under optimal conditions, even when thicker materials, regardless of the type of material used. This enables job shops to produce high-precision parts for less money.

One example is the use of abrasive waterjet cutting to produce dies and drawing punches for extruders in tool manufacture and mould making. In this example, Dynamic Waterjets can cut process time by more than 80 percent. The emphasis in this example is not on achieving the accuracy of wire EDM, which is in fact ten times greater, but rather to recognize that this ultra-high level of accuracy is frequently unnecessary. In many cases, the most important factor is to ensure a taper free cut to the tool surface and thereby to guarantee a high degree of contour accuracy. Ultimately, the goal is to produce a cost effective part in the most cost efficient manner possible.

FLOW's Dynamic Waterjet has taken waterjet technology a step further by eliminating limitations frequently associated with waterjet cutting processes, such as angular errors at the edge of the cut and poorly cut corners. This means it is now possible to manufacture accurate parts even when using thicker materials such as tool steel. To achieve such accuracy as well as higher cutting speeds, this process employs intelligent software and a highly accurate 5-axis machine tool to control the cutting head.

Both wire EDM and Dynamic Waterjet cutting have several advantages. Accuracy and surface roughness are the two primary differentiating factors between EDM and waterjet cutting, with EDM being the more accurate process. If you are cutting an application that requires an extremely tight tolerance, EDM would be

your best choice. However, EDM is also limited to being able to cut conductive materials. Waterjets are extremely versatile, they can cut conductive as well as non-conductive materials. In this waterjets are the best solution.

The particular advantages of the Dynamic Waterjet when compared with wire-erosion are:

- A reduction of up to 50 percent in manufacturing costs depending upon the geometry of the part and the material concerned
- A cutting speed at least eight to ten times faster (e.g. 30 mm/min with tool steel 35 mm thick)
- The starting hole is drilled directly by the waterjet
- Different materials may be processed on a single machine
- Simple application by means of the intelligent FlowMaster machine control system
- No thermal effect at the cut edge

A comparison of different processing methods clearly demonstrates the numerous advantages of waterjet cutting for a modern manufacturing activity (see table: Comparison of Procedures).

Wire EDM is used to cut steels, Inconel, carbide, graphite, aluminium, copper, brass, and titanium. It is extremely accurate, with rough cutting at +/- 0.04 mm +/- 0.05 mm [.002"], and precise cutting of +/- 0.002mm [.0001"]. EDM can cut nearly any thickness but most typically cuts up to 150 mm [6"] thick. EDM leaves no burr, little heat-affected zone and leave and excellent surface finish. Also, a wide variety of wires are used for different applications. Brass, zinc-coated brass, molybdenum, and many others provide different cutting attributes. Zinc-coated wires cut faster, stronger wires such as molybdenum cut more accurately, and so on.

Waterjet cutting represents a cost-efficient alternative for an increasing number of applications involving the manufacture of high-precision parts. It is also possible to use a waterjet system to directly finish-machine components, which previously had to be manufactured in multiple stages on different machines.

Andreas Meyer, Director of Engineering X-Y Systems for Flow International,, Kent, WA, USA and Flow Europe, Bretten, Germany said: "In more and more applications the waterjet and particularly our Dynamic Waterjet Process offers an economically favourable alternative for the manufacture of high-precision parts. Today, parts can be completely finished on a single waterjet machine which previously required processing in a number of stages on several different machines."

Pressemitteilung  
Press Release  
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While there are many benefits to both technologies, your most important considerations when deciding between using waterjets and wire EDM should be determining your existing customers' needs, and looking at what your future customers might need along with finding the most efficient and cost effective manner in which to produce parts.

The waterjet cutting process is today finding increasing application in the construction of precision machines and in the manufacture of complex parts using modern materials. Using modular standardized waterjet-cutting machines with dimensions of from 1.2 m x 1.2 m to 4 m x 6 m Flow Europe GmbH offers complete solutions throughout the world from a single source supplier. The ultra-high-pressure pump produced by FLOW and renowned for their ease of maintenance, and because of a continuous 4,150 bar (60,000 psi) continuous operating pressure, offer the industry's highest levels of productivity. The machines are operated in conjunction with the intelligent FlowMaster<sup>®</sup> control system, a PC-based software with all the necessary material parameters already stored in an extensive data base. In addition to the ease of operation, the software also makes it possible to import and tool path or even program drawings from any standard CAD program. Machine monitoring and diagnosis are also features of the software.

Flow Europe GmbH is a division of Flow International Corporation, USA and the European Headquarters for all products relating to ultra-high pressure waterjet cutting technology. FLOW is a world leader in the development, design and sales of complete water- and abrasive-jet cutting machines for processing a wide variety of raw materials.

Visit us in the internet: [www.floweurope.com](http://www.floweurope.com)

For further information please contact: Flow Europe GmbH  
Gewerbestraße 95  
75015 Bretten, Germany  
Phone: +49 (0) 72 52 - 5 38-0  
Fax: +49 (0) 72 52 - 5 38-5 30  
E-mail: [marketing@flowgmbh.com](mailto:marketing@flowgmbh.com)

# Vergleich unterschiedlicher Herstellungsverfahren

## Comparison of Different Production Methods

Herstellung von Präzisionsbauteilen  
*Production of Precision Parts*

	<b>Wasserstrahl Waterjet</b>	<b>Drahterodieren Wire Erosion</b>	<b>Laserstrahl Laser Beam</b>	<b>Plasma</b>	<b>Brennschneiden Oxygen Fuel</b>	
<b>Materialdicke</b>	++	++	-	+	++	<i>Material Thickness</i>
<b>Materialvielfalt</b>	++	-	+	-	--	<i>Material Variety</i>
<b>Schnittqualität</b>	+	++	+	-	-	<i>Cutting Quality</i>
<b>Schnittgeschwindigkeit</b>	+	--	++	+	+	<i>Cutting Speed</i>
<b>Universeller Einsatz</b>	++	-	--	+	-	<i>Versatility</i>
<b>Präzisionsschnitte</b>	++*	++	+	-	--	<i>High Precision Cutting</i>
<b>Endbearbeitete Teile</b>	+	++	+	-	--	<i>Finished Parts</i>
<b>Umweltverträglichkeit</b>	+	-	-	-	--	<i>Environmental Safety</i>
<b>Flexibilität</b>	++	-	+	-	--	<i>Flexibility</i>
<b>Gesamtbearbeitungszeit</b>	+	--	+	-	--**	<i>Total Machining Time</i>

++ =	<i>sehr gut</i>	<i>very good</i>
+ =	<i>gut</i>	<i>good</i>
- =	<i>befriedigend</i>	<i>fair</i>
-- =	<i>schlecht</i>	<i>bad</i>

\* = mit Dynamic Waterjet Technologie von FLOW  
 = with Dynamic Waterjet Technology from FLOW