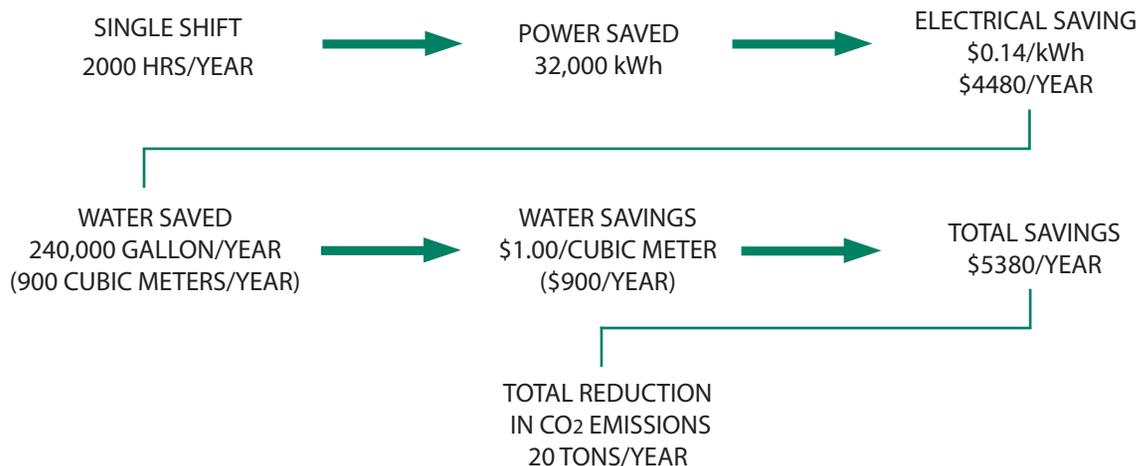


Reducing The Carbon Footprint With TECHNI Waterjet™

The Quantum ESP™ is the most environmentally friendly, having the least affect on global warming and creating the smallest carbon footprint of any of the waterjet cutting pumps available on the World market.

The high level of efficiency achieved by the Quantum ESP™ dramatically reduces the energy and water required. For example, *a typical fabrication company running a single head waterjet cutting machine with a Quantum ESP™, for a single shift for a year, will save approximately 32,000 kWh, saving around \$4,500/year in electricity charges , and reducing harmful CO₂ green house gases by a staggering 20 tons/year. There are also considerable water savings as a result of the increased efficiency. For the above example savings of approximately 240,000 gallons/year can be achieved, resulting in savings of around \$900/year.

* Figures are based on a comparison with a 50HP Intensifier pump running at a 60% Duty Cycle. \$ values are based on a USA average at time of printing.



www.techniwaterjet.com

TECHNI USA

15301 West 109th Street,
Lenexa, KS 66219, USA.
Tel: +1 913 492 3700

TECHNI AUSTRALIA

47 Barry Road, Campbellfield,
VIC 3061 AUSTRALIA.
Tel: +61 3 9357 8360

TECHNI CHINA

No. 3069 Catian Road
Futian District Shenzhen
518035 China
Tel: + 86 755 2399 1213

QUANTUM™
E.S.P.

Electric Servo Pump



WATERJET CUTTING SYSTEMS



INNOVATION AND TECHNOLOGY

Core Technology - Proven & Reliable

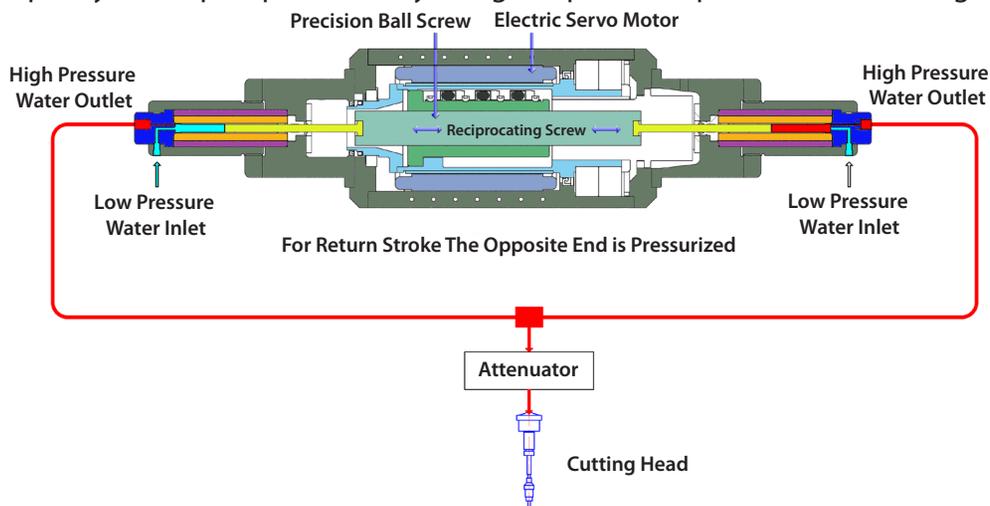
"The TECHNI Waterjet™ Quantum ESP™ (Electric Servo Pump) incorporates core "servo" technology that was first applied by NASA for the Space Shuttle Program by replacing old-fashioned hydraulic cylinders with new, highly compact, efficient, reliable and infinitely controllable Servo Linear Actuators. This same style actuator is used today in many high end machine tools and presses replacing inefficient hydraulic systems. Similarly, TECHNI Waterjet™ is the first waterjet manufacturer to utilize "servo" technology in an ultra-high pressure waterjet pump and has developed patented designs to integrate the core technology into the world's first, most efficient, reliable and controllable ultra-high pressure (UHP) waterjet cutting pump.

Existing Technology - The Best of Both Worlds

Traditional UHP pumps fall into 2 main categories, the Intensifier Pump, and the Direct Drive Crank Shaft Pump. These 2 pumps offer very different benefits from each other but also both have considerable limitations. The Intensifier Pump is capable of producing higher pressures, can support multiple nozzles with varying size orifices, and can be "dead headed" by holding pressure without any water being displaced. While dead heading is desirable, intensifiers have a pressure spike of 5-10% when dead heading, which is harmful to the UHP components and is a significant cause of failure in UHP pipes and fittings. However, these pumps are very inefficient, large and noisy. Direct Drive Crank Shaft Pumps are smaller, quieter and more efficient, but must displace the water whenever the motor is on, which is done by directing the water over a relief valve to drain. This means that they are not practical to run multiple heads or varying orifices as the unused water and energy is wasted. They are also not suitable for running varying pressures, and are less reliable than intensifiers due to their high plunger speeds. The Quantum ESP™ takes all of the best features of the 2 existing technology UHP pumps, with none of their limitations.

New Technology - The Future in Waterjet Cutting

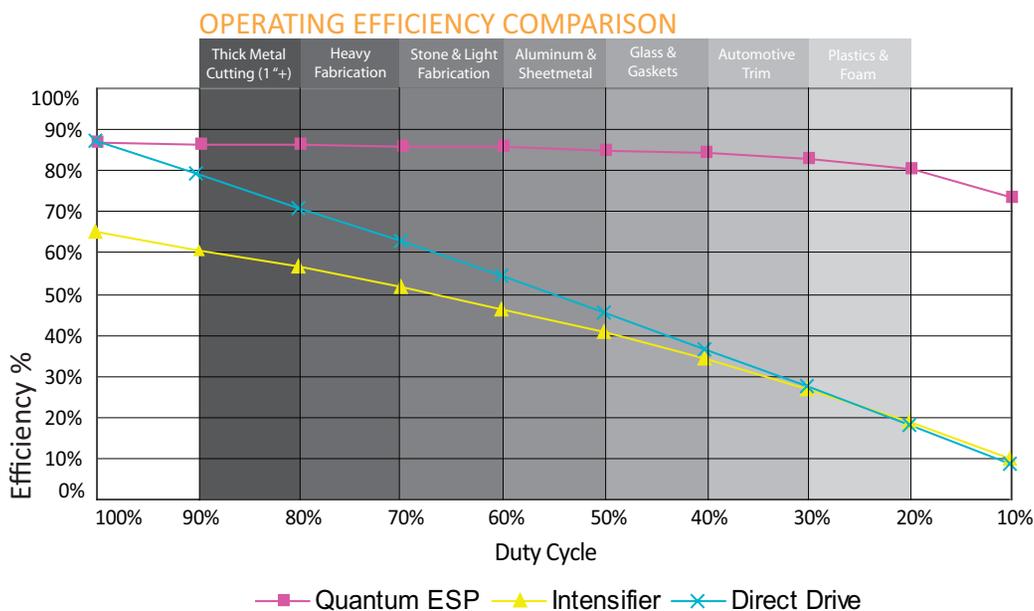
The Quantum ESP™ is a revolutionary concept in waterjet cutting. Incorporating a Servo Motor directly enveloping a high load, precision ball screw. The ball screw directly houses the ceramic plungers, which reciprocate back and forth to create the pumping action, in much the same way as the hydraulic cylinder works on an Intensifier Pump. The infinite control of the Servo Motor and precision of the ball screw, enable extremely accurate control over the output pressure and volume of the water displaced, and eliminates pressure spikes when dead heading. This infinite control gives an operator the ability to program virtually any pressure and flow rate from zero up to the full capacity of the pump, while only using the power displaced at the cutting head.



EFFICIENCY

Real Efficiency - Real Savings

The Quantum ESP™ is by far the most efficient UHP pump available on the market, delivering “real” efficiency gains. Direct Drive Crank Shaft Pumps have traditionally been marketed for their efficiency, however, they are only efficient while the cutting head is open and the full capacity of the pump is being used. When the head closes while the machine positions for the next cut, or the material is being unloaded and re-loaded, almost all of their energy is directed over a relief valve, literally sending power, water, and money down the drain. Intensifier pumps are inherently less efficient due to the power required to simply run the hydraulic system. They also use a large percentage of their power regardless whether cutting or idle as the oil is passed over a relieve valve in the hydraulic system. The Quantum ESP™ only ever uses the power required for the cutting process. This means that regardless of whether the cutting head is open or closed, or the pressure or flow is reduced, there are no additional power losses. The below graph highlights the increasing efficiency gains achieved with the Quantum ESP™ as duty cycles decrease.



Duty cycles relate to the percentage of time that the cutting head is open and actually removing material. As with any profile cutting machine a percentage of time is used positioning the head between cuts and while sheets are being loaded and unloaded. Typical duty cycles range from 90% for very heavy plate cutting, down to 10% for plastics, foams and automotive trim components. Most common Waterjet applications such as Fabrication, Stone and Glass run at about a 60% duty cycle.

THE FACTS

The Relationship between Pressure, Flow Rate and Horsepower

The TECHNI Waterjet™ Quantum ESP offers the unique ability to set varying output pressures, flow rates and power usage. The Quantum ESP is the only waterjet pump that uses only the power required for any given pressure and flow rate. Other pumps adjust pressure and flow rate by dumping either the excess cutting water, or the excess hydraulic oil, over a relief valve.

In order for a user to correctly decide the best set up for a particular application, it is important to understand the relationship between pressure, flow rate and power.

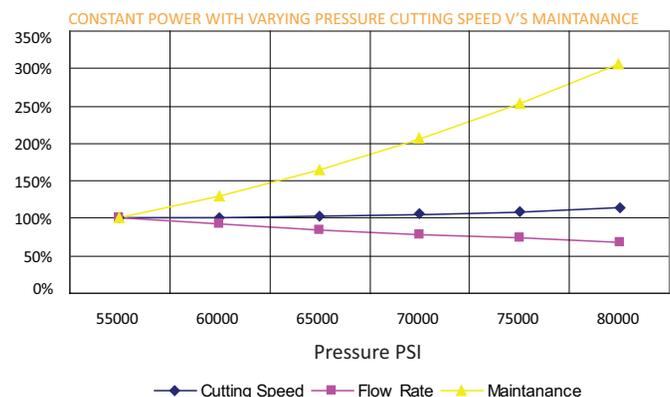
There is much misinformation available which suggests that simply increasing pressure will result in significant increases in cutting speed. While this might be true, but only if you ignore the fact that as pressure increases, so does the power requirement, or the flow rate must be proportionately reduced by using a smaller orifice. For example, a 50% increase in pressure will result in a 50% reduction in flow rate (using a smaller orifice) while maintaining an equal power consumption. Because most traditional pumps have a fixed maximum available power, there is no choice but to reduce the flow rate if higher pressures are desired.

As pressures increase, there is a small improvement in efficiency due to reduced friction, as the same amount of energy is being distributed over a smaller area. Typically, this will result in an increased cutting speed of approximately 20% of the increase in pressure (assuming that the power, garnet supply and focusing tube size remain constant.) For example, using a 50 hp pump with a cutting head set up with a .010" orifice, .030" focusing tube and 0.5 lb/min garnet flow, and increasing the pressure 50% from 55,000 psi (@ 1 gpm) to 80,000 psi (@.65 gpm), will result in approximately a 10% increase in cutting speed.

The Relationship between Pressure and Maintenance

Another important consideration before deciding to increase pressure is the significant increase in maintenance, consumable cost and machine downtime. Pressure (force) has a non-linear relationship with fatigue related wear, and for many mechanical machine components, it has a cubed (x^3) relationship. That means that a 50% increase in pressure will reduce the design life of many mechanical components by about 70%. For example, a 50% increase in pressure from 55,000 psi to 80,000 psi, will reduce the expected life of a component by 70% from 10,000 hours to 3,000 hours.

So, using this example, in order to achieve a 10% increase in cutting speed, the required maintenance will increase by approximately 300%. The cost of components and consumables at pressures over 66,000psi are also typically 50-100% more expensive than standard waterjet components. Plus, add the fact that whenever maintenance is being performed, your very valuable investment sits idle, and it is clear that the decision to simply increase the pressure, should not be taken lightly.



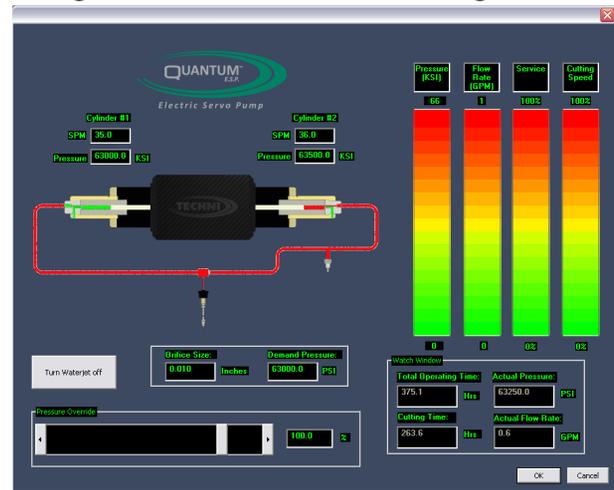
ULTIMATE CONTROL

Control and Diagnostics

Ultra High Pressure water can very quickly cause major failure of high pressure components, if leaks go undetected. The precise control of the Quantum ESP™ allows rapid detection of leaks and assists the user to identify the location of the leak, thereby saving valuable time and minimizing the chance of a simple leak turning into a major breakdown.

The diagnostic control will help determine the following common fault conditions and help identify the fault location:

- Orifice or Cutting Head
- Fitting or Tubing
- High Pressure Seals
- Dump Valve
- Low Pressure or High Pressure Check Valve



The Quantum ESP™ software diagnostic screen gives a quick and easy-to-read analysis of the pump performance, with an in-time graphical representation of the relationship between volume, pressure and maintenance of the pump at all times. This will help the operator determine the correct set up for a given application.

Cutting Speeds

| MATERIAL | 0.25" (6mm) | 0.50" (12mm) | 1" (25mm) | 2" (50mm) |
|-------------------------|-------------|--------------|------------|-----------|
| Mild Steel ipm (mm/min) | 14.9 (378) | 6.7 (170) | 3.0 (76) | 1.3 (33) |
| Hardened Tool Steel | 14.7 (373) | 6.5 (165) | 2.9 (73) | 1.2 (30) |
| Stainless Steel 316 | 15.6 (396) | 7.0 (177) | 3.1 (78) | 1.4 (35) |
| Titanium | 18.2 (462) | 8.2 (208) | 3.6 (91) | 1.6 (40) |
| Aluminium | 44 (1117) | 21 (533) | 9.1 (231) | 4.1 (104) |
| Granite | 85 (2159) | 38 (965) | 17.5 (444) | 7.5 (190) |
| Glass | 90 (2286) | 42 (1066) | 20 (508) | 8 (203) |

Machine Set Up: 60,000psi, 0.013" Diamond Orifice, 0.030" Focusing Tube, 0.75lb/min Garnet

Machine Specification

| MODEL | ESP 55S | ESP 66S | ESP 77S |
|---------------------------------|--|---------------|---------------|
| Max Output Pressure PSI (BAR) | 55,000 (3722) | 66,000 (4550) | 77,000 (5308) |
| Max Output Volume GPM (LPM) | 1 (3.8) | 0.8 (3) | 0.7 (2.8) |
| Physical Dimensions (L x W x H) | 63" (1.6m) x 19" (0.5m) x 36" (0.9m) Weight: 990 lbs (450Kg) | | |
| Max Noise Level | 68 dBA | | |
| Power Requirements | 3 PH 380-480 VAC, 50-60 Hz, 60 Amp | | |
| Cooling Water Requirement | 1.2 GPM (5 LPM) @ 72F (22C) | | |

*Due to constant endeavour to improve the machine, the specification may be changed without prior notice

ELECTRIC SERVO PUMP

- **Most Efficient Waterjet Pump – up to 60% more efficient than standard hydraulic intensifiers**
- **Lowest Cooling Water Requirement – up to 75% less cooling water than standard hydraulic intensifiers**
- **Most Quiet – <68dBA with almost silent operation**
- **Smallest Footprint – over 50% less sq. ft. than an average hydraulic intensifier and lower profile and more ergonomic**
- **Longest Life Fittings and Tubing – due to the elimination of “dead head” pressure spikes**
- **Easiest Maintenance – easy access and improved visual diagnostics**
- **Superior Design - quick-change seal components for the fastest seal change in the industry**
- **Smartest – Intelligent Diagnostic Control reduces maintenance and increases uptime**
- **Environmentally Friendly – significantly less consumption of water & power, and minimal oil usage compared to standard hydraulic intensifiers**

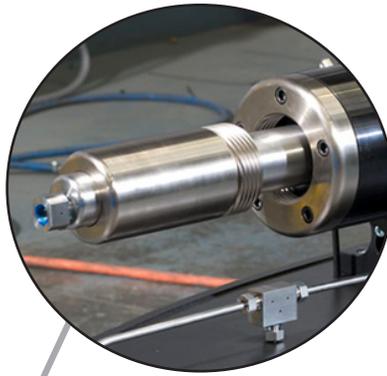


“TECHNI Waterjet™ is proud to be introducing the Quantum ESP™, another waterjet cutting industry first. This revolutionary product follows our introduction of other industry firsts, including Break Away Head™, Precision Stainless Steel Band Drive™, Linear Encoder Feed Back™, Techsense Abrasive Monitoring System™ and the PAC 55™ 5 axis bevel cutting with taper elimination. The Quantum ESP™ demonstrates TECHNI Waterjet’s™ commitment to developing innovative products, that truly benefit the customer”.

Darren Reukers, Managing Director



Long Life High Pressure Components, Designed for Ease and Speed of Maintenance



Quick Change Threaded Cylinder Retaining Sleeve for Increased Safety and Fast Maintenance



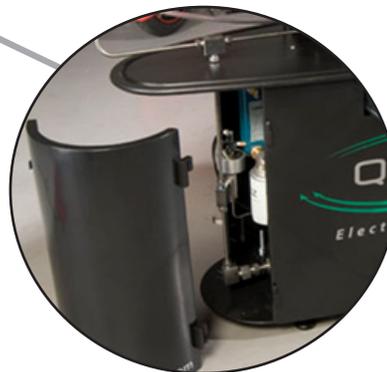
Hard Wearing UHMWPE Work Bench that Resists Chipping, Scratching and will not Damage or Dent Components during Maintenance



Automatic Lubrication System with Filtration and Cooling



Easy Access Spare Parts and Maintenance Tools Drawer



Quick Action Removable Hinged Panels for Ease of Maintenance

**International Patents Pending*