



**RGL's Jetnife**

## Ultra High Pressure Abrasive Water Jets for Cold Cutting in Explosive Atmospheres



*GIVING WATER THE CUTTING EDGE*

**RGL**

# Ultra High Pressure Abrasive Water Jets for cold cutting in explosive atmospheres.



## COLD CUTTING ONSITE SERVICES

Jetnife Hole Cutter

### Summary

**Abrasive Water Jet Cold Cutting is a proven, intrinsically safe method of cutting process plant and structures without heat. It is perfectly suited for use in hazardous environments where there is a risk of fire or explosion.**

The process uses an Ultra high pressure abrasive water jet and will cut any metal, concrete or composite material that contains or is adjacent to highly flammable materials, liquids or gases e.g. naphtha, petroleum, flammable gas, hydrogen sulphide, methane rubber, diesel, paint, tar, grease, plastics or powders.

### Process overview

RGL uses its own portable, remote controlled, cold cutting system (**Jetnife**) that pumps UHP water through a cutting head nozzle to produce a water jet at 3000 bar/ 45,000 PSI.

At the nozzle tip a small quantity of garnet is fed at a metered rate into the water stream to produce a high velocity abrasive cutting jet. Crushed garnet is a hard, angular, sharp mineral available in graded sizes. This enables it to pass through a small diameter nozzle without clogging.



Crushed Garnet Abrasive Cutting Media

Cutting cannot be undertaken freehand. The nozzle is mounted on a driven carriage and secured to tooling which in turn is secured to or in close proximity to the material being cut. This ensures a high degree of accuracy and control.

We are capable of cutting any material and creating complex shapes, circular or rectangular holes. Small and large radii.

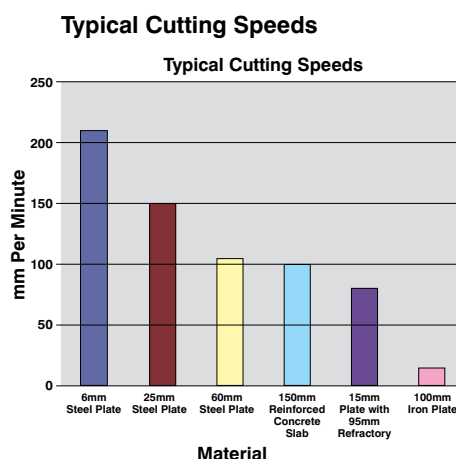
### Applications/experience

RGL's **Jetnife** system can be deployed in many situations involving; upgrade, repair, maintenance, inspection, demolition or disinvestment of plant and equipment.

### Materials to be cut

Abrasive water jets are able to cut any material known to man. We have cut metal up to 600mm thick, Cementitious & rubber linings, coatings and multi-layer composite materials.

### Cutting speeds



### Cutting finish/tolerance

As a guide; cuts can be achieved to within 1-3mm tolerance.

Whilst we currently do not offer precision cutting, our process removes just a few millimetres of metal. This means that in many cases the removed coupon of material can be reused.

Cold cutting provides a smooth clean cut, ideal where part of the structure is required to remain undamaged. Minimal dressing and finishing are required. Mitred/Weld preparation detail can be added to pipes if required.

Cold cutting does not alter metallurgical properties of the metal. No heat in the cutting zone means that the original structural integrity of the substrate is preserved.

### Environmental advantages

Garnet is an inert mineral that presents little or no adverse environmental consequences. On impact garnet breaks down into a powder based sludge that immediately separates from the waste water. The water can then be disposed into site drainage system and the garnet sludge can be separately collected and disposed of as non hazardous general waste.

If waste water is contaminated with oils or chemicals, the effluent can be contained and removed by vacuum tanker for disposal to licensed site.

### Limitations/Hazards

When cuts are made into an enclosed area e.g. pipes/tanks there may be a consequential risk of damage to adjacent material or coatings. This can usually be overcome by the introduction of water into the pipe or the use of a sacrificial plate that the jet can impinge upon once it has penetrated the material being cut. Alternatively adjustments can be made to the angle and speed of cut to minimise this effect.

If the cut is made into pipes that have connected equipment e.g. pumps/valves, it is advisable to isolate this equipment so that the spent abrasive can be completely flushed out of the system prior to re-commissioning.



Coupon Removed from Gas Holder Crown



Cold Cut Coated Steel Pipe



Jetnife Pipe Cutter



Cold Cut Side Sheet Heavy Oil Storage Tank



Large Diameter Pipe Cutting / Flange Removal



Cold Cutting Hole into Cylindrical Steel Vessel



Cold Cut to Remove Cat Cracker Head



Abrasive Water Jet Cutting Hole in Vessel at an Oil Refinery

## RGL experience of cold cutting in hazardous environments

### Oil refineries

#### Gas flare line

Removal of a horizontal section prior to replacement.

#### Refractory lined gas pipework

Cut large diameter pipework to enable new section to be fitted.

#### Catalyst regeneration unit

Cut/removal of domed head.

#### Fractionating towers

Repair/upgrade/controlled demolition.

#### Turbine casing

Cut large diameter threaded fixing studs and nuts.

### Gas storage

#### Storage tanks/cylinders

Disinvestment of 40mm thick cylinder adjacent to live operational site.

Cut apertures into gas holders to allow full ventilation prior to repair or disinvestment.

### Oil/fuel storage

#### Storage tanks/cylinders

Cut apertures into heavy oil storage tanks for cleaning.

Cut access holes for surveys/insurance validation or for leak assessment.

#### Underground tanks

Removal of buckled, perforated or corroded sections for replacement.

Cut angled weld preparation detail onto pipework.

### Chemical plant

#### Chemical vessels (e.g. styrene/rubber)

Alterations to pipework to enable new valves to be fitted.

Removal of flanged stub pipes.

### Utility – Waste water

#### Waste water treatment works

Alterations to cast iron/steel pipes to enable re-routing or new T pieces or valves to be added.

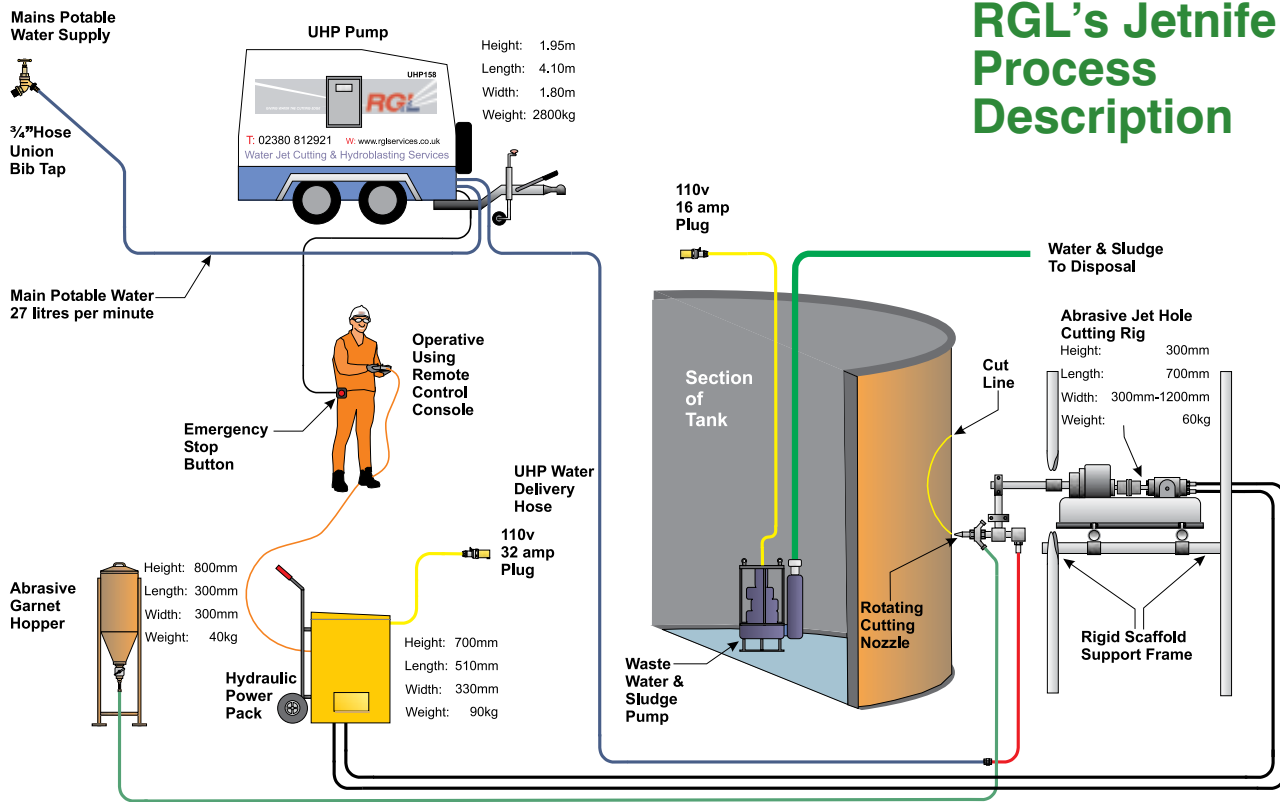
### Onshore oil exploration site

#### Well site/cellar

Cut steel joists in roof of underground tank prior to upgrade of well site.



# RGL's Jetnife Process Description



Our portable diesel powered trailer mounted Jetting Units require a water supply in the region of 10 - 20,000 liters per working shift. Each diesel engine is fitted with a certified Chalwyn Valve engine over speed protection and exhaust Spark Arrestor. This enables them to be used on sites where explosive atmospheres could be encountered, such as Oil Refineries or Chemical plants.

The water supply (see Client supplied services) is pre-filtered to 1 micron before it enters the pump to maintain pump performance and reliability.

Ultra High Pressure Hose Assemblies and connectors link the pump to the cutting nozzle.

Depending on the task, a suitable nozzle handling device is selected from our extensive range. This device is either fixed directly to the work piece or adjacent to it via separate support frame (Generally tube and pipe scaffolding).

When using our Track System; we mount the nozzle on a hydraulic rack and pinion driven carriage.

We offer a wide range of different nozzle handling devices and associated tracks

depending on the type and shape of the cut required. This can vary from straight cuts through to complex shapes, radiuses, coupon removal.

Where required we design and manufacture bespoke pieces of tooling for specific applications.

Our nozzles and cutting track have been refined over many years to be as effective and reliable as possible in very harsh environments. Few companies can match the reliability and cutting speeds that RGL can achieve.

Once set up has been completed, a remote console is used to control the operation of carriage/water jet.

## Additional Considerations:

- Access and supporting scaffold
- When cutting in open air an exclusion zone/ work enclosure at the workface is desirable to contain water spray
- Acoustic mats to keep noise within site limits
- Waste water collection, filtration and treatment prior to disposal
- Sacrificial plate to deflect/diffuse the water jets energy after it has made its cut and passed through the work piece.

## Client supplied services/ considerations

Cold cutting requires a peak flow in the region of 25 litres of potable water per minute. This would typically be drawn from chlorinated, town mains water supply. In some circumstances potable water can be supplied and stored in storage tanks adjacent to the working area and pumped across to our jetting unit.

Clients should consider how the item being cut might be supported to prevent movement during cutting.

Also, consideration should be given to how the cut section of pipe/plate etc. can be lifted out once cut.

## Safety

The system is inherently safe. Once set up has been completed, an operator positioned well away from the work surface uses a remote console to control the commencement, direction and speed of the carriage/water jet.



“What we say  
....we do”

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**RGL**