



Refractory Lining Hydrodemolition

Ultra High Pressure Water Jets for Refractory Lining Removal



By remote controlled, Ultra High pressure Water Hydrodemolition Process

GIVING WATER THE CUTTING EDGE

RGL

Refractory Lining Removal by Ultra High Pressure Water Jets



Inlet duct cut showing Hex Mesh

RGL'S REMOTE CONTROL SYSTEMS

Overview

A safe and effective method of removing old or damaged cementitious refractory lining material. From catalyst regeneration chambers, risers and loop seals, as well as furnaces, incinerators and boilers using a purpose built rig incorporating a remote controlled water jet cutting head. The rig can be used for entire lining removal or patch repairs. This is an innovative, proven solution which does not damage the integrity of the steel vessels or pipes, preserves the 'Y' anchors and Hexmesh but safely removes the refractory lining. It is also used for removing refractory from Boiler Water Walls and leaves the delicate tube un damaged and perfectly clean ready for re application of new refractory material. This method is quicker and more cost effective than the jackhammers and reduces overall turnaround times for this critical maintenance task. This is an in house developed solution which has been trialled and refined over recent years.

Method

A light weight modular adjustable frame is deployed into the Vessel or Boiler and normally winched into position. This can quickly be assembled by two men. The remote control cutting head is positioned on the frame over the area of refractory selected for removal. Once in position the men leave the vessel. A series of remote control, nozzle passes are made removing the lining material. Once a section of lining material has been removed the rig is repositioned to the next section.

- Once the rig is positioned operatives normally remain outside the structure during the cutting process thus reducing their exposure to hazards.
- The remote control powered movement of the cutting head is provided by an Electro - Hydraulic power pack control unit. The operator has full control via a console on a wander lead.
- The cutting head uses an ultra high pressure water jet to cut the refractory lining material. This leaves all steel

intact (note: the threshold pressure of lining material is lower than the steel structure, anchors and Hexmesh)

- It is capable of negotiating and removing linings in bends and lobster back sections.
- The water jet removes all non – visual chemical contaminants and helps ensure that subsequent failures due to corrosion of the steel substrate do not occur.
- The water jet process leaves the surface clean warm and dry.
- The water jet cuts the refractory lining material into small pieces (similar to coarse gravel) and this waste can be removed manually or by vacuum truck.
- Ultra high pressure water is delivered via portable diesel driven pump units with working pressure up to 3000 bar.
- The cutting head uses clean tap water – approximately 14,000 – 20,000 litres of water are used in one shift.
- Waste water is filtered to remove the majority of suspended solids and then disposed through plant drainage system.

To optimise timing for equipment set up on site and deployment of cutting rig, early involvement with your TA Team for planning is recommended.



Lining Removed from large diameter Flue Gas Riser Pipe



Partial removal completed, showing cutting head making vertical pass.

All material removed in target area.

Duration

For this type of operation we typically work around the clock, running two twelve hour shifts.

Strike rate

Typical removal speed – 0.1 cubic metres per hour We have previously achieved removal rate of one square meter of 125mm thick refractory in 2-3 hours over a sustained period.

Access

The frame and cutting head can be inserted via 500 mm diameter man way

Experience:

Exxon Mobil - Fawley
Essar Oil - Stanlow
Enviropower - Lancing
Vesuvius/EON - Stevenscroft
Mollar - Hexham
Total - Milford Haven

	RGL “Remote control water jetting”	Comparison with jackhammers
Safety	Operatives normally remain outside the structure and cut via remote control.	Higher risk because operatives are working in confined spaces with dust, flying debris, noise and HAVS risk
Cost	Does not damage the integrity of the steel vessels or pipes, preserves the ‘Y’ anchors and Hexmesh – so overall costs compare favourably with conventional methods.	Secondary process of grinding off and replacing ‘Y’ anchors and Hexmesh required. Where removal of lining is required over tubes. Damage caused to tubes by jack hammer points means they must be buttered up/welded.
Speed	This solution is a one step process without the need for secondary processes.	Requires additional contractors / processes (as above).and HAVS risk
Quality	Excellent – produces a perfectly clean surface which is free from any chemical contamination. Improves the quality and longevity of the subsequent lining material. This substantially reduces the risk of failure of new linings through disbondment.	Disbondment sometimes occurs due to poor quality surface preparation.
Risks	Minimal – vibration free. No danger to steel substrate, micro cracking or disbondment of adjacent lining material.	Jackhammers can cause damage to steel structure, ie “boiler water wall” through mechanical damage, vibration and operative error – they also produce sparks and dust.
Patch work quality	Excellent – no transfer of vibration to adjacent refractory lining material No micro cracking or disbondment Helps improve the bond between new and existing refractory material	Jackhammers produce vibration and cause, micro-cracking in the remaining refractory material.



Riser Cut showing close up of refractory and Y anchors



“UHP water jetting is now recognised by engineers and consultants as the safest, most effective, vibration free method of refractory lining removal”



- Ultra high pressure water jets are used to remove sound and deteriorated refractory
- Highly versatile – can be used for most projects/applications
- Cuts to any depth
- Creates no percussive noise or vibration
- Steel structure suffers no damage

Compared to other methods?

- No heat/dust, sparks created or blades to clog or go blunt
- Usually faster than jack hammering
- Less noise than percussive tools
- No HAVS issues – crews can work normal hours without risk

Typical applications



J Bend cut showing refractory

We remove refractory linings from

- Boiler water walls
- Incinerators
- Power plants
- Oil plant flue gas lines
- Catalyst regeneration plants
- All large and small diameter ducts and risers



In summary, we will do our utmost to deliver complete satisfaction to you by:

- responding quickly to your enquiries
- working with you to fully understand your requirements
- providing you with the benefit of our experience
- preparing detailed site safety, quality and environmental plans, including method statements and risk assessments
- providing competitive quotations
- delivering on what we promise for project start and duration
- deploying experienced crews and proven, correctly maintained equipment
- working within site safety rules and regulations
- managing the project environment including waste water treatment and filtration
- managing each project through to completion

**“What we say
....we do”**