



## An introduction to KRR (UK) LTD

**Avoid costly down time with KRR (UK) Ltd's unique online boiler cleaning technology. Used safely and effectively worldwide!**

KRR (UK) Ltd is a company specialising in the fast and effective cleaning of boilers in waste to energy plants, bio-mass and conventional power plants. Using proven and unique pressure wave technology, we are able to clean boilers without the need for them to be shut down. This means you can continue to generate power at full capacity without the need for several days downtime.

### **And full capacity means maximum generating revenues**

Based in Guildford, Surrey, the company's full-time team of engineers bring many years operational experience to each project, ensuring the work is carried out to time and budget. The system is quick to set up and cleaning is very time efficient with minimal infrastructure requirements. Pre and post clean monitoring means you are able to see how effective the KRR system is.

### **Here when you need us**

Whether its routine scheduled cleaning or an emergency, KRR (UK) Ltd is the only company to be able to provide a truly rapid response service.

### **Where can it be used?**

Our cleaning technology is used in waste to energy power generation plants and can be applied in

- **Furnace**
- **Radiation part**
- **Evaporator**
- **Superheater**
- **Economiser**
- **Air pollution control systems (APC)**
- **Silo's for ash storage**

Offline cleaning before inspection and maintenance means that boilers, silo's and APC systems can be cleaned efficiently, safely and cost effectively.

Traditional cleaning methods require plant to be shut down to allow safe boiler cleaning. The operational and cost impact is considerable. That is why our technology and service is being widely used by operators all over the UK.

We are able to effectively and quickly clean boilers whilst they are running, removing the need for plant shut down. The efficiency of the cleaning is such that additional cleaning of boilers between scheduled maintenance is often not necessary.

### **KRR cleaning means lower cost and higher revenues**

There are multiple benefits of using KRR (UK) Ltd:

#### **Lower costs**

Traditional cleaning methods are costly in terms of staff and time – with KRR online cleaning this cost is removed.

#### **Higher Revenues**

Because online cleaning ensures continuous operation, generating revenues are not affected.

#### **No impact on operations**

The cleaning process involves the use of compact equipment and limited personnel with minimal infrastructure requirements.



### **Continuous operation at full capacity! Consider these examples**

#### ● **Example benefits of KRR offline cleaning**

The cost for manually cleaning an average boiler (13t/h MSW, 40t/h steam), when you take into account additional downtime, loss of revenue and the actual costs related to the cleaning can be up to £60,000.

**The same job can be achieved by KRR much quicker for under £10,000**

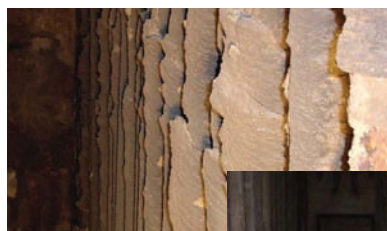
#### ● **Example benefits of KRR online cleaning**

Savings for online cleaning are even more impressive. The cost for manually cleaning an average boiler (13t/h MSW, 40t/h steam), when you take into account additional downtime, loss of revenue and the actual costs related to the cleaning can be up to £100,000.

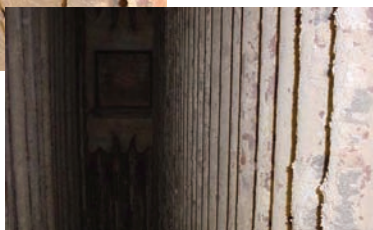
**The same job can be achieved by KRR much quicker for under £11,000**

### **Sounds too good to be true?**

*Full price and cost breakdowns which underpin these assumptions are available.*



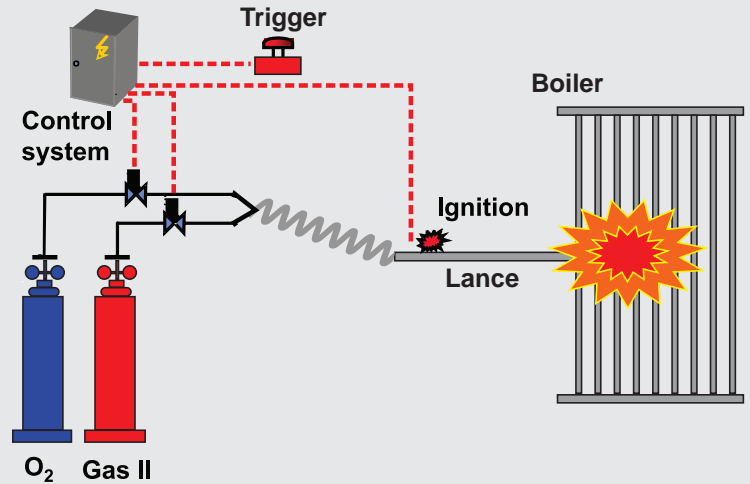
*Before cleaning*



*After cleaning*

### How does it work?

- A lance is introduced into the boiler near the area to be cleaned.
- At the end of the lance a balloon is inflated with an explosive gas mixture.
- The mixture is ignited via a remote ignition on the control panel.
- The resulting explosion creates a shock wave which causes vibrations in the boiler wall and pipe bundles. It is these vibrations, along with the shock wave that dislodges the ash.



### Technical Requirements

#### Boiler/Vessel Openings

To reach the areas to be cleaned, boiler openings must be a minimum 100mm ND

#### Access requirements

In front of each opening there must be sufficient space for handling the cleaning lance.

#### Connections required

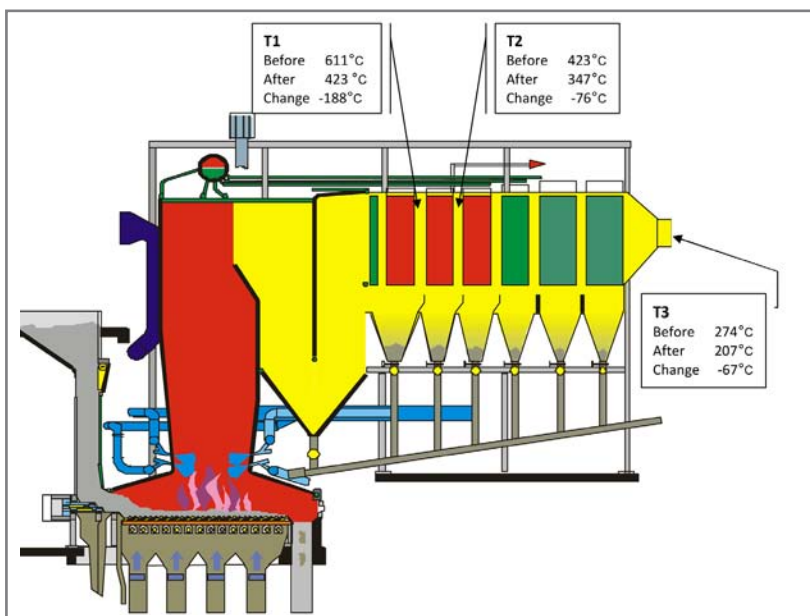
Pressurised Air (4-8 bar)

Water (4-8 bar)

Power: 110 volts

#### Cleaning interval

Depending on the boiler design, waste composition and operating conditions boilers should be cleaned between 4 weeks and 6 months.



### What are the results?

The following is a typical result taken from a boiler cleaning in Veolia plant in Tysley, Birmingham

		Before	After cleaning	Delta cleaning
Superheater 2 inlet temperature	T1	611°C	488°C	-123°C
Superheater 2 outlet temperature	T2	423°C	347°C	-76°C
Economiser outlet temperature	T3	274°C	207°C	-67°C

## Safety: First and always

### Safety

For those not experienced with pressure wave cleaning technology, the idea that an explosion will be set off inside the boiler can be alarming! It's a perfectly reasonable anxiety but the following will provide clarity and understanding of why there is no basis for concern.

For KRR (UK) Ltd, safety is a guiding principal of our organisation and operatives. Nothing is left to chance when undertaking cleaning operations to ensure the safety of personnel and plant.



- **There is no risk of damaging the boiler pipes or structure**

This is true even if the explosion bags connect directly with them. This is because the special gas mixture which is ignited creates a sonic wave which dislodges the ash.

- **No explosives are used**

The sonic wave explosion is produced by a mixture of gases which are mixed immediately prior to use.

- **Fail Safe**

Should any aspect of the system fail or develop a fault then fail safe systems immediately come into play.

- **Systems, staff and procedures**

Any technology is only as safe as the protocols which govern its use and the experience of the personnel who operate it. All our staff are equipped with the latest safety kit and experienced in all aspects of the technologies operation. Vigorous Standard Operating Procedures and reporting are in place. In addition to our own safety systems, KRR UK's staff are all trained to adopt the operational site procedures, including lock out and permit to work systems.

- **Proven technology used worldwide**

Our technology is used widely in plants in Holland, Germany, Switzerland, Denmark, Sweden and Japan. To date it has been successfully and safely applied in over 100 plants during 1,500 cleanings. We are happy to provide references from existing customers.

- **Fully Insured**

KRR (UK) Ltd operations, staff and customers are fully insured. Further details available on request.

- **ISO Certified**

KRR (UK) Ltd is fully certified to ISO 9001 standards.