

RJM resolves the most complex combustion and emissions challenges for all fuels including biomass and Energy from Waste through the application of cost-effective, innovative solutions

IMPULSE® Online Boiler Cleaning Technology



The IMPULSE® Cleaning System has enabled the plant to increase MWe output and operate longer campaigns with reduced downtime

RJM International is an award-winning provider of products and services that enable power producers to operate more cleanly, efficiently and reliably as they embark on their transition to Net Zero.

With offices in the UK, the USA, the EU, Singapore and Malaysia, supported by agents in key markets, RJM is able to carry out projects all over the world.

IMPULSE® Cleaning is Revolutionising On-line Plant Cleaning

IMPULSE® Cleaning technology delivers dramatic improvements in the online cleaning of fouled surfaces, when compared to conventional cleaning systems. The pulse waves work effectively as a non line-of-site cleaning system, removing deposits without erosive damage to heat transfer surfaces, unlike conventional cleaning systems.

A Proven Technology for Every Fuel

Biomass Power Plant, UK

Outotec 21.5 MWe unit firing 165,000 tonnes per annum of waste wood, UK

IMPULSE® Objectives

Gasifier: To increase availability

Boiler and Economiser: To increase load

RJM Solution

Install 11 IMPULSE units; four each on the gasifier and economiser, and three on the evaporator

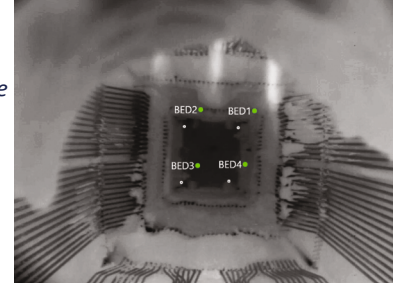
IMPULSE® Results

Post IMPULSE upgrade, gasifier availability increased by 5% (19 days) with load increase of 1 MWe)

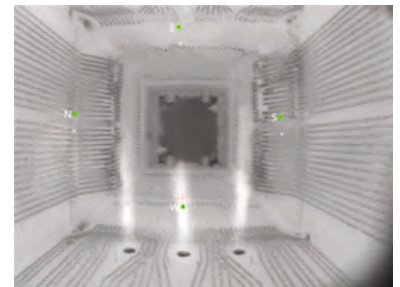
Key Benefits

The combination of increased availability and load has returned the plant to profit with a financial payback of just over 12 months

Before: Gasifier image (Right) 28 days running with no IMPULSE® firing. Note large build-up of ash deposits on the water tubes in the top right-hand corner



After: Gasifier image (Right) 21 days running with regular IMPULSE® firings. Water tubes in the top right hand corner are still clearly visible with minimal ash deposits.



Waste to Energy Power Plant, USA

BWSC 8MWe unit

Firing RDF, the unit could only run for a limited time before the air heaters were fully blocked

Post-IMPULSE® installation, the unit run-time doubled to 2 - 3 days.

Coal-Fired Power Plant, USA

261MW unit

Firing sub-bituminous coal

Two IMPULSE® cleaning systems installed on opposing walls of reheat section of boiler. Operational running times increased from 12 months to 18 months.

Two steam soot blowers no longer required

Key Advantages of IMPULSE® Cleaning

Superior Cleaning Coverage – IMPULSE® fires multiple supersonic shockwaves during each activation, typically 20 shockwaves in ten seconds, resulting in highly effective, pro-active cleaning

Low Operational Costs – Simple design with few moving parts, the system requires minimal maintenance and has a significantly lower OPEX than other shockwave systems.

Ease of Installation and Retrofit – The compact, self-contained design allows for easy retrofitting on existing boilers with minimal structural modifications required and does not protrude into access gangways.

Zero Tube Erosion – when replacing soot blowers, eliminating high-pressure steam and water, IMPULSE® removes the risk of tube thinning and erosion, significantly extending the life cycle of the plant's heat transfer surfaces.

Increased Exported Power – The system does not scavenge plant steam. This allows 100% of generated steam to be directed to the turbine, directly increasing the plant's net MWe output and revenue.

Safety – As IMPULSE® is a permanently installed online cleaning system it avoids the cost and operational implications of mobile online detonation cleaning.

Large Municipal Utility, USA

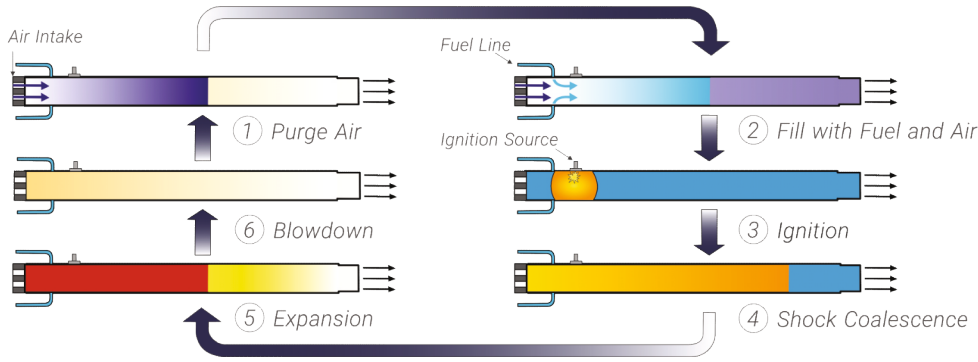
2 x 297.5MW Circulating Fluidised Bed Units
Firing coal, petcoke and Refuse Derived Fuels

Post IMPULSE® installation, Unit 1 is now delivering an annual reduction in Opex of over \$2.24 million. For Unit 2, annual Opex has been reduced by over \$2.28 million (300 days at full load). Unit 2 also now has an improved heat rate of 2.5%.

Following the impressive results of the first IMPULSE® installation, an additional 14 units were installed on Unit 1 less than two years later.



Harnessing Supersonic Shockwaves to Deliver Optimal Cleaning



The IMPULSE® supersonic shockwave cycle, typically fires 20 pulses in bursts of ten seconds

The technology behind the IMPULSE® boiler cleaning system was originally developed by GE and detonates a mixture of fuel and air to create a supersonic shockwave. Each IMPULSE shockwave is characterised by a high density front, followed by an ultra-low pressure wave behind the shock that generates a vacuum. This in turn creates a substantial edge vortex or eddy current.

The repeated combination of ultra-high and ultra-low pressure waves causes a series of currents to pass through the boiler which effectively dislodge and sweep away stubborn deposits on the front and opposing faces of the heat transfer tube surfaces. In addition, wherever shockwaves are reflected off any hard surfaces, this further improves the effectiveness of the cleaning.



Some of RJM's IMPULSE® Customers



Wide Range of Multi-Fuel Applications in the USA, the UK and the EU

IMPULSE® Installations Worldwide

Facility Type	Fuel	No. of Facilities	Total number of IMPULSE systems installed
Utility	Coal / Pet Coke	49	213
Waste to Energy	MSW Mass Burn	7	59
Waste to Energy	RDF	1	6
Co-Gen	Biomass	7	33
Industrial	Waste Heat Recovery	11	74
Pulp & Paper	Black Liquor	1	4
Speciality Waste	Hazardous Waste	1	2
Total		77	391



Why IMPULSE® Cleaning from RJM?

Customers confirm that the IMPULSE® Cleaning System delivers significant operational advantages, including longer plant run times, reduced cleaning time, greater reliability and increased MWe output



A full service offer from RJM

Utility power generators, process plants as well as biomass and Energy from Waste operators are seeking out RJM to help resolve the most complex operational, combustion and emissions challenges.

A combination of tightening emissions regulations and the imperative to transition to Net Zero means power producers need to take a new, whole plant approach to maintain viable and reliable generation.

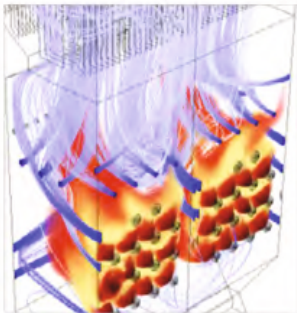
Today RJM is working with a wide range of customers to secure their generation future.

Find out more...

To learn more about how the IMPULSE® technology works and how it could benefit your power plant facility, please contact us.

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Some of RJM's Energy Sector Customers



RJM is the exclusive licensed distributor in the UK and Europe (Asia-Pacific: Non-exclusive) for IMPULSE® Cleaning System technology, designed and developed by PowerPlus Cleaning Systems Inc. of Missouri, USA

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