

Waste to Energy News

Too hot!

RJM's oFGR installations at Evero's Hull and Ince plants have solved a major slagging issue by lowering peak temperatures.

Too cold!

RJM's CFD-inspired rejig of the OFA system on a waste plant has solved an ammonia slip problem by raising combustion temperatures.

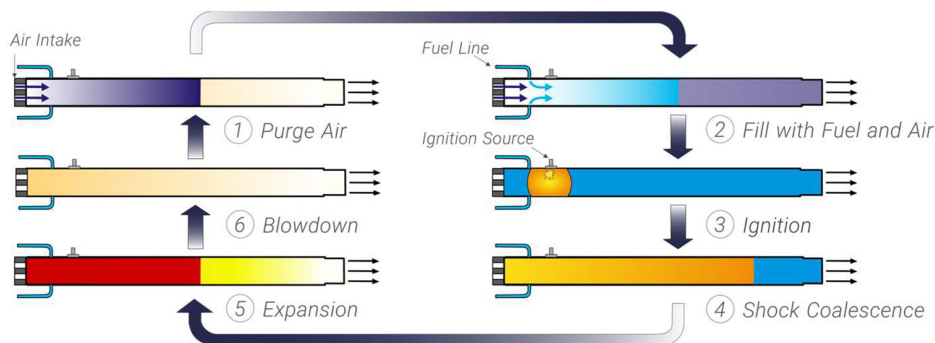
Just right!

Using detailed modelling, RJM has solved a complex fuel flow issue to ensure a consistent flow, no matter what the load on the plant.

New IMPULSE® Cleaning System is revolutionising online cleaning

RJM's new IMPULSE® Cleaning System significantly reduces the build-up of fused ash deposits and enables plants to operate longer campaigns with reduced downtimes.

This technology has been installed on over 300 power generation units in the USA, including RDF-fired and MSW-fired plants. The first set of UK units will be installed in 2024.



Key advantages of IMPULSE Cleaning

- Effective and efficient online cleaning system
- No erosion or damage to heat transfer surfaces
- Low Opex and maintenance
- Minimal intrusion into boiler means small installation footprint and low installation cost
- Does not scavenge plant steam, therefore no reduction in exported power
- innovative design avoids moving parts
- Negligible recoil from proprietary detonation technology
- Non line-of-site cleaning; better coverage than sootblowers
- Significantly less expensive capital cost and lower operational costs than its competitors
- Suitable for all boilers, all sizes, all combustion technologies and all fuels

RJM is now working at 13 biomass and Waste to Energy sites across the UK

“We're finding that plants really value our detailed, analytical approach. At the outset, we typically carry out a very detailed review of all aspects of a plant's operations and this gives us a unique insight into how the plant is running.

Where required, we will also carry out additional, sophisticated simulations to give us further insights and to enable us to develop a set of solutions that will resolve critical plant issues. Having worked out what needs to be done, we will then provide and implement those solutions, backed up by guarantees.”



*John Goldring
Managing Director*

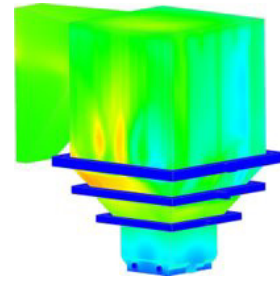
Too hot!

On two fluidised bed gasifier units, RJM recognised that overly-high combustion temperatures were causing an excessive build-up of slagging material. Following

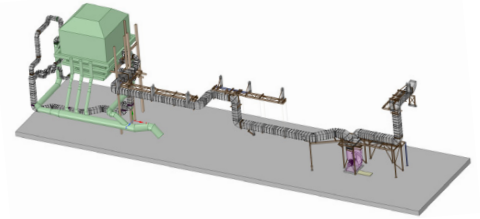
CFD modelling, RJM designed a new oFGR (Overfire Flue Gas Recirculation) system to lower temperatures and significantly reduce the build-up of slag.



New oFGR ducting being fitted to the outside of the plant



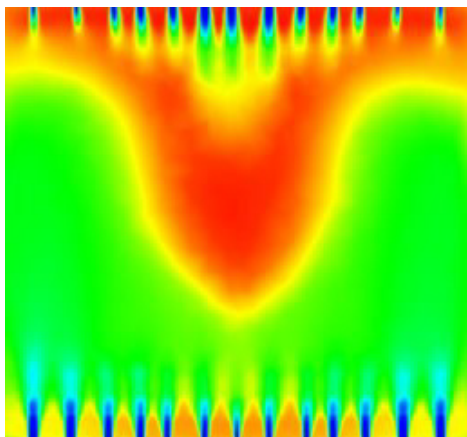
RJM used CFD to determine how peak temperatures could be lowered



3D visual of the oFGR ducting route

Too cold!

On a W2E site firing black bag waste on a reciprocating grate, RJM analysed the OFA (OverFire Air) system to see how ammonia reagent usage could be optimised to meet the new BREF regulations limiting emissions of NO_x and ammonia to air. Following CFD modelling, RJM's new OFA port set-up has raised combustion temperatures and reduced ammonia slip, whilst also meeting NO_x emission limits.



RJM worked through several CFD iterations to model how the OFA nozzle configuration could be optimised. This is the final version which has now been implemented on the plant.

Just right!

This gasifier plant firing waste was experiencing inconsistent fuel flow and limited throughput, so RJM reconfigured the entire fuel input system, including the fuel metering bin, plug screw, motor, gearbox and flow control unit. This has increased throughput by 40%, improved stability and enabled the plant to maintain a stable flame, without fossil fuel burner support. Consequently, this upgrade also helped the plant to secure its CfD green subsidy.



Fuel on conveyor



111 days and counting!....

Thanks to the new oFGR system at Evero's waste wood plant, Ince Bio Power, trips caused by slag falls have now been virtually eliminated. This is because the bed can now break up the material that sheds during the campaign. Turnaround periods for gasifier cleaning now only take 12 hours rather than four days and the plant's longest continuous generation campaign of 111 days

would have carried on, but for a planned outage. This and other performance improvements delivered by RJM have returned the plant to profitability.

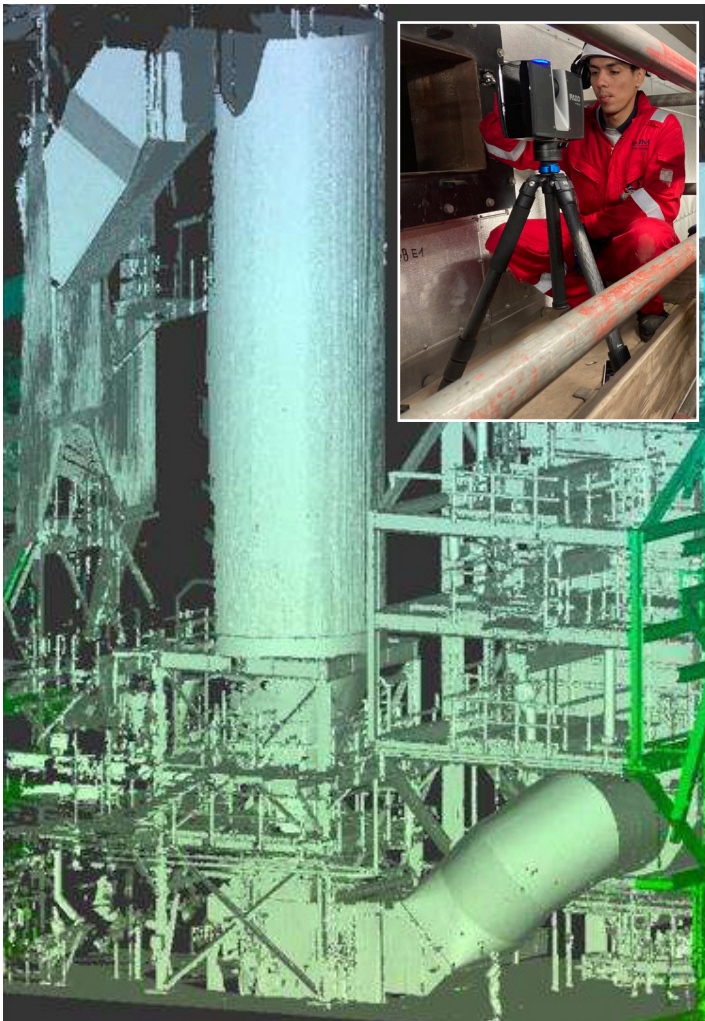


Slag from a fluidised bed boiler



Harnessing the power of 3D scanning

RJM uses portable 3D scanners with Scene and ReCap software to record accurate dimensions and the position of the existing plant equipment. This means that any modifications to components and locations can be accurately configured, saving time and money on engineering, manufacture and installation.



3D scan of a scrubber unit at a plant firing waste wood

Mass flow versus core flow

One of the major challenges in Materials Handling is getting a consistent supply of fuel into the combustion unit, no matter what the flow rate or fuel make-up. As WtE and biomass fuels can suffer from fuel degradation (moisture content, oxidation, fermentation, self-heating, fungal spores / moulds



Core flow (left) Mass flow (right)

etc.), ensuring consistent flow is essential, where no material is stuck in dead spots. This contrasts with less reactive fuels such as coal, where core or funnel flow is as acceptable as mass flow. RJM has redesigned a number of hoppers, bins and silos, bespoke to the fuel, to resolve these materials flow issues.

Core or Funnel Flow: First-in-Last-Out Principle:

Some material moves, whilst most material remains stationary. This flow pattern occurs because of shallow or rough hopper surfaces. Core flow typically results in dead areas, erratic flow, segregation, flooding and rat-holing.

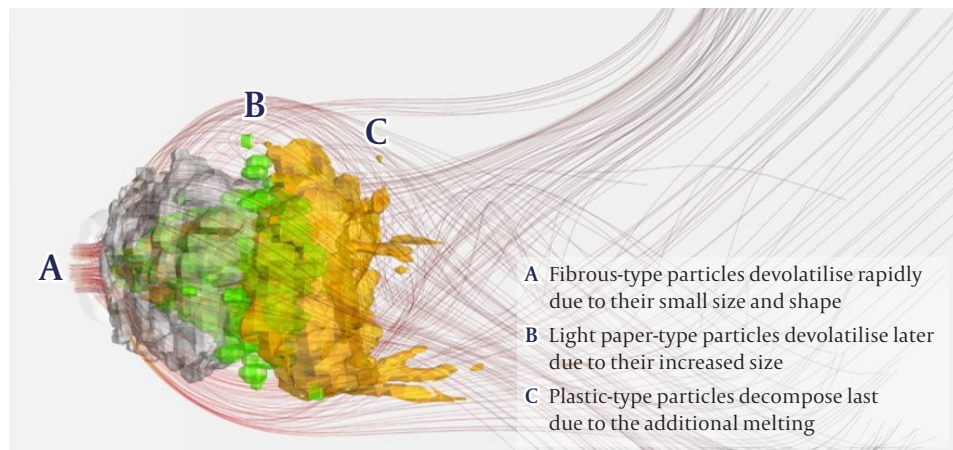
Mass Flow: First-in-First-Out Principle:

When all the material in a silo is in motion, whenever any is withdrawn. Here, hopper walls are steep and smooth enough to ensure an easy flow. This type of flow is uniform and rat-holing, erratic flow, segregation or flooding problems are mitigated.

What burns where?

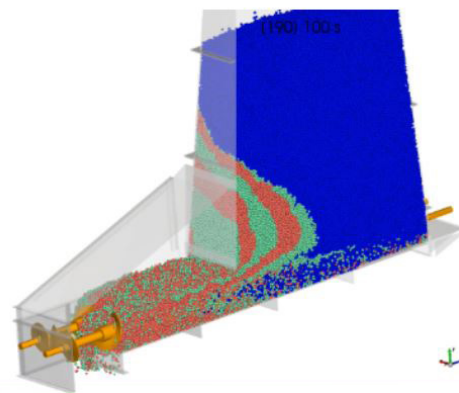
In its R&D work to evaluate how waste fuel in pelletised form could be fired successfully, RJM analysed

how different elements within the fuel have their own combustion characteristics.



DEM Modelling

As well as CFD modelling, RJM uses DEM (Discrete Element Method) modelling to gain further insights into fuel flow behaviour.



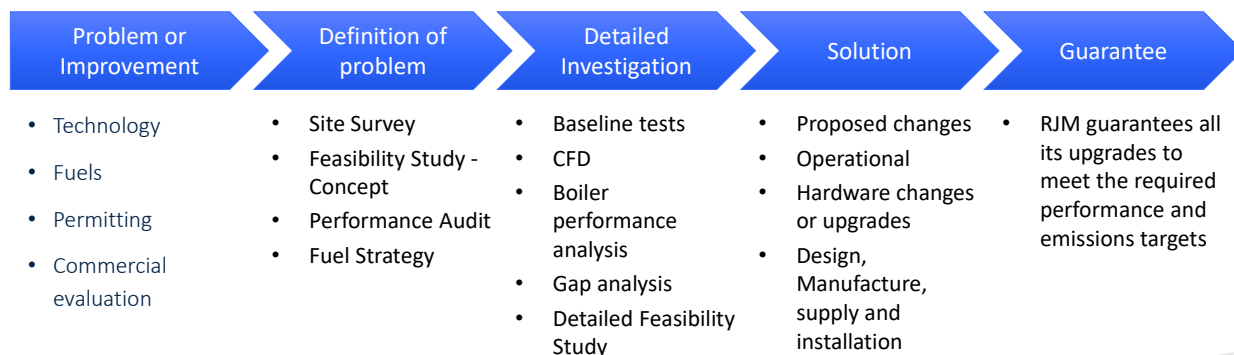
Looking ahead to a zero carbon future!



RJM is developing a new burner that will have applications across every type of process industry. This new burner will be fuelled by a mix of hydrogen and oxygen. When this fuel is combusted, the burner produces zero emissions, as the only products of combustion will be heat and water.

In addition, when the hydrogen and oxygen are produced using renewable power, such as via an electrolyser powered by wind, the fuel is 100% renewable and the heat output is 100% clean energy, completely emissions-free.

RJM – your ‘One Stop Shop’ for combustion improvement, emissions reduction and plant performance upgrades



Covers all plant operations, from fuel reception right through to the stack
 Includes materials handling, fuel safety, combustion plant, boiler plant including boiler performance, air quality control systems (AQCS) and ash handling

To find out more, please contact:

Dr. Gerry Riley, Head of Business Development

E griley@rjm-international.com W www.rjm-international.com

T + 44 (0) 1962 831250



Dr. Gerry Riley

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