

Improving Dust Collection Performance with HRL's Flue Gas Management System

Challenges

How to maximise generation capability during periods of high energy pricing, when high flue gas temperature or dust limits are reached.

The Innovation

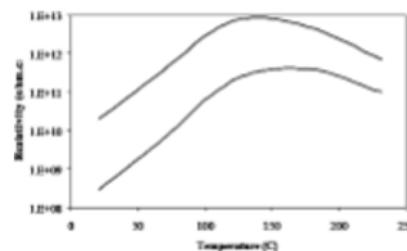
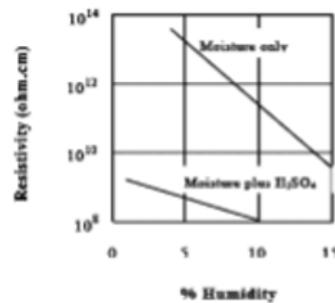
Water mist injection to control flue gas temperature and humidity.

Background

- Cooling by evaporation of water, although a recognised cooling method has usually been considered impractical for fly-ash laden flue gases. State of the art modelling techniques eliminates the uncertainty and identifies what is required to make the process practical and eliminate the risk.
- Water mist injection into flue gas has a dramatic effect on lowering flue gas temperature, and provides conditioning to lower ash resistivity and hence improve ash collection.
- The latent heat of evaporation of water being very high means flue gas attenuation can be controlled with a low amount of water. The resultant increase in gas mass flow is small, hence additional Induced Draft Fans (IDF) loading is minimised.
- Water Injection therefore enables flue gas temperatures to be controlled within limits without overloading the IDF during periods of high load and high ambient temperatures
- Water mist injection systems must be extensively modelled to maximise the cooling effect, yet optimise the spray pattern and distribution to minimise water consumption.
- Crude spray systems along with short inlet duct systems can result in poor atomisation and evaporation which in turn causes clogged baghouse filters and or dew point corrosion issues in precipitators.
- Plant re-rating / upgrades can result in some areas of the plant operating with less design margin, which can mean some limits become more critical (most noticeable in the combustion and back-end plant).



Implementing the solution



Ash Resistivity as a function of Moisture & Temperature

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expertise in action

- On hot days, market conditions can provide high economic rewards for high generation; water injection enables flue gas plant limits associated with high ambient temperatures to be readily overcome.
- Implementing the solution
- Improving Dust Collection Performance with hrl: Flue Gas Management System
- Ash Resistivity as a function of Moisture & Temperature
- Fabric filters are emerging as the preferred dust collection technology for new power stations to meet current EPA discharge licensing limits, Fabric filter life is very dependent on average flue gas temperature, managing flue gas temperature below the specification and minimising excursions maximises the asset life.
- Precipitators are designed to operate most effectively over a narrow range of operating conditions and can suffer from dew point corrosion if the temperature and humidity are not controlled. A comprehensively modelled design and control eliminates this risk.
- Water Injection can correct the ash resistivity by lowering the temperature and introducing a controlled amount of moisture into the gas stream (but above dew point) in order to improve precipitator collection performance and thereby reduce visible (particulate) stack emissions
- Base load Power Stations are being driven to operate on lower grade coals (usually with higher ash) to contain fuel costs. Higher ash loadings place more demand on the dust collection system. When combined with high flue gas temperature and volume, the efficiency of the dust collection system is reduced. Water injection can assist.
- The hrl: team with extensive experience in computer modelling, design and project management has proven this process can be a very successful turnkey project with minimal risk.

The Benefits

- Rapid payback of investment.
- Realisation of full station capacity on hot days allowing maximum revenue and profitability.

Case Study

HRL's Attemperating Spray System: Delivering Profitability to Macquarie Generation - Bayswater Power Station

Bayswater Power Station is recognised for its world class performance and was seeking ways to increase its generating capacity on hot, humid days.

Power station staff worked with HRL to develop options to achieve this. The preferred option was comprehensively modelled by HRL before a prototype was built and commissioned.

The demonstration was so convincing that Bayswater Power Station immediately proceeded with the work on subsequent units.

HRL had the practical research and development know-how to implement the system.

The performance of the Attemperating Spray System exceeded the expectations of both HRL and Bayswater Power Station.



Bayswater Power Station

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The company's NATA Accredited Laboratories number is 561.

HRL Technology Group's ISO 9001 Quality Management is certified by BSI under certificate FS605116

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