BOILER SERVICE SOLUTIONS

Combustion Stability Monitoring System RSS-3

Flexible operations and cost savings for pulverised coal boilers

Alstom's Combustion Stability Monitoring System (RSS-3) is a cost saving add-on for pulverised coal-fired boilers. By combining flame monitoring with advanced stability analysis, RSS-3 allows cost saving fuel control decisions to be made confidently.

In dynamic, competitive markets, with renewables on the rise, boiler operators are looking for solutions for greater flexibility, broader load range and safer, clean operations.

Alstom's Combustion Stability Monitoring System (RSS-3) meets your need for reliability, savings and safety with a boiler flame instability assessment that allows more effective operational decisions during start-ups, feeder issues, fuel quality issues, air distribution issues, tube leakages and clinker falls.

The RSS-3 system comprises four optical sensors for flame monitoring in the visible and infrared spectra and an evaluation unit, which processes the flame fluctuations and computes the instability value for display on the local unit or the plant DCS.

The instability readings provided by the RSS-3 allow the operator and DCS programmes to make confident operational control decisions that can save significant amounts of auxiliary fuel (gas or oil) during low load, start-ups and extraordinary events. and reduce the likelihood of boiler trips. At the same time the system also ensures a master fuel trip to protect the boiler and plant personnel when the flame stability fails.

The system enables typical start-up savings of 0.5 to 1 hour of full auxiliary fuel flow, meaning around 10% to 15%, and in some cases up to 25% auxiliary fuel savings (dependent on duration of the turbine start). During load low operation the use of stabilising burners can usually be significantly reduced resulting in between 25% to 50% stabilising fuel savings.

CUSTOMER BENEFITS

Availability
Combustion stability is continuously monitored to help the operator prevent event-triggered flame outages and boiler trips.

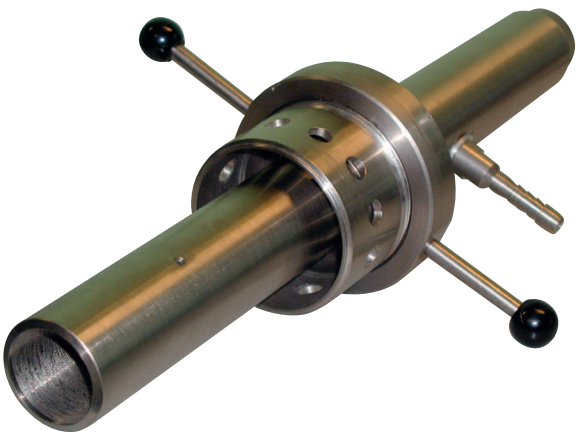
Flexibility
Helps to safely extend boiler operational range to handle low demand periods or a wider range of fuel characteristics without the risk of costly boiler trips.

Cost reduction
Smart combustion control based on flame stability information allows large savings of stabilising fuel during low load, start-ups and extraordinary events. Stabilising burners are used only when really needed.

SAFETY

RSS-3 provides the highest standards of combustion stability control:

- Boiler safety according to EN 12952-9
- SIL 3 system safety in accordance with EN 61 508
- Boiler protection against unburned powder explosions



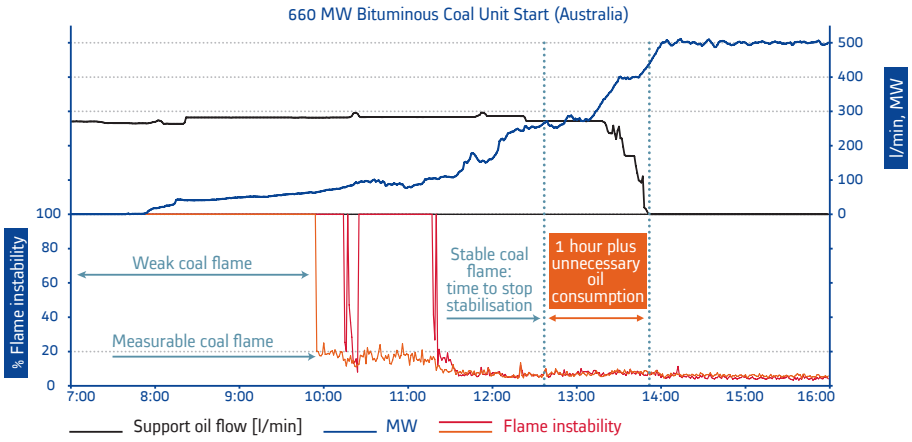
RSS-3 optical sensor

TPWR/PRSHT/CSMSRSS/EN/S.2013/FRA/1516

INSTABILITY VALUE STAGES

The following table shows the instability values computed by the RSS-3, the associated combustion state and the recommended actions and owner benefits.

Operation	**Normal**	**Low Load**		**Exceptional**	
Stability	Very good	Good	Deteriorated	Dangerous	Failed
Instability [%]	<10%	~15%	>30%	>50%	>70%
Operator info					
Flame safeguard	Flame	Flame	Flame	Flame	Flame
Stability State Description	Stabilisation consumes gas needlessly	Stabilisation not needed	Stabilisation is needed (Bad coal, feeding event)	Unburned coal accumulation DANGER of EXPLOSION	Untenable state Boiler overloading
Action needed	Stop Stabilising (if in service)	Normal operation	START Stabilising to keep operation	BLOCKING of start of Stabilising burners	Master fuel trip (MFT)
BENEFIT	SAVINGS of gas / oil	SAVINGS of gas / oil At Low Load	OPERATION RELIABILITY	BOILER PROTECTION from damages	



CASE STUDY:

Auxiliary fuel savings at boiler start

The graph shows a start-up with an operator making decisions based on traditional criteria. The lower half of the graph shows the RSS-3 flame stability readings, which indicate that stable combustion was achieved at 11:30 with 100 MW (15% load).

After allowing some time to ensure the flame remains stable, the operator could have shut down the auxiliary fuel at least one hour earlier. This would have saved approximately 30,000 AUD in auxiliary fuel costs.

A PROVEN SOLUTION

RSS family products have been successfully applied more than 36 times since 1996 on units ranging from 30 to 660 MWe. The RSS-3 retains the successful features while now adding SIL3 level security.

APPLICATION

Pulverised coal boiler new or retrofit projects.

SCOPE

System comprising 4 optical sensors, 1 evaluation unit, connection to DCS and a small logic in the DCS. Installation and commissioning.

To find out more about Alstom's RSS-3 system please contact your local Alstom representative.

Visit us online: **www.alstom.com**

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