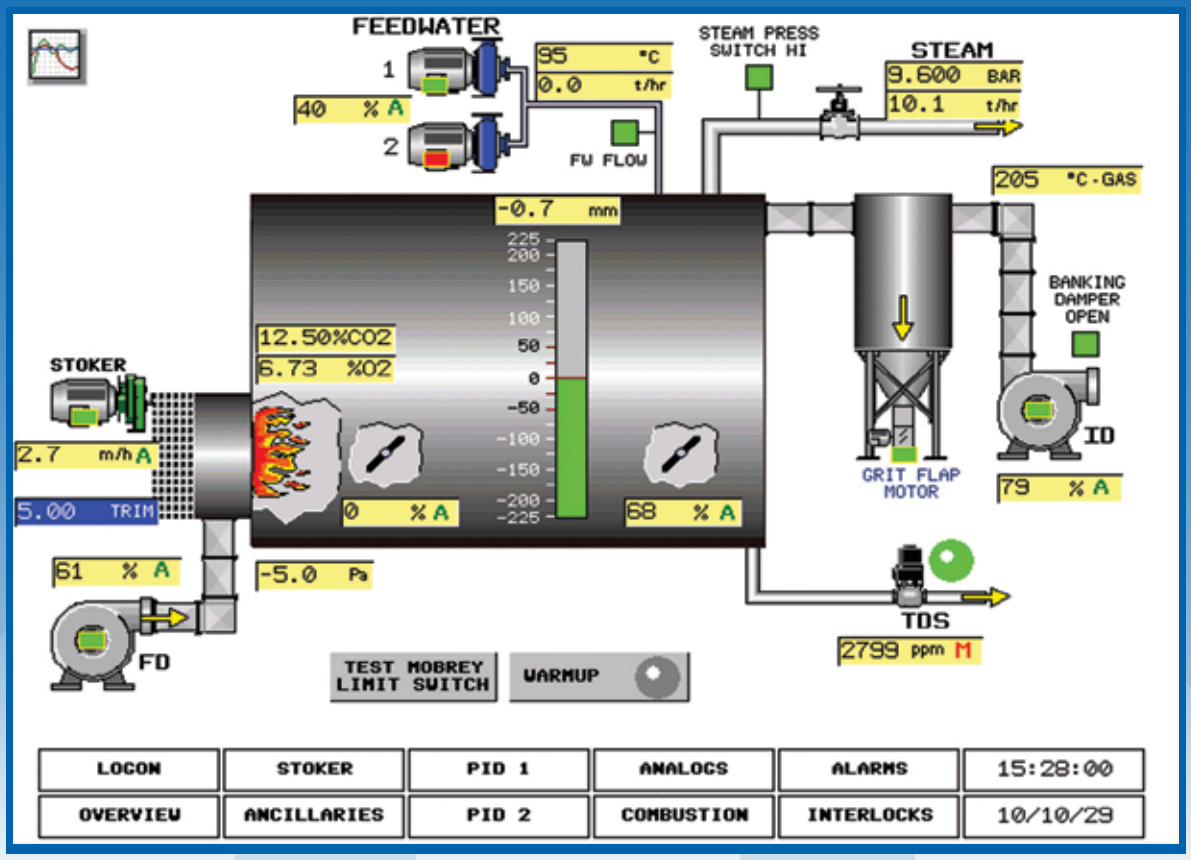
Higher combustion efficiency
Lower power consumption
Lower coal consumption
Remote monitoring
Lower emissions



JOHN THOMPSON MICROPAC™

Boiler Management System

john thompson

ACTOM

An ALSTOM technology partner

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Background

The John Thompson (JT) Micropac Boiler Management System is supplied as standard equipment with JT Europac coal-fired boilers and can be retrofitted on existing JT boilers. Since its introduction feedback from customers confirms that installation of the Micropac has been a major factor in reducing coal consumption from 10% to 30% when compared with some older generation combustion systems. The Micropac is now available in three models: R, S and SX, with features as indicated on the adjacent chart.

Overview

The Micropac Boiler Management and Combustion Control System is PLC based and designed to maintain high combustion efficiency and reduce electrical power consumption over a wide turndown range.

The control interface is via a graphical, programmable, touch screen. Service access is provided to all functions with operator access to most. In addition, a number of operator intelligence functions together with new safety features are built into the control system.

The ID fan motor, FD fan motor, stoker drive and the boiler feed-pumps are controlled by AC variable speed drives which reduce power consumption under varying load conditions.

The Micropac is web-enabled with Industrial Ethernet interfacing via the Modbus® Protocol. This universally supported protocol ensures seamless integration with SCADA/DCS systems. An ActiveX supplied component, allows zero software cost boiler monitoring using Windows Internet Explorer from any remote location.

General Philosophy

When the Micropac is in automatic control mode the boiler combustion system modulates with steam load. This is achieved by varying the speed of the ID fan to a change in boiler pressure. The resultant change in furnace pressure is sensed by the furnace draught transmitter. The control system balances the furnace draught by varying the speed of the FD fan. The speed of the chaingrate stoker and hence the amount of fuel is also varied as the fan speed changes to maintain a constant air to fuel ratio.

The combustion control system also operates the motorized under-grate dampers to correctly zone the air along the length of the stoker. The continual adjustment of the air to fuel ratio by on-line flue-gas analysis ensures optimum combustion efficiency, rapid response to load changes and minimal flue-gas emissions.

Coal remains the most economical fuel for steam raising

Despite the rising cost and deteriorating quality of coal on the local market, coal is still the most economical fuel choice for most industrial users. The table below gives an indication of the relative costs of commonly used energy sources in the Gauteng area. Even in coastal areas, where coal is more expensive due to transport costs, it is still the most attractive option, particularly as recent improvements in the JT chaingrate stoker design, grit emission control and digital combustion control have addressed a number of environmental issues.

Fuel	Grade C Smalls Coal	Natural Gas	HFO
Energy in fuel	26 MJ/kg	39 MJ/m^3	41.8MJ/litre
Typical cost delivered site	R700/t	R56/GJ	R4/litre
Typical thermal conversion efficiency on GCV	80%	83%	85%
Fuel cost per ton steam (f & a 100°C basis)	R76/t	R152/t	R254/t
Relative cost to coal	1.0	2.0	3.3

Table of Comparative Fuel Costs

Micropac™ Model	R	S	SX
Boiler Controls			
Steam pressure control	•	•	•
Furnace draught control	•	•	•
Induced draught fan control	VSD	VSD	VSD
Forced draught fan control	VSD	VSD	VSD
Stoker drive control	VSD	VSD	VSD
Oxygen trim		•	•
Feed pump control	VSD	VSD	VSD
TDS control		•	•
Boiler Instrumentation			
Boiler pressure gauge	•	•	•
Boiler pressure transmitter	•	•	•
Water level gauge	•	•	•
Water level transmitter	•	•	•
Steam flow meter with mass flow correction			•
Feedwater flow with integrator	•	•	•
Feedwater temperature		•	•
Exit gas temperature gauge	•	•	•
Exit gas temperature transmitter	•	•	•
Stoker			
Ignition arch temperature probe and alarm		•	•
Hopper burn-back probe and alarm		•	•
Rear under-grate temperature probe and alarm		•	•
Motorised under-grate dampers		•	•
Electronic shear pin for stoker drive	•	•	•
Manual guillotine door height adjustment	•	•	•
Fuel bed height monitoring		•	•
Sootblowers			
Manually operated soot-blowers	•	•	
Motorised soot-blowers c/w auto steam valve			•
Panel Indicators - Via Touch Screen Interface			
Steam flow			•
Water flow*	•	•	•
ID fan speed	•	•	•
FD fan(s) speed	•	•	•
Stoker(s) speed	•	•	•
Water level	•	•	•
Front & rear under-grate damper positions		•	•
Feedpump speed	•	•	•
Status/alarms			
ID fan run/trip	•	•	•
FD fan(s) run/trip	•	•	•
Stoker(s) run/trip	•	•	•
Swinging chute(s) run/trip	•	•	•
Feedpump 1 run/trip	•	•	•
Feedpump 2 run/trip	•	•	•
Steam pressure high	•	•	•
Water level low	•	•	•
Water level low low	•	•	•
Water level high	•	•	•
Gas temperature high	•	•	•
Stoker torque high	•	•	•
Operator notification (checks/service/calibration)	•	•	•
Data logging		•	•

* feedwater flow meters are included with all JT boilers

• denotes standard supply

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