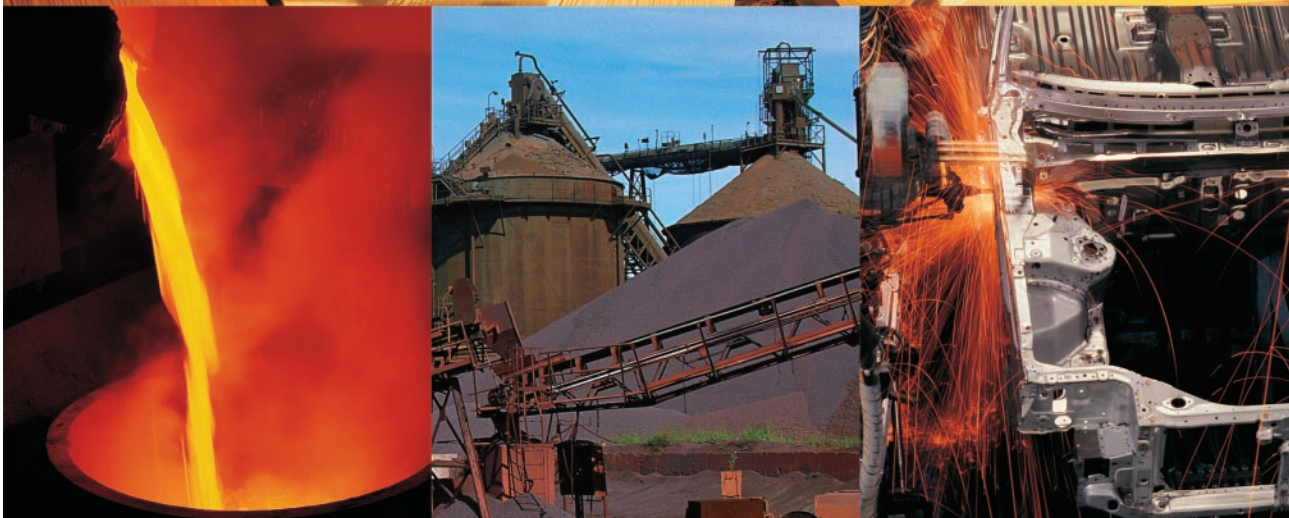




Iron & Steel Solution



Iron & Steel Solution

*Instruments and Solution for
Iron & Steel Industry*

LF3BUSS04-00EN

www.yokogawa.com

YOKOGAWA 

Iron & Steel Plant for the World

Process for Fundamental Materials, Requires Effective Production with vast Operational Excellences

Challenges in the iron & steel plant

To technology in iron & steel industry is continuously improved to obtain the best possible performance. The improved plant performance gives rise to the higher quality improvement and lower cost, and simultaneously environmental friendly plant operation.

The control systems and field instruments are working at the various processes of the iron and steel plant. The process of iron and steel plant is starting from Sinter plant, Coke oven etc, and the blast furnace, iron pre-treatment are following.

The products are widely used at furnace control and utilities in important processes (such as continuous casting machine (CCM)) in down stream of iron / steel making process.

Improve combustion efficiency and product quality

The temperature of the hot blast used in blast furnace has been increasing every year and currently stands at around 1300°C. Under such circumstances efficient operation is achieved by such measures as increasing the calorie value of fuel gas and recovering waste heat from gas. To further improve combustion efficiency and save energy, measurement of the oxygen concentration in exhaust gases is required.

A furnaces for heating slabs needs to be operated under low-oxygen conditions at high temperatures of 1000°C and above to prevent oxidation of the steel. The measurement of oxygen concentration in the furnace is essential.

Why buy Yokogawa?

Blast furnace and it's peripherals such as hot stoves, PCI (Pulverized coal injection), TRT (Top pressure turbine), etc. is the most important area in steel factories where Yokogawa delivers best performance. We have much experience in the area of instrumentation of not only the area but also all iron and steel process. The reliable and high quality measurement & control with Yokogawa's field-proven sensors and controllers helps the process optimization, and efficient/ safe/ reliable plant operation at low cost, and supports to achieve the dual aims of quality production and environmental protection through the field proven technologies.

Furnace Body Cooling



EJX

EJA

Solution

- Field proven silicon resonant sensor guarantees long term stability
- EJA: 0.1 % of URL 5 years
- EJX: 0.1 % of URL 10 years
- Under all conditions (temperature, static and over pressures)

Benefits

- Improvement of a maintenance period
- High stability and High reliability
- Reduction of a maintenance cost

Overview and Problems

- Drum pressure control and drum water level control
- Monitoring of circulation water flow
- Enlarge the maintenance period and save the maintenance cost

Monitoring of Cooling Water

Overview and Problems

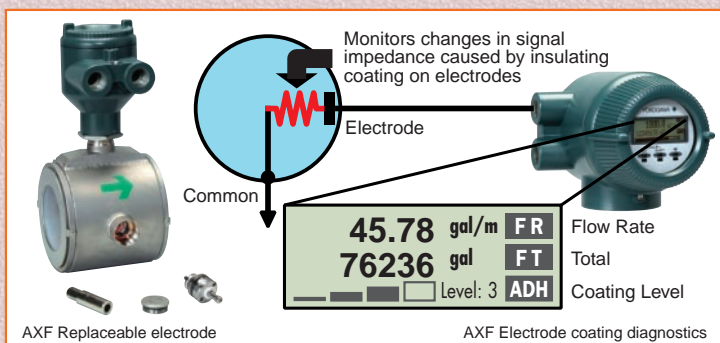
- Tuyere water leakage detection system (BF)
- Secondary cooling water flow control (CCM)
 - Intermittent control
 - Mist spray control

Solution

- Adhesion diagnosis function
 - Replaceable electrode structure
- High quality and High performance
 - Accuracy: ± 0.35 % of Rate ($V = 0.15 \sim 10$ m /sec)
 - (0.2 % of Rate is available as an option)
 - Repeatability: ± 0.1 % of Rate ($V \geq 1$ m /sec)
- High noise suppressor and Quick response

Benefits

- Informs the timing of the maintenance of the electrode
- Safety operation
- High-quality steel producing



Zirconia Oxygen Analyzer



Overview and Problems

- Energy loss from air leak in sintering furnace
- Combustion control in coke oven, hot blast stove, blast furnace and heating furnace
- Prevent oxidation of the steel in heating furnace

Solution

- Air leakage detection
- Measuring and adjusting oxygen concentration in the exhaust gas
- Monitoring oxygen concentration in heating furnace

Benefits

- Save energy and improve the efficiency of sintering furnace maintaining high quality
- Improve combustion efficiency in coke oven, hot blast stove, blast furnace and heating furnace
- Maintain high enough temperature and prevent hazardous condition in blast furnace
- Maintain high product quality in heating furnace

Combustion Control



Overview and Problems

- Coke oven gas and blast furnace gas are utilized in various combustion process
- Continuous and stable measuring is difficult because of dust, tar, naphthalene and so on
- Pre-treatment to eliminate dust, tar and naphthalene is necessary

Solution

- Stable measurement by combined YOKOGAWA reliable products and technically effective burner design
- Sampling system matching process condition

Benefits

- Accurate calorie measurement improves the heating process efficiency
- Boost yield and maintain high quality

Process Gas Chromatograph



Overview and Problems

- Guidance of the total furnace operation
- Detect abnormal condition

Solution

- Analyze blast furnace top gas, coke oven gas and mixed gas composition

Benefits

- Improve the process efficiency and custody transfer

Inductive Conductivity Analyzer



Overview and Problems

- The pickling process removes the contaminants from the metal's surface by using acids without damaging the metal's surface

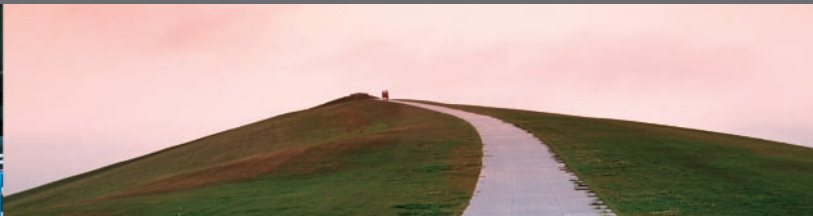
Solution

- The acid concentration is monitored and controlled to remove scale and oxide sufficiently

Benefits

- Maintain the customers' high product quality efficiently enough in the pickling process

Technologies Commit Users' Benefits



Our Goal

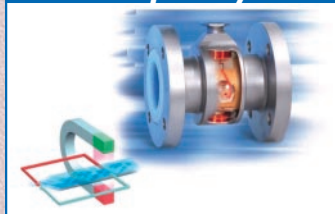
Our shared goal is customer satisfaction through operational excellence. Yokogawa has brought true innovations to industry. We are committed to ensuring accuracy, reliability, and safety of your production system throughout your business life cycle. Our comprehensive solutions and expertise help you achieve more results with less total costs of ownership. Below key technologies shall aim for your operational excellence.

DPharp Silicone Resonant Sensor



DPharp Pressure Transmitters with digital silicon resonant sensor delivers the maximum benefits from the elasticity of the single crystal silicon material while enhancing sensitivity and repeatability. The properties of the resonators remain constant for a long time. This makes DPharp the ideal pressure sensor for harsh industrial automation environments. DPharp offers the highest stability, repeatability and reliability.

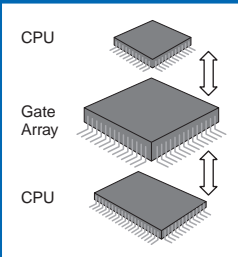
Dual Frequency Coil Excitation



Magnetic Flowmeters measure flow volume based on Faraday's law. The frequency of excitation current given to coils affects in the measurement accuracy and response time.

Dual Frequency Coil Excitation is Yokogawa's original technology to ensure $\pm 0.35\%$ accurate measurement as well as 0.1 second fast response simultaneously. Our signal processing technique enables us to bring the benefits of an AC & DC magnetic flowmeter into a single magnetic flowmeter.

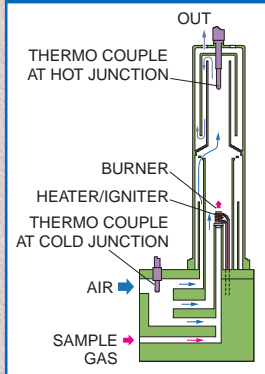
YS1000 Dual CPU



With dual-CPU construction, manual control capability and display continues even if an abnormality occurs on one of the CPUs. If controller self-diagnostics detects a

control circuit failure, the controller can suspend analog/digital output, switch to manual mode and allow manual control by operator.

Gas Calorimeter Key Technology



Burner Unit

The sample gas burns inside the burner unit and a thermocouple detects the burning temperature increase. The air is introduced from the air inlet and divided to the primary, secondary and tertiary air. The primary and secondary ones are for burning the sample gas and the tertiary is for diluting and stirring the exhaust gas. The sample gas is mixed with the primary air (In case of the low calorie gas, the primary air is throttled), and burnt completely by the secondary air. Then, the combustion temperature generates, and burnt gas is promptly diluted and stirred by the tertiary air. Finally the gas is exhausted out from the top of the detector.

The increased temperature is measured with the difference of the electromotive force between the cold junction point (located at the air inlet) and the hot junction point (inside the mixed diluted exhaust gas). The heating wire wound the burner tip is used for both ignition and preheating (In case of low calorie gas).

For Your Operational Excellence

Pressure Transmitter

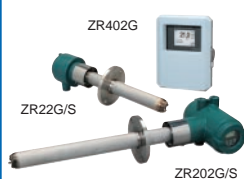


DPharp EJA/EJX Series

- Best installed performance
- Compact and rugged design
- Multi-Sensing digital sensor
- SIL2 as standard (EJX)
- Fieldbus communication capability

DPharp

Direct In Situ Zirconia Oxygen Analyzers



ZR402/ZR202

- In-Situ measurement for furnace and boiler
- Integrated and separate type available
- Also can be used as a high temperature humidity analyzer
- Fully field-repairable probe
- HART communication
- Explosion proof (FM, CSA, ATEX) (ZR22S, ZR202S)

Magnetic Flowmeter



ADMAG AXF Series

- Best-in-class performance with dual frequency excitation method
- Predictive electrodes adhesion diagnostics
- Variety of liners & electrode materials
- Fieldbus communication capability

ADMAG AXF™

Gas Calorimeter



CM6G

- Original sensor design
- Rapid-response and stable
- Flow change of sample gas and air compensation
- Density compensation
- Reliable and accurate
- Easy to use and maintain
- Safety procedure on burning out

Single Loop Controller



YS1000 Series

- Two programming method
 - Function-block and text based
- High reliability
- Compact and light weight
- Expandable I/O
- Compatible with YS170 and SLPC

YS1000 Series

Process Gas Chromatograph GC1000MarkII



GC1000

- Field proven sampling system suitable for Iron Steel Application
- Wide range of boiling points
- Easy operation via User Friendly Displays
- Enhanced maintenance using PC operation
- High Sensitivity TCD

Paperless Recorder



DXAdvanced

- Up to 48 channels of input
 - Up to 348CHs with external I/O
- Custom display function
- PROFIBUS-DP and EtherNet/IP protocol
- Standard Ethernet interface
- Reliable hardware

DXAdvanced

Inductive Conductivity Analyzer



ISC450

- Wide measuring range with single stain-resistant sensor
- Process-independent customized temperature compensation
- Process data trending up to 2weeks
- Two mA-outputs and four SPDT relay contacts with display indicators
- Intrinsically safe sensor available

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vigilantplant.®

The clear path to operational excellence

SEE
CLEARLY

KNOW
IN ADVANCE

ACT
WITH AGILITY

VigilantPlant is Yokogawa's automation concept for safe, reliable, and profitable plant operations. VigilantPlant aims to enable an ongoing state of Operational Excellence where plant personnel are watchful and attentive, well-informed, and ready to take actions that optimize plant and business performance.

YOKOGAWA ELECTRIC CORPORATION
YOKOGAWA CORPORATION OF AMERICA
YOKOGAWA EUROPE B.V.
YOKOGAWA ENGINEERING ASIA PTE. LTD.

Phone: (81)-422-52-6329, Fax: (81)-422-52-6619
Phone: 800-888-6400, Fax: (1)-770-251-6427
Phone: (31)-88-4641000, Fax: (31)-88-4641111
Phone: (65)-62419933, Fax: (65)-62412606

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