



## Gas Monitoring Enhancement



*Reduce consequences of mechanical or human error, improve performance reliability, decrease energy expense*

The gas controls monitoring enhancement was developed to provide improved performance reliability for ongoing operations. ICM's current design meets all applicable safety codes (including NFPA standard guidelines), and can be safely operated in accordance with the published operating procedures.

Human error accounts for the majority of dangerous incidents at ethanol plants. A well-trained team is your number one asset when it comes to accident prevention. ICM has developed a second line of defense to mitigate potential safety incidents resulting from human error.



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### Fuel-to-Air Monitoring Package

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This system modification will monitor combustion air flow and gas flow on the Dryer(s). In the event the fuel-to-air ratio is below recommended limits, the DCS will trip the burner. These levels will be customized for each plant's specific operating parameters in order for the plant to maintain required airflow.

#### Dryer Air Flow Monitoring

- Dryer Air Flow Monitoring provides a multi-probe design for measuring combustion air-flow accurately, covering the combustion air requirements from "low fire" light-off to maximum dryer burner capacity. The monitor consists of multiple traversing pitot tubes which are housed in a frame that mounts on the combustion air fan inlet box (new plant design) and in the combustion fan discharge duct (old plant design). An inlet air filter is required to prevent plugging the pitot tubes.

#### Gas Flow Transmitter

- ICM includes a replacement Fox Thermal Gas Mass Flowmeter. This flowmeter has a measurement range turndown of 100:1. The flowmeter accurately measures the gas flow at the low end, which is the "low-fire" gas rate when lighting the burner.

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### Thermal Oxidizer Oxygen Sensors

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This equipment addition will provide enhanced monitoring of actual oxygen levels and will allow for the addition of alarms and trips to be added to the DCS to maintain recommended minimum O<sub>2</sub> levels.

- An oxygen sensor will be installed on the thermal oxidizer (T.O.) to ensure operation of equipment at or above safe O<sub>2</sub> levels. It will provide an added layer of protection in the event of equipment failure, such as loss of combustion air. Because of the multiple sources and varying levels of makeup air to the T.O. air flow monitors would be difficult to incorporate, therefore O<sub>2</sub> sensors are used.

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### Gas Valve Upgrade

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This upgrade replaces your current Siemens actuator and linkage on your gas train with Fisher segmented ball valves and direct actuators. Features include:

- Replacement valves deliver more precise control than existing equipment
- Elimination of linkage improves performance reliability by eliminating the variance associated with the linkage between the actuator and the valve body
- Pneumatic valve with spring return fails to low-fire state with minimum gas flow
- Dryer control loop tuning is improved
- Product moisture control is optimized
- Hysteresis is minimized



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**Gas Valve Upgrade** eliminates linkage and provides improved control.

Gas valve linkages can become loose over time. If not tightened and maintained properly, they can fail to an open state, allowing a dangerous flow of gas. (Refer to Service Bulletin # SB 003B-08 titled "Main Gas Valve Linkage," issued 8-22-2008.)

## Additional Services included with each option

### DCS Programming

- All ICM dryers have existing DCS programming to promote safe dryer operation. DCS programming takes advantage of more sensitive and more accurate gas flow and air-flow instrumentation. Example(s):
  - DCS programming will be implemented to confirm high-fire combustion purge air. This will ensure actuation of combustion air damper prior to light-off.
  - The existing 1st-Ratio table would still be used to adjust combustion air flow based and gas valve position feed-back. A 2nd-Ratio table (additional programming) will be implemented to insure the combustion air flow always exceeds a "set-minimum." The DCS will use the 2nd-Ratio table to reference Gas Flow Transmitter readings compared to Dryer Air Flow Monitoring. The ratio table will be set up so that at any set MMBTU reading from the Gas Flow Transmitter, a required CFM of combustion air is maintained through the Air Flow Monitoring device. If this set value of combustion air-to-fuel flow is not maintained, the DCS will shut down the burner.

### P&ID Updates

- ICM Process Engineering will update the plant's P&ID's to reflect the addition of the Gas Monitoring Enhancement to help the plant maintain compliance with OSHA regulations standards – 29 CFR – PSM 1910.119 (Based on latest ACAD revision in our files).

### Combustion Tuning

- ICM will provide one qualified combustion technician to optimize the system, to evaluate and implement preferred operating parameters.



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