

FALCONEER™ IV Virtual Workforce Solution Benefits for Incinerator Operational Reliability and Energy Cost Savings

Based on our experience in this area (projects in Louisiana, New York, Pennsylvania, Taiwan, New England) and working with IFCO, an industry-leading manufacturer, FALCONEER™ IV can be set up to help existing and new incineration facilities as another set of “virtual engineer or operator eyes” in a number of ways, including:

- Monitoring and trending operating conditions on fuel usage, temperature and air input can help to maintain or improve incinerator temperature consistency.
- Saving operational costs by improved real-time on-line dashboard and trending charts of dynamic critical conditions and key performance indicators, such as sludge feed and quality, energy, temperatures & fuel usage.
- Determining when excess fuel use is occurring and then alerting operators for action can save hundreds or thousands of dollars per day (5-10% of annual cost) when the adjustments are made.
 - This advisory alert can help reduce fuel usage per ton of biomass feed.
- Identifying periods of high excess air to the incinerator and adjusting saves both fuel costs on incinerator and electricity costs on the fan.
 - Excess air requires more fuel to reduce O2 levels to optimal %.
- Providing timely alerts of pending sensor, equipment or process failures or abnormal conditions to avoid unscheduled shutdowns and save costs / maintain efficiencies.
 - Ensuring that the Advanced Process Control operating mode works properly.
 - Saving costs from avoiding unnecessary preventative maintenance instrumentation calibration.
 - Identifying non-optimal conditions as they begin to occur or problems and failures as they are about to happen will allow for rapid corrective action that may prevent or mitigate the economic, environmental, and safety consequences.
- Troubleshooting time is reduced. Difficult problems, or multiple cause problems, are more readily diagnosed. Engineering, maintenance, and operations resources are focused where they are most needed and provide the biggest economic payback

The FALCONEER™ IV Virtual Workforce™ solution can help at all operational levels.

1) OPERATOR TOOL

- IDENTIFY, ALARM on Excess Fuel Use or Out of Range Feed and Temperature Conditions
- ADJUST with online SOPs or Troubleshooting Manual
- Provide Easy-to-Access Trending Charts and Tools
- PROMOTE Uniform Operator Response and Knowledge with Dashboard, Guidelines, Training to ensure maintaining incinerator control, temperatures, and energy saving conditions

2) ENGINEER TOOL

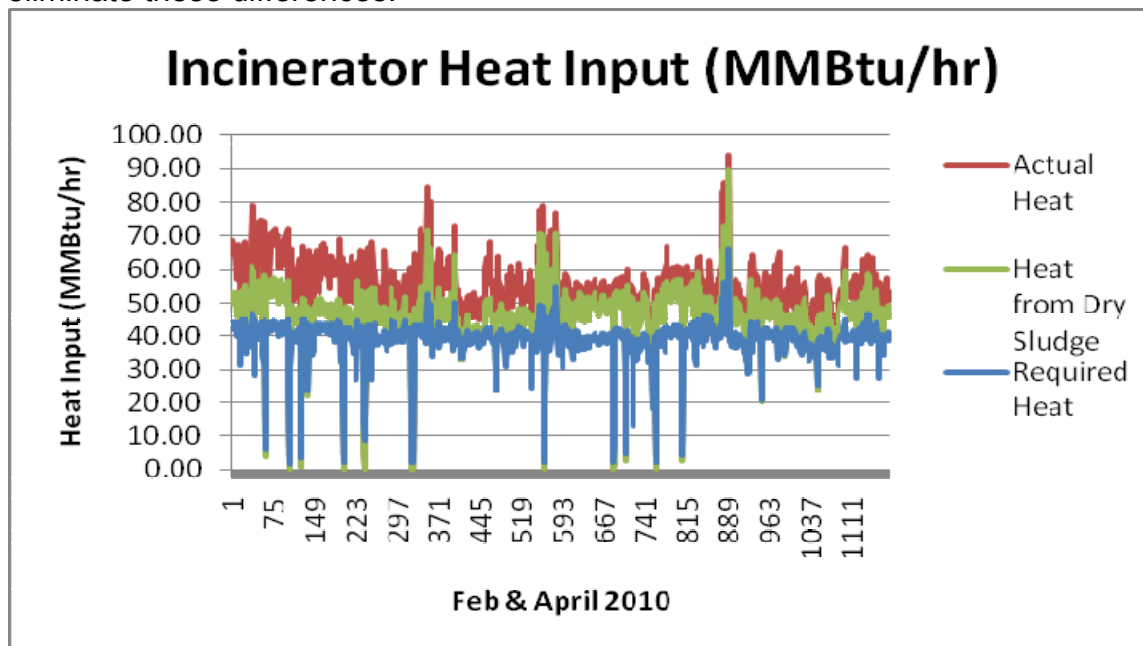
- TRACK and OPTIMIZE temperature consistency and fuel use on incinerators
- TRACK and OPTIMIZE total incinerator heat requirements & manage actual heat use
- IDENTIFY Operational and Equipment problems sooner, such as leaks, control valve issues, etc.

3) SUPERVISOR/MANAGER TOOL

- INFORM & REPORT – Automated Event Based and Daily on Excess Fuel Use
- Track, Investigate, Educate, Control

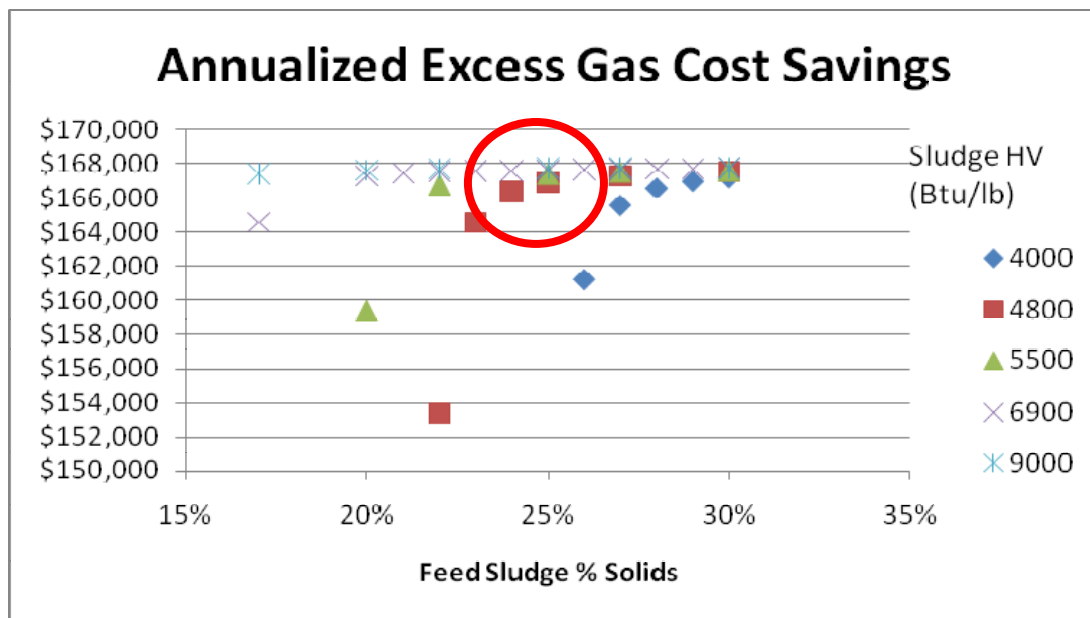
FALCONEER ENERGY SAVING BENEFITS FOR FLUID-BED INCINERATORS EXAMPLE

Significant savings opportunities were identified at a fluidized-bed incinerator facility based on improved monitoring and control using 2010 usage conditions, even before optimization efforts are considered. FALCONEER™ IV can determine and track on a daily basis how much heat and gas was required for incinerator operation and how much heat was actually provided by the combination of biosolids and fuel (oil or natural gas). The cost savings were the difference between the fuel fed and the fuel actually required to make-up the heat requirement. This excess heat, which is directly related to excess fuel use, and therefore the opportunity to reduce fuel cost, is shown below. The blue line is the calculated required heat input in MBtu per day and the red line is the actual heat input in MBtu per day. FALCONEER™ IV helps identify, reduce and eliminate these differences.



Incinerator Energy Use at Waste Water Treatment Plant w/ FB

The analysis investigated variations of sludge feed % solids/moisture levels and the range of biomass heating value, both of which may vary for this facility. The cost savings opportunities identified can be achieved by identifying and notifying operations in a timely manner for proper control actions. Based on using the FALCONEER tool in conjunction with the installed control system, the likely cost savings opportunities will likely meet or exceed \$150K per year on incinerator process area alone with good control of fluidizing air flow and incinerator/flue gas temperatures. Target or typical conditions are circled in red. To this end, FALCONEER™ IV performance solution provides real-time forecasting and calculations using the relationship between % cake solids and gas use targets as alarms and real time trending for operators in order to have better control over the natural gas usage to maintain bed and exit temperatures without overfeeding it.



Natural Gas Cost Savings Opportunities

To this end, FALCONEER™ IV performance solution provides real-time forecasting and calculations using the relationship between flue gas temperature, combustion air flow, THC, and natural gas feed as alarms and real time trending for operators in order to have better control over the natural gas usage without overfeeding it. An example is shown below. For every sludge feed condition, there should be an optimal range of natural gas use. FALCONEER can readily be configured to monitor, alarm, trend and report around this fuel performance goal for the benefit of operations.

**BIOSOLIDS FURNACE
FUEL PERFORMANCE GOALS**



8/2010

Biosolids Fuel Performance Goal Range