

FINAL REPORT ABSTRACT

FALCONEER™ IV PROCESS PERFORMANCE SOLUTION BENEFITS

FOR

KEELUNG Resource Recovery Plant (RRP)

BY

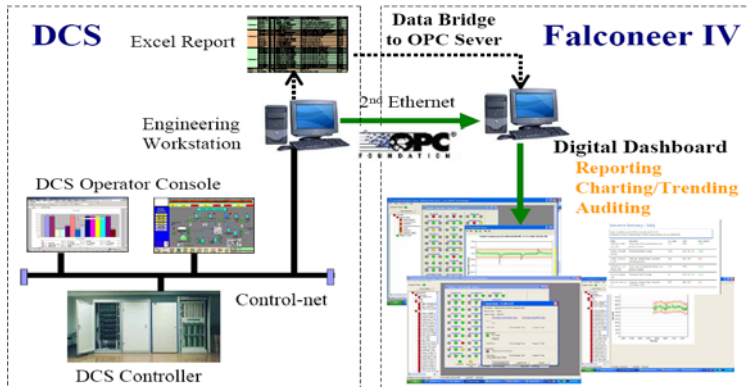
FALCONEER TECHNOLOGIES LLC

and

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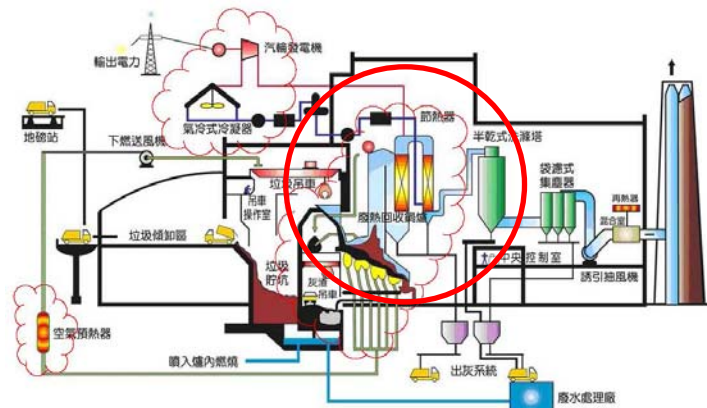
Abstract

FALCONEER™ IV Process Performance Solution works with a wide variety of existing process control systems to increase the value of the information available to managers, supervisors, engineers and operators. FALCONEER™ IV also interfaces with Intergraph's SmartPlant P&ID software to leverage the information used to design and operate the process with the real-time information from the process. FALCONEER™ IV takes the data from DCS and SCADA systems and adds wisdom or intelligence to the raw information. FALCONEER™ IV provides intelligence by using the plant's process knowledge combined with the raw process data. FALCONEER™ IV comprehensively accounts for ALL process information by concurrently auditing & alerting at the highest, process-wide level as well as the individual sensor level. This helps operators, engineers, and managers to focus on the information that's most critical to optimal costs and operations. FALCONEER™ IV takes tools that are normally used offline by these groups and incorporates them into a comprehensive online auditing and advisory suite. These tools include alarming, charting, reporting, real-time key performance indicators, and soft sensors. Identifying and preventing a single incident can often provide immediate payback for this software.



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The suite comprises several modules providing continuous process performance auditing and optimization, sensor and process abnormal condition monitoring and detection, and sensor and process validation and reliability. For the pilot, FALCONEER™ IV targeted 4 process areas including the incinerator, boiler, economizer and turbines to help Keelung RRP in a number of ways, including:



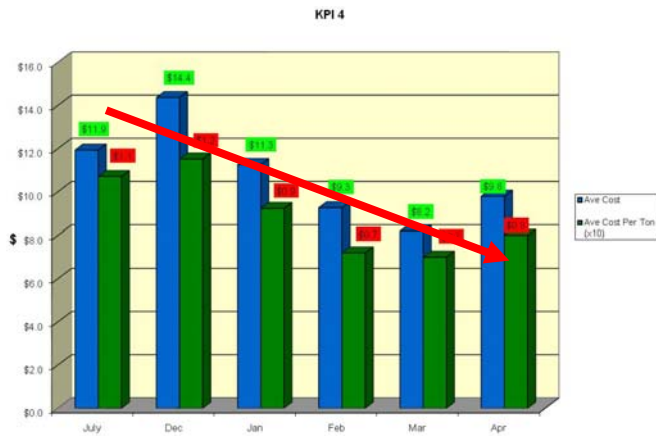
- Saving operational costs by improved real-time on-line monitoring of key dynamic performance indicators, such as energy & natural gas costs and raw material usages. Examples include
 - Tracking Low Heating Value (LHV) KPI deviations for burning control for efficiency and

- stability improvements due to fuel quality.
- Tracking Urea and Lime usage KPIs, which may help optimize raw material use and reduce costs for unnecessary chemical addition.
- Tracking Power Generation Efficiency KPI.
- Providing timely alerts of pending sensor, equipment or process failures or abnormal conditions to avoid unscheduled shutdowns
 - Tracking Boiler Leak Detection KPI to identify possible tube leaks requiring scheduled maintenance and avoiding unplanned failures and shutdown.
 - Reducing pipe corrosion inside the furnace.

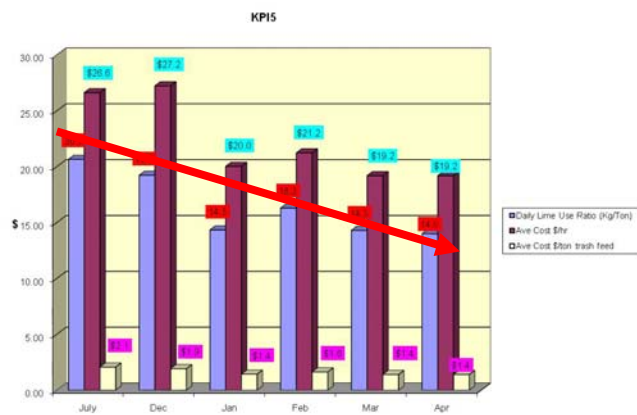
- Tracking Turbine Performance KPIs for maintaining good equipment performance and operation conditions.
- Validating sensor data & process information to help with control decisions and to meet environmental and safety reporting requirements.
- Tracking Incinerator Operation Stability and its associated Indices related to Incinerator Temperature, Steam Production, Boiler Output O2, Stack CO, SOx, NOx, HCl
- Avoiding environmental release or process safety events from sensor or process failures.
- Saving costs from avoiding unnecessary preventative maintenance instrumentation calibration.
- Improving steam & power generation by avoiding significant fluctuations from uncontrolled process variables.

To date, Keelung operations have already begun to realize these benefits in several important areas – 1) cost savings from KPI advising & reporting, 2) instrument fault and abnormal condition identification and reporting. The result is more power generated from the same amount of steam produced at a lower cost. More power to sell brings in higher revenues. Higher revenues with reduced costs yield greater profits!!

Since FALCONEER at the Keelung RRP facility has been in use from early February through May, improving trends in the plant Key Performance Indicators (KPI) are seen. This success in meeting one of



the key pilot objectives is due to the increased vigilance from FALCONEER informing operations combined with their renewed focus and more timely corrective actions – exactly the purpose and function of FALCONEER’s process auditing and advising solution. The total projected average annualized chemical cost savings ranges from **\$57,000 to \$83,000** just from having a tool in place to help operators and engineers continuously monitor, adjust and maintain critical cost saving KPI. Projected savings on an annualized basis for reduced urea use (KPI4) average \$30,000 and reduced lime use (KPI5) average \$40,000.

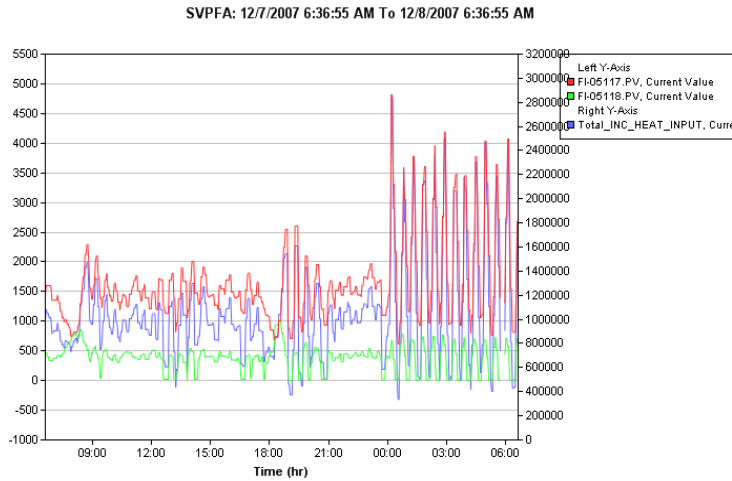


Projected annual revenues from increased power generation during the winter months are even better. Compared with January’s baseline performance, an additional **\$235,000** is projected on an annualized basis from diligently maintaining target or design operations. If even poorer performance occurs, significantly more additional annualized revenue may be possible by preventing or minimizing this type of operation because of FALCONEER’s auditing and advising. Plus there is certainly additional opportunities for KPI based cost savings still to be achieved. Continued and sustained

improvement from FALCONEER’s continuous auditing and reporting should provide Keelung a high ROI and short payback for this solution.

Simulated faults or problems were created for several critical instruments. In all cases, detection and alarming occurred and was reported in less than an hour from the start of the problem or abnormal condition. This response is quicker than operations would likely have detected the problem unless they were lucky enough to be looking at that particular information at the right time and recognized the event before it triggered a Hi Hi or Lo Lo control system alarm.

Several abnormal conditions have been detected and reported by FALCONEER. In some cases



corrections or adjustments by maintenance or operations were made in a timely manner. Besides KPI related abnormal conditions, several instruments were found to require recalibration or adjustments to their control parameters compared to expected normal operational performance. In other cases, FALCONEER correctly detected corrections or adjustments by maintenance or operations that had been made resulting in significantly different performance from previously expected. In this situation, FALCONEER was

easily and quickly updated with the new information and continued to performance its' real-time auditing and advising functions.

Finally, about 5 days per month of operator/supervisor time is saved because of the online, continuous KPI1, KPI2, and KPI3 calculations. This time savings comes out to about 60 days (2 months) per year or 1440 hours per year. This time savings could result in about **\$15,000 - \$20,000** cost savings, depending on the hourly worker's rate or increased productivity as the time is better spent on key operational or business tasks.