



Griffin Open Systems

Griffin Open System Toolkit – Huntington Unit 2 Installation

Milestone Report – October 5, 2018

EXECUTIVE SUMMARY

The U2 STEP NO_x Neural Network project became active in January of 2017. This project centers on the installation of the “Griffin Open Systems Toolkit” in order to perform real-time process control and optimization using neural network models trained with historical plant data. The development of this system (known as the Combustion Optimization System, or COS) has undergone a number of iterations and improvements. Originally, the first running application of the system was used to collect data for subsequent model training, and the first bias controller became active in August of 2017. The Griffin system in its current configuration has been operational with only minor attention since April 13, 2018. A detailed list of the evolution of the system, as well as its current configuration is available within a separate document, “System Status and Major Changes Oct 2 2018.pdf”.

The COS has shown to be effective in reducing NO_x, as well as addressing other issues experienced by the unit (e.g. steam and tube temperature excursions). While performing on/off tests of the Griffin system to characterize its effect on unit performance and behavior, immediate reductions in NO_x emissions of more than 19% have been observed. Concerning quarterly average NO_x emissions across the unit’s load range, NO_x has been reduced by 13% (QIII 2018 (July – Sept. ’18) compared to before installation (July – Sept. ’17)). NO_x emissions also exhibit a downward trend since initial install, while load over this period shows an increasing trend.

Another system was installed in early July which focuses on automatic control of sootblowers within the unit. This system (known as Knowledge-based Sootblowing, or KSB) has been fully operational with only minor attention since July 13, 2018. Before and after this active period of 83 days, the average number of retract blows per day has remained relatively constant (~38/day). The average number of wall blows has reduced by 20% (from 99 to 79/day). The most recent adjustment to wall blower logic has reduced the number of wall blows by 52% (average of 47/day). This has been achieved while maintaining adequate ash and slag control in the unit, as well as improving steam temperature control. Further details of these control methods are available in the document “KSB Sootblower Op Guide Sept 19 2018.pdf” and most recent performance is available in the document “Weekly KSB Report – Sept 30 – Oct 6 2018.pdf”.

As mentioned, the Griffin system has enabled other operational issues to be addressed. Of major concern has been an excessive amount of high tube temperatures (temperatures greater than 1100 °F). Control methods made possible by use of the Griffin system have resulted in these events occurring much less frequently. Considering two weeks before and after logic was implemented to address these issues, the number of times individual tubes reached temperatures above the limit was reduced by 34%, and the number of instances where the average 4 hottest tubes were above this limit have been reduced by 86%. Additionally, overall temperatures within the unit appear to be more uniform, and other methods of temperature control which have had direct negative effects on NO_x and other systems are rarely used, resulting in overall better performance. COS and KSB performance details are available in the document “Griffin Milestone Report Oct 4 2018.pdf”