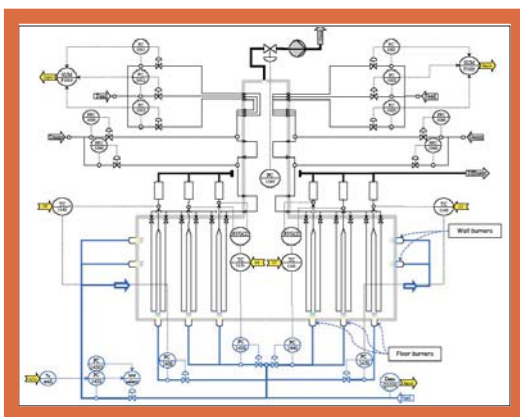


Ethylene manufacture is one of the most important chemical process and although elements of it are predictable and can be measured, the sheer scale of the operation makes optimisation difficult and expensive.

Doug Nicholson and colleagues were asked to optimise the base control configuration on an ethylene cracking furnace to give tighter control and greater stability. The furnace in question was large, cracking Hydrocracker residue. It contributed some 65% to the total ethylene production of the plant making it critical to the performance of the facility.

The project team faced various challenges. The site fuel system was subject to occasional large, fast specific gravity changes, giving a potential operating range of 0.3 to 1.1 kg/m³. Moreover, burner pressures had to be adjusted quickly to respond to fuel gas disturbances which could cause severe perturbations to efficiency and reduced run length. Overall, considerable operator intervention was required to keep operations running smoothly.

Control problems often start with the hardware, so the project team began by opening the existing temperature cascades and starting from the control valves upwards. By considering each stage in the process, measuring performance and identifying problems in a systematic way, each component could be assessed and tuned in sequence. This minimised disruption to the plant and meant the furnace could be kept running almost continuously. The structured approach built improvements on improvements, all brought



together finally under a new robust control system.

The completed scheme brought not only increased economic benefits to the customer, but improvements in safety. Moreover, this project shows that a major part of the control system optimisation in ethylene cracking plants can be done only on the furnace in operation, leading to significant rewards.

More details about the project can be found in Optimising base DCS configuration for improved furnace control, Staack W, Nicholson S, Goodhart, S and Zeppenfeld R, presented at the 2003 AIChE Spring National Meeting (15th Annual Ethylene Producers Conference) Louisiana USA, April 2003.

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