SYSTEMS STUDIES OF ETHYLENE FURNACES

L. Carr, Gulf Oil Corporation, P.O. Box 2038 Pittsburg, Pennsylvania 15230, (USA)

After a decade of developing cybernetic theory for the control of chemical plants, Gulf moved to practical implementation on ethylene furnaces. Unfortunately the current chemical engineering, ability to predict furnace performance was inadequate for cybernetic models. This paper details the first phase of implementation a sophisticated data collection methodology used since 1971 on ethylene furnaces at Europoort, Netherlands, Varennes, Canada and Port Arthur, USA.

The methodology of these studies will be illustrated by naphtha cracking furnaces. The special automated data logging, computer, chromatographs, and coil effluent sampler system will be described. The data acquisition equipment was trailer-mounted and mobile. As many as 100 plant data points were logged in addition to the stream composition of the furnace effluent. Engineering calculations were performed on line and the information reported via a computer-teletype system.

Yield models have been developed for almost all the important components, despite the complexity of the product distribution from hydro-

carbon pyrolysis of feedstocks which range from ethane through gas oils. The results are aggregated to comprehensive yield models, feed consumption and furnace efficients needed for cybernetic process control. The yield structure of ethylene, olefins, and BTX can be optimized for a range of feedstocks. This methodology of detailed real time data analysis is one of many parallel efforts now underway at Gulf on problems that range from the control of nuclear reactors to seismic analysis for offshore geology. It represents a coordinated effort to implement cybernetic theory.