

# SOCAL-IBM Movie

Movie presented by Prof Manfred Morari,  
Computing in Chemical Award Address,  
CAST Division Banquet, November 2002

Movie excerpts created by Peter Rony

May 5, 2003

# Film Producers: SOCAL and IBM



# Abbreviations

- SOCAL = Standard Oil of California
- IBM = International Business Machines

# Title: Computer Control of a Catalytic Cracker



# Catalytic cracker process (early 1960s)



# Catalytic cracker control panel



# California Research Corporation (SOCAL)



# SOCAL engineers explore use of a computer control system



# Examine data from past runs



Computer needs a complete description of catalytic cracker process under ideal conditions



**SOCAL engineer transfers  
description and plant's past records  
into punched cards**



# SOCAL engineer feeds punched cards into a computer



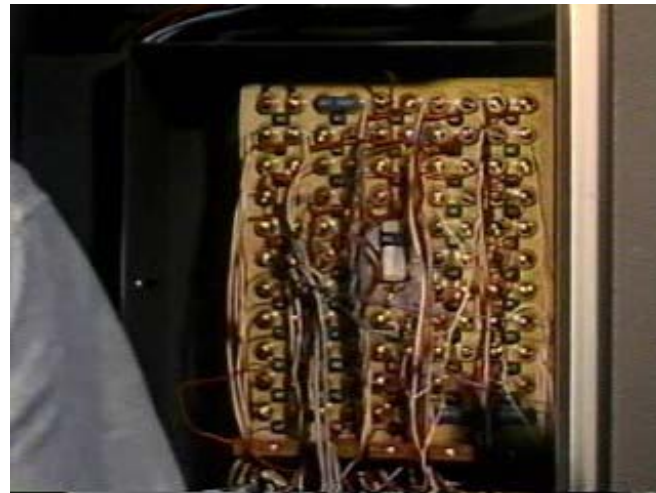
Output predicts production and profits if plant were run using a computer control system



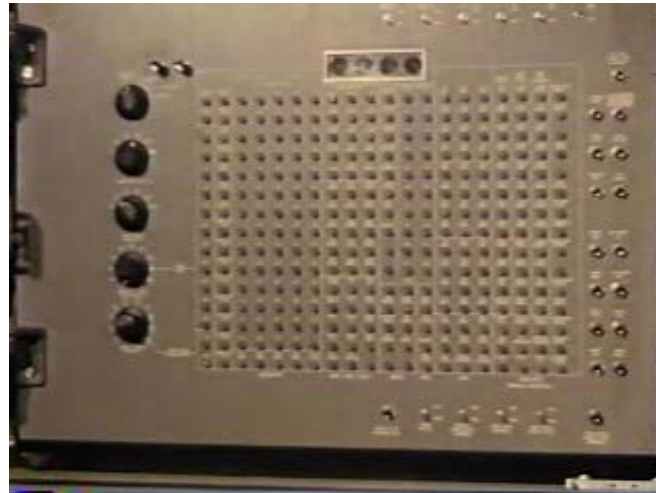
The mainframe computer was located at the SOCAL San Francisco computer center -- located 400 miles away from the cat cracker unit in El Segundo



Terminal block at El Segundo process site receives analog signals that represent temperature readings



Analog signals were translated into  
computer digital signals



The digital signals were sent over telephone lines to San Francisco, where they were converted into punched cards



The mainframe computer evaluated all of the digital data, made control recommendations, and sent the recommendations back to El Segundo



# Punched (perforated) paper tape and reader



A complete operator guide was typed out, with suggested settings plus the indirect process changes that such settings would cause



Plant operators could bring the plant to optimum performance and hold it there

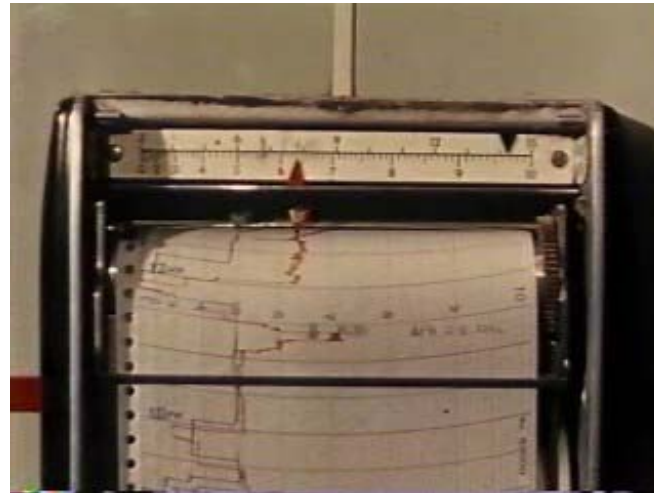


The next step was to cut down the time (“**turnaround time**”) between gathering the data and providing the computer recommendations back to the computer operators

This **turnaround time** was reduced by installing a new process control computer at El Segundo and by connecting it directly to the instruments as an **OPEN LOOP** system



Now plant operators had a direct indication of what was happening in the catalytic cracker system



# The last refinement was CLOSED LOOP operation



However, the operator still retained the option of OPEN LOOP operation



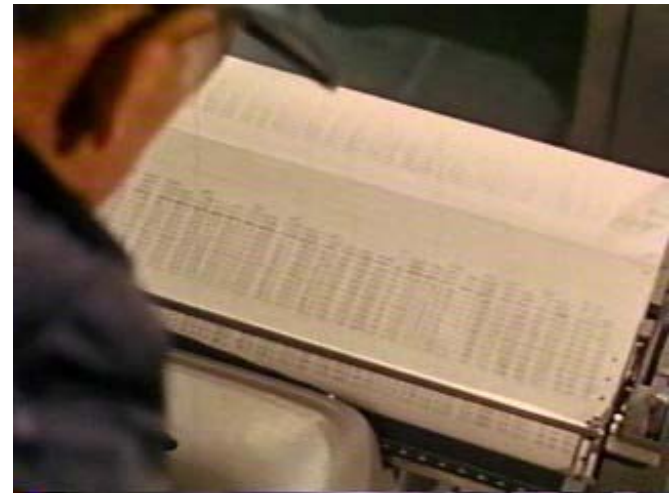
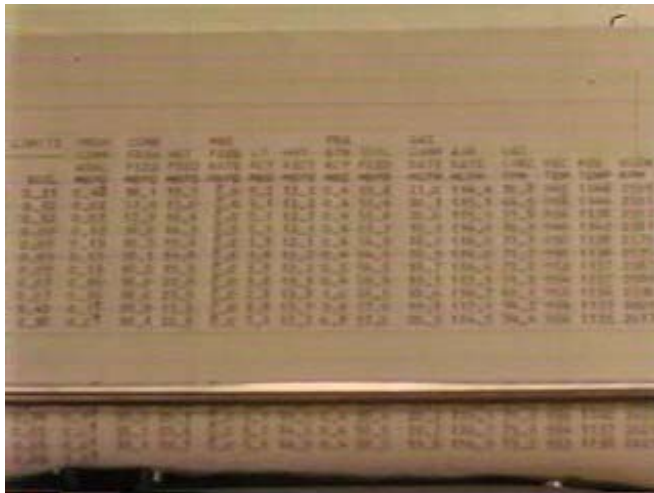
One happy operator; in practice, he learned that he could do a better job by closing the loop



Operator console provides two-way communication between the engineer and the computer; requests bring fast replies; any data that he enters is quickly confirmed on their typewriter



The computer control system also helps the engineers keep records for process analysis; data is updated every 6 minutes



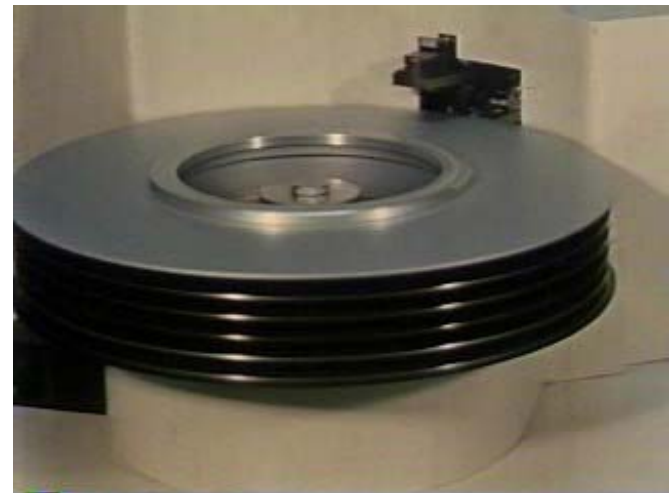
Two input/output typewriters, used  
for either OPEN and CLOSED  
LOOP operation



Operators can switch on their punched paper tape recorder for data archiving



Today, the closed-loop computer-control system is giving the operator a tighter reign on the catalytic cracker process



# The end . . and credits

