



The Clear Path to Operational Excellence



**2005 Yokogawa
Conference & Exhibition**

Starting a Journey Toward Excellence

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Don Fowler



Shell Chemicals

Overview



- ❖ Norco Chemical Background
- ❖ Where We Were and Are Now
- ❖ Our Case for Action
- ❖ Where we are moving Toward
- ❖ Our Results So Far
- ❖ Q & A Period

Norco Chemical Background

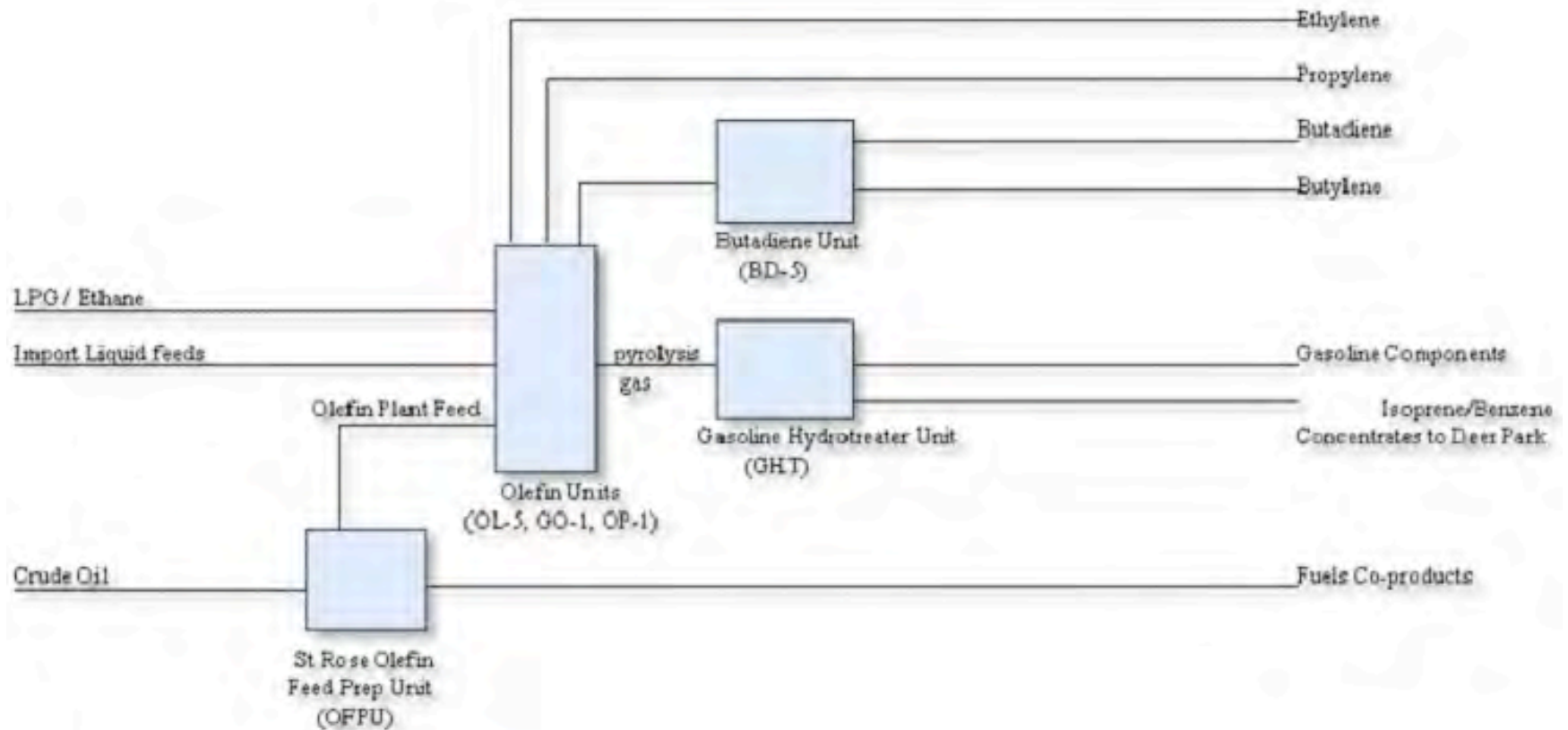


Site size in acres	1000 (area includes Motiva Refinery)
Investments	\$442 million (Net Book Value)
Principal Activities	At Norco, Shell Chemical LP manufactures lower olefins (ethylene propylene, butadiene), aromatic feedstocks, olefin feedstocks and chemical solvents.
History	<ul style="list-style-type: none">· Site purchased in 1929· Chemical site started up in 1955· First ethylene plant started in 1967· Major ethylene expansions in 1974 and 1981· Original ethylene plant shutdown in 1982.· Norco Manufacturing Complex split into Chemical and Refining businesses in 1996.· Expansion of Norco olefins business with OP-1 project in 1999.

Norco Chemical Background



NORCO CHEMICAL PLANT



Where We Are



Where We Are



Where We Are



Case for Action



- During the 90s we attempted numerous times to justify **reinstrumenting our operating units**. Difficulty was that the capital expense was high and was having to compete with other projects with significant potential returns.
- In the late **90s our units installed some “smart” instrumentation** into a DCS as part of larger projects. Did not make sense to implement large projects with new pneumatic instruments.
- We needed a platform to capitalize on **today’s advancements in controls** – virtually impossible to do large multivariable control on a 70’s era computer system (although we tried!)

Case for Action

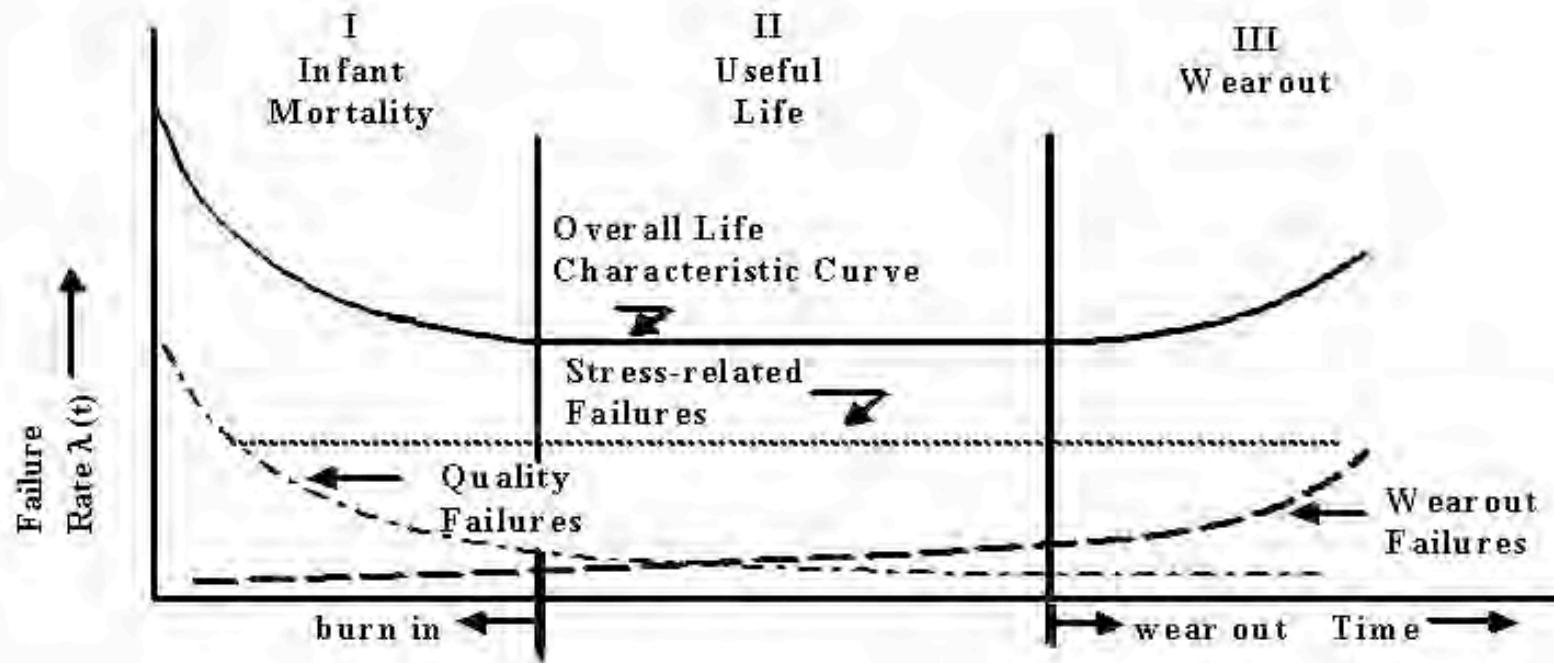


- In 1999 we pushed again. This time we did not try to sell reinstrumentation as a profitability project, but rather as an asset replacement – required if we wish to **maintain our business position.**
- Originally we were going to use **4-20** and single pair digital protocol instruments (like HART).
- As we worked on justification, **fieldbus systems began to look more promising.**
- One Note - Since we have started our reinstrumentation program we have noticed that numerous **pneumatic devices** we use are either officially **obsolete** (manufacturer can no longer replace or repair) or have become very difficult to find. Many items we have had to **rebuild ourselves.**

Case for Action



EQUIPMENT LIFE PERIODS



Why Fieldbus?



❖ Three main reasons we chose Foundation Fieldbus

- First, the **cost** of our initial Fieldbus system we believe will be roughly the **same as a conventional** 4-20 or HART type system.
- Second, we believe that fieldbus systems will eventually **overtake 4-20** / single pair type systems and will be the industry norm.
- Third, we believe there is **potential for improving instrument reliability and ultimately operating reliability.**

Why Fieldbus?



- ❖ If Fieldbus becomes the industry norm we want to be able to capitalize on it.
 - We **did not** want to **repeat what we did in 1981 and be the last 4-20** installation!
 - There are many different fieldbus protocols (Profibus, DeviceNet, etc.), but Shell believes that **Foundation Fieldbus will be the dominant fieldbus in the US** due to the numerous instrumentation suppliers like Yokogawa and users like Shell and others.

Why Fieldbus?



❖ We believe the potential for **improving** instrument reliability and ultimately **operating reliability** is there.

❖ How?

- By using **on-line**, constantly checking **diagnostics** that identify problems well in advance before they turn into operating problems.
- **Valves especially** – Fieldbus valve positioners provide much potential to detect valve problems before performance deteriorates.
- We're hoping that **other diagnostics** like plugged tap detection will detect potential transmitter faults as well.

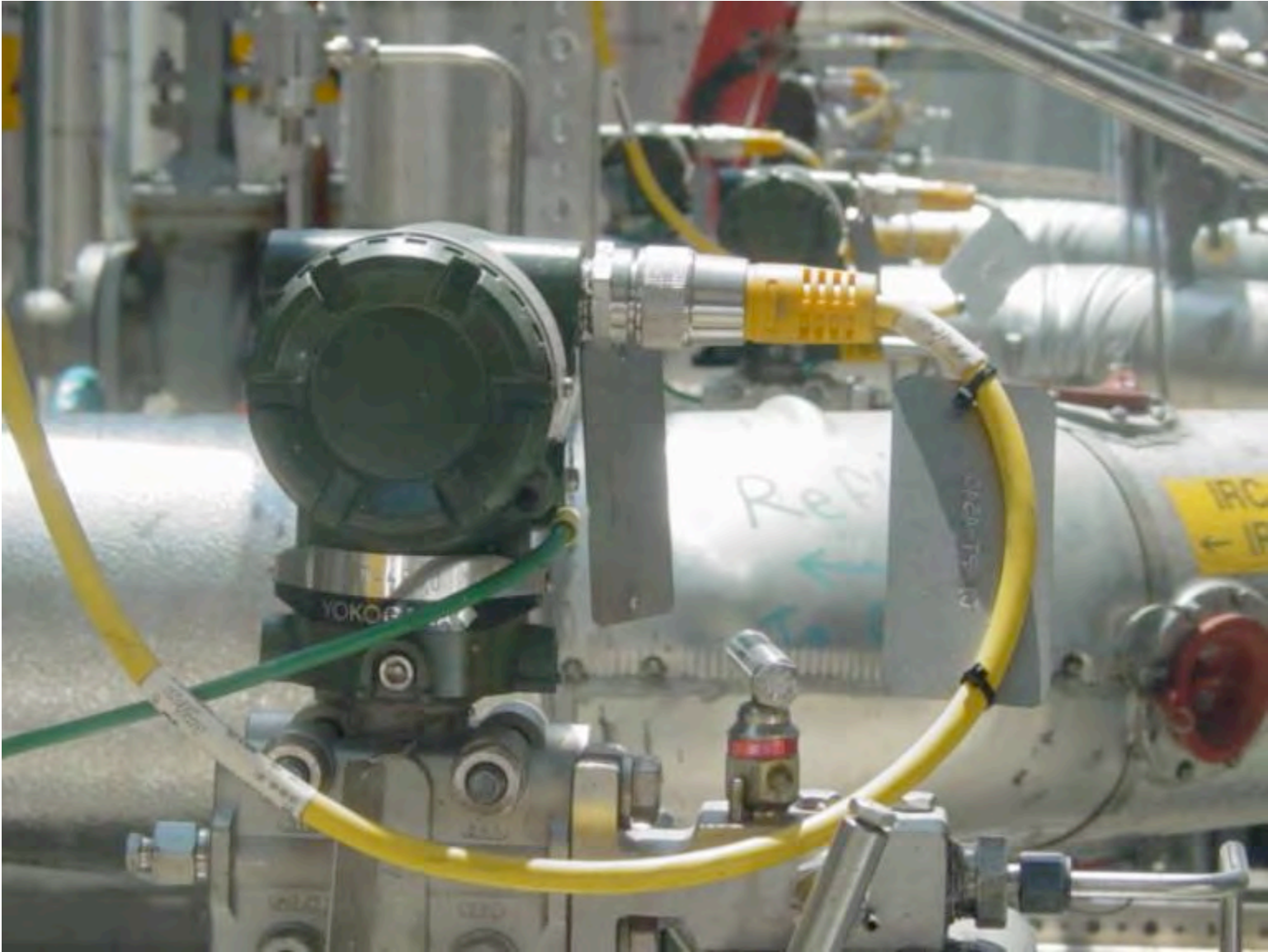
Why Fieldbus?



- ❖ What does improved instrument reliability mean?
 - **Productivity and quality increase**
 - **Fewer** off spec incidents and plant upsets, less flaring, better yields and higher process availability

- ❖ Lower cost of ownership
 - Less reactive maintenance and **more planned & proactive maintenance**
 - **Less labor** needed **to identify** instrument problems and correct them.

Where We Are Moving Toward



Where We Are Moving Toward



Where We Are Moving Toward



Where We Are Moving Toward

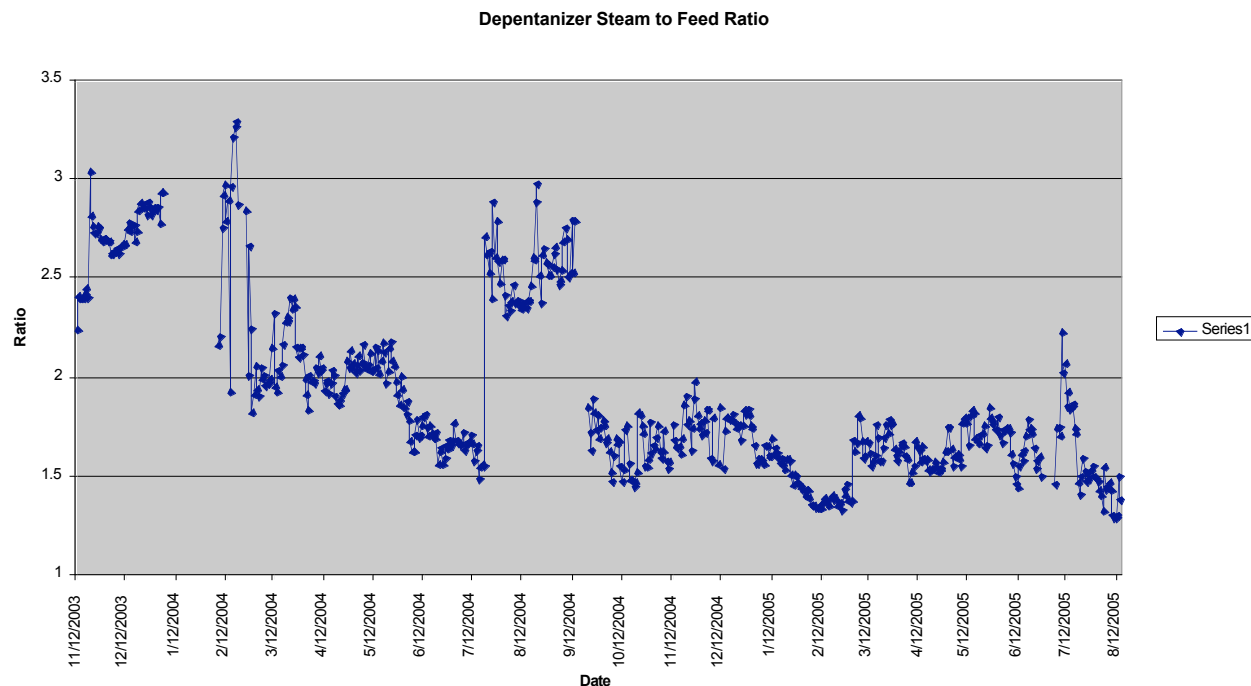


What Has Been the Return So Far?



GHT Improvements

- Slight reduction in **steam consumption**
- Other benefits hard to identify at this time (changes in operating conditions)
- # of process **alarms reduced**

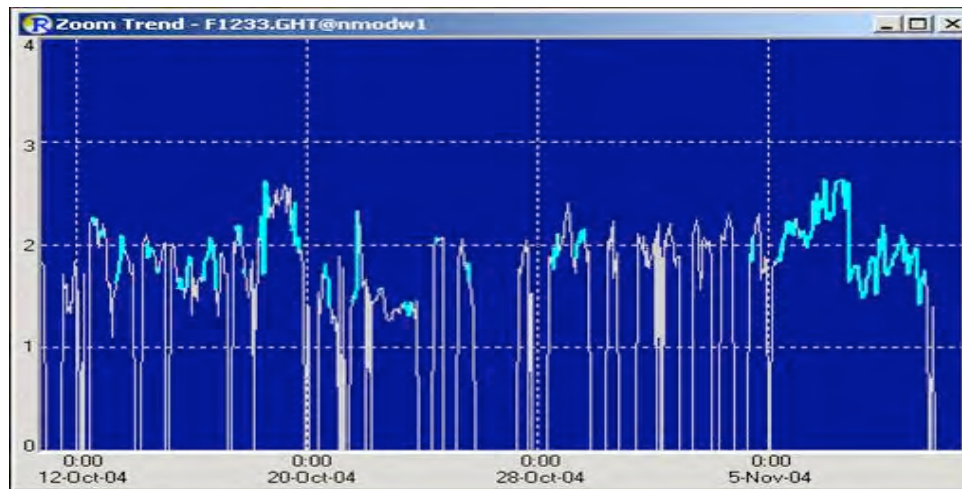


What Has Been the Return So Far?



GHT Improvements

- Improved instrument reliability



What Has Been the Return So Far?



- ❖ GO-1 Furnaces (post cutover)
 - **Reduced variability on the feed flow and outlet effluent temperatures** . Have been online for a couple of months – data collection is ongoing but looks promising.
 - **Goal** is to reduce coking, increase run time between decoking cycles and operate more efficiently.

What Has Been the Return So Far?



Operator Acceptance

- In general operators have been very pleased. Most feedback has been that between the DCS and the advanced process control the **unit runs better** with less need to oversee every operating detail.
- Operators **can focus on improving** key operating parameters and optimizing unit operation.

What Has Been the Return So Far?



❖ Diagnostics

- Fieldbus diagnostics have identified **several valves** at GHT that were operating at less than ideal conditions. We have identified
 - Sticktion
 - Overtightened packing
 - Air leakage / diaphragm problems
- We detected **high body temperature** in one of our FF transmitters. Cause was too much steam tracing. Potentially prevented a transmitter failure.
- We are continuing this effort and hope to use valve diagnostic tools to better identify those **valves that need repairs during our upcoming turnaround.**

What Have We Learned?



❖ A lot! Too much to list here but a few key items have been

- **Don't underestimate training needs!** The technology jump from pneumatic to FF as well as operating via DCS requires tremendous training effort for **maintenance, operations and technical** personnel.
- Seriously think about how you will coordinate field work. Ensure that **proper work processes** are in place. Many issues arose around coordination, especially during hot cutovers.
- Shell's **presentation on Wednesday** will discuss some of our learnings during our first unit cutover.

What Have We Learned



In Closing



- ❖ Our journey is really **just beginning**.
- ❖ Shell Norco believes that our **Fieldbus installations should not cost significantly more** than our past instrument installations, and as we gain more experience our installation costs for future projects should decrease.
- ❖ For the same cost we believe we have the capability of using **diagnostics to identify instrument problems** before they have an operational impact.
- ❖ In our first six months we have seen some improvements and **believe we will see even more** in 2005 as we continue to cutover units.