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**CALCASIEU REFINING PETROLEUM REFINERY CONTROL SYSTEM UPGRADE, LAKE CHARLES, LA, USA**

By November 2001, Calcasieu Refining Company had finished upgrading virtually all of the controls at its 22,000bpd petroleum refinery from 25-year-old pneumatics and relay logic to the latest generation of process control technology: open field-based automation using FOUNDATION™ fieldbus and PlantWeb architecture from Emerson Process Management.

**BUS-CONNECTED INTELLIGENT (MICROPROCESSOR-BASED) FIELD INSTRUMENTS**

It is believed to be the world's first refinery controlled entirely by bus-connected intelligent (microprocessor-based) field instruments. The automation system embraces two atmospheric crude distillation units, a naphtha stabilizer, an 800,000-barrel tank farm, and a five-mile product pipeline.

**FOUNDATION FIELDBUS SEGMENTS**

FOUNDATION fieldbus allows a single twisted-pair cable called a segment to carry digital communication and power for as many as 16 intelligent field instruments and control valves (e.g., Rosemount pressure and temperature transmitters, magnetic flowmeters, and vortex flowmeters; Micro Motion Coriolis flowmeters; Fisher valves and Fisher FIELDVUE® digital valve controllers; and Rosemount Analytical analyzers.) Because of "nonincendive circuit" wiring methods in this Division 2 (normally nonhazardous) area, no conduits or intrinsic safety barriers were required.

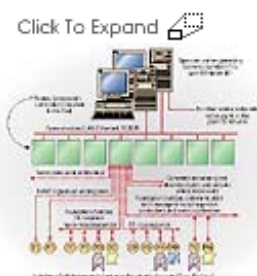
More specifically, the job involved 22 FOUNDATION fieldbus segments carrying 116 intelligent instruments. The project also integrated additional new and legacy subsystems consisting of HART and conventional instrumentation, a Modbus network of intelligent tank gages and a radio link to two RTUs (remote terminal units).

**DIGITAL AUTOMATION SYSTEM**

The main key to this implementation of PlantWeb architecture was Emerson's DeltaV™ digital



**Typical PLC network or DCS using conventional field instruments.**



**Open field-based automation architecture.**



**PlantWeb open field-based architecture at the Calcasieu refinery.**



**Operator consoles in the control room, old pneumatic control**

automation system. FOUNDATION fieldbus segments radiate from field-mounted controllers that communicate by TCP/IP Internet protocol on a dual redundant optical-fiber Ethernet LAN.

### SOFTWARE


Software includes Emerson's AMS (Asset Management Solutions) for remote instrument configuration, calibration, diagnostics and preventive maintenance. The resulting architecture actually represents the next step in the advance of process automation - a totally digital, scalable network that makes the most of computer intelligence in field instruments, using industry-standard operating systems and protocols and modular software. That software is attuned to ordinary plant operators, engineers and technicians.

### TIME SAVING AND INCREASED OPERATING CAPACITY

The retrofit was accomplished much more quickly, smoothly, and economically than conventional DCS or PLC architecture could have achieved; an estimated 75% time savings by the customer.

A 5,000bpd crude unit was added when the retrofit was made and is on-line without requiring additional operators. Costs for operation and maintenance have proven substantially lower, and operating capacity has increased, yielding an expected annual return on the order of 80% of the million-dollar automation investment.

Calcasieu Refining attributed most of this speed to FOUNDATION fieldbus wiring and virtually automatic commissioning of intelligent instruments and control valves.

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### FEATURED SUPPLIERS

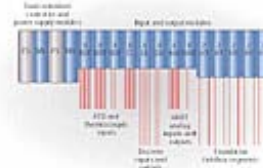
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**panel in the background.**

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**Modular DeltaV controller for Crude Unit No. 1.**

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**Field-mounted DeltaV controllers and I/O modules for the naphtha stabilizer, top row also serving the tank farm and pipeline and Crude Unit No. 1**