



Rotating Machinery Controls



[PETROTECH HOME PAGE](#)

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January 2007



APPLICATIONS and CAPABILITIES
for
ROTATING MACHINERY CONTROL SYSTEMS

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Thank you for your interest in Petrotech's products and services.

Petrotech, Inc. is a control system provider specializing in the control of rotating equipment such as gas or steam turbines, reciprocating engines, compressors, generators and pumps. The general list of products and services that we can provide include:

- Turnkey open architecture integrated control systems for turbine driven compressors, generators, and pumps; electric motor driven compressors and pumps; and reciprocating engines and compressors.
- Station supervisory control systems.
- Technical studies & surveys.
- Installation & commissioning.
- Training.
- Technical support services.

The combination of these services from one supplier means that Petrotech, Inc. has in fact the turnkey capability to perform all of the engineering, manufacturing, installation, commissioning, and training required to complete your project.

Please refer to the table of contents following this letter for a list of the items comprising this publication. Of special interest is our reference list containing many repeat customers, some having installed Petrotech Control Systems on over 50 of their units.

To learn more about any of these applications, please contact us at info@petrotechinc.com, and one of our application engineers will promptly be in touch with you. For immediate application information you can also visit our WEB Site www.petrotechinc.com that contains detailed product literature.

Sincerely,

Malcolm Melancon
Product Applications V.P.
Petrotech, Inc.

APPLICATIONS and CAPABILITIES

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PETROTECH, INC. OVERVIEW



Petrotech, Inc. was founded in 1978 with head offices in New Orleans, Louisiana, USA, with sales and sales representative offices in all major regions of the world. For over 25 years Petrotech has remained committed to providing advanced controls to improve the performance of Rotating Machinery. This commitment is fulfilled by continued focus and improvement of our core competencies, providing application expertise and turnkey solutions with project management, engineering, system integration, commissioning, testing, service and training.

The advanced control software development has evolved to a fully open architecture that is transportable to all major commercially available hardware platforms. The control algorithms that have been developed are based on over 25 years of experience in providing control systems for rotating machinery. The advanced functionality continues to evolve with development of additional capabilities.

Petrotech has the commitment to dedicate resources to research and development to continuously improve our value added to our customers worldwide. In our peer group of turbomachinery control companies, Petrotech provides the most innovative solutions for difficult control problems for rotating equipment.

Examples of such complex systems are:

- An advanced five-section centrifugal compressor for a Urea Plant, each section having independent inlet guide vanes to control flow. The compressor control system also included on-line optimization and calculations of thermodynamic parameters.
- A turnkey upgrade of sixteen (16) GE Frame 5 turbine generators with dual fuel capability and auxiliary systems.

COMPANY PROFILE



View of Petrotech's Panel Test Area

Note that the control panels are assembled in templates that have the same dimensions as the on-site enclosures into which they will be installed. This procedure minimizes installation resulting in significant decrease in equipment downtime.

FACILITIES

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PRINCIPAL PRODUCTS and SERVICES

Integrated Control Systems for:

- Gas and Steam Turbines
- Centrifugal and Axial Compressors
- Generators, E-Motors and Pumps
- Reciprocating Engines and Compressors.
- Supervisory Control Systems for Compressor Stations, Gas Plants, Power Plants, Process Plants, and Off-shore Platforms

Auxiliary Systems for:

- Gas and Liquid Fuel Upgrades
- Water and Steam Injection
- Vibration, Hydraulics, Power, Fire & Gas

Technical Support for:

- Installation
- Commissioning
- Training
- Consulting Services

INCORPORATED:

1978, State of Louisiana
 1997, State of Delaware

QUALITY ASSURANCE PLAN

Per ISO 9001 standards

BANKING FACILITIES

Whitney National Bank
 228 Saint Charles Avenue
 New Orleans, Louisiana, 70131-2601 USA
 Phone: (504) 552-4671

COMPANY OFFICERS AND MANAGERS

President: John A. Kazour
 Sales & Marketing: Dan Tipton
 Product Applications: Malcolm Melancon
 Engineering & Operations: David Lavie
 Controller: Mike Dufrechou
 Human Resources & Corporate Services: Kevin Corrigan

TRANSPORTATION

- Nearest seaport:
 Port of New Orleans 12 km (7.5 miles)
- Nearest major airport:
 New Orleans International Airport (MSY),
 37 km (23 miles)

LICENSES

- Registered as a professional engineering company by the Louisiana State Board of Registration. Initial date of license: 1980
- State of Louisiana contractor's license #13827-Other states available

INSURANCE

Petrotech maintains all workers' compensation, automobile, general liability, and other insurance typically required by major industrial customers worldwide. Certificates available upon request.

PRODUCTS & SERVICES

Petrotech offers a complete line of rotating machinery control system related products and services for new installations as well as retrofits of existing controls.

INTEGRATED CONTROL SYSTEMS

Complete driver control, load control, sequencing, protection, and information systems integrated into a control system hardware platform of customer choice. The types of rotating machinery include the following:

- **TURBINE DRIVES**
Gas or Steam Turbine Driven Compressors, Generators and Pumps.
- **RECIPROCATING ENGINE DRIVES**
Reciprocating Engine Driven Compressors, Generators and Pumps.
- **ELECTRIC MOTOR DRIVES**
Electric Motor Driven Compressors and Pumps.
- **COMPRESSOR TRAINS**
Complex Centrifugal and Axial Compressor Trains.
- **STATION CONTROLS**
Station Supervisory Control Systems for Pipeline Compressor Stations, Gas Plants, and Power Plants.

TECHNICAL SURVEYS AND STUDIES

Petrotech offers site surveys and studies of control problems with already-installed machinery to identify specific problems in process piping or layout that require correction or mitigation to achieve satisfactory results.

INSTALLATION AND COMMISSIONING

Petrotech is one of the few rotating machinery control vendors with specifically trained installation crews. Some supervisors have managed more than 200 rotating machinery control installation projects. Crews are familiar with special heat, vibration, and wiring integrity requirements for high value rotating machinery control installations.

Petrotech commissioning engineers and technicians operate worldwide and have special training and equipment for commissioning, calibration and tuning.



TECHNICAL TRAINING

Petrotech offers training at the beginner, operator, engineer and senior technical management levels, for basic machinery control technology, compressor control, gas turbine control, and energy management

Standard courses are offered at Petrotech in a classroom setting with all required equipment and simulators. Custom courses can also be given on-site, designed for your specific control system.

TECHNICAL SUPPORT AND SERVICES

Petrotech offers an optional Site Support Agreement for remote troubleshooting services via the Internet or a dial-up connection. Using this connection, Petrotech engineers can direct on-site technicians with troubleshooting efforts, and see an exact representation of real-time site conditions. Changes can be made remotely if needed.

CUSTOMER SELECTABLE COMPONENTS FOR THE CONTROL SYSTEM

APPLICATION CONTROL PACKAGE

The Application Control Package provides integrated control of the turbine and driven equipment. Typical packages can include the appropriate combination of any of the following control schemes:

- Gas Turbine.
- Steam Turbine.
- Reciprocating Engine/Compressor.
- Centrifugal Pump.
- Electric Motor.
- Compressor Anti-surge Control.
- Compressor Capacity/Loadshare Control.
- Compressor Station Monitoring and Control.
- Generator Autosynchronizer.
- Generator Isochronous Load Sharing.
- Sequencing and Protection.
- Vibration Monitoring.

ADVANCED PROGRAMMABLE CONTROLLER

The Application Control Package is available to run on Advanced Programmable Controllers such as the following:

- Siemens/TI 505.
- Allen-Bradley Series 5, Flex I/O, ControlLogix.
- GE Fanuc 90-70 and 90-30
- Modicon Quantum.
- Fault Tolerant.
- Customer specified.

MAN MACHINE INTERFACE (MMI) PACKAGE-LOW END

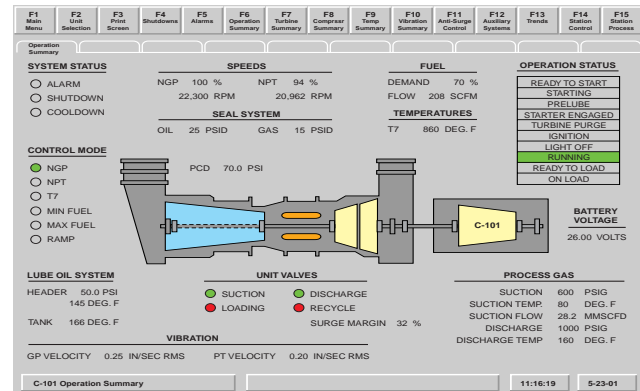
The low end MMI hardware generally consists of an alphanumeric display plus panel meters for NHP, NLP, and EGT and is available on:

- NEMATRON.
- CTI Access 4000.
- Allen-Bradley Redi-Panel.
- Customer specified.

MAN MACHINE INTERFACE (MMI) PACKAGE-HIGH END

The high end MMI hardware is available on:

- Intecolor industrial computer and monitor.
- IBM industrial computer and monitor.
- Texas Microsystems industrial computer and monitor.
- XYCOM industrial computer and monitor.
- Nortech industrial computer and monitor.
- NEMATRON industrial computer and monitor.
- Customer specified.



MMI SOFTWARE

Software to operate the MMI is available from:

- WonderWare InTouch.
- Citech.
- Intellution.
- Reafflex.
- Customer specified.

CRITICAL FUNCTION REDUNDANCY:

Customer specified shutdowns in addition to NHP, NLP, EGT, and low lube oil pressure.

COMMUNICATIONS INTERFACE FOR DCS OR SCADA:

- MODBUS.
- Ethernet
- Customer specified.

VIBRATION MONITOR

Vibration Monitoring Devices can be integrated into the Application Control Package and are available from the following:

- Bently Nevada 3300, 3500, and 2201 (for Allen-Bradley systems only).
- Vibrometer.
- Metrix.
- Vibrotec.
- Customer specified.

TYPE OF CONTROL PANEL ENCLOSURE:

- Front plate for existing control enclosure (common for GE gas turbine retrofits).
- Custom fabricated new control enclosure.
- Class I, Division II stainless steel purged panel enclosure for hazardous locations.
- Standard Rittal type panel enclosures.

ADVANTAGES OF THE PETROTECH INTEGRATED CONTROL SYSTEM

Open architecture systems offer numerous advantages such as initial lower cost than proprietary type systems. Other benefits include standardization with existing installed hardware base, reducing spare parts inventory and simplifying maintenance and service. Spare parts are readily available worldwide from many sources. Open architecture also allows for new control functions to easily be added at a future date. The following are some major advantages of a Petrotech Integrated Control System:

- **Firmware**
Petrotech licensed Application Control Packages that are derived from well-proven, mature functions that have been implemented in thousands of similar control systems
- **Auxiliary Controls**
Complete auxiliary systems including gas turbine fuel system upgrades and conversions, water and steam injection systems for gas turbine NO_x reduction and power augmentation, machinery hydraulic system upgrades, and fast response recycle valves for centrifugal compressor applications
- **Integrated Control Capability:**
Turbine fuel control, driven equipment control, and sequencing/protection are integrated into a single platform. This eliminates the need for additional hardware and communication links, thereby providing a less complicated, more cost-effective solution.
- **Open architecture system:**
Application control package's portability allows customer choice of hardware platform (typically a PLC) thereby reducing need for additional spare parts and training expenses. Projects have been completed with GE Fanuc, Siemens-TI, Allen-Bradley, Square D, Modicon, and ICS Triplex
- **Fault Tolerant:**
Control package is available on fault tolerant controllers for critical control applications. Redundant speed and EGT protection using entirely separate hardware from the main control hardware.
- **Standard Industrial Components:**
Non-proprietary, commonly available parts are less costly and more easily serviced by customer's on-site personnel. Much longer time to obsolescence compared to proprietary systems.
- **Reliability:**
All control functions are performed by tested and proven industrial PLC equipment, not by MS-DOS based computer equipment, which is not designed to function as a "controller".
- **Simplified Interface to DCS or SCADA:**
Communication tasks are handled with a separate, dedicated module in the PLC, increasing data rate and simplifying network installation.
- **Non-proprietary Interfaces:**
Interfaces in the form of 4-20 mA, RTD, frequency, thermocouple, and dry contact I/O allow simple integration into existing sequence/protection logic controller, making very low-cost partial control upgrades simple and practical.
- **Improved Fuel Regulation:**
Fast loop sampling rate, combined with modern digital control techniques improve steady-state setpoint control, and reduce overshoot during transients.
- **Improved Start-up Reliability:**
Special "lean light-off" procedure ignites all burners with essentially 100% reliability, and with greatly reduced thermal stress.
- **Improved Exhaust Temperature Monitoring and Control:**
Advanced statistical algorithms detect turbine hot/cold spots and automatically reject failed thermocouples.
- **Fail-safe Features:**
Redundant over speeds; open/short monitoring of mA and thermocouples; read back monitoring of outputs; and special self-check features improve safety.
- **Improved Operator Information with Graphic Interface:**
Industrial workstation graphically displays start-up sequencing, speeds, temperatures, operating points, and alarm/shutdown status. Optional data logging and trending can be used as part of a preventative maintenance program.
- **Simple Installation:**
A dimensionally identical replacement of the control panel is possible, saving substantial architectural and installation cost. Control panels can be installed one at a time allowing other units to continue operating.
- **Rugged:**
Control panels can be built Division 2, Nema 4X for installation in harsh local environments.
- **Flexibility:**
The control system package can accommodate many different control strategies based on customer's need and budget.

AUXILIARY SYSTEMS FOR TURBINE & COMPRESSOR PACKAGES

The following auxiliary systems and components are also available for complete or partial system upgrades:

- **Fuel Control Valve Systems.**

The upgrade can include replacement of fuel control valve, fuel speed ratio valve upgrade, addition of a fuel vent valve, compressor discharge pressure transmitter, and interstage fuel pressure transmitter.

- **Inlet Guide Vane Control.**

Hydraulic controls for inlet guide vanes.

- **Interstage Nozzle Controls.**

Complete second stage nozzle actuator and hydraulic system retrofit for GE Frame 3, with an increased capacity industrial RAM and servo with accumulator, pumps, and support components integrated into a complete system.

- **Dual Fuel Conversion.**

Dual fuel conversion skids including addition of a gas or liquid fuel valve system.

- **Water or Steam Injection Systems.**

Skidded systems for NOx reduction and power augmentation.

- **Speed probe and exciter gear assemblies.**

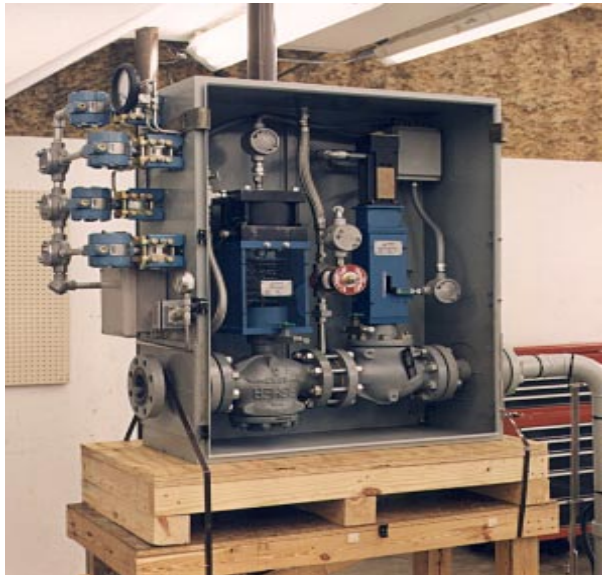
- **Flame detectors for combustion chambers.**

- **Recycle Control Valves.**

Engineered compressor recycle control valves to prevent surge.

- **Recycle and Sequencing Skids.**

Skid mounted recycle and isolation valves for centrifugal compressors.

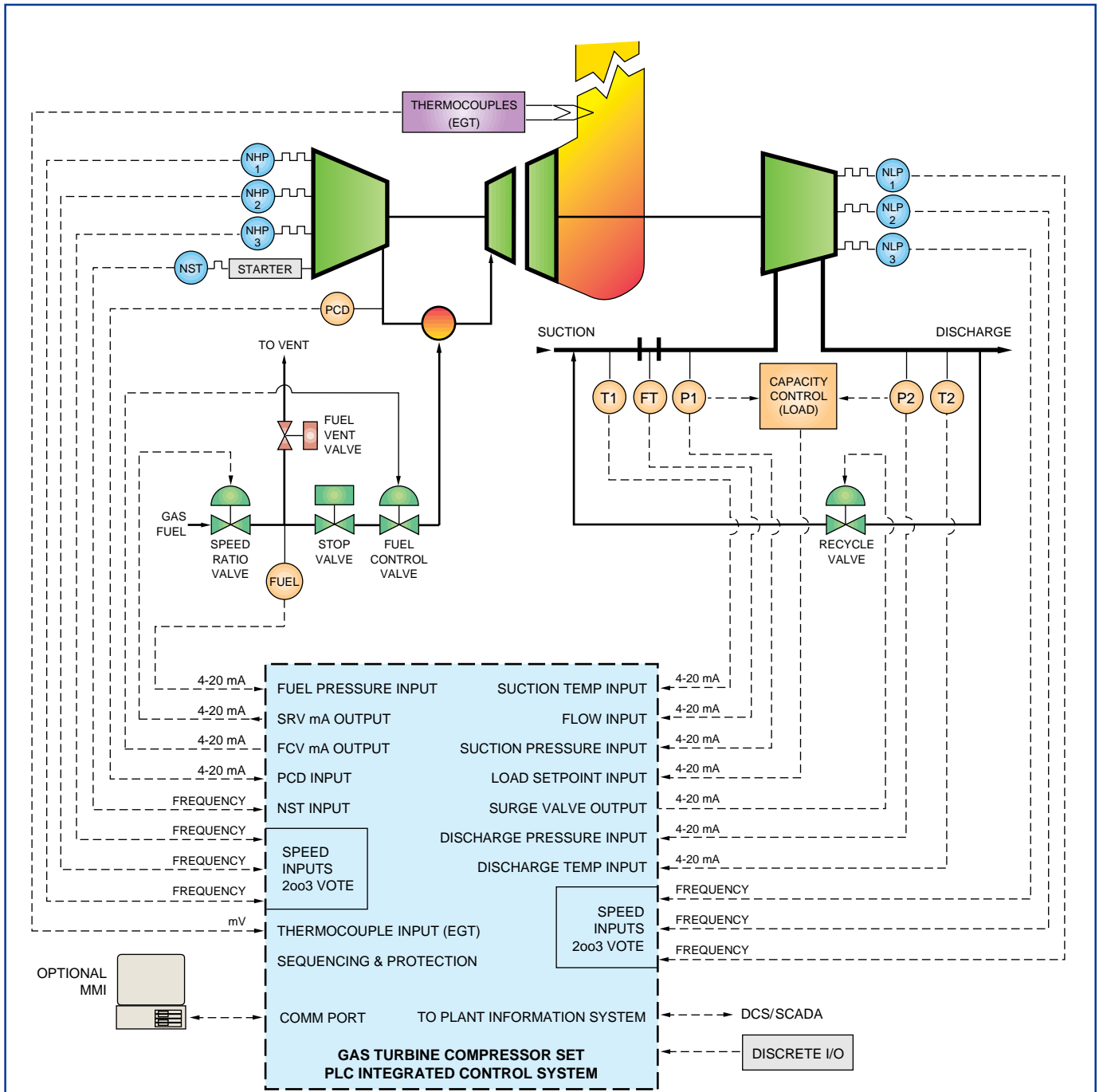


Add gas fuel system for gas turbine gen set with electro-mechanical servo actuated valves



Replacement controls for one GE Frame 5 gen set in utility peaking service with water injection skid for NOx reduction

**GAS TURBINE COMPRESSOR DRIVE
INTEGRATED CONTROL SYSTEM APPLICATION DATA**



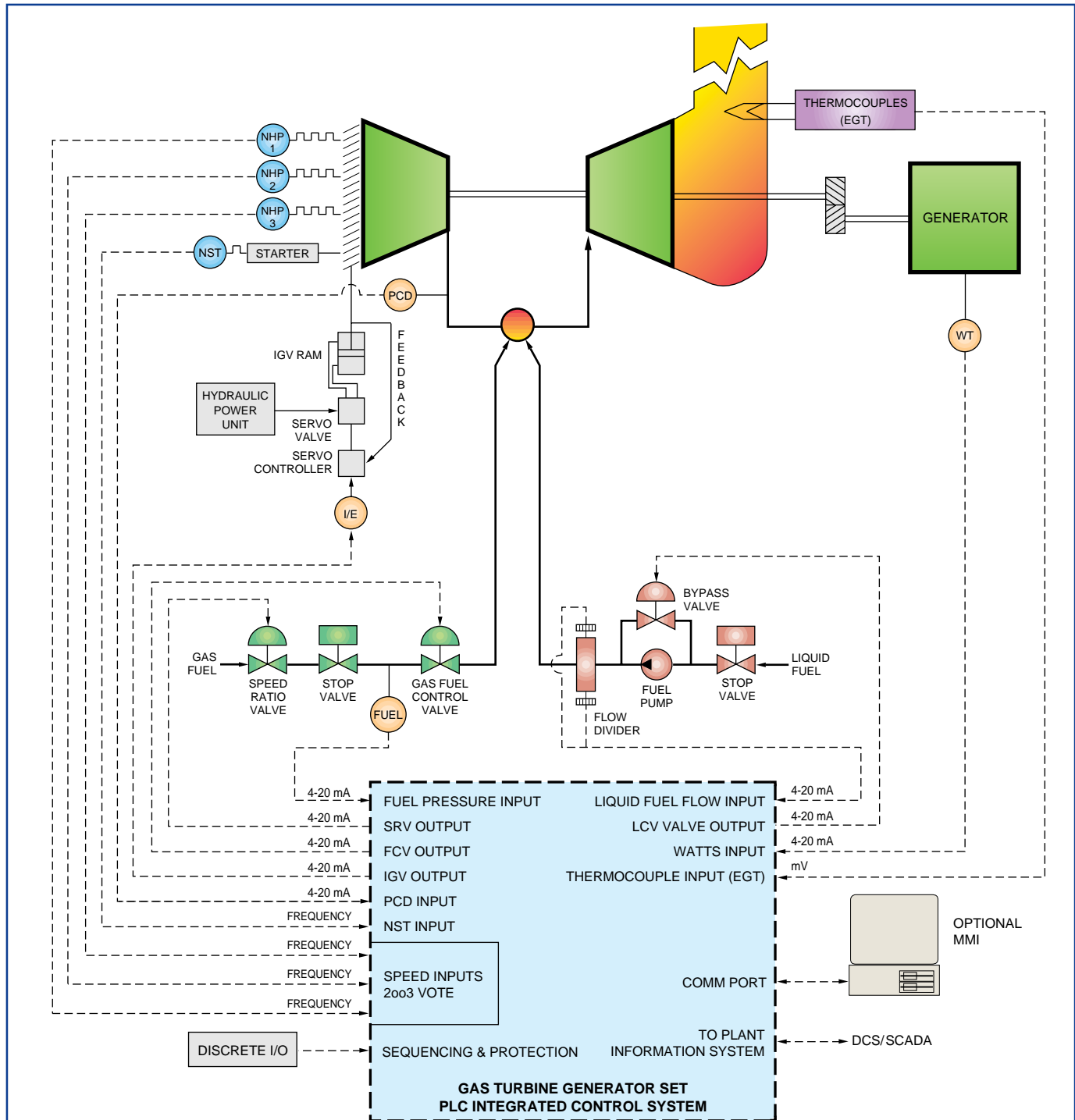
Simplified schematic of a Petrotech advanced PLC-based integrated control system for a gas turbine compressor set.

APPLICATION

The Petrotech integrated control system provides cost-effective complete or partial control system retrofits for gas turbine driven compressor packages. The system provides replacement controls for outdated electro-hydraulic and analog-electronic controls. The

PLC-based system typically includes complete turbine and compressor control, turbine and compressor sequencing, capacity control, DCS interface, and a graphic operator interface for system status, trending, and data logging.

GAS TURBINE GENERATOR DRIVE INTEGRATED CONTROL SYSTEM APPLICATION DATA



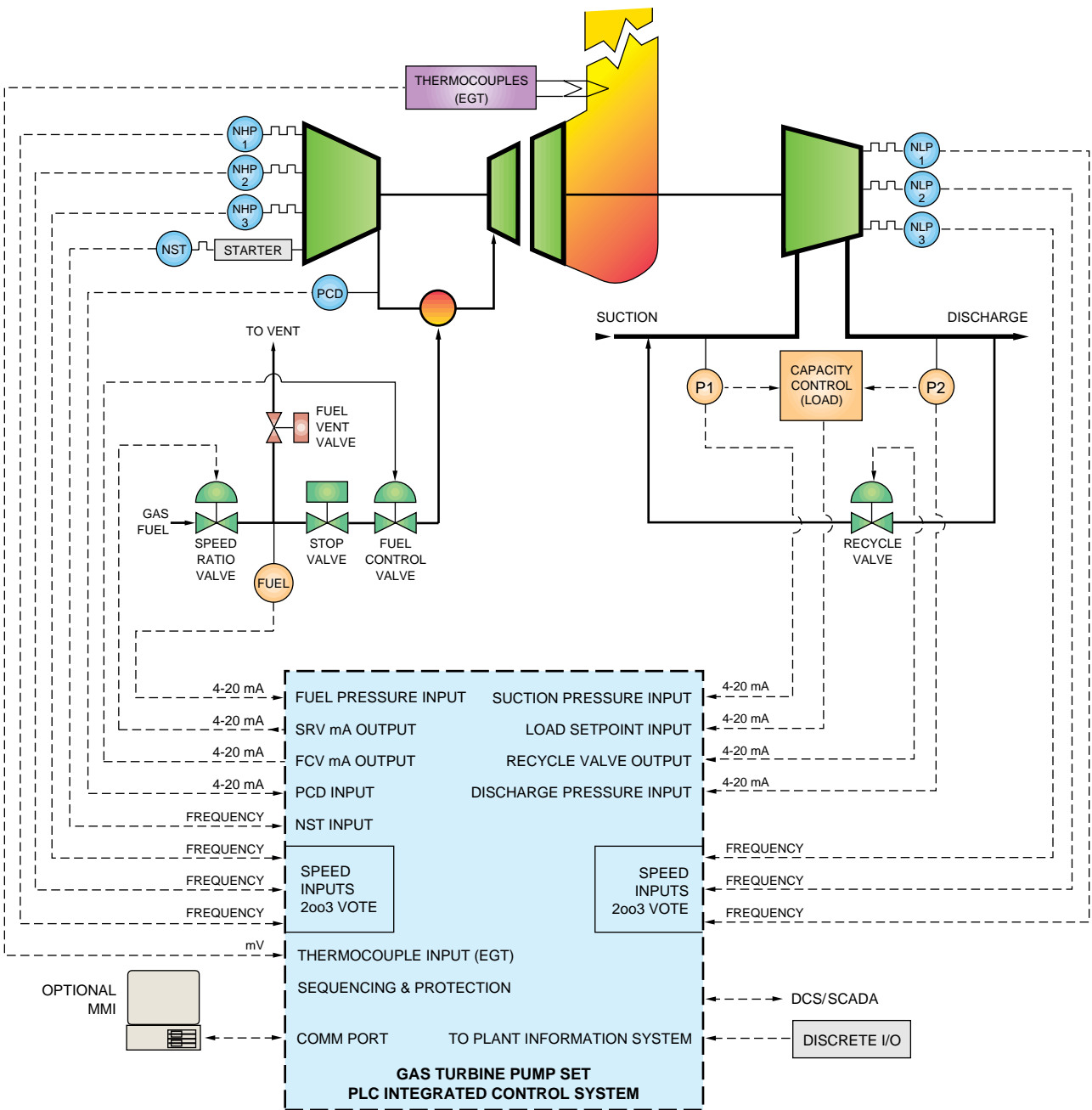
Simplified schematic of a Petrotech advanced PLC-based integrated control system for a gas turbine generator set.

APPLICATION

The Petrotech integrated control system provides cost-effective complete or partial control system retrofits for gas turbine driven generator packages. The system provides replacement controls for outdated electro-hydraulic and

analog-electronic controls. The PLC-based system can include turbine and generator sequencing, complete turbine control, load control, DCS interface, and a graphic operator interface for system status, trending, and data logging.

GAS TURBINE PUMP DRIVE INTEGRATED CONTROL SYSTEM APPLICATION DATA



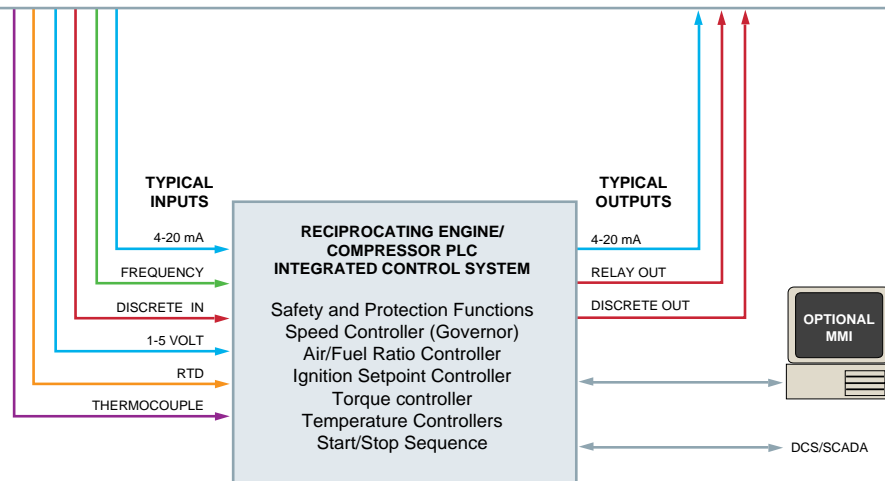
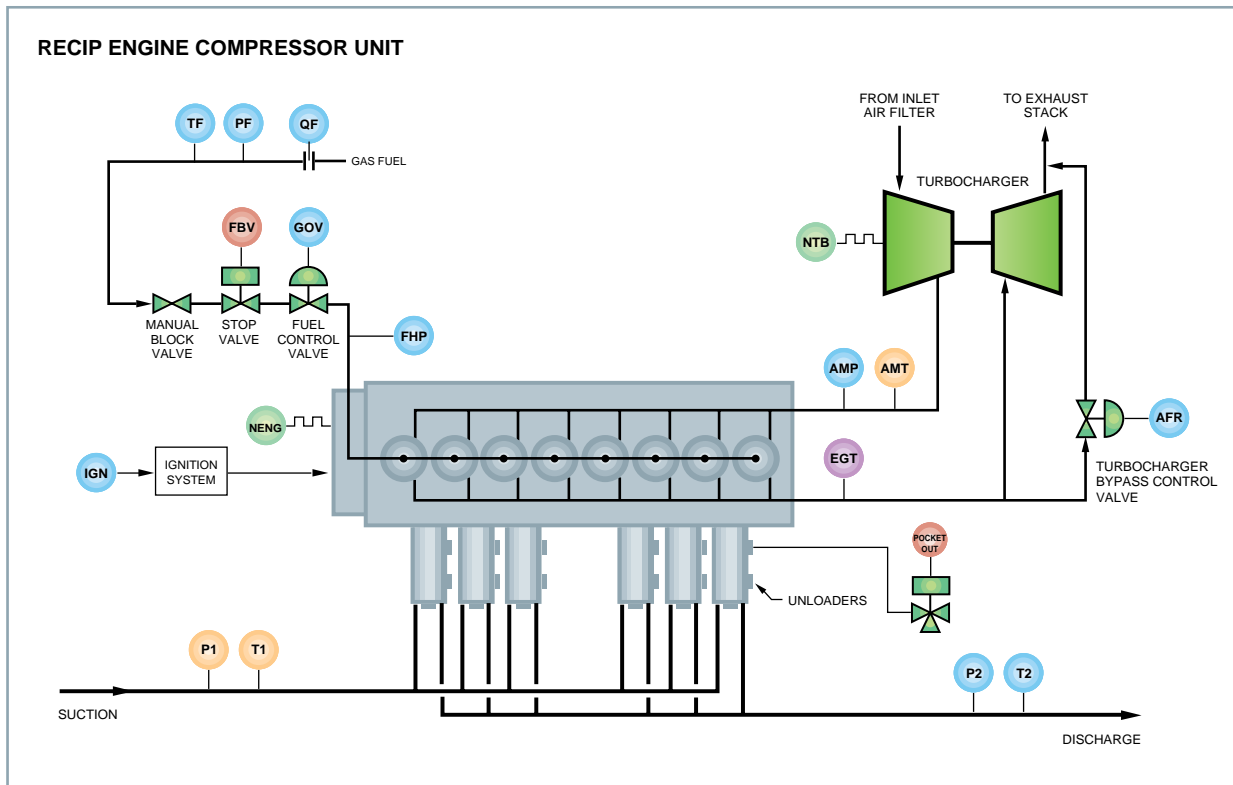
Simplified schematic showing a Petrotech advanced PLC-based integrated control system for a gas turbine pump set.

APPLICATION

The Petrotech integrated control system provides cost-effective complete or partial control system retrofits for gas turbine driven pump packages. The system provides replacement controls for outdated electro-hydraulic and analog-electronic controls. The PLC-based system can include turbine and pump sequencing,

complete turbine control, pump control, capacity control, DCS interface, and a graphic operator interface for system status, trending, and data logging.

RECIPROCATING GAS ENGINE COMPRESSOR DRIVE INTEGRATED CONTROL SYSTEM APPLICATION DATA



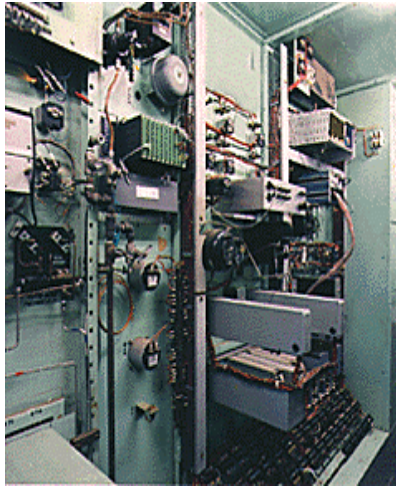
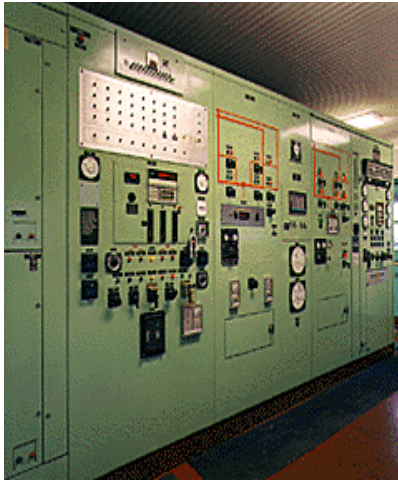
Simplified schematic showing typical control I/O for a recip engine/compressor system.

APPLICATION

Petrotech's custom integrated control systems provide cost-effective complete or partial control retrofits for reciprocating engine or electric motor driven compressor packages. The PLC-based system can include speed control (governor), torque

control, air/fuel ratio control, ignition timing setpoint generation, temperature controllers, capacity control, DCS/SCADA interface, and a graphic operator interface for system status, trending, and data logging.

EXAMPLE OF A GE FRAME 3 TURBINE COMPRESSOR CONTROL SYSTEM UPGRADE



Existing 1960's electro-hydraulic, pneumatic, and relay-based controls for one GE Frame 3 Compressor train



PLC-based integrated replacement controls with MMI graphic workstation for one GE Frame 3 compressor train

This turnkey controls upgrade for one GE Frame 3 compressor train replaced the old electro-hydraulic-mechanical control system with an advanced PLC based integrated system, new instrumentation, and end elements. All control functions such as fuel regulation, speed, EGT, and anti-surge control are accomplished in the PLC, along with sequencing and protection. The MMI has extensive capability for alarm reporting, trending, and data logging. PLC independent redundant backup systems include critical shutdown functions. The unit control panel has a communication interface with the station panel to allow remote operation of the turbine compressor train.

The controls upgrade included replacement of some temperature and pressure switches with new RTDs, transmitters, and thermocouples. The old fuel valve

system was modified and retrofitted with standard industrial components. The nozzle positioning system was upgraded from 300 psi to 1200 psi and included a new shaft-driven hydraulic pump, relief valve, and regulator valve. A new hydraulic actuator with integral temposonic feedback and electronic servo controls was also retrofitted.

This controls upgrade was completed in 4 months, and the second unit is presently scheduled for upgrade. Five (5) additional turbine compressors sets on the pipeline will be retrofitted with similar control systems. Benefits include increased equipment reliability and efficiency, extensive and detailed data/diagnostics available for predictive maintenance and troubleshooting, reduced operating and maintenance costs, remote operation, and a system based on familiar standard industrial components.

EXAMPLES OF TURBINE CONTROL SYSTEM UPGRADES



Replacement controls for two Allison 501K compressor sets in pipeline service



Replacement controls for two Allison 501K generator sets in emergency backup power service



Replacement controls for two Ruston TB4000 gas turbine driven pumps for crude oil pipeline service



Explosion proof Division 2 replacement controls for Solar Centaur in offshore gas gathering service

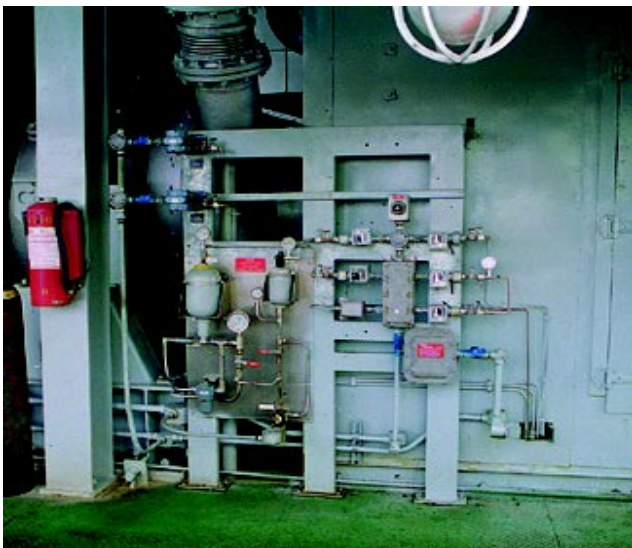
EXAMPLES OF TURBINE AUXILIARY CONTROL SYSTEM UPGRADES



Upgraded fuel valve system, hydraulic system, flame detectors, speed pickups, and thermocouples for gas turbine



New thermocouple installation (left) and installation of new LP speed sensing probes for gas turbine



Hydraulic power control rack for GE Frame 3 nozzle ramsystem retrofit including mA to servo controls



Installation of a Petrotech model RVAM compressor anti-surge recycle valve assembly

As part of a gas turbine compressor controls upgrade, it is generally necessary to replace older auxiliary systems to interface to the new controls. Petrotech can modify or retrofit fuel valve systems, hydraulic systems, speed sensing elements, thermocouples, flame detectors, compressor recycle valves, pressure switches, and transmitters.

Modernizing these older field devices is an essential part of an overall controls upgrade scheme in terms of functional control improvements and increased reliability and maintainability.

The retrofitted auxiliary systems are based on standard industrial hardware components which are typically familiar to the customer's service staff. Spare parts are also readily available from multiple vendors.

A full retrofit will include removal of the old devices, installation, checkout, and commissioning of all new systems and components.

EXAMPLES OF RECIPROCATING ENGINE CONTROL SYSTEM UPGRADES



Shown are PLC-based controls for two Ingersoll-Rand KVR-16 recip engine gas compressors and industrial workstation with graphical HMI package for remote supervisory control

Petrotech provided PLC-based controls for two Ingersoll-Rand KVR-16 and one Ingersoll-Rand KVT-16 reciprocating engine compressors in gas pipeline service. The systems include torque control, load step control, ignition timing control, air fuel ratio control, speed setpoint control, and sequencing and protection. The software also includes extended engine diagnostics, unit performance, process calculations, predictive horsepower calculations for optimum load step selection, station throughput control, and unit load management. All engine/compressor control functions, discrete logic functions, and calculations are accomplished in the PLC, using mature and proven Petrotech software packages.

The control panels include not only the main controllers and redundant safety shutdowns (Petrotech's standard, using independent hardware), but also autonomous backup control systems. These control systems allow manual start-up and operation of the engines in the

unusual event of a PLC failure. They include the means for adjusting ignition and speed setpoints, modifying output to waste-gate valve (air-fuel ratio control), and loading/unloading compressor pockets (load step control).

The control systems also include a dual communication interface. For local operator controls, a small OIT in each control panel with a serial link is installed. An industrial workstation with graphical HMI and Ethernet links is used for remote supervisory control, system status monitoring, and data trending and logging.

Petrotech provided turnkey services for this project including panel design, programming, control hardware, assembly and testing, field devices, conduit and tubing, field installation, start-up assistance, commissioning, and training.

REFERENCE LIST



Integrated Control Panels for a GE Frame 3 Turbine Compressor Retrofit Project

REFERENCE LIST

This section contains a partial reference list of Rotating Machinery Control Systems that have been furnished by Petrotech, Inc.

TURBINE & RECIPROCATING ENGINE CONTROL SYSTEMS

The majority of the Turbine and Reciprocating Engine Control System projects are retrofits that were designed to replace the original equipment manufacturers' (oem's) controls that became out-dated, unreliable due to lack of spare parts, and had low operating efficiency

COMPRESSOR CONTROL SYSTEMS

These type systems generally provide control of axial and centrifugal compressors and from pneumatic in the early 1970s to advanced hardware platforms such as microprocessors and PLCs that are currently being used.

HARDWARE PLATFORM

The Integrated Control System can be configured to operate on most industrial control hardware platforms such as PLC's available from major manufacturers such as:

- Siemens-TI
- GE Fanuc
- Allen-Bradley
- Modicon

Hardware platforms are continuously being evaluated by Petrotech R & D to determine if it meets our requirement for a reliable and cost effective Rotating Machinery Control System.

The reference list is comprised of the following major types of control systems:

TURBINE CONTROL SYSTEM

Integrated Control Systems designed to control Gas or Steam Turbines driving compressors, pumps and generators.

Pages 16-19

RECIPROCATING ENGINE CONTROL SYSTEM

Integrated Control Systems designed to control reciprocating engines driving compressors, pumps and generators.

Pages 20 and 21

COMPRESSOR CONTROL SYSTEM

Control Systems designed to control centrifugal and axial compressors.

Pages 22 to 29

A review of the reference list will indicate that there are many repeat customers who have purchased Petrotech, Inc. Systems to control and protect their valuable machinery, some spanning over a decade. The industries served include power generation for Utilities, Gas Pipelines, Petrochemical Plants, and Oil & Gas Production Facilities.

REFERENCE LIST of TURBINE CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
Allison 501 Series Turbine Compressor Drive			
Amerada Hess	2	Gas Processing Plant	U.S.A.
Columbia Gas Transmission	2	Pipeline	U.S.A.
Columbia Gulf Transmission	3	Pipeline	U.S.A.
El Paso/Tennessee Gas Pipeline	4	Pipeline	U.S.A.
Enron	2	Pipeline	U.S.A.
Enron/NNG	2	Gas Processing Plant	U.S.A.
Kinder Morgan	1	Pipeline	U.S.A.
Kinder Morgan/Natural Gas Pipeline	3	Pipeline	U.S.A.
Williams Natural Gas	3	Pipeline	U.S.A.
Allison 501 Series Turbine Generator Drive			
Aiken County Public Service	1	Wastewater Treatment Plant	U.S.A.
Phelps Dodge	2	Metals Processing	U.S.A.
Powertech Services	1	Power Generation	U.S.A.
Salomon Smith Barney	3	Emergency Backup Power	U.S.A.
Dresser DC 990 Turbine Compressor Drive			
Duke Energy	2	Pipeline	U.S.A.
Duke Energy/Texas Eastern Transmission	4	Pipeline	U.S.A.
El Paso/Tennessee Gas Pipeline	2	Pipeline	U.S.A.
Elliott Steam Turbine Compressor Drive			
Pemex	3	Refinery-Refrigeration	Mexico
Pemex	3	Refinery-Residual Gas	Mexico
Fiat TG-16 Turbine Compressor Drive			
Exxon Mobil	1	Pipeline	U.S.A.
GE Frame 3 Turbine Compressor Drive			
Arco Alaska	5	Gas Processing Plant	U.S.A.
CMS Energy/Trunkline Gas Company	4	Pipeline	U.S.A.
Duke Energy/Texas Eastern Transmission	20	Pipeline	U.S.A.
El Paso Energy	4	Pipeline	U.S.A.
El Paso/American Natural Resources	10	Pipeline	U.S.A.
El Paso/Tennessee Gas Pipeline	13	Pipeline	U.S.A.
Enron	2	Pipeline	U.S.A.
Enron/NNG	3	Pipeline	U.S.A.
Kinder Morgan/Natural Gas Pipeline	4	Pipeline	U.S.A.
Koch Gateway Pipeline	3	Pipeline	U.S.A.
Maraven	6	Refrigeration	Venezuela
Nerco	1	Refrigeration	U.S.A.
Shell	1	Gas Gathering	U.S.A.

REFERENCE LIST of TURBINE CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
GE Frame 3 Turbine Compressor Drive			
Tesoro Petroleum	1	Refinery	U.S.A.
Williams Natural Gas/Texas Gas Transmission	12	Pipeline	U.S.A.
Williams Natural Gas/Transco	8	Pipeline	U.S.A.
GE Frame 3 Turbine Compressor Drive with Tandem Steam Turbine for Power Boost			
Tosco	1	Refinery	U.S.A.
GE Frame 3 Turbine Generator Drive			
Elf Aquitaine	4	Power Generation	France
ELF Petroland	4	Power Generation	West Africa
GE Frame 5 Turbine Compressor Drive			
Duke Energy	4	Gas Processing Plant	U.S.A.
Duke Energy/Texas Eastern Transmission	9	Pipeline	U.S.A.
El Paso Energy	1	Pipeline	U.S.A.
El Paso/American Natural Resources	1	Gas Gathering	U.S.A.
El Paso/Tennessee Gas Pipeline	1	Pipeline	U.S.A.
Enterprise Products	2	Propane Refrigeration	U.S.A.
Maraven	1	Gas Injection	Venezuela
GE Frame 5 Turbine Generator Drive			
Alberta Pacific Forest Industries	1	Pulp/Paper Processing	Canada
Aluminium Bahrain	5	Alumimium Plant	Bahrain
American Atlas	1	Cogeneration	U.S.A.
Archer Daniels Midland	2	Food Processing	U.S.A.
Arizona Electric Power Company	3	Utility	U.S.A.
Central Vermont Public Service	1	Utility	U.S.A.
Chevron Angola	1	Utility	Angola
Citizens Utilities	3	Utility	U.S.A.
City of Lakeland	1	Utility	U.S.A.
City of Marquette	1	Utility	U.S.A.
City of Medicine Hat	2	Utility	Canada
City of Springfield Utility	2	Utility	U.S.A.
Consolidated Edison	4	Utility	U.S.A.
Delmarva Power	2	Utility	U.S.A.
Electricity Generating Authority	1	Utility	Thailand
Electroquito	2	Utility	Ecuador
Enelbar	2	Power Generation	Venezuela
Federal Electricity And Water	5	Utility	Dubai, U.A.E.
Houston Light and Power	1	Utility	U.S.A.
Imperial Irrigation	2	Gas Processing Plant	U.S.A.
Koch Power Company	4	Utility	U.S.A.

REFERENCE LIST of TURBINE CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
GE Frame 5 Turbine Generator Drive			
Madison Gas & Electric	4	Utility	U.S.A.
Manitowoc Power Company	1	Utility	U.S.A.
New Smyrna Beach Utility	1	Utility	U.S.A.
Northern Indiana Public Service	1	Utility	U.S.A.
Northern States Power	4	Utility	U.S.A.
*Pennsylvania Power & Light	4	Utility	U.S.A.
Reliant Energy/Orion Power	16	Utility	U.S.A.
Rochester Gas and Electric	1	Utility	U.S.A.
Texas Petrochemical	1	Petrochemical Plant	U.S.A.
Union Carbide	1	Petrochemical Plant	U.S.A.
Virgin Islands Water & Power	2	Utility	Virgin Islands
GE Frame 7 Turbine Generator Drive			
Lincoln Electric	1	Utility	U.S.A.
GE LM 1500 Turbine Compressor Drive			
Enron/NNG	3	Pipeline	U.S.A.
Sempra Energy/Southern California Gas	3	Pipeline	U.S.A.
GE LM 2500 Turbine Generator Drive			
CMS Energy	1	LNG Storage	U.S.A.
GE LM 5000 Turbine Generator Drive			
American Municipal Power	2	Utility	U.S.A.
Ecopetrol	1	Refinery	Columbia
Tractebel	1	Utility	U.S.A.
Hispano Suiza Model 1203 Turbine Compressor Drive			
Connecticut Natural Gas	2	Pipeline	U.S.A.
Total Peaking	1	Gas Processing Plant	U.S.A.
Lycoming TF-35 Turbine Generator Drive			
Cooperativa Electrica	1	Power Generation	Argentina
Pratt & Whitney FT Turbine Generator Drive			
ZADCO	1	Power Generation	Abu Dhabi
Pratt & Whitney GG3 Turbine Compressor Drive			
Columbia Gulf	2	Pipeline	U.S.A.
Duke Energy/Texas Eastern Transmission	1	Pipeline	U.S.A.
Williams Natural Gas/Texas Gas Transmission	1	Pipeline	U.S.A.
Pratt & Whitney GG4 Turbine Generator Drive			
Consolidated Edison	1	Utility	U.S.A.

REFERENCE LIST of TURBINE CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
Rolls-Royce Avon Series Turbine Compressor Drive			
Columbia Gulf Transmission	3	Pipeline	U.S.A.
Kinder Morgan/Natural Gas Pipeline	2	Pipeline	U.S.A.
Maraven	2	Gas Gathering	Venezuela
Vico	2	Pipeline	Indonesia
Rolls-Royce Avon Series Turbine Generator Drive			
Qatar Fertilizer Company	2	Fertilizer Plant	Qatar
Ruston TA Series Turbine Compressor Drive			
Chevron	1	Pipeline	U.S.A.
Ruston TB Series Turbine Compressor Drive			
Petroleum Development of Oman	1	Pipeline	Oman
Ruston TB Series Turbine Generator Drive			
Oman Refinery Corporation	2	Refinery	Oman
Ruston TB Series Turbine Pump Drive			
Arco Alaska	4	Pipeline	U.S.A.
Conoco Alaska	3	Pipeline	U.S.A.
Petroperu	3	Pipeline	Peru
Phillips Alaska	2	Pipeline	U.S.A.
Solar Centaur Turbine Compressor Drive			
Apache/Shamrock	1	Pipeline	U.S.A.
Enron/TGS	3	Pipeline	Argentina
Koch Gateway Pipeline	2	Pipeline	U.S.A.
National Gas Company of Trinidad	3	Pipeline	Trinidad
Texaco	1	Gas Gathering	U.S.A.
TotalFinaElf	2	Gas Gathering	The Netherlands
UMIC	1	Gas Gathering	West Africa
Williams Natural Gas	1	Pipeline	U.S.A.
Williams Natural Gas/Northwest Pipeline	2	Pipeline	U.S.A.
Solar Centaur Turbine Generator Drive			
AGIP	2	Power Generation	Nigeria
Plains Exploration	2	Power Generation	U.S.A.
Solar Mars Turbine Compressor Drive			
Wood Group	1	Gas Processing Plant	Dubai
Wood Group	1	Gas Processing Plant	Indonesia
Solar Mars Turbine Generator Drive			
ONGC	4	Offshore Power Generation	India

REFERENCE LIST of TURBINE CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
Solar Saturn Turbine Compressor Drive			
Conoco	1	Gas Gathering	U.S.A.
El Paso Natural Gas	4	Pipeline	U.S.A.
El Paso/American Natural Resources	1	Pipeline	U.S.A.
Enron/NNG	3	Pipeline	U.S.A.
Gaz de France	2	Gas Gathering	The Netherlands
Kerr-McGee/Oryx Energy	1	Gas Gathering	U.S.A.
KN Energy	2	Pipeline	U.S.A.
Petronas Carigali	2	Pipeline	Malaysia
South Carolina Pipeline	42	Pipeline	U.S.A.
Williams Natural Gas/Northwest Pipeline	2	Pipeline	U.S.A.
Solar Saturn Turbine Generator Drive			
Bras Nigeria	2	Power Generation	Nigeria
Westinghouse 251 Turbine Compressor Drive			
Duke Energy/Pan Energy	1	Gas Processing Plant	U.S.A.
Westinghouse 251 Turbine Generator Drive			
DSM	1	Power Generation	The Netherlands
Texas Petrochemical	1	Petrochemical Plant	U.S.A.
Westinghouse 251 Turbine Hot Gas Generator with Tandem Steam Turbine for Power Boost			
Global Octanes	1	Refinery	U.S.A.

REFERENCE LIST of RECIPROCATING ENGINE CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
Ariel Compressor Drive Brotherhood, Ltd.	4	Pipeline	Argentina
Ariel JGB12 Compressor Drive El Paso/Tennessee Gas Pipeline	1	Pipeline	U.S.A.
Chicago Compressor Compressor Drive PEMEX	1	Oil/Gas Separation	Mexico
Clark BA-8M Compressor Drive El Paso/Tennessee Gas Pipeline	9	Pipeline	U.S.A.
Clark HBA-6 Compressor Drive El Paso/Tennessee Gas Pipeline	16	Pipeline	U.S.A.
Clark HBA-8 Compressor Drive El Paso/Tennessee Gas Pipeline	3	Pipeline	U.S.A.
Clark HBA-8T Compressor Drive Duke Energy	3	Pipeline	U.S.A.
Clark TCV-16 Compressor Drive Duke Energy/Texas Eastern Transmission	2	Gas Storage	U.S.A.
Clark TCVA-16 Compressor Drive Enron/NNG	1	Pipeline	U.S.A.
Clark TCVC-20 Compressor Drive Enron/NNG	1	Pipeline	U.S.A.
Clark TLA-6 Compressor Drive Enron/NNG	4	Pipeline	U.S.A.
Clark TRA-8M Compressor Drive El Paso/Tennessee Gas Pipeline	1	Pipeline	U.S.A.
Cooper-Bessemer 14-4 Compressor Drive Williams Natural Gas/Texas Gas Transmission	1	Pipeline	U.S.A.
Cooper-Bessemer GMV-10 Compressor Drive El Paso/Tennessee Gas Pipeline	21	Pipeline	U.S.A.
Cooper-Bessemer GMVA-8 Compressor Drive PEMEX	3	Pipeline	Mexico

REFERENCE LIST of RECIPROCATING ENGINE CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
Cooper-Bessemer GMWA-10 Compressor Drive			
Duke Energy/Texas Eastern Transmission	3	Pipeline	U.S.A.
El Paso/Tennessee Gas Pipeline	12	Pipeline	U.S.A.
Cooper-Bessemer GMWA-6 Compressor Drive			
Enron/NNG	2	Pipeline	U.S.A.
Cooper-Bessemer GMWA-8 Compressor Drive			
Enron/NNG	1	Pipeline	U.S.A.
Cooper-Bessemer GMWC-6 Compressor Drive			
Enron/NNG	4	Pipeline	U.S.A.
Dresser-Rand Compressor Drive			
Chevron	2	Pipeline	U.S.A.
Ingersol-Rand KVR-16 Compressor Drive			
Enron/NNG	1	Pipeline	U.S.A.
Ingersol-Rand KVS-12 Compressor Drive			
Southern California Pipeline	5	Gas Storage	U.S.A.
Trinidad Natural Gas	4	Gas Storage	Trinidad
Ingersol-Rand KVT-16 Compressor Drive			
Enron/NNG	1	Pipeline	U.S.A.
Ingersoll-Rand 2HHE-VE Generator Drive			
Shell Sarawak	3	Power Generation	Indonesia
Rolls-Royce Allen 5016 V16 Compressor Drive			
Power Engineering	1	Pipeline	Taiwan
Ruston 16 RKW Generator Drive			
Alstom/Kim Chuan	3	Power Generation	Singapore
Various Engines Compressor Drive			
Williams Natural Gas/Texas Gas Transmission	30	Pipeline	U.S.A.
Waukeshaw 7042 GU Generator Drive			
Southern California Pipeline	3	Power Generation	U.S.A.
Waukeshaw 7042V-12 Generator Drive			
Southern California Pipeline	4	Power Generation	U.S.A.
Worthington 168-LTC Compressor Drive			
El Paso/Tennessee Gas Pipeline	8	Pipeline	U.S.A.

REFERENCE LIST of COMPRESSOR CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
Single-section Air Separation Compressor			
Air Liquide	1	Gas Processing Plant	Canada
Argonal/Air Liquide	1	Chemical Plant	Canada
City of Los Angeles	5	Chemical Plant	U.S.A.
City of Los Angeles	5	Hyperion Plant	U.S.A.
Dragoso	1	PTA Plant	Canada
Single-section Alkaline Process Compressor			
Tesoro Petroleum	1	Refinery	U.S.A.
Single-section Carbon Monoxide Compressor			
Liquid Carbonic Industrial	1	Chemical Plant	U.S.A.
Single-section Chlorine Process Compressor			
Formosa Plastics	6	Chemical Plant	U.S.A.
Single-section Crack Gas Process Compressor			
Dow Chemical	2	Chemical Plant	U.S.A.
Single-section Ethylene Compressor			
Han Yang Chemical	3	Refinery	South Korea
Single-section FCCU Process, Axial Compressor			
Fina Oil & Chemical	2	Refinery	U.S.A.
Mobil Refinery	2	Refinery	U.S.A.
Mobil Refinery	1	Refinery	U.S.A.
Single-section FCCU Wet Gas Compressor			
Sinclair Oil	2	Refinery	U.S.A.
Single-section H2S Compressor			
Brigita	2	Gas Processing Plant	Germany
Brigita	2	Gas Processing Plant	Germany
Single-section HCL Blower Compressor			
Han Yang Chemical	2	Refinery	South Korea
Single-section Hydrogen Compressor			
Mobil Refinery	3	Refinery	U.S.A.
Shell Refining Inc.	2	Refinery	U.S.A.
Texaco	6	Refinery	U.S.A.
Single-section Hydrogen/Methane Compressor			
Zhongyuan Petrochem	6	Chemical Plant	China
Single-section Liquid Extraction Compressor			
Mid Con	2	Pipeline	U.S.A.

REFERENCE LIST of COMPRESSOR CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
Single-section LPG Compressor			
Amoco	1	LPG Plant	Sharjah, U.A.E.
Single-section Maleic Anhydride Compressor			
Miles Inc.	2	Refinery	U.S.A.
Single-section Natural Gas Compressor			
AGIP	1	Gas Gathering	Italy
Al Furat Petroleum	5	Gas Processing Plant	Syria
American Pipeline	1	Pipeline	U.S.A.
Amoco	3	Refinery	U.S.A.
Amoco	1	LPG Plant	Sharjah, U.A.E.
Amoco	4	Pipeline	Sharjah, U.A.E.
Arco Indonesia	6	Gas Gathering	Indonesia
Arco	2	Gas Gathering	China
Arco	2	Pipeline	U.S.A.
Arkla Energy	2	Pipeline	U.S.A.
Chevron Overseas	2	Gas Gathering	West Africa
Chevron Overseas	8	Gas Lift	West Africa
Chevron	8	Gas Gathering	U.S.A.
China Pipeline	2	Pipeline	China
CMS Energy/Trunkline Gas Company	3	Pipeline	U.S.A.
Columbia Gas Transmission	2	Pipeline	U.S.A.
Consolidated Edison	1	Pipeline	U.S.A.
Consolidated Natural Gas	3	Pipeline	U.S.A.
Crescent Petroleum	1	Gas Gathering	Dubai, U.A.E.
Delhi Gas	2	Pipeline	U.S.A.
Pipeline	2	Pipeline	U.S.A.
Duke Energy/Algonquin Gas Pipeline	6	Pipeline	U.S.A.
Duke Energy/Pan Energy	1	Gas Processing Plant	U.S.A.
Duke Energy/Texas Eastern Transmission	29	Pipeline	U.S.A.
Duke Energy	1	Gas Processing Plant	U.S.A.
El Paso Energy	4	Pipeline	U.S.A.
El Paso Natural Gas	4	Pipeline	U.S.A.
El Paso/American Natural Resources	9	Pipeline	U.S.A.
El Paso/Tennessee Gas Pipeline	24	Pipeline	U.S.A.
Elf Petroland	3	Gas Processing Plant	The Netherlands
Enagas	4	Pipeline	Spain

REFERENCE LIST of COMPRESSOR CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
Single-section Natural Gas Compressor			
Enron/NNG	12	Pipeline	U.S.A.
Enron/TGS	3	Pipeline	Argentina
Enron	6	Pipeline	U.S.A.
Enserch	2	Gas Gathering	U.S.A.
EPMI	1	Gas Injection	Malaysia
Exxon	2	Gas Processing Plant	U.S.A.
Exxon	2	Gas Gathering	U.S.A.
Exxon	3	Gas Injection	U.S.A.
Exxon	4	Gas Processing Plant	U.S.A.
Foothills Pipeline	3	Pipeline	Canada
GPM	2	Gas Processing Plant	U.S.A.
GUPCO	1	Gas Gathering	Egypt
Hadson Energy	2	Gas Processing Plant	Australia
Huffco	1	Gas Gathering	Indonesia
Kerr-McGee/Oryx Energy	3	Gas Gathering	U.S.A.
Kinder Morgan/Natural Gas Pipeline	6	Pipeline	U.S.A.
KN Energy	2	Pipeline	U.S.A.
Koch Gateway Pipeline	5	Pipeline	U.S.A.
Maersk	6	Gas Gathering	The Netherlands
Maraven	7	Pipeline	Venezuela
Maraven	1	Gas Gathering	Venezuela
Maraven	1	Gas Injection	Venezuela
Maraven	5	Gas Lift	Venezuela
Megal	4	Pipeline	Germany
Mesa Petroleum	4	Gas Gathering	U.S.A.
Mesa Petroleum	2	Pipeline	U.S.A.
Mobil Netherlands	1	Gas Gathering	The Netherlands
Pennzoil	9	Gas Gathering	Russia
Petrobel	4	Gas Gathering	Egypt
Petrocanada	2	Gas Gathering	Canada
Petrocanada	2	Gas Processing Plant	Canada
Petroleum Development of Oman	2	Gas Processing Plant	Oman
Petroleum Development of Oman	6	LPG Plant	Oman
Petronas Carigali	2	Gas Lift	Malaysia
Petronas Carigali	3	Pipeline	Malaysia
Phillips Petroleum	2	Gas Lift	The Netherlands

REFERENCE LIST of COMPRESSOR CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
Single-section Natural Gas Compressor			
Placid Oil	6	Gas Processing Plant	U.S.A.
SECWA	6	Pipeline	Australia
Shell Brunei	2	Gas Gathering	Brunei
Shell Offshore Inc.	6	Gas Gathering	U.S.A.
Shell	1	Gas Gathering	U.S.A.
Sonatrach	1	Pipeline	Algeria
South Carolina Pipeline	9	Pipeline	U.S.A.
Southwest Gas	1	Pipeline	U.S.A.
Texaco	1	Gas Gathering	U.S.A.
Texas Utilities	4	Pipeline	U.S.A.
Union Gas	1	Pipeline	Canada
Union Pacific Resources	2	Gas Processing Plant	U.S.A.
Union Pacific Resources	3	Pipeline	U.S.A.
United Texas Transmission	10	Pipeline	U.S.A.
Universal Compression	1	Fuel Gas Compression	Iraq
Unocal	3	Gas Gathering	Thailand
Valero Energy	2	Gas Processing Plant	U.S.A.
Valero Energy	30	Pipeline	U.S.A.
Virginia Indonesia Company	2	Gas Gathering	Indonesia
Warren Petroleum	3	Pipeline	U.S.A.
Williams Natural Gas/Northwest Pipeline	10	Pipeline	U.S.A.
Williams Natural Gas/Texas Gas Transmission	13	Pipeline	U.S.A.
Williams Natural Gas/Trans OK	1	Pipeline	U.S.A.
Williams Natural Gas/Transco	31	Pipeline	U.S.A.
Williams Natural Gas	1	Pipeline	U.S.A.
Wintershall Noordzee	2	Gas Gathering	The Netherlands
Wintershall Noordzee	2	Gas Lift	The Netherlands
Single-section Nitric Acid Expansion Compressor			
C.F. Industries	2	Chemical Plant	U.S.A.
Mississippi Chemical	2	Chemical Plant	U.S.A.
Single-section Nitrogen Process Compressor			
Liquid Carbonic Industrial	2	Chemical Plant	U.S.A.
Single-section Process Air Compressor			
Sterling Chemicals	3	Chemical Plant	U.S.A.
Single-section Propane Refrigeration Compressor			
Enterprise Products	1	Chemical Plant	U.S.A.
Mobil Refinery	2	Refinery	U.S.A.
Shell Refining Inc.	2	Refinery	U.S.A.
Enron	2	Gas Processing Plant	U.S.A.

REFERENCE LIST of COMPRESSOR CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
Single-section Refrigeration Compressor			
Enron	2	Gas Processing Plant	U.S.A.
Valero Energy	2	Gas Processing Plant	U.S.A.
Wesfarmers	4	Gas Processing Plant	Australia
Will Gas Company	1	Gas Processing Plant	U.S.A.
Single-section Residual Gas Compressor			
PEMEX	3	Refinery	Mexico
Single-section Turbo Expander Compressor			
PEMEX	2	Refinery	Mexico
Petroleum Development of Oman	8	LNG Plant	Oman
Single-section Waste Gas Compressor			
Quantum Chemical	2	Chemical Plant	U.S.A.
Single-section Maleic Anhydride Compressor			
Miles Inc.	2	Refinery	U.S.A.
Two-inlet Refrigeration Compressor			
Al Furat Petroleum	3	Gas Processing Plant	Syria
Nerco	1	Gas Processing Plant	U.S.A.
Petroleum Development of Oman	1	Gas Processing Plant	Oman
Two-section Carbon Monoxide Compressor			
Liquid Carbonic Industrial	1	Chemical Plant	U.S.A.
Two-section Coker Gas Compressor			
PEMEX	1	Refinery	Mexico
Petrobras	1	Gas Processing Plant	Brazil
Shell Refining Inc.	2	Refinery	U.S.A.
Two-section FCCU Wet Gas Compressor			
Petrobras	1	Gas Processing Plant	Brazil
Petrobras	1	Refinery	Brazil
Two-section Flash Gas Process Compressor			
Petroleum Development of Oman	4	LPG Plant	Oman
Two-section H2S Gas Compressor			
PEMEX	4	Gas Processing Plant	Mexico
Two-section Hydrogen Gas Compressor			
B.P. Alliance Refinery	1	Refinery	U.S.A.

REFERENCE LIST of COMPRESSOR CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
Two-section LNG Refrigeration Compressor			
Williams Natural Gas/Northwest Pipeline	1	LNG Plant	U.S.A.
Williams Natural Gas/Northwest Pipeline	1	Pipeline	U.S.A.
Two-section Natural Gas Compressor			
Amerada Hess	6	Gas Processing Plant	U.S.A.
Apache Corporation	1	Pipeline	U.S.A.
Arco Alaska	5	Gas Lift	U.S.A.
Arco	1	Gas Gathering	U.S.A.
Chevron Cabinda	1	Gas Gathering	Cabinda
Chevron Zaire	5	Gas Gathering	Zaire
Chevron	2	Gas Gathering	U.S.A.
El Paso/Tennessee Gas Pipeline	2	Pipeline	U.S.A.
Elf Petroland	2	Gas Gathering	The Netherlands
EPMI	3	Gas Gathering	Malaysia
GUPCO	1	Gas Gathering	Egypt
GUPCO	2	Gas Lift	Egypt
Maraven	1	Pipeline	Venezuela
Maraven	3	Gas Gathering	Venezuela
Maraven	2	Gas Lift	Venezuela
Gas Processing Plant	1	Gas Processing Plant	U.S.A.
Mesa Petroleum	2	Pipeline	U.S.A.
NORAM	2	Pipeline	U.S.A.
PEMEX	3	Gas Gathering	U.S.A.
Sempra Energy/Southern California Gas	3	Gas Injection	U.S.A.
Shell Offshore Inc.	7	Gas Gathering	U.S.A.
Shell Offshore Inc.	1	Gas Lift	U.S.A.
Sovereign Oil	2	Gas Lift	United Kingdom
Union Pacific Resources	1	Pipeline	U.S.A.
Union Texas Petroleum	1	Gas Gathering	U.S.A.
Unocal	2	Gas Gathering	Malaysia
Two-section Process Air Compressor			
Chevron Chemical	2	Chemical Plant	U.S.A.
Two-section Propane Refrigeration Compressor			
Duke Energy/Pan Energy	1	Gas Processing Plant	U.S.A.
Two-section Propylene Compressor			
Fina Oil & Chemical	2	Refinery	U.S.A.
Two-section Coker Gas Compressor			
PEMEX	1	Refinery	Mexico

REFERENCE LIST of COMPRESSOR CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
Two-stage Refrigeration Compressor			
PEMEX	3	Refinery	Mexico
Three-inlet Refrigeration Compressor			
El Paso/Coastal Javelina	4	Gas Processing Plant	U.S.A.
Maraven	2	Gas Processing Plant	Venezuela
Three-section Natural Gas Compressor			
Amoco	2	Gas Gathering	Trinidad
Amoco	2	Gas Lift	Trinidad
Pipeline	4	Pipeline	U.S.A.
Chevron Cabinda	1	Gas Gathering	Cabinda
Chevron Zaire	1	Pipeline	Zaire
Chevron	1	Gas Gathering	U.S.A.
Chevron	1	Gas Lift	U.S.A.
EPMI	2	Gas Lift	Malaysia
GUPCO	2	Gas Gathering	Egypt
GUPCO	3	Gas Lift	Egypt
Maraven	1	Gas Gathering	Venezuela
Maraven	3	Gas Injection	Venezuela
Maraven	4	Gas Lift	Venezuela
Maraven	2	Gas Processing Plant	Venezuela
Maraven	1	Pipeline	Venezuela
PEMEX	3	Gas Gathering	U.S.A.
Pennzoil	1	Gas Gathering	U.S.A.
Petrobras	2	Gas Lift	Brazil
Petrobras	4	Pipeline	Brazil
Petroleum Development of Oman	4	Gas Lift	Oman
Union Pacific Resources	3	Gas Gathering	U.S.A.
Union Texas Petroleum	2	Gas Gathering	U.S.A.
Unocal	2	Gas Lift	Indonesia
Three-section Refrigeration Compressor			
Liquid Energy Corporation	1	Refinery	U.S.A.
Four-section Natural Gas Compressor			
Petroleum Development of Oman	6	Gas Lift	Oman
Shell Gabon	3	Gas Injection	Gabon

REFERENCE LIST of COMPRESSOR CONTROL SYSTEMS

TYPE/CUSTOMER	QTY	SERVICE	LOCATION
Four-section Process Air Compressor Petrocel	1	Refinery	Mexico
Ten-stage CO2 Process Compressor Borsig/Azot	1	Gas Processing Plant	Russia
Nowomoskowsk	1	Chemical Plant	Russia

REFERENCE LIST of COMPRESSOR CONTROL SYSTEMS

TYPE/CUSTOMER

QTY

SERVICE

LOCATION

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