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# Company Overview

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EXPERIENCE • CAPABILITY • EXECUTION

[petrotechinc.com](http://petrotechinc.com)



## Who We Are

Petrotech, Inc., (Petrotech) supplies control systems and turnkey instrumentation and electrical services (I&E) for a wide variety of turbomachinery assets such as centrifugal and reciprocating compressors, gas, hydro and steam turbines, generators and their associated auxiliary systems.

With more than 50 years of combined experience, over 2,500 installations and at least ten million operating hours, Petrotech is a trusted expert in rotating machinery and process control systems.

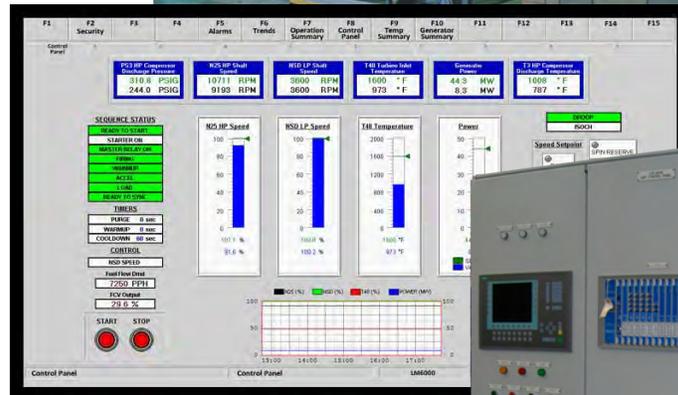


## We Help our Customers Increase Reliability, Improve Efficiency and Reduce Downtime.

Petrotech supplies complete turnkey solutions for your most critical rotating equipment to minimize downtime, increase reliability and improve efficiency of your operation. Petrotech understands that your application is unique, so we go through the process of identifying your specific needs, then design a control system focused on your equipment and how it integrates into your plant.

We pride ourselves on being a full service control systems provider from technical consultation and troubleshooting through engineering design and the execution and commissioning phases of the project, with full 24/7 aftermarket support once we leave the site.

Petrotech facilities include corporate offices in New Orleans, Louisiana and facilities in Houston, Texas and Suffolk, United Kingdom.



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## Petrotech Markets

Petrotech works across the energy sector. From power generation for Utilities, IPPs and EPCs to the Oil and Gas, Petrochemical and Refining and Mining industries.

Regardless of where in the energy chain Petrotech operates, our approach remains the same - we deliver superior customer satisfaction that builds on our reputation as the leaders in turbomachinery controls.

Our control systems are found in the following applications.

- **Upstream - Oil & Gas Production**

Commonly referred to as Upstream or the Exploration and Production (E&P) sector, Petrotech's customized solutions include: Associated Gas, Re-injection, Liquids Stabilization, Driver (EMD/Gas Turbine), Capacity and Loadsharing Controls

- **Midstream - Pipeline & Natural Gas Processing**

The Oil & Gas Midstream sector includes the transportation of refined product through pipelines and other means as well as gas processing plants. Petrotech's customized solutions include: Pipeline Booster Compressors (Centrifugal, Reciprocating), Driver (EMD/ Gas Turbine/Steam Turbine), NGL Expander/Compressor, Capacity and Loadsharing Controls

- **Downstream - Petrochemical & Refining**

Referred to as the Downstream sector, petrochemical and refining include refining petroleum crude oil and processing and purifying raw natural gas. Petrotech's customized solutions include: Wet Gas Compressor, FCCU Air Blower, Driver (EMD/Gas Turbine), Capacity and Loadsharing Controls

- **Power Generation**

Petrotech's customized solutions include: Standby-Peaking Power (Aero-derivative & Frame Turbines), Driver (EMD/Gas Turbine/ Steam Turbine) Controls, Data Center Stand-by Power

- **Instrumentation and Electrical Turnkey**

Services encompass all industry sectors, including marine and process automation.

Our customers look to us for complete driver control, load control, sequencing, protection and information systems integrated into a control system hardware platform of their choice.



*Oil & Gas Production*



*Pipeline & Natural Gas Processing*



*Petrochemical & Refining*



*Power Generation*



*Marine*



*Process Automation*



## Petrotech Control Systems

### Gas Turbines

Petrotech supplies cost-effective integrated control system solutions for mechanical and generator turbine drive packages. Our control systems provide replacement controls for outdated electro-hydraulic and analog-electronic controls.

Compressor systems typically include complete gas turbine fuel control system regulation (TFR), compressor control anti-surge controls, turbine and compressor sequencing, capacity control, HMI and DCS interface.

Generator systems typically include complete gas turbine fuel control system regulation (TFR), generator sequencing, isochronous and droop load control, HMI and DCS interface.



### Steam Turbines

Petrotech's advanced steam turbine controls for compressor and generator drive applications feature the same integration strategies deployed on gas turbine driven mechanical and electrical drive systems. The steam turbine controls also provide turbine steam flow control, extraction admission flow control, pressure control, sequencing, capacity/load control, DCS interface and a graphic operator interface for the visualization and display of system status, trending and data logging.

### Centrifugal & Axial Compressors

Petrotech provides a comprehensive suite of compressor control solutions, designed to provide the end-user with a wide range of flexible and economical compressor control and protection capabilities.

Over the past four decades, Petrotech has developed numerous compressor anti-surge and capacity control algorithms that can be hosted in many different control systems. Our anti-surge system algorithms provide pressure, temperature and molecular weight correction strategies, adaptive control and anticipation strategies and contingency strategies for transmitter failures. Our capacity control system algorithms provide customers the ability to operate their compressor systems without constant operator interaction and provide solutions and strategies to minimize energy consumption.

Petrotech compressor solutions are classified as:

- ASC – Anti-Surge Control
- CAP – Station Level Capacity Control
- LSC – Multi-compressor Loadsharing or Turndown Control





## Petrotech Control Systems

### Reciprocating Engines & Compressors

Petrotech also provides economical, flexible, integrated retrofit solutions for reciprocating engine and electric motor driven compressors. Our PLC-based systems can include speed control, torque control, pocket-loader control, air/fuel ratio control, ignition timing set point generation, capacity control, DCS/SCADA interface and a graphic operator interface for the visualization and display of system status, trending and data logging.



### Auxiliary Systems

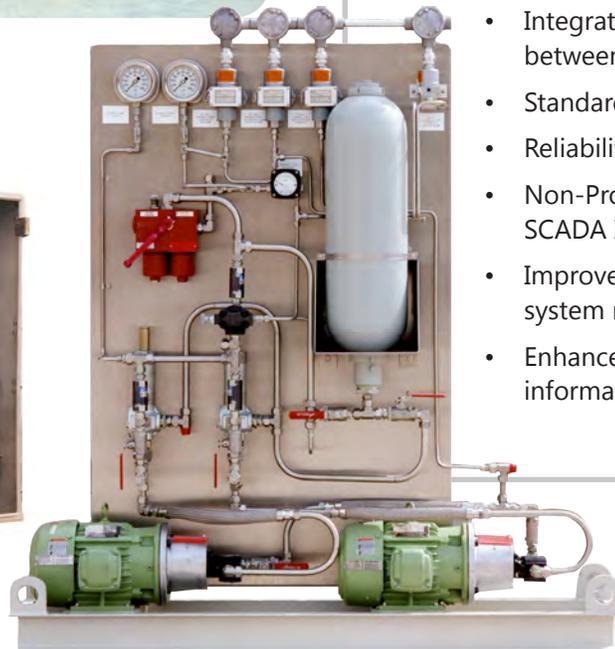
Petrotech specializes in every aspect of controls and instrumentation, including the supply of upgrades and auxiliary systems for turbine and compressor packages. The following auxiliary systems and components are available for complete or partial system upgrades:

- Fuel control valves
- Inlet guide vane control servos
- Interstage nozzle control servos
- Water and steam injection systems
- Speed probe replacement
- Exciter gear assemblies
- Flame detectors for combustion chambers
- Recycle or Anti-Surge control valves

Petrotech provides control systems and instrumentation for rotating machinery assets such as compressors, gas, hydro and steam turbines, generators, reciprocating engines, associated auxiliary systems and balance of plant automation functions.

### All Petrotech Control Systems Feature:

- Integrated control capability between the unit subsystems
- Standard Industrial components
- Reliability
- Non-Proprietary DCS or SCADA Interface
- Improved start-up and fuel/system regulation
- Enhanced operator interface information (HMI)



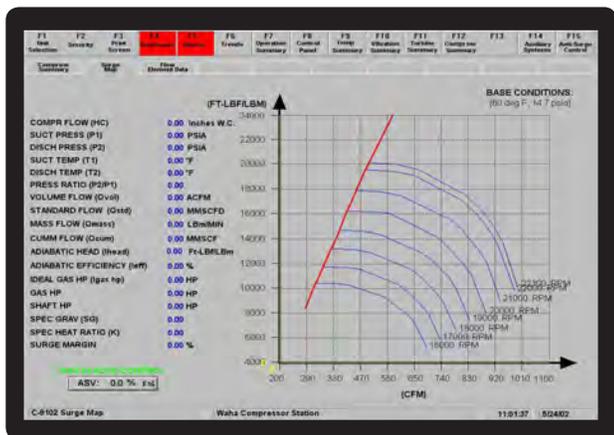


## Petrotech Stand-Alone Products

Petrotech's stand-alone products provide economical solutions to specific turbomachinery functions such as anti-surge, capacity control and steam turbine control solutions. Our stand-alone products are pre-engineered to reduce installation costs and provide comprehensive operator interface functionality to simplify user configuration and monitor operations. Stand-alone products may also be combined with other systems to enhance functionality and provide low-cost configurable solutions. Each of these control products includes the same mature field-proven Petrotech software found in our integrated turbomachinery control solutions.

### Em-400 Multi-Body Anti-Surge Compressor Controller

The Em-400 is a multi-body compressor anti-surge controller that incorporates the field-proven Petrotech anti-surge algorithms into a rack mountable package. The Em-400 is user configurable through the built-in color touch screen display. It includes more than 45 configuration and display screens. No additional hardware is needed to configure the Em-400. The user can access key controller parameters, including tuning information, alarm status and live compressor performance maps. The Em-400 controller accommodates up to three compressor bodies.



### Em-405 Parallel Compressor Capacity Controller

The Em-405 capacity controller provides a cost effective full featured capacity control solution for up to four parallel compressors typically found in upstream and midstream compressor applications. Designed to interface with the Em-400 or any other 3rd party anti-surge controller, the Em-405 provides an integrated low cost capacity control solution for these systems where a full integrated control system is not desired or required. The Em-405 capacity control system algorithms provide customers the ability to operate their compressors systems without constant operator interaction and provide solutions and strategies to minimize energy consumption.



### Em-406 Air Blower Capacity Controller

The Em-406 capacity controller provides a cost effective, full featured capacity control solution for up to four parallel axial air blowers. Similar to the Em-405, the Em-406 deploys the similar capacity control strategies utilized in the Em-405 with the addition of strategies designed to efficiently operate axial air compressor systems such as those found in refinery and petrochemical applications.

### Em-430 Steam Turbine Controller

The Em-430 steam turbine controller provides a cost effective, full featured steam turbine governor for small to mid-size steam turbines with admission/extraction controls. The Em-430 provides a low cost steam turbine regulation solution for systems where a full integrated control system is not required.

### Em-405R Refrigeration Capacity Controller

The Em-405R capacity controller provides a cost effective, full featured capacity control solution for up to four parallel propane refrigerant compressors. Similar to the Em-405, the Em-405R deploys the similar capacity control strategies utilized in the Em-405 with the addition of strategies designed to efficiently operate refrigeration compressors such as quench recycle control.





## Control System Advantages

### **Integrated Control System**

Petrotech control systems offer our customers an economical and flexible alternative to OEM supplied control systems. Our ability to provide hardware independent control system solutions enable our customers to standardize their existing installed hardware base, minimize their spare parts inventory and maximize the efficiency of their maintenance and service functions.

### **Firmware**

Petrotech proven-in-use Application Control Packages are derived from well-proven, mature functions that have been implemented in thousands of similar control systems.

### **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.

### **Stand-Alone Control Capability**

When budget or project requirements do not require Integrated Control Capability, our stand-alone control solutions utilize the same field proven equipment control algorithms deployed in our integrated systems.

### **Fault Tolerance**

Petrotech also supplies high availability redundant control systems designed to withstand multiple faults or failures without loss of mission.

### **Critical Function Redundancy Assembly**

Even though many of the world-class control systems on the market today have availability in the 99% range, Petrotech includes the Critical Function Redundancy (CFR) assembly to ensure system reliability in the face of unexpected component failures. The CFR assembly provides redundant protection for critical shutdowns, such as redundant over speed, exhaust gas temperature and any other critical protection function and will trip the machine independent of the main PLC control, upon detection of an abnormal operating condition. Our CFR systems provide the first defense against intentional and unintentional cyber-security threats by separating critical functions from the control system communications network.

### **Cyber Security**

There is no single defense against cyber-security threats. Therefore, all Petrotech control systems utilize the cyber security features provided by the control system hardware manufacturer on both the controller level and the control system network level. Petrotech can help you comply with your Critical Infrastructure Protection (CIP) requirement.

### **Petrotech Support Services**

Petrotech provides its customers with a full range of technical support and consulting services. Our experienced support team of control systems specialists and engineers, have years of hands on experience in the industries we serve. Support services include telephone and on-site support, after-market parts, training, turnkey installation and commissioning and the necessary tools, materials and labor to get the job done.

### **Turnkey Installation**

Petrotech offers single vendor turnkey installation services which reduces the risk for the client. This includes all installation labor and materials, while utilizing our personnel or local content as necessary.

### **Field I & E**

Our mobilized Petrotech team provides on-site I&E services. Services include design engineering, I&E construction, control system fabrication, fire and gas safety systems, on-site project management site audits, centralized purchasing and training programs.

### **Commissioning**

During the commissioning process experienced Petrotech engineers and rotating machinery consultants actively participate in initial system start-up and field commissioning activities. This includes loop check responsibilities, Site Acceptance Test execution, system tuning and on-site warranty support.

### **Field Service**

Experienced Petrotech engineers and rotating machinery consultants can be dispatched to address control system operational issues. This can include fault finding, calibration, repair/replace actions, system modification, system updates and programming services. Petrotech's team is available on a call-out and service plan basis.

### **Technical Consultation**

Petrotech offers site surveys and studies of control problems with pre-existing machinery to identify specific problems in process piping or layout that requires correction or mitigation to achieve satisfactory results. Petrotech is also offers an optional Site Support Agreement for remote troubleshooting services via the Internet or a dial-up connection.

### **Telephone Support**

No charge 24x7x365 availability. Customers speak to an experienced Petrotech engineer and rotating machinery consultant.

### **Training**

Petrotech offers training at the beginner, operator, engineer and senior technical management levels for basic machinery control technology, compressor control and gas turbine control. Standard courses are offered at Petrotech's or client's facilities in a classroom setting with all required equipment and simulators.

## Partial Reference List of Rotating Machinery Control Systems

Following is a partial list of common rotating machinery for which Petrotech has developed control solutions. Other machinery control systems are available from the extensive library of products developed by Petrotech.

### Turbine-Compressor Control Systems

|                 |                   |
|-----------------|-------------------|
| Allison         | Pratt & Whitney   |
| Dresser         | Rolls-Royce Avon  |
| Fiat            | Ruston Series     |
| GE Frame Series | Solar-All Engines |
| GE LM Series    | Westinghouse      |
| Hispano         |                   |

### Turbine-Generator Control Systems

|                 |                 |
|-----------------|-----------------|
| ABB Stal        | Lycoming        |
| Allison         | Pratt & Whitney |
| Dresser         | Rolls-Royce     |
| GE Frame Series | Ruston          |
| GE LM Series    | Siemens         |
| Kongsberg       | Solar           |

### Reciprocating Engine Control Systems

|                    |                |
|--------------------|----------------|
| Ariel              | Ingersoll-Rand |
| Chicago Compressor | Rolls-Royce    |
| Clark              | Ruston         |
| Cooper-Bessemer    | Waukesha       |
| Dresser-Rand       | Worthington    |

### Compressor Control Systems Applications

|                   |                       |
|-------------------|-----------------------|
| Air Separation    | Liquid Extraction     |
| Alkaline Process  | LNG                   |
| Carbon Monoxide   | LPG                   |
| Chlorine Process  | Maleic Anhydride      |
| CO2 Process       | Natural Gas           |
| Coker Gas         | Nitric Acid Expansion |
| Crack Gas         | Nitrogen Process      |
| Ethylene          | Process Air           |
| FCCU Process      | Propane               |
| FCCU Wet Gas      | Propylene             |
| Flash Gas Process | Refrigeration         |
| H2S Gas           | Residual Gas          |
| HCL               | Turbo Expander        |
| Hydrogen/Methane  | Waste Gas             |
| Hydrogen Gas      |                       |

## Partial Customer Reference List

The following is a partial list of customers that have installed a Petrotech, Inc. Rotating Machinery Control System.

### Turbine-Generator Control Systems

|                                   |          |
|-----------------------------------|----------|
| AGIP                              | Nigeria  |
| Alberta Pacific Forest Industries | Canada   |
| Aluminum Bahrain                  | Bahrain  |
| Arizona Electric Power Company    | U.S.A.   |
| City of Springfield Utility       | U.S.A.   |
| Consolidated Edison               | U.S.A.   |
| Consumers Energy                  | U.S.A.   |
| Eastern Generation (US Power Gen) | U.S.A.   |
| DSM Power                         | Holland  |
| Dyergy                            | U.S.A.   |
| Ecopetrol                         | Colombia |
| Electricity Generating Authority  | Thailand |
| Electroquito                      | Ecuador  |
| Federal Electricity and Water     | Dubai    |
| Houston Light and Power           | U.S.A.   |
| Madison Gas & Electric            | U.S.A.   |
| MidAmerican Energy                | U.S.A.   |
| Northern Indiana Public Service   | U.S.A.   |
| Northern States Power             | U.S.A.   |
| NRG Energy (Reliant Energy)       | U.S.A.   |
| Oman Refinery Corporation         | Oman     |
| Pennsylvania Power & Light        | U.S.A.   |
| Qatar Fertilizer Company          | Qatar    |
| Rochester Gas and Electric        | U.S.A.   |
| Spectra Energy                    | U.S.A.   |
| Tractebel                         | U.S.A.   |
| Union Carbide                     | U.S.A.   |

### Turbine-Compressor Control Systems

|                      |              |
|----------------------|--------------|
| Amoco                | Trinidad     |
| Aramco               | Saudi Arabia |
| Arco                 | Various      |
| BP                   | USA/China    |
| Chevron Texaco       | Various      |
| Columbia Gas & Gulf  | U.S.A.       |
| Conoco-Phillips      | U.S.A.       |
| Duke Energy          | U.S.A.       |
| Enterprise           | U.S.A.       |
| Exxon Mobil          | Various      |
| Gaz de France        | Holland      |
| Gulf South Pipeline  | U.S.A.       |
| Kinder Morgan        | U.S.A.       |
| National Gas Company | Trinidad     |
| Northern Natural Gas | U.S.A.       |
| Northwest Pipeline   | U.S.A.       |
| ONGC                 | India        |
| PDVSA                | Venezuela    |
| PEMEX                | Mexico       |
| Petrobras            | Brazil       |
| Petrocanada          | Canada       |
| Petronas             | Malaysia     |
| PDO                  | Oman         |
| Sempra               | U.S.A.       |
| Shell                | Various      |
| Williams Energy      | U.S.A.       |

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