

Automated Control Systems



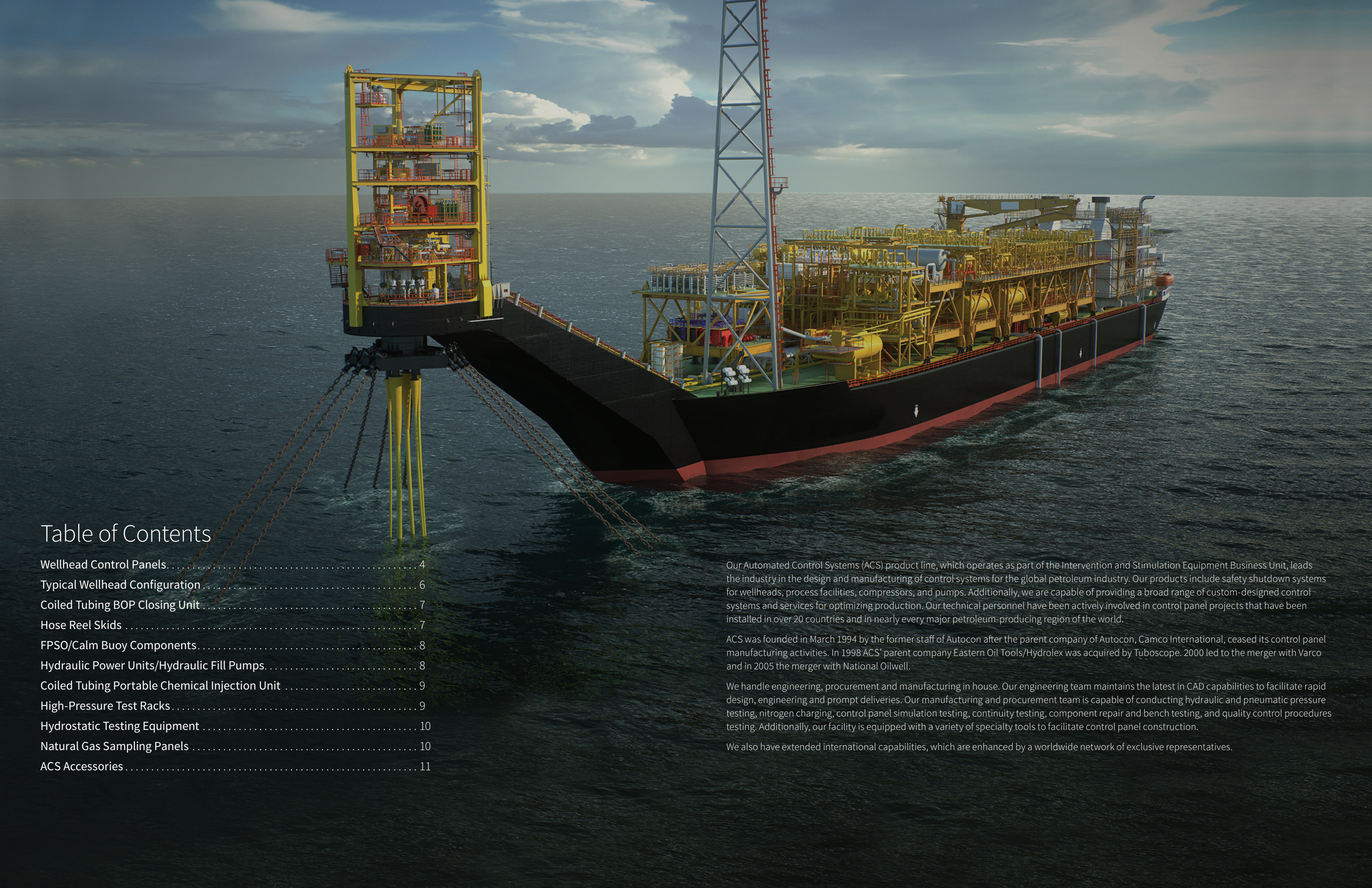


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Our Automated Control Systems (ACS) product line, which operates as part of the Intervention and Stimulation Equipment Business Unit, leads the industry in the design and manufacturing of control systems for the global petroleum industry. Our products include safety shutdown systems for wellheads, process facilities, compressors, and pumps. Additionally, we are capable of providing a broad range of custom-designed control systems and services for optimizing production. Our technical personnel have been actively involved in control panel projects that have been installed in over 20 countries and in nearly every major petroleum-producing region of the world.

ACS was founded in March 1994 by the former staff of Autocon after the parent company of Autocon, Camco International, ceased its control panel manufacturing activities. In 1998 ACS' parent company Eastern Oil Tools/Hydrolex was acquired by Tuboscope. 2000 led to the merger with Varco and in 2005 the merger with National Oilwell.

We handle engineering, procurement and manufacturing in house. Our engineering team maintains the latest in CAD capabilities to facilitate rapid design, engineering and prompt deliveries. Our manufacturing and procurement team is capable of conducting hydraulic and pneumatic pressure testing, nitrogen charging, control panel simulation testing, continuity testing, component repair and bench testing, and quality control procedures testing. Additionally, our facility is equipped with a variety of specialty tools to facilitate control panel construction.

We also have extended international capabilities, which are enhanced by a worldwide network of exclusive representatives.

Wellhead Control Panels

Our control panels are available in a wide variety of options and are built with exceptional quality with a proven track record for reliability and ease of maintenance. We specialize in the design and assembly of wellhead surface and sub-surface safety valve control panels for well production facilities. Our panels are adaptable to facilities located both onshore and offshore and are designed and assembled in-house in both standard and custom configurations.

Our panels are constructed of 12 gauge 316SS enclosures with 316SS ASTM 269 tubing and fittings along with weather-tight doors to protect panel-mounted components. Exotic material tubing and fittings are available to specification.

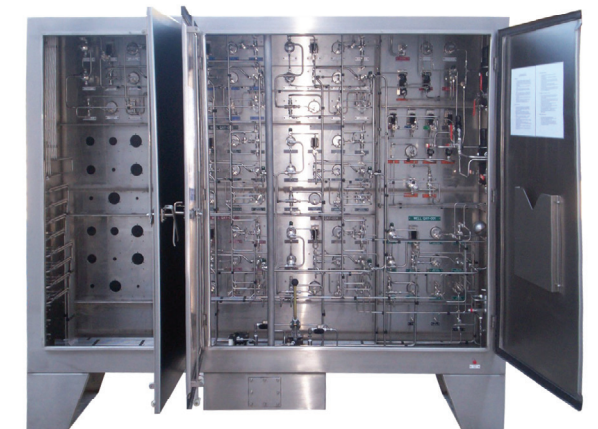
Our wellhead control panel products include:

- Pneumatic/hydraulic control systems
- Electro/hydraulic control systems
- Single well control panels
- Multi-well control panels
- Modular well control panels
- Process control panels
- Custom-designed control panels
- Panel-mounted pressure pilots
- Process shutdown logic with pneumatic first-out indicators



Single-Well Control Panels

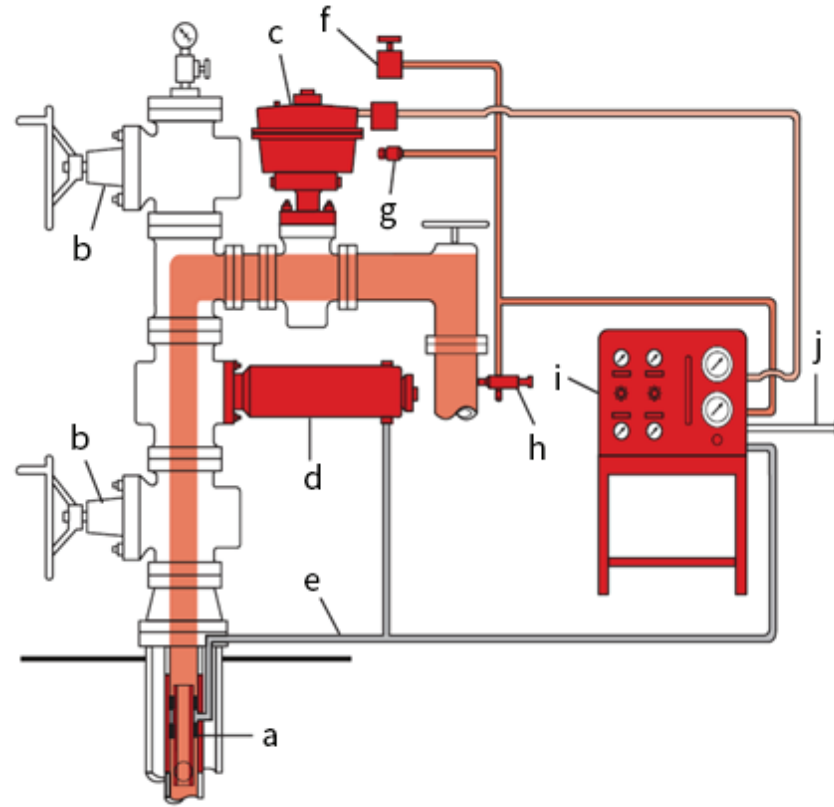
Our standard single-well control panels is used to operate one hydraulically controlled subsurface safety valve (SCSSV) and up to two hydraulically or pneumatically controlled surface safety valves (SSV) for any type of well. The panel automatically closes the safety valves in response to alarm conditions that require shut-in. Safety valves can be shut down manually or automatically, remotely or at the panel. Panels can include logic, which enables the wells to be controlled by an ESD/fire loop and high/low pilots. The panel can monitor the status of the flowline high-low pressure sensors and provide shut-in during emergency conditions. Pneumatic pressure can be from either wellsite process gas or compressed air. Our panels are available with a wide range of selection options to ensure that your particular production requirements are addressed.



Multi-Well Control Panels

Our multi-well panels offer all of the features of our single-well panels in a combination of pneumatic, hydraulic, and electronic logic in a single panel for multiple wells onshore or offshore. Hydraulic pressure is developed from either pneumatic/hydraulic or electric/hydraulic pumps within the control system to provide a failsafe system for ESD, fusible-loop fire protection, and wellhead valve opening/closing sequencing. Multi-well control panels can be completely customized to meet your operational requirements as well as weight and footprint constraints. Our multi-well control panels offer the option of interchangeable well control modules, each controlling a single well, and can be easily isolated and removed to minimize downtime during maintenance or repair.

Typical Wellhead Configuration



Typical remote-control surface and subsurface safety system components:

- | | |
|------------------------------------|-----------------------------------|
| a. Surface-controlled safety valve | f. Emergency shutdown valve |
| b. Manual gate valve | g. Fusible plug |
| c. Pneumatic surface safety valve | h. Monitor pilot |
| d. Hydraulic surface safety valve | i. Safety control panel |
| e. Control line | j. Low-pressure air or gas source |



Coiled Tubing BOP Closing Unit

Our coiled tubing BOP closing unit enables standalone operation of coiled tubing BOPs and associated auxiliary valves. These are available in any standard configuration from one to 10 functions. Each function is protected with an external cover and safety detents to avoid accidental operation. The coiled tubing BOP closing unit has a heavy-duty carbon steel frame and includes a custom vinyl cover.

Features and Benefits:

- Designed for standalone operation to meet API requirements
- One gallon, 3,000 psi bladder accumulators
- Wet center, 3,000 psi manually operated hose reels
- Each equipped with 50 ft hydraulic hose/50 ft fire-resistant BOP hose
- Equipped with self-retracting, 50 ft air hose reel
- Air-operated hydraulic pumps
- Manual backup hydraulic pump
- Heavy duty oilfield skid frame with corrosion-resistant coating and four lifting pads
 - Includes custom fit, heavy-duty vinyl cover and four-point bridle sling with shackles
- SST hydraulic fluid tank
 - Equipped with sight level gauge, suction strainer, check valve filler strainer, and drain valve
- SST hydraulic system pressure gauge
- SST hydraulic output pressure gauges for open/close functions
- SST tubing and fittings
- Relief valves on hydraulic system to protect against over-pressure
- On-board self-contained audible alarm system for low hydraulic fluid level, low air supply pressure, and nitrogen supply pressure
- Air supply on/off valve and pressure gauge
- Engraved phenolic nameplates



Hose Reel Skids

Our hose reel skids can be customized to any configuration necessary. Reels can accommodate up to 200 feet of 3/8 in. fireproof hose with pressures up to 3,000 psi and are terminated with customer-specified disconnect fittings.

Features and Benefits:

- Heavy duty oilfield skid frame with corrosion-resistant coating and four lifting pads
- Includes four-point bridle sling with shackles
- Manual crank hose reels with two hydraulic outlets per reel
- Crank handles included
- Integrated storage basket included
- Forklift slots



HPU and Valve Control Systems



HPU and Valve Control Systems



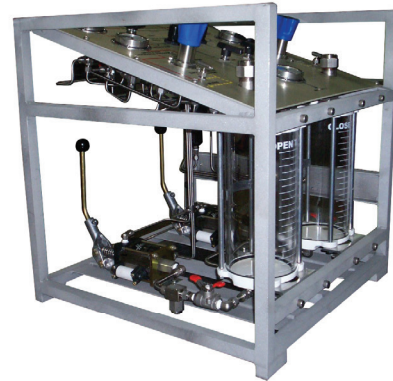
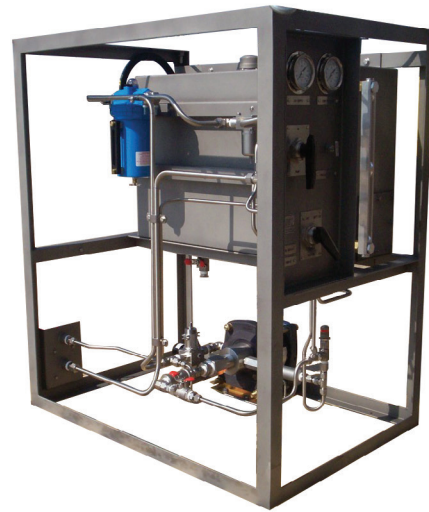
Toroidal Swivel Lubrication Control Panels

FPSO/Calm Buoy Components

We offer catenary anchor leg mooring (CALM) buoy manufacturers and FPSO/FSO/FLNG vessel manufacturers the components needed to control PLEM valves and turret toroidal swivel leak containment solutions.

Features and Benefits:

- Hydraulic power units (HPUs) and valve control systems
- Toroidal swivel lubrication control panels



Hydraulic Power Units/Hydraulic Fill Pumps

We design and manufacture a vast number of HPUs to meet your exact specifications. All HPUs are designed to provide a safe and reliable hydraulic supply to a wide range of end-user equipment. In addition, our HPUs are highly customizable and available in a wide variety of pressure range—from 1,000 to 60,000 psi—to fit your specific requirements.

Features and Benefits:

- Generates elevated hydraulic pressures using shop air
- Highly portable



Coiled Tubing Portable Chemical Injection Unit

We design and manufacture highly portable chemical injection units for the coiled tubing industry. These units are compatible with most widely used inhibitors and can be customized to meet your needs.

Features and Benefits:

- 5,000 to 15,000 psi operating pressure
- Check valve included to mate with Texas Oil Tools™ strippers



High-Pressure Test Racks

We offer our customers a truly customized pressure test solution for testing units up to 50,000 psi. We will work with your R&D lab or testing facility to provide exactly what you need to test your products. We also offer wall-mounted and shop portable racks.

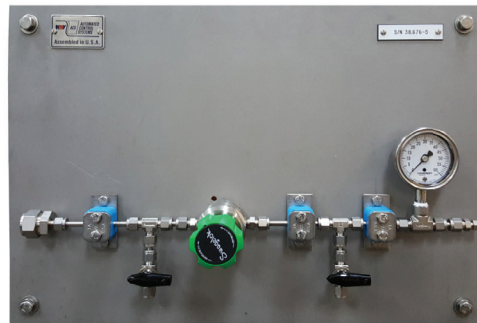
Features and Benefits:

- Multiple test zones for oil, air, gas, and water
- Gas booster to 10,000 psi



Hydrostatic Testing Equipment

We design and manufacture a comprehensive range of hydrostatic testing systems that are safe and easy to operate for a vast variety of liquids and gases. These systems include all controls and instrumentation required to manage the speed and pressures at which the liquid pumps and gas boosters operate as well as inlet/outlet connections. We offer simple multi-use applications and high portability when required. We build custom high-pressure test systems to your specifications.



Natural Gas Sampling Panels

We design and manufacture collection panels for use in LNPG plants.

Features and Benefits:

- Remote collection points
- Collection point consolidation to gas chromatography machines



Portable Hand Pump

Includes 3/4 H.P. pneumatic driven hydraulic pump with accessories

ACS Accessories

We support and offer a high level of aftermarket sales such as portable hand pumps, ESD stations, double block and bleed manifolds, accumulator/bottle racks, high-pressure valves, fittings, and tubing. Our range of accessories includes chart recorders, high-pressure hoses, relief valves, pressure gauges, and much more.



ESD Stations

Available in manual or push button operation



Double Block and Bleed Manifold Assemblies



Bottle / Accumulator Racks

Custom racks for N² or Accumulator systems

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