Boosting Transmission Performance

Rotating and electrical equipment for oil and gas pipelines

Answers for energy.

SIEMENS
Industrial IT
Enterprise intelligence solutions for safe and reliable operation, planning and scheduling. Real-time operational intelligence; process modeling, simulation and optimization; asset management.

Automation and Telecommunication
A unique array of automation and telecommunications products, systems and solutions for field, operation and management levels. Designed to achieve maximum productivity while realizing substantial life-cycle cost savings.

Security
A full range of security solutions for enclosed infrastructures, including main control centers, compression and pump stations, valve stations and for the intrusion of the pipeline itself.

Compression and Pumping
A portfolio of field-proven compressors, gas turbines, electric drives and motors and their associated control systems including instrumentation for virtually all production, transport and process applications in the oil and gas industry.

Power Generation and Distribution
Comprehensive power solutions, including planning, finance, engineering and optimization of power grids, gas and steam turbine-based power plants, transformers, high, medium and low voltage distribution switchgear, substation automation, energy management, network consulting.

Life-Cycle Services
A portfolio of life-cycle services, including feasibility studies, financial engineering, design and network studies as well as all levels of preventive and corrective maintenance, performance enhancement programs, service level agreements and training.
Engineered for Optimum Leverage from Pipeline Operations

Totaling some 3.5 million kilometers worldwide, oil and gas transmission pipelines are among the largest physical infrastructures operated by man. For more than 100 years they have provided a safe and reliable means of transporting hydrocarbons from wellhead to consumer. Fully automated, today’s pipeline operations demand ultimate dependability from all employed rotating and electrical equipment.

Enter Siemens. With a wide range of compression and pumping, power generation and distribution, automation, telecommunications, industrial IT, security and life-cycle services, Siemens provides a host of solutions designed to run pipelines with ultimate dependability and integrate pipeline operations for superior manageability, safety, reliability and efficiency.

Innovative design, excellence in engineering, maximum lifetime value as well as ultimate compliance with health, safety, environmental and industry standards are common denominators for all components, products, systems and services in the Siemens pipeline portfolio. Moreover, through its global manufacturing and service network, Siemens ensures maximum local content and customer proximity. Combining our competence and strengths, we can together achieve a winning performance and realize optimum leverage.
Operational costs as well as environmental performance and safety of a pipeline are largely determined by the design of compressor or pumping stations in general, and specifically the applied compression or pumping solution.

Siemens compression and pumping solutions combine excellent environmental performance, economical operation, superior availability and wide maintenance intervals, translating into unrivaled lifetime value. Available with a wide range of power ratings, they are designed to match the needs of all stages and aspects of gas and oil transmission. Custom-designed machines are engineered to meet specific customer requirements, e.g., solutions with extended operating area to cope with daily or seasonal swings in demand.

What’s more, Siemens offers a range of pre-engineered standard packages for compression and pumping. A natural extension of the single-source supply approach, they are designed for maximum efficiency and economy in a wide range of applications. Whether off-the-shelf or custom-built, Siemens compression and pumping solutions undergo elaborate testing of all string components before delivery to customers’ sites, ensuring that tight project schedules won’t be obstructed by unforeseen problems.

Integrating all assets at a compressor or pumping station into a comprehensive automation and control system, Siemens’ integrated compressor/pumping station control system ensures ultimate dependability and ease of facility management.

Compression, Pumping
Gas and dual-fuel turbines from 5 to 30 MW class • Variable-speed drive systems (VSDS) from 1 to 65 MW • Compressors • Dry-dry compressor/motor solutions • Skid control systems for compression and pumping applications

Standard Pipeline Compressor Packages
Based on Siemens gas turbines in combination with a direct-driven single-shaft vertical Siemens turbo-compressor (STC-SV)

Pipeline Maintenance and Integrity
Leak detection and location • Predictive analysis • Pig and scraper tracking • Over-/under-pressure monitoring • Pipeline inventory & efficiency

Field Instrumentation & Analytics
A comprehensive field instrumentation and analytics portfolio designed to provide operation-relevant data directly from all facilities along a pipeline, enabling the operations control system to run the facility at optimum productivity and efficiency.

Automation
Integrated distributed control system, for compressor automation as well as compressor station control, including associated instrumentation • Advanced operations control solutions • Integrated data visualization software enabling informed decisions for asset utilization and operating efficiency • Energy management and control system (EMCS)

Power Distribution
High voltage (HV) switchgear; HV/MV transformers • Medium voltage (MV) switchgear; MV/LV transformers; NER; protection and controls; cabling; bus ducts • Low voltage (LV) switchgear; protection and controls; cabling, bus ducts • Substation control • Motor control centers • Emergency diesel generator sets • Uninterruptible power supply systems • Station batteries • Power quality and power correction • Fault recording

Balance of Plant
Lighting • Building ventilation systems • Building control systems • Active and passive cooled shelters • Solar panels • Earthing and lightning protection • Fire & gas protection systems
A Wingas compressor station boosting European east/west natural gas transport capacities. Siemens scope of supply: 2 compressor trains powered by innovative SGT-700 30-MW gas turbines; coupling to driver; gas seal module; vibration and temperature monitoring system; oil supply and return header; valves; control systems; automation and integration up to enterprise resource planning (ERP) level.

Providing a main-line oil pump capacity of more than 1,700 cubic meters per hour, six of these Sonatrach-operated pumping stations keep crude oil flowing through the 840-km pipeline from Haoud El Kamra to Arzew, Algeria. Siemens scope of supply: a total of 30 SGT-200 gas turbines; SCADA system; SINAUT remote transmission units along the pipeline; fiber optic transmission system; fiber optic cable; uninterruptible power supply; passive cooling shelters; cathodic protection monitoring.

Operated by Gasversorgung Süddeutschland, the Blankenloch compressor station was among the first to employ a sophisticated VSDS-driven dry-dry compression solution. Siemens scope of supply: 5.2-MW VSDS electric motor driver; STC SV 08-3-A compressor; active magnetic bearing system; dry gas seals.

BOTAS, Turkey’s national gas company, equipped their Hanak pipeline station with Siemens standard pipeline compressor packages. Siemens scope of supply: three SPCP 100 compressor packages based on the 5.25-MW SGT-100 gas turbine in combination with a direct-driven STC-SV pipeline compressor.

TCPL Additional Gas, Trans Canada Pipelines. Siemens scope of supply: 6 variable speed drive system (3,100 to 5,040 rpm, 30.6 MW); brushless synchronous motor; thyristor converter; transformer 36.4 MVA; harmonic filter circuits; cooling systems for motor and converter; gas compressors; lube oil system; MV switchgear 13.8 kV; station control units; harmonic and load flow study; rotor dynamic study.
Valve, Metering, Custody Transfer Station

Fulfilling manifold safety, environmental, fiscal and commercial requirements, valve and metering stations have to meet the most exacting standards, no matter where they are located or how adverse a local climate may be. In addition, with gas markets being progressively liberalized in a number of countries, custody transfer stations play an increasingly important role as part of sophisticated entry/exit systems.

Linking field level and operations management, Siemens’ portfolio for valve, metering and custody transfer stations provides comprehensive solutions for all of these applications, regardless of their scale and level of distribution. Building on robust field instrumentation networked through a dependable communications support structure, they make sure pipeline operators can be certain to know what is happening at every point along their widely distributed facilities.

Instrumentation
Pressure transmitters • Temperature transmitters • Flow meters • Level measuring instruments • Gas analysers • Remote transmission units

Control System for Valves and Scraper Pig
Remote transmission units • Valve control • Pig launch control unit • Pig receiver control unit • Emergency shut-down system • Flow calculation • Gas quality monitoring • Gas compression analysis • Process Device Manager software for operation, configuration, parameterisation, maintenance and diagnosis of intelligent field instruments • Sensors • Positioners • Cathodic protection

Metering Station
Remote transmission units • Flow computer • Metering tubes • Instrumentation

Power Supply
Solar Panels • Turbo expander • Batteries • Diesel gensets • Low-voltage (LV) distribution

Balance of Plant
Active and passive cooled shelters • Earthing and lightning protection • Fire and gas protection system • Access control
Natural gas pipelines of OMV Gas (incl. TAG, WAG, HAG, Penta West), Austria. Siemens scope of supply: remote transmission units (SAT 1703) for all valve, metering, custody transfer and compressor stations; integration of various sub- and control systems via Modbus, IEC60870-5-104 and DSfG; automation and HMI in selected pipeline stations; modern ethernet-based communication network; remote maintenance; maintenance services. Photo courtesy of OMV Gas.

Gazoduc Maghreb Natural gas pipeline, operated by Sonatrach; Hassi R’mel, Algeria, 520 km to Moroccan border. Siemens scope of supply: redundant master control center SINAUT LSX; tele control center SINAUT ST; OTN/PDH teletransmission center; fiber optic cable; shelters with passive cooling; OMNI telecommunication system.

Revamp of a 3.000 km bi-directional crude-oil and multi-product pipeline distribution network, covering 80% of South African demand. Siemens scope of supply: distributed redundant SCADA system; integrated leak detection and batch tracking; integration of various subsystems; fiscal metering systems; automation of pump stations with fault-tolerant PLCs; pump surge protection.
Backed by many years of experience and success with a wide range of pipeline applications around the world, Siemens offers pipeline operators and key decision makers simple, clearly understandable real time depiction of the process to assist operational and business-related decision making. The system also increases operational efficiency and safety, protects pipeline assets, while reducing both costs and environmental impact.

The advanced supervisory control and data acquisition (SCADA) system offered by Siemens ensures a high level of data integrity, redundancy, distributed redundancy and network security. The system also allows seamless integration with third party applications and legacy systems, as well as management information systems (MIS), manufacturing execution systems (MES) and enterprise resource planning (ERP) systems, providing maximum leverage for pipeline operators. It also allows seamless integration with automation systems, remote transmission units and other instrumentation systems.

**SCADA**

General control tasks • Alarms, event processing • Communication • Leak detection • Trend calculation • Alert control personnel • Online service • Pig position identification system • Leak detection and location • Nomination management • Predictive analysis • Pig and scraper tracking • Over-/under-pressure monitoring • Real-time optimization • Batch tracking • Planning/scheduling • Pipeline inventory and efficiency
Oil and LPG transportation, 6 pipelines, each >500 km, Algeria. Siemens scope of supply: SCADA system; SINAUT remote transmission units along the pipelines; fiber optic transmission system; fiber optic cable; uninterruptible power supply; passive cooling shelters; cathodic protection monitoring.

Natural Gas Pipeline, 540 km/48 inch, Sumatra Island, Indonesia. Siemens scope of supply: redundant SCADA system with independent back up systems at 3 stations; integrated leak detection and line balancing; management information system (MIS); remote transmission units; integration of various subsystems via Modbus; telecommunication systems.

Revamp of Tennessee Gas Pipeline 100, Louisiana, Mississippi, Kentucky and Tennessee. Siemens scope of supply: 6.6-MW and 7.5-MW motors; 13.8-kV switchgear, substations; 25-MVA transformers; SIMATIC PLC automation system; low-voltage MCCs.
Siemens infrastructure solutions provide the power and communications backbone ensuring safe and reliable operation of the entire pipeline system.

Siemens power transmission and distribution equipment covers a wide range of supply-voltage levels and is designed for ultimate performance under any ambient conditions, including extremely high and low temperatures, high altitudes and special environments such as highly corrosive atmospheres.

Integrating a host of communications technologies, Siemens’ telecommunications solutions provide dependable coverage along the whole pipeline, including communications with maintenance personnel, among compressor stations, and air-to-ground communication. In order to reduce installation downtimes, Siemens telecommunications solutions can be integrated into the SCADA system.

What’s more, Siemens offers the most comprehensive set of security solutions, not only for enclosed pipeline infrastructure such as main control centers, pump stations and valve stations, but also for the pipe itself. This includes the provision of intruder-detection systems protecting both pipeline and personnel, ensuring continuous accident-free production.

Balance-of-plant equipment provides effective protection to automation, communication and electrical systems to ensure maximum availability.

Power Transmission and Distribution
Planning, calculation and optimization of power grids • Power transformers • Converter and distribution transformers with cast resin insulation • High- and medium-voltage switchgear in gas- and in air-insulated design • Low-voltage switchgear • MCCs and distribution systems • Emergency power supply systems • Protection • Substation automation • Control center systems • Energy management • Fully installed and pre-commissioned E-houses (‘plug-and-play’ containerized substations) • Earthing and lightning protection

Telecommunication
Fiber optic cable • Synchronous Digital Hierarchy (SDH) data transfer • Open Transport Network (OTN) • VSat satellite backup system • Trunk radio • High-frequency SSB system • Microwave • Data radio • FM air-to-ground radio • PABX

Security of Pipeline
Fiber-optic based pipeline intrusion detection system

Security of Enclosed Infrastructure
Intrusion detection based on infra-red systems, video-based detection systems, leaky cable systems, glass break detection systems, contact sensors • Access control based on biometrics

Balance of Plant
Active and passive cooled shelters

Automation
Fire and gas protection system
NETRA GmbH, E.ON Ruhrgas-operated compressor station, Wardenburg, Germany. Siemens scope of supply: 13 panels 20-kV air-insulated switchgear with local control, metering and protection; 2 GEAFOL distribution transformers 20 kV/400 V, 1000 kVA; low voltage switchgear and MCC’s (26 panels).

Nord-West Oelleitung GmbH, Wilhelmshaven, Germany. Siemens scope of supply: 20-kV primary distribution systems (AIS) with local control and protection; 6/10-kV secondary distribution systems (AIS) with local control and protection; 0.69-kV and 0.4-kV power distribution with motor control and protection units SIMOCODE; 6-kV motors; replacement of the existing power cable grid; modernisation of process control equipment; design and implementation of router-based WAN using state-of-the-art mix of 100 Mbps Ethernet on single-mode fiber and leased ISDN channels.

Greater Nile Petroleum Operating Company (GNPOC), Muglad Oil Basin Development Project, 1750 km pipeline, Sudan. Siemens scope of supply: 6 different telecommunication systems: Vsat, Trunked Radio, SSB, VHF-AM/FM, NDB, PABX; radio towers; fiber optic backbone 155 MBit/s; fiber optic cable, including splice works; uninterruptable power supply; solar power system.

Gazoduc GR1/GR2 Natural Gas Pipeline, >1000 km, Algeria, Alrar gas field to Hassi R’Mel. Siemens scope of supply: SCADA system; SINAUT remote transmission units at 63 stations along the pipelines; Automation of the remote stations; fiber optic transmission system; fiber optic cable; solar power; uninterruptible power supply; cathodic protection monitoring.

Brega via Zuetina to Bengazi natural gas pipeline, 250 km, Libya. Siemens scope of supply: security system of compressor stations based on CCTV; SCADA system; remote transmission units; automation system; Station control for compressor stations; fiber optic cables and fiber optic transmission system 155 Mbit/s; uninterruptible power supply; fire and gas protection system.