

Boosting supply

ABB technology creates a vital natural gas link in Poland

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Five compressor stations built on the Polish section of Yamal-Western Europe gas pipeline make up one of ABB Zamech Gazpetro's most important and successful projects to date.

Originating in the rich gas fields of the Yamal Peninsula in northwestern Siberia and stretching about 5,000 kilometers to Germany, the Yamal pipeline is an essential new supply route bringing Russian natural gas to valuable markets in Western Europe.

The pipeline crosses Polish territory for about 680 kilometers of its route.

When all five pumping stations are operational, the Polish segment of the Yamal pipeline will have a capacity of about 33 billion cubic meters of natural gas per year.

ABB Zamech Gazpetro Sp. z o.o. was established by ABB in Poland to ensure efficient management of large, "turn-key" projects in the gas and petrochemical industry.

The Yamal pipeline certainly qualifies: it was and is a challenge in terms of design, construction, and execution, involving both domestic and foreign companies.

The first two ABB-built compressor stations have been operating since 1999 and 2000; two more were completed in June 2005 and the fifth one is near completion.

Engineers have based their unique technical solutions on state-of-the-art automation electrical engineering technology and equipment supplied by ABB.

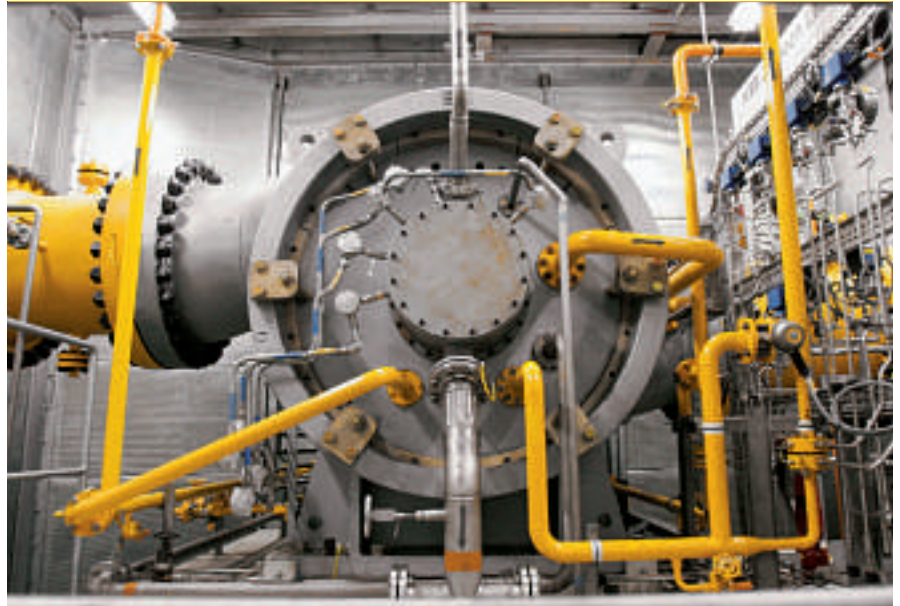
Each station is a complete, "turn-key" project, comprising project design; deliveries; assembly; start-up; tests and trials; staff training; guarantees, and service.

In the design and construction of the control and measurement units, particular attention was paid to environmental protection. Thanks to the application of modern and efficient filtering systems, each pumping station meets all environmental standards.

A project of this complexity requires highly skilled and experienced project management. The number and location of compressor stations was initially determined by a detailed economic and technical analysis.

Yamal's designers required the unhindered flow of natural gas through the

1 A typical compressor station 25 MW gas turbine.



Polish section. To meet this condition, five compressor stations were constructed to ensure the whole system can operate continually.

The main task of the compressor stations is to maintain proper gas pressure in the pipeline.

The stations are designed to compress and pump gas, but two of them perform additional tasks. The Kondratki compressor station near the border of Poland and Belarus also continuously measures the amount and quality of delivered gas coming through the pipeline.

Meanwhile, another station is equipped with system regulating and

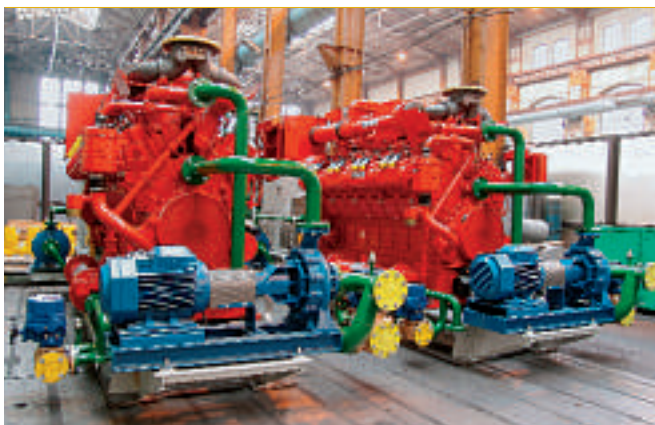
metering station controls to oversee gas distribution from the main pipeline into Poland's domestic gas pipeline system.

The Kondratki and Wloclawek gas compressor stations began operating in 1999 and 2000. The next three stations are in Ciechanów, Szamotuly and Zambrów.

Ciechanów and Szamotuly were completed at the end of June 2005; the Zambrów station is expected to be finished in December 2005.

Each station is spread over 11 hectares and bristling with devices, instruments and systems, including three gas compressors driven by 25 MW gas turbines 1; gas coolers 2; gas filters 3; a central control system that makes it possible to start and switch off an in-

2 Power generation units packaged by ABB Zamech Gazpetro.



3 Gas filter station.



dividual compressor station and operate it from the distance through a SCADA system **4**; an underground system of pipelines and various valves; a fire system; an anti-surge system; a safety system.

The main task of the compressor stations is to maintain proper gas pressure in the pipeline to overcome hydraulic resistance within a specific section at the given gas flow.

The pumping station has independent reduction and measurement units, a power generation station, boiler house and workshops, warehouses and an administrative building that also contains the main control room.

In addition, the station houses a cut-off and relief valves unit, a central filtering plant, a condensate tank, oil radiators, ventilation gas coolers, outburst columns, technological valve pipelines, liquid nitrogen installations and containers for the aggregated unit's control.

It has its own fire fighting tank and all equipment necessary for independent operation, including lighting, sewage and security systems.

The ultra-modern plant is fully automated, and set up to run without the need of any human intervention. The computerized control room is the station's "brain." All installations displayed on the large screen are automated.

From here, control room staff can also access the internal television system, which features TV cameras in sensitive locations that continuously monitor critical operations.

Operations are recorded, and basic parameters may be printed out. Thanks to the central control system, individual compressors may be switched on and off independently, or operate in parallel, and the entire, complex technological process is remote controlled.

The stations' automated systems contain many unique features to ensure faultless operation at full capacity, including monitoring and control of the pumping stabilization process, load selection for individual pumping units, and supervision of parallel operation.

Each compressing unit consists of a 50P2 compressor driven by a GT10 gas turbine with a nominal power output of 25 MW. The components are mounted on a foundation, equipped with acoustic screens, and can operate under varying conditions in accordance with world standards.

5 Hand operated cut-off valve for one filtration pipe string.



The unit's auxiliary equipment includes an exhaust gas monitoring system as well as fire and explosion protection systems.

Gas flows into the pumping station through high diameter DN1400 pipelines. It is purified by a two-stage filter. After passing through the filtering strings, it is compressed in the compressing units and then cooled in the ventilation coolers.

Once it has been compressed, the gas flows on through the outlet compressor collector, past no-return and cut-off valves **5** and into the transit pipeline.

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The successful implementation of the five "turn-key" pumping station projects has been ABB Zamech Gazpetro's most important success, in which technical and safety requirements of the highest order were fulfilled over a tight delivery schedule.

4 Typical compressor station control room.



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