

Case note

ACS 1000 variable speed drives improve process control at gas gathering complex

The DEZGAS gas gathering complex, which distributes natural gas directly to industrial facilities, is using reciprocating compressors to boost the pressure and push the gas through the pipeline grid.

By controlling the compressors with ABB's ACS 1000 variable speed drives, the gas pressure can be regulated as per customers' demand without having to flare excess gas.

DEZGAS gas gathering complex

The DEZGAS gas gathering complex in northeastern Syria turns gas, which was flared in the oilfields in the past, into a valuable resource. It collects the gas and transports it via a 250-kilometer pipeline to the Syrian national gas grid, which connects to major population centers, fuel power plants and industrial facilities.

The complex comprises five plants each with a capacity of 20 million standard cubic feet (SCF)/day. It is located in the desert of the Deir Es Zor region, where the ambient temperature is about 52°C.

Reciprocating compressors

There are three different kinds of compressors: centrifugal, reciprocating and screw compressors.

Since reciprocating compressors displace a constant volume of gas regardless of operating conditions, the compressor must be configured to displace slightly more gas than required. Excess gas has to be flared.

If the gas handling capacity is below 50 million SCF/D, reciprocating compressors are more economical than centrifugal compressors.



View of the compressor assembled on the skid

Highlights

- Compressor operation adjustable to actual demand
- Low harmonics
- No starting inrush currents
- Reduced vibrations
- Increased lifetime of equipment
- Variable speed drives with closed-loop water cooling system
- Equipment designed for 52°C ambient temperature



One of the five ACS 1000 variable speed drives controlling the reciprocating compressors.

The DEZGAS gas gathering complex is using reciprocating compressors to boost the pressure and push the gas through the pipeline grid.

Challenge

The DEZGAS gas gathering plant distributes natural gas directly to industrial facilities without storing it in silos. This means that the gas volume needs to be regulated, depending on the customers' actual demand, which can vary considerably. Since reciprocating compressors are designed to run at constant speed, displacing a constant volume of gas, the speed of the compressors needs to be controlled.

In gas plants, fuel driven engines are usually used to adjust the speed of compressors. However, they have the following disadvantages:

- Vibrations caused by fuel driven engines are a major problem on skids
- Process control is limited

In addition, the ambient temperature of about 52°C poses a big problem with regard to the cooling of the equipment.

Solution

By installing ABB's water-cooled ACS 1000 medium voltage drives, the gas pressure can be regulated as per customers' demand without having to flare excess gas. Also, variable speed drives (VSDs) do not cause any vibrations.

Cooling of VSDs

The ACS 1000 variable speed drives are installed in pre-fabricated rooms. As there is no raw water for cooling available in the Deir Es Zor desert region, ABB supplied chillers, a closed-loop water cooling system, which enables the VSDs to operate at 52°C.

Benefits

Energy savings

By installing VSDs, the volume of gas displaced is regulated, depending on the customers' actual demand. With fixed speed, excess gas would have to be flared.

Low maintenance costs

Maintenance costs for electric motors and drives are much lower than for fuel driven engines.

Low harmonics

The drive system is optimized by configuring the variable speed drives with 12 and 24 pulse rectifiers. As a result network harmonics are minimized.

No starting inrush currents

A direct-on-line started electric motor can cause starting currents of up to five to six times of nominal current. By soft starting machinery with variable speed drives, high starting currents, voltage dips and trips on other electrical devices on the same bus are eliminated.

No vibrations

VSDs and electric motors do not cause any vibrations, which would pose a major problem on skids.

Increased lifetime of equipment

The smooth speed ramp up protects the mechanical equipment, thus prolonging its lifetime and reducing maintenance costs.

Small footprint

The use of IGCT semiconductors contributes to the small footprint of the drive which has proved beneficial because of the restricted space on the skids.

Gas Services International (GSI)

GSI is a process plant packager, based in Singapore. It had the total system responsibility including the assembly of the skids with the motors, drives and compressors.

ACS 1000 key data

Inverter type	Three-level Voltage Source Inverter (VSI)
Power range	Air cooling: 315 kW - 2 MW Water cooling: 1.8 MW - 5 MW
Output voltage	2.3 kV, 3.3 kV, 4.0 kV, 4.16 kV (optional: 6.0 kV - 6.6 kV with step-up transformer)
Maximum output frequency	66 Hz (optional: 82.5 Hz)
Converter efficiency	Typically > 98%
Type of motor	Induction motor

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