

## Case note

# ACS 1000 variable speed drive improves process stability and reduces emissions of petrochemical plant

Preem Petroleum AB is an environmentally aware ISO 14001-certified company, keen to minimize its emissions of greenhouse gases.

To improve process stability and reduce emissions ABB implemented a motor control solution based on its ACS 1000 variable speed drive for the exhaust fan at Preem's petroleum refinery in Gotheburg. The system delivers greater control of the fan process, cutting fan downtime and reducing emissions. Emissions are now consistently and predictably low and fully controllable.

### Challenge

Preem Petroleum AB refines crude oil at a facility in Gothenburg, Sweden. Emissions of greenhouse gases must comply with stringent government regulations. As part of the refining process, hot gases are passed through a catalytic converter where  $\text{NO}_x$  reduction is carried out.

The exhaust fan driving the gas throughput had been controlled by a damper. However, this was insufficiently accurate, leading to occasionally unacceptable levels of  $\text{NO}_x$  emissions. On the suction side of the fan, heaters contribute to the process, with their operation being dependent upon the stability of the vacuum created by the fan. The inaccuracy of the throttling valve solution was creating inadequate control of the heaters, necessitating the fan to be shut down altogether. When this happened, the refining process continued, but the  $\text{NO}_x$ -rich gases had to bypass the catalytic converter, being vented directly into the atmosphere.



Preem Petroleum refinery in Gothenburg, Sweden.

### Highlights

Reduced  $\text{NO}_x$  emissions

Improved production stability

Increased process efficiency

Improved productivity

## Solution

ABB implemented a motor control solution based on its leading medium voltage AC drive technology to deliver greater control of the fan process, cutting fan downtime and reducing emissions. The equipment installed comprised:

- Standard ACS 1000 frequency converter, rated 700 kVA
- Six-pole induction motor, 560 kW, maximum speed 1,172 rpm
- Three-winding transformer, 850 kVA

The system was implemented and commissioned by an ABB team based locally in Sweden, with the drive sourced from ABB in Switzerland.

## Benefits

The ACS 1000's high degree of speed and torque control has removed the inaccuracies suffered with the previous system. The consistency of the vacuum on the fan suction side has eliminated the heater process stoppages and, with them, the need for regular catalytic converter shutdown.

Emissions are now consistently and predictably low and fully controllable, within Swedish legislative mandates and meeting Preem Petroleum's own exacting requirements.

In addition to the environmental advantages of the ABB system, there are financial benefits from the decreased downtime and improved process stability, which results in greater consistency of product quality.

### Reduced noise

The use of DTC and the sine filter, has reduced the drive system noise level to 75 dBA.

### Fast commissioning and startup

Total system commissioning was completed within three days, including complete electrical circuit redesign and motor reconnection.

### Highly reliable operation

Since the installation in 1999, the ACS 1000 AC drive has operated smoothly without any production interruptions.

## Background

Preem Petroleum AB, based in Stockholm, is an environmentally aware ISO 14001-certified company, keen to minimize its emissions of greenhouse gases.

Its ultra-modern refineries in Lysekil and Gothenburg process around 13 million tons of crude oil annually, representing two-thirds of Sweden's crude oil refinery capacity and a quarter of the capacity of Northern Europe. The Gothenburg facility refines some 5 million tons of crude oil per year into petrol, paraffin, diesel and heating oil.



### 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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