

ABB's Model Predictive Torque Control (MPTC) protects against gas supply interruptions

The software uses Model Predictive Control to protect compressor operation during power supply disruptions, saving time and money.

Zurich, Switzerland, September 29, 2016 – ABB has released the first variable speed drive control software that uses Model Predictive Control* to regulate the drive's torque. The MPTC software was initially developed to ensure the operation of compressor stations during voltage disruptions, caused by lightning strikes, winter storms or ice buildup on power lines.

The stations use large compressors, up to 50 megawatts (MW), to compress natural gas for travel through hundreds of miles of pipeline. Historically gas turbines powered the compressors, today, more efficient large synchronous electric motors are used. The motors are controlled by variable speed drives, such as ABB's largest drive, the MEGADrive-LCI.

When power supply disruptions happen, protection systems quickly shut down the compressors. This halts the supply of gas. Restarting compressors lasts from a few hours to days. The resulting interruption in the gas supply can mean financial losses that range into the hundreds of millions USD per year for large facilities.

Installed in the MEGADrive-LCI, the MPTC uses a control algorithm based on Model Predictive Control that ensures the operation of the drive during power and grid disturbances in order to provide the compressor with partial torque, preventing the compressor from going into surge.

The MEGADrive-LCI application is the first where MPTC is used to control a commercial multi-megawatt drive system with much faster dynamic behavior, where the underlying optimization problems need to be solved in less than a millisecond.

Live testing of the software was done over the winter at two Statoil gas facilities in Norway. It was installed on ABB MEGADrive-LCIs used to power two 42.2 MW compressors at a gas processing plant in Kollsnes, and three 7.5 MW booster compressors in Kårstø. The control software successfully protected the compressor operation during voltage dips.

A pioneer in electric drive technology, ABB has installed about 1,000 MEGADrive-LCIs globally and brings the decade-long experience in high-power LCI applications to make significant productivity contributions to key facilities in the natural gas supply chain.

ABB (www.abb.com) is a leading global technology company in power and automation that enables utility, industry, and transport & infrastructure customers to improve their performance while lowering environmental impact. The ABB Group of companies operates in roughly 100 countries and employs about 135,000 people.

*Model Predictive Control is a control algorithm that has its roots in the process industries and that has been in use in chemical plants and oil refineries since the 1980s. In comparison with traditional control techniques, MPC intelligently predicts the future behavior of the system to be controlled via a mathematical model, and solves an optimization problem to compute the best control action with respect to given criteria and limits of operations.

Images:



Image 1: Compressor at Statoil site in Kollsnes (Source: Statoil).



Image 2: The MEGADRIE-LCI uses Model Predictive Torque Control (MPTC) ensuring the operation of the drive even during power and grid disturbances.

For more information please contact:

ABB Drives and Controls

Senior Drives Expert

Pieder Joerg

Tel: +41 58 589 21 93

pieder.joerg@ch.abb.com