WARRINGTON, UK, AUGUST 6, 2013

ABB medium voltage drive saves 82 percent energy for motor test rig

A manufacturer of specialist motors has achieved an 82 percent reduction in energy use on its test rig, following the installation of an ABB medium voltage drive. The total project delivery comprises ABB medium voltage drive, medium voltage switchgear, dry-type input transformer and control system, design, installation and training.

ATB Laurence Scott Ltd. designs and manufactures high and low voltage AC induction motors, DC motors and generators, cage induction motors and flameproof motors used in industrial and marine applications. The motors are used for driving air and gas compressors, axial and centrifugal fans, as well as in pumps used for water, effluents, high-density gases, crude and fuel oils.

The company's test rig was based on a 40-year old water brake dynamometer, used for providing a test load for machines up to 7 MW. This was very inefficient, as a 60 Hz machine typically needed a motor-generator set and ancillary equipment such as transformers and switchgear, which drew more power than the motor under test. Most of this energy was lost to the atmosphere in the water brake cooling system.

In addition, the 7 MW limit meant that larger machines could not be tested. Results for larger machines could only be estimated, which did not provide the required accuracy demanded by the more discerning oil and gas companies. Setting up the test procedures was also very labour and time intensive.

To improve the application, ABB installed an ACS 6000 medium voltage AC drive to replace the water brake dynamometer. The test stand uses an ATB Laurence Scott induction generator coupled to the motor under test which applies a loading torque to that motor. Through this arrangement, the generator exports energy back into the ACS 6000 multi-drive, recirculating power through the common DC bus arrangement thereby ensuring that the energy consumption of the test stand is minimised. This has resulted in an 82 percent reduction in energy use compared to the previous system.

The voltage and frequency of the motor under test can be set to the precise customer requirement due to the use of two ATB Laurence Scott supplied motor-generator sets, with the test stand configuration being altered via ABB medium voltage switchgear. The new recirculating power test bed system is designed for the testing of medium voltage machines. It offers the facility to test motors in the voltage range 3.3 kV to 13.8 kV and power ratings of up to 14 MW.

Two simultaneous motor tests can be conducted on machines up to 7 MW, giving greater utilisation test-bed. For motor tests above this rating, the drive system can be quickly reconfigured to test a single motor of power rating up to 14 MW.

"While there are test rigs using similar technology, this is the first of its kind for testing large machines using motor-generator set with links to configure the rig from 3.3 kV to 13.8 kV," says David Harvey, technical director of ATB Laurence Scott. "While energy saving is the main reason for our investment in the drive system, we have also benefited from increasing the capacity of tests from 7 MW up to 14 MW. We have already successfully tested a 13.3 MW machine."

An ABB AC800M controller and ABB PP846 process panels enable the test rig to be controlled and monitored very accurately from a control desk, allowing precise testing and mapping of the motor characteristics.

Data acquisition trolleys, designed by ATB Laurence Scott, use ABB S800 I/O to input bearing and winding RTDs. The data from the trolleys is transferred via Profibus to the control room, where customers can review the results.

“Our customers witness a modern installation and can see data being collected more efficiently which means they get quick and accurate test certificates. This gives them confidence that they are dealing with a truly professional motor manufacturer,” says Harvey.

ABB (ABBN: SIX Swiss Ex) is a pioneering technology leader in power grids, electrification products, industrial automation and robotics and motion, serving customers in utilities, industry and transport & infrastructure globally. Continuing a history of innovation spanning more than 130 years, ABB today is writing the future of industrial digitalization with two clear value propositions: bringing electricity from any power plant to any plug and automating industries from natural resources to finished products. As title partner in ABB Formula E, the fully electric international FIA motorsport class, ABB is pushing the boundaries of e-mobility to contribute to a sustainable future. ABB operates in more than 100 countries with about 147,000 employees. www.abb.com

Caption: ATB Laurence Scott has achieved an 82 percent reduction in energy use on its test rig following the installation of an ABB medium voltage drive.

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