Case Study

Tester for Electro-Mechanical Equipment

Situation:

A leading manufacturer in the nuclear industry needed a tester for performing bench testing of two types of mechanical shaft encoders. The two types of shaft encoders had identical electrical outputs but were significantly different in physical size and used different electrical connectors. The client wanted a single benchtop tester that would accept both types of encoder by a simple change out of the mounting fixture for the encoder.

The tester's primary function was to validate, at operational speeds and rotation direction, the full range of the Gray-code output of an encoder.

Solution:

AFDtek designed and built a self contained benchtop tester consisting of a test fixture for the encoders and an electronics panel equipped with a touch screen Human Machine Interface (HMI) for setting test parameters, initiating the test and reporting the test results.

Key Features of the Project Hardware:

The test fixture was equipped with a brushless DC motor to drive the encoders and with two different interchangeable mounting brackets, one for each type of encoder, which mounted to a fixed base plate. The different mounting brackets compensated for the differences in physical size of the encoders, enabling the different encoders to attach to the motor without further adjustments.

The encoder mounting brackets each used a clamping mechanism to secure the encoder. The clamp was secured with snap action latches to facilitate quick installation of the encoder under test.

For the electrical connection to the encoders, the electronics panel was equipped with a circular bayonet type connector. This standardized the electrical connection for the encoders and allowed for quick cable changes. Each type of encoder required a unique cable configuration that adapted the panel's standardized electrical connection to the encoder's unique pin-out and connector style.

To switch from testing one type of encoder to another required only the replacement of one bracket with the other and the connection of the encoder compatible cable to the electronics panel.

Key Features of the Project Software:

The software received Gray-code output from the hardware interface and evaluated in real-time the validity of the bits. The validation algorithm was fixed in software but the operator was able to modify test conditions such as shaft speed, direction of rotation, the number of test rotations and the allowable number of errors for a pass or fail. The tester was operated entirely through a 7 inch touch screen HMI.

The tester would report a pass or fail based on the operator entered test limits. The Encoder and operator documentation, test parameters, test results and failing Gray-code output values, if any, of each test were automatically stored in a dated report. Reports could be printed to a connected printer or copied to a USB connected storage device for archiving.

Project at a Glance

Client: GE Hitachi

Field: Nuclear industry

Location: Peterborough

Project: Shaft Encoder Tester

Date of Completion: March 2009

Pictures

Components

Test Configuration