

Developing a Low-Cost Engine Testing System Using LabVIEW and FieldPoint

The Challenge: Developing a low-cost, easy-to-use automated test system for studying the long-standing behavior of SCANIA diesel engines.

The Solution: Creating a flexible and simple test system using National Instruments LabVIEW together with FieldPoint hardware for distributed I/O.

SCANIA is one of the world's leading manufacturers of trucks that weigh more than 16 tons and buses for more than 30 passengers. SCANIA is an international specialist in customized engines for boats, electrical generators, earth-moving machines, and harvesters. We developed a test system for SCANIA using National Instruments LabVIEW and FieldPoint to optimize speed, control, and ease in testing and training.

We began this project without prior experience using FieldPoint with LabVIEW, but found ease of use, thanks to the software tools included.

Developing a System for Measurement and Control

Our system controls and measures a variety of parameters, from the engine to surrounding functions, such as the fuel system, cooling, ventilation in the test



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room, thrust, and temperatures. We also include monitoring and calibration capability. We developed our program so operators can configure their own tests, without changing the source code. Operators can save this configuration in a file, to use it later.

Rapid Development Using LabVIEW

We used graphical object-oriented programming as a development model to make the system software easy to maintain and modify. With this type of programming, the development process was also easier because we could use the same terminology used by the customer, SCANIA. First, we simulated the control of the FieldPoint modules in the program to verify that the flow and logic of the program was functioning correctly, which saved time during the implementation. For this purpose, we developed a special LabVIEW application for manipulating the I/O signals and to test the functionality of the program.

Our development time was minimal with LabVIEW, taking only three months to develop the software and train operators to feel comfortable with the system and use it effectively.

Creating a Multilayer Solution

We split the system software into several layers, which simplifies the process of developing new graphical user interfaces (GUIs). The simulation (SIM) layer contains the application-specific parts, such as the engine and cooling system. We called the layer that handles the hardware the abstraction layer (HAL), which is not related to HAL in Windows NT. HAL contains objects such as analog I/O, digital I/O, and thermocouple.

Easy-to-Use Software Tools Led to Success

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SCANIA is very satisfied and happy with this system because the application has essentially simplified the work for the operators, who can run the tests without extensive experience and training. Also the time for developing and implementing the system was minimal, which made the total cost of the project reasonably low. ✎

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