

# Hardware-in-the-loop (HIL) Test Rig for Jet ECU

## Overview

The customer develops and manufactures high-technology components for aircraft-, rocket- and gas turbine engines, in cooperation with the world's leading engine manufacturers.

The Full Authority Digital Engine Control (FADEC) for the engine in the Swedish JAS-39 Gripen Fighter Aircraft, is continuously maintained and updated and require thorough testing before release into a real aircraft. One major part of the testing is HIL simulation where the FADEC is connected to a simulated jet engine making it possible to execute system tests without the need of engine testing.

In order to improve the HIL testing, the customer needed better simulator performance. A new HIL system was therefore designed by the Test System Design group in Sweden.

## The Challenge

- Development of a real-time simulator test system to be used for developing and testing the FADEC units for the Swedish jet fighter JAS-39 Gripen.
- The engine model should be executed faster than with the previous system in order to increase the accuracy of the engine simulation.
- Due to the lifespan of the product the system should be easy to maintain and update and therefore be based on standard off-the-shelf hardware and well structured software.



## System Description

- Hardware build upon PXI with boards for the electrical I/O simulation and a large external GPIB controlled AC Power Source. Complex I/O signals were simulated using programmable FPGA PXI boards. The system is operated by a normal desktop PC running windows XP.
- All software in the system is developed using the graphical application development environment LabVIEW. LabVIEW is the industry-leading tool for designing test and measurement systems.

- General LabVIEW is used for control and supervision, specific add-on modules LabVIEW RT is used for HIL simulation and LabVIEW FPGA for programming the I/O boards.

## Results

- The new HIL simulator is in use by the customer. Built with industrial off-the-shelf components, it become less expensive, it has better performance and accuracy, and it is more flexible than the previous solution.