

Enerdrive uses HIL400 for distribution transformers testing.

Enerdrive developed closed loop control software with optimization of the filtering components of a 700kVA VSI to replace a traditional MG set for distribution transformers testing.

"A setup comprising the Typhoon HIL400 and an OEM controller makes an ideal development environment which combines: real control signals, in real time, with "real hardware" which is as easy to operate as a software simulation package."

*"HIL400 is must have for every Power Electronics Engineer",
Dr. Andreas Dittrich, Enerdrive CEO*

Introduction

Enerdrive is a Power Electronics control software Company founded in 2005 which offers services in the areas of power electronics and energy conversion systems. Its expertise is in applications for wind and solar power conversion, industrial drives, active filter technology and static power supplies with focus on control system design and software development.

Challenge

Distribution transformers are one of the most important and widest spread components of the power grid. To determine the state of health of distribution transformers typically, a series of tests comprising open-circuit tests, short-circuit tests, and partial discharge tests are required.

Traditional test setups—comprising rotating motor-generator (MG) sets—have a number of drawbacks and are slowly being replaced with voltage source inverter (VSI) technology. The key challenge was to reach very low levels of voltage THD and common mode currents with the smallest size filtering components.

The VSI control has to be optimized to provide high quality waveforms to the device under test for:

- open-circuit test under nominal voltage,
- short-circuit test under nominal current, and
- partial discharge measurements with minimal interference from common mode currents.

Solution

Simultaneous optimization of the differential mode filter, common mode filter, the modulation algorithm and the closed-loop control is a challenging task. When an OEM controller is connected to the HIL400, the simultaneous optimization of power electronics software and power electronics hardware is greatly simplified because the power hardware in the HIL400 becomes as easy to handle as the control software.

Typhoon HIL software tools provide an intuitive way to describe the power electronics hardware and to operate it inside the HIL400. With HIL400 it is now possible to operate an OEM power electronics controller in the comfort of the office.

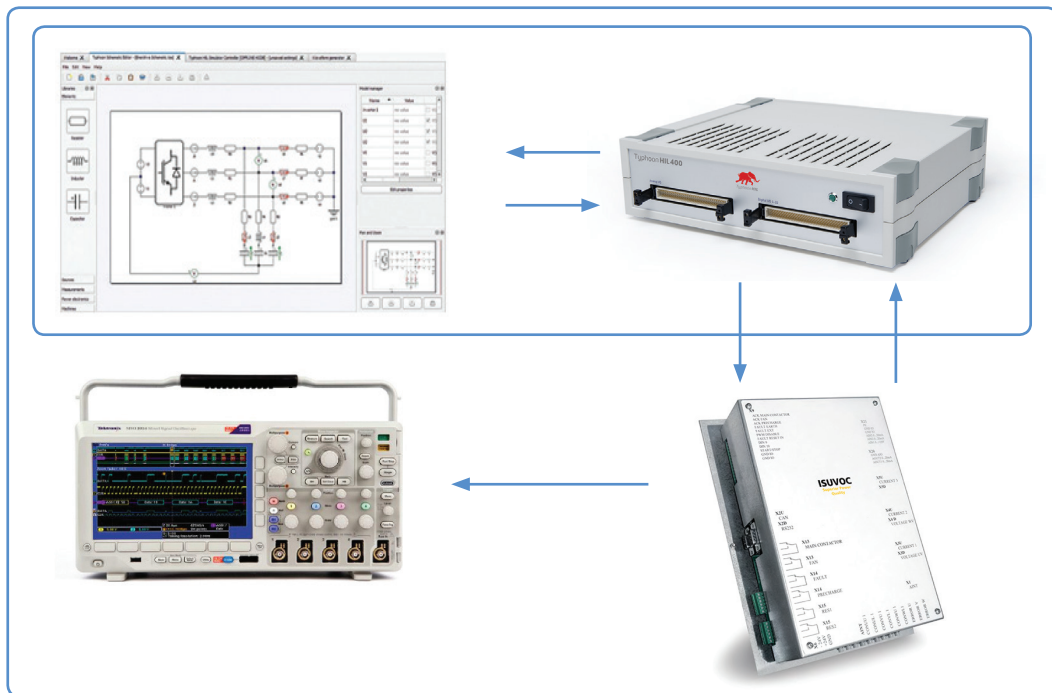
Results

Measurements of inverter phase current and line voltage in the laboratory match almost perfectly with the measurements from the setup with HIL400 in the office. In both cases exactly the same OEM control software and hardware were used.

Conclusion

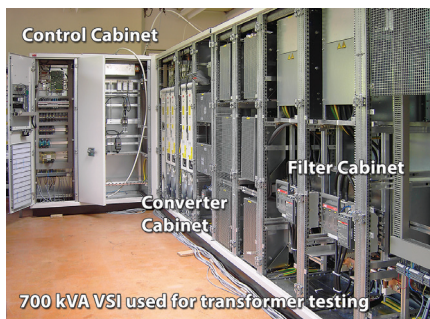
HIL400 enables both physical and temporal decoupling of the power electronic software and hardware development.

With Typhoon HIL400 is now possible to test the operating conditions that would be too time consuming, too expensive, or simply impractical to do in the laboratory.

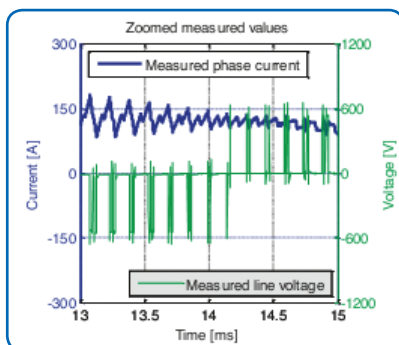
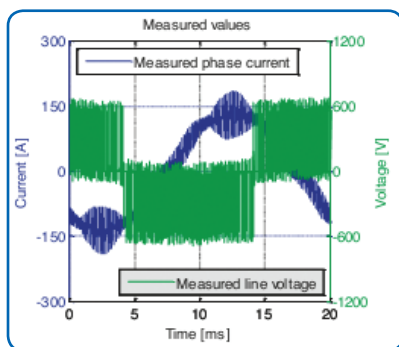


Laboratory setup

HIL400 based setup



Laboratory setup results



HIL400 setup results

