



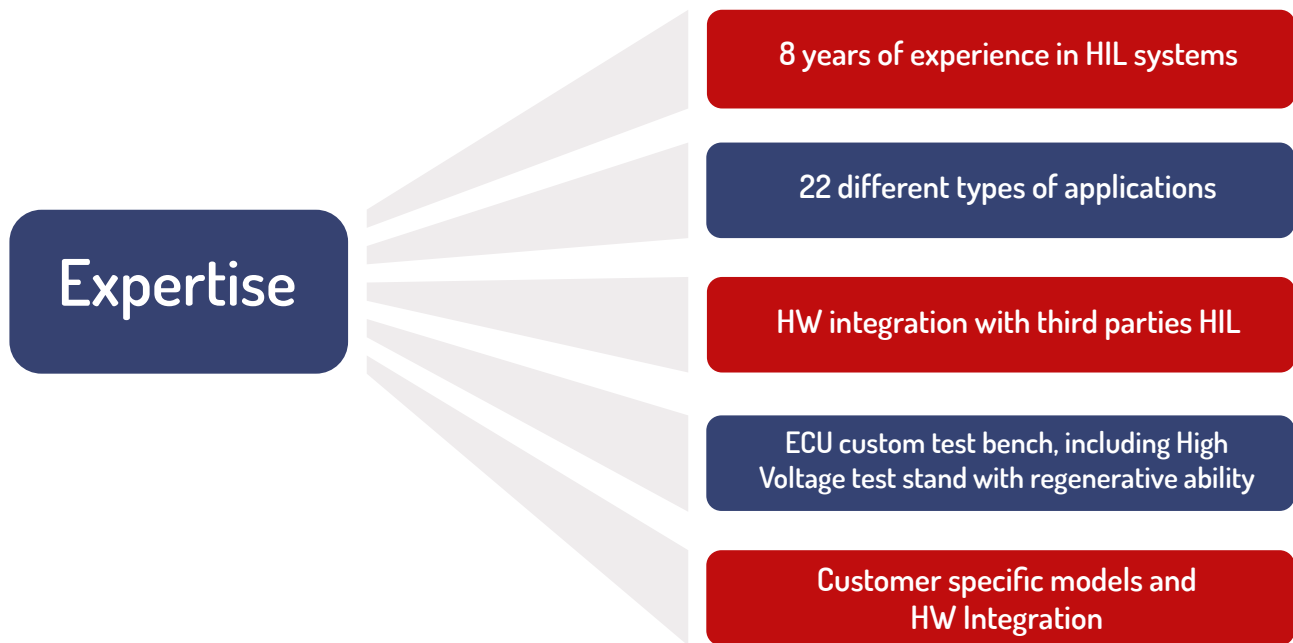
HIL

Hardware-in-the-loop systems



What we offer

- Custom made Hardware-in-the-loop systems designed for:
- Automotive ECU validation
- Power electronics, hybrid and EV powertrain
- High voltage systems testing and validation
- BUS and network interfaces
- Connectivity and interdependence between vehicle systems



What do you need to perform an effective simulation of your system?

A Real-time environment, to run the simulation models

A complete set of physical I/O, to interface properly with the DUT (device under test)

Communication Buses, to interface and check the DUT status

Fault Insertion Capabilities, needed to inquire the diagnosis responses

Safety systems for high voltage applications

Power supplies ready for the EV systems testing

What we offer

NI Veristand platform installed on custom-spec PC

Multiplatform NI I/O (such as C-series, PXI, SLSC, etc) connected to Alma Automotive custom conditioning modules.

Standard Automotive communication buses, CAN, LIN, Ethernet, etc..

Custom Fault Insertion Units

Isolation monitoring, fast high-voltage bus discharge, lock pins

High voltage, high power power supplies with regenerative capabilities. High bandwidth electronic loads.

Features

The HIL system is based on National Instruments VeriStand software platform. The typical hardware solution is based on an NI RT platform (such as RT-PC, PXI, cRIO) with the addition of other I/O modules from National Instruments, third party manufacturers and Alma Automotive's custom devices. Exemplary list of features that can be modified based on specific user needs:

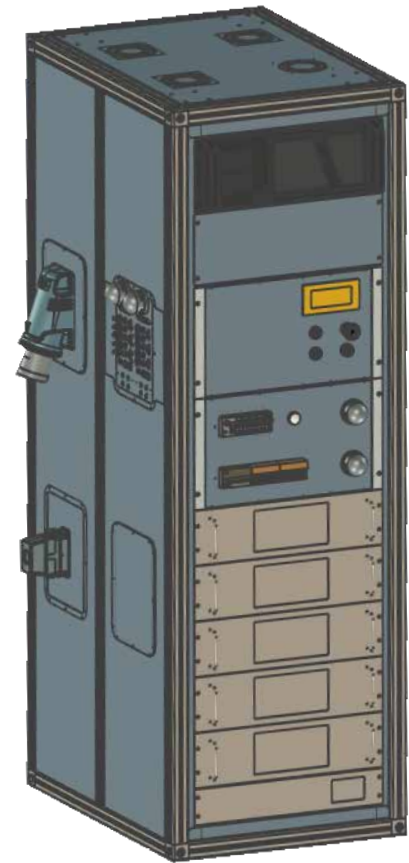
- Real time controller with last generation processing power
- Easy system definition with Veristand System Explorer interface
- Base system configuration (step-time, CPU allocation)
- HW channels definition (analog, digital, CAN)
- Model DLL import from any supported modeling environment
- User and calculated channels definition
- Channel mappings
- Custom devices setup
- Stimulus profile editor
- Data logging
- Flexible GUI for easy run-time customization of the workspace
- FPGA based engine simulation
- High resolution resistor simulation
- Rugged desktop rack or custom enclosures
- Fault insertion units :
 - Power channels FIU;
 - Sensors channels FIU;
 - Make-before-break switch operation;
 - User selectable fault current limiting with feedback signals.
- Lambda simulation (HEGO/UEGO)
- Standard communication bus (CAN, Ethernet, RS232, XCP, LIN)
- High voltage, high current capability
- Two-quadrant power supplies with regenerative capability
- High bandwidth electronic loads
- Battery cell simulation for BMS testing
- Isolate test area for high voltage testing
- Embedded operator safety systems (isolation monitoring, fast high voltage bus discharge, lock pins, etc...)
- Liquid cooling systems with temperature and flow control for DUT

Modular HIL platform, built by four subsystems: the building blocks will be chosen to fit exactly your application.

- Signal Conditioning Chassis: the main block, it hosts the conditioning modules and powers the NI I/O H W
- Breakout Box
- FIU block: it hosts powers and controls the fault insertion unit modules
- Load Rack: it hosts the DUT loads that cannot be simulated. Fast change to rearrange the application. Custom made.

All the computational power you need

We can tune the computational power of the system on request. The National Instruments multi-platform approach makes it possible to scale the real time processor, from Arm® based computers to the latest Intel® based platforms. The system also includes a powerful FPGA to meet the most demanding real-time capability requirements.



Development environment: NI Veristand

VeriStand is a software environment for the development of advanced real-time test applications such as stimulus generation and data acquisition for conditional measurements. It allows to:

- Configure I/O channels, data logging, stimulus generation and real time host communication for NI hardware;
- Import simulation models and control algorithms and respond to events with configurable alarms; Interact and monitor application data, alarm states and system execution metrics thanks to a user interface that can be modified during execution;
- Use a variety of software environments such as LabVIEW, ANSI C / C ++, Python and ASAM XIL to add customized functionalities to VeriStand.

