Advanced Testing Chain Supporting the Validation of Smart Grid Systems and Technologies


Real-Time (RT) and Hardware-in-the-Loop (HIL) simulations proved to speed up developments in the field of smart grids. These simulations represent the basis for the development of a holistic test chain.

RT- and HIL-based Holistic Test Chain for Smart Grids

Stage 1
Pure Simulation
- Preliminary test case studies;
- Simulative investigations on new smart grids technologies.

Stage 2
Software Performance Testing
- Analysis and performance evaluation of smart grids related optimization and control strategies.

Stage 3
Controller Performance Testing
- Test cases for hardware controls;
- Performance and parameters verification of hardware controller.

Stage 4
Power System Testing
- Field-test-close laboratory testing;
- Validation of technologies and/or control strategies by integrating hardware under test.

Advantages of each Stages of the Advanced Testing Chain for Smart Grids

Conclusion
- Efficient, low-cost prototyping;
- Early product faults detection;
- Alternative to cost- & time-intensive field tests.

Stage 3 & 4
- Realistic & Worst-Case testing in controlled environment;
- Validation & compliance testing;
- Optimization of Controller behavior.

Stage 1 & 2
- Fast controller development;
- Flexible test case studies;
- Controller algorithm optimization;
- Easy to use

We acknowledge the support of our work by the European Community’s Horizon 2020 Programme (H2020/2014-2020) within the project eERIGrid: European Research Infrastructure supporting Smart Grid Systems Technology Development, Validation and Roll Out (Grant Agreement No. 654113).