

# The system type test

A global organization ensuring that 800xA performs as advertised  
Bill Anderson



In 1999, ABB announced its vision for the next generation automation platform, called Industrial<sup>IT</sup>. The goal was to combine traditional distribution control systems (DCS) with IT-based business applications to provide seamless integration between the shop floor and the boardroom. Industrial<sup>IT</sup> required a new process control platform, ABB's System 800xA, which was released in late 2003. Since then, over 1700 800xA systems have been sold. The main advantage of the system is that it supports the progressive development of ABB's previously installed process control systems, worth \$20 billion. Customer satisfaction with the 800xA system is ensured by rigorous testing of new versions by multidisciplinary teams prior to release.

ABB's award winning Industrial<sup>IT</sup> System 800xA has been extremely successful since its release in 2003. This success has been due to many factors. Two of the most important are the breadth and scope of its functionality, and its ability to support the evolving development of all ABB's earlier systems. To fulfill the needs of many different industries, business landscapes, and expectations, ABB employs a global support network for the research and development of the system. This structure allows the 800xA system to benefit from truly global development, capitalizing on the skills, talents and market intelligence from a global pool of talent.

Since its introduction, several revisions have been made to improve the performance of 800xA. The latest release, System version 5.0 (SV5.0) was released late in 2006. With each release, companies like ABB must ensure that the new version has been comprehensively tested and is ready for customer use. The problem is how to test a system devised by more than 20 different product development teams to ensure that it meets ABB quality standards in all industries served by ABB, in all locations around the globe. The solution is ABB's System Type Test (STT) organization.

**The role of System Type Test (STT)**  
STT is a global organization with locations in Västerås (Sweden), Minden (Germany), and Wickliffe, Ohio (USA), with additional support for Microsoft security patch testing from Bangalore (India). The objective of the organization is to test the 800xA

system in an environment as close to customers' working conditions as can be achieved.

Each STT location specializes in some aspect of 800xA testing. Minden deals heavily with the fieldbus and I/O (input/output) subsystems, as well as the interface to the Melody Open Control Systems (OCS). Wickliffe specializes in extended applications such as Production Management, Information Manager, and Asset Optimization in addition to the Harmony, MOD and DCI OCS system interfaces. The Västerås center is responsible for ensuring that the core 800xA system (PPA and AC800M), engineering, core history reporting, licensing, calculations, etc. operate properly for all users. The center is also responsible for the 800xA interface to the AC400 OCS, PLC Connect, and Safeguard Connect.

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#### Test planning

Before each new product or revision of an existing product is released, ABB devises a global system test plan that ensures all system level and some product level requirements are tested. The system level test is designed as a whole and is broken down into components for testing at each center. All centers use the same test strategy

and use-case scenarios. Each center focuses on different test cases for each use case in combination with different specialized equipment and applications.

In Västerås, there are 15 test professionals who perform a variety of tasks to make sure the system works as intended. Västerås also regulates product quality for the entire global test organization, ensuring that the test process is stringent and effective, maintaining global customer satisfaction of new releases of the 800xA system, product rollups and service packs. The center organizes personal computers and AC800M controllers into test networks to support the various system versions and system configurations.

#### Test development process

While development teams are busy designing and implementing functionality, the STT organization is developing new tests or enhancing existing tests. Test development includes both the written procedure, as well as any test configurations and applications required to execute the test plan. Applications used to execute the tests come from several sources. Some were designed by the Västerås test staff to execute specific functions, such as controlled alarm bursts, heavy system load, and other stress conditions. Other applications came from end customers and are used to operate the system in user-typical scenarios. STT creates test cases within the following use cases:

- System-wide installation and configuration





## Risk management

- System- and application upgrades
- Application engineering for various system functions
- Run-time characteristics and usability of the system under normal operation and transient conditions.
- Recurrent and complete system maintenance
- Performance characterization of the system under normal runtime and transient conditions.
- System and network security in conjunction with use case for extended systems.
- Use case for special functions

The best results are often produced when engineers from end-user companies are integrated into a test team and able to interact freely with ABB test engineers.

### Test execution process

The STT process is designed to take the system through a series of stages that grow in scope and complexity to ensure improvements in system quality at each step.

### System Integration Test

At pre-planned stages in the product development process, the product is subjected to a System Integration Test to ensure that the individual components can be installed and run as an

800xA system. This starts with a small system and is integrated, step by step, into a full, working system. The system configurations grow progressively over time, as do applications and basic load, until the system size and capacity is ready for formal testing.

### System Type Test

The formal STT is run once the appropriate quality level is achieved. This test is executed on more than 12 different system configurations, distributed across the three centers to create a variety of user scenarios. STT has a wide scope to identify all errors that impact customers.

### Release Acceptance Test

When the STT is completed, a Release Acceptance Test is conducted on the final version of the software to ensure that it is ready for release for manufacturing and distribution to end customers.

### Keys to success

One key to Västerås' success is collaboration with many internal ABB organizations and end-users. Each test network is lead by an experienced professional tester. The test team is normally composed of a blend of ABB engineers from various specializations such as technical support, operations, and field service. This type of cooperative collaboration benefits all of the organizations in the chain that are expected to provide a full range support to end-users as soon as a release is made. The

best results are often produced when engineers from end-user companies are integrated into a test team and able to interact freely with ABB test engineers. This blend of backgrounds, expectations and experience in a test team provides the balance needed to produce a good result.

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The story of STT in Västerås is one of continuous improvement. Many improvements to the process and innovations have been made over time and more are planned for the future. Automated testing, AutoTest<sup>IT</sup>, is a growing component of the current tests being performed in all test centers. This innovative tool was developed specifically for 800xA testing in Västerås and has been invaluable as a tool to increase test speeds, reducing cost and helping developers debug issues that are normally hard to reproduce with manual steps. Projects are underway in collaboration with the ABB Corporate Research Center on a new generation of process and tool improvements. The next generation of tools will automate many of the manual steps that testers use to design and conduct tests and to report results.

Finally, another benefit of the STT is not at all related to fixing "bugs". Since STT employs both ABB project engineers and customers, system usability improvements are routinely identified and incorporated into new releases. Ultimately, the role of the STT is to ensure the successful release of 800xA, providing customer satisfaction, straight out of the box.

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