Exploring the value of Industrial IT enabled™ products from ABB

Lars Bratthall, Lars Gundersen, Johan Hasselberg, Brad Hoffman, Zbigniew Korendo, Patrik Resmalm, Ann Thörn

All new ABB products – hardware as well as software – carry the IndustrialIT Enabled symbol. This says that they are compatible with other enabled products and, importantly, that they support their own key lifecycle phases. But what exactly *is* the value of a product that is Industrial IT Enabled versus one that is not? This layman's version of a longer research paper has the answers.

Imagine it. The main circuit-breaker in your company's distribution station has tripped and there is no power for your machines. Production has ground to a standstill. Neither automatic nor remote manual reset works. You've got just 15 minutes before your financial baseline is affected.

The technician you dispatch to the station regrets, but he hasn't trained on this type of circuit-breaker. The only person who really knows this particular breaker is off duty, and the manuals are locked in his office.

Change of scene

Fortunately, there's a better way to run a business – and avoid the nightmare described above. Look again.

You're in luck. Your circuit-breaker is Industrial IT Enabled, and certified, like all other enabled products, to carry electronic documentation as an integral part of it. No need to look in a separate system, or for a locked-up binder. And there's no more reliance on that key information that your chief engineer – and only he – carries around in his head.

Thanks to Industrial IT all the documentation and drawings you need are at your fingertips. And not only now. Any time, from purchasing to the breaker's ultimate de-installation, the essential information you require is made immediately available.

This is what the ABB certification program called *Industrial IT enabling* is all about – *ensuring that every Industrial IT Enabled product supports and adds value to its key lifecycle processes.*

Four levels of certification

A product can be Industrial IT Enabled at one of four levels, each of which builds on the prior level to provide further value. Thus, it is easy for existing production facilities to gradually grow into the Industrial IT Enabled world – a case of evolution instead of revolution.

Level 0: Information

This first Industrial IT Enabled level ensures that a product has documentation, drawings and similar information available as an integral part of it. The certification also ensures that there is global product support available.

Drive and control company Bosch Rexroth is Industrial^{IT} enabling its full line of pneumatic components to give customers easy access to electronic documentation. (Shown: Rexroth pneumatic solution for pick-and-place and assembly).

Level 1: Connectivity

The second level, Connectivity, ensures that a product has all the level 0 characteristics plus proven user-oriented features necessary for 'plug-and-produce' installation and integration. For example, replacing a defective or defunct circuit-breaker with a new model, even one from a different vendor, is much simpler when the new breaker is Industrial IT Enabled at the Connectivity level. Software products certified to the Connectivity level also have defined installation, operation and de-installation capabilities.

Level 2: Integration

The next level, Integration, defines standardized user interfaces for navigation, presentation and information distribution, for example in a network. This reduces the need for user training. Complete protocol definitions are supplied for communicating products to facilitate integration with other products at this level.

Level 3: Optimization

Products at this level fulfill criteria that ensure efficient use in complex systems and in very large installations. These include state-of-the-art bulk data management, import/export routines for complex data, and object copy/paste for easier reusability of solutions. Thus, large systems based on Industrial IT Enabled products at the Optimization level can be engineered extremely fast and efficiently. In addition, an Optimized Industrial IT Enabled product offers native language support, allowing functionality to be presented in different languages.

Enabled breaker – empowered technician

Returning to the industrial crisis described at the beginning of the article, what would our technician have done with an Industrial IT Enabled circuit-breaker?

First, he would have clicked on the breaker icon on his plant overview – opening up all the documentation and drawings, plus a technical reference manual. Looking at these, he would see that the rod that moves the auxiliary switches was deformed, probably concluding that it had happened during a violent storm the day before. As a temporary measure, he might quickly fabricate a makeshift rod from some spare metal lying around his office, getting the plant back on line in five minutes. And just another five minutes is all he would need to order a replacement part from the supplier via the eCommerce web link built into the documentation.

A plant back on line and a problem solved ... thanks to an Industrial IT Enabled product. And some ingenuity on the part of the technician.

Real-world enabling

Although fictional, the above scenario

"By Industrial IT enabling our products, we give ABB as well as the end-customers direct and structured access to all relevant information about Rexroth's cylinders and valves anywhere and anytime."

Patrik Resmalm, head of product management

does illustrate how a product enabled at the Information level can support the operation and maintenance phases of its lifecycle. In the real world, this support can have benefits across the entire value chain, as the following three actual applications show.

Bosch Rexroth

Bosch Rexroth AG, a leading German supplier of drive and motion control solutions, has decided to Industrial IT certify its complete range of pneumatic components. Rexroth's pneumatic cylinders and valves are used in all types of automated processes, for example for gripping, moving, holding or pushing. These products, one of which is shown in **1**, are therefore critical to keeping a production line running.

Patrik Resmalm, head of product management at Rexroth, explains: "By Industrial IT enabling our products, we give ABB as well as the end-customers direct and structured access to all relevant information about Rexroth's cylinders and valves, anywhere and anytime."

Users need information on installing the company's products as well as technical data during engineering and maintenance. Another area that is supported is machine upgrading, which could include shortening cycle times; also, there are calculation programs that help users check possible product applications. Considering how much a company's revenues can depend on smooth, uninterrupted running of its production lines, certification could result in a major cost saving for users of Rexroth's Industrial IT Enabled pneumatic components.

By enabling the products in this way, Rexroth now has the means to effectively empower its customers by providing

2 Hewlett Packard's Industrial IT Enabled X2100 workstation

them with all available key information. Further, the structured approach will secure the availability of information for the complete range of products. Patrik Resmalm adds: "Industrial IT enabling of our products does not require Rexroth to change its product information, but rather to use it more efficiently by giving it a structure. This alone makes Industrial IT enabling a powerful tool."

Hewlett Packard

HP is a leading provider of technology solutions, and supplies the business as well as the consumer sector with fault-tolerant servers, UNIX® servers, Linux servers, Windows® servers, storage solutions, management software, imaging and printing systems, and PCs. The company is in the process of Industrial IT

certifying parts of its workstation range at the Information level so that ABB customers can be sure that their base computing platforms, like other ABB deliverables, are Industrial IT Enabled.

Ann Thörn, account manager at HP, says: "We want to be a leading partner for ABB in the Industrial IT area. Apart from our products, we can contribute our extensive knowledge, competence and network. The Industrial IT platform,

"We want to be a leading partner for ABB in the Industrial IT area. The Industrial IT platform, vision and commitment, are of great interest to us, and we hope that more HP hardware – and software – will be Industrial IT certified."

Ann Thörn, account manager at HP www.hp.com

vision and commitment, are of great interest to us, and we hope that more HP hardware – and software – will be Industrial IT certified."

One result of this partnership is the Industrial IT certification by ABB of HP's X2100 workstation **2**. This will assure ABB's many customers that they can rely on the X2100 working efficiently in their business environments throughout its lifecycle. HP can prepare its workstations for integration in Industrial IT based systems already during production, thereby shortening the lead time for integrated deliverables.

A European electrical supplier

Though plant documentation is not a product in itself, it is important as it influences a customer's overall acceptance of acquired equipment and systems. Customers require comprehensive and up-to-date documentation they can access in a natural and efficient way. Providing the documentation in an electronic format meets these requirements only partially. A comprehensive product information environment that offers a variety of tools for accessing the documents is obviously of immense value.

3 PS1 modular substation. ABB has developed a comprehensive product information environment for this substation, comprising a complete Industrial IT based model with all the documentation embedded in a collection of Aspect Objects.

4 "How many times more valuable is an Industrial IT Enabled product than one that isn't?" was the question put to 14 senior engineers in two running projects. The vertical axis shows the multipliers for different phases in a product lifecycle. The boxes show the 75% response spread.
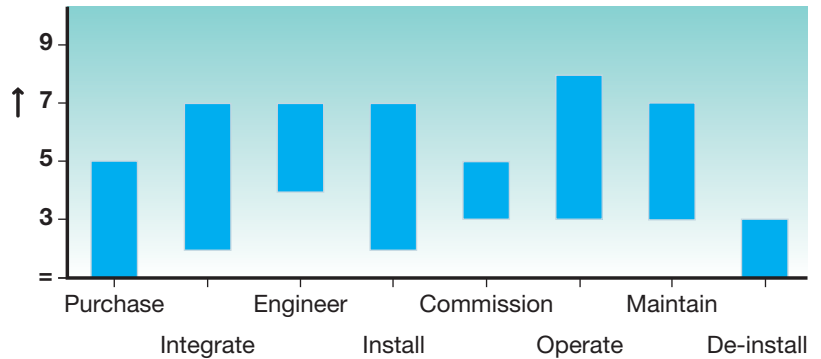
5 Relative value of an Industrial IT Enabled product during its lifecycle. The support provided during integration, engineering, operation and maintenance results in a high value, while for the de-installation phase the value is lower.

For a high-voltage modular substation **3** ABB is currently delivering to an electric utility in Europe, just such an environment has been developed and installed using Industrial IT Aspect Objects. It consists of a complete Industrial IT based model of the ordered substation, with all the documentation embedded in a collection of Aspect Objects. Instead of a plain set of document folders on a CD, it features a flexible information system from which maintenance manuals can be retrieved in seconds by clicking on the appropriate apparatus symbol in the displayed single-line diagram. The Industrial IT based documentation solution supports different needs through the provision of adequately structured information. For example, a substation operator can access information through a structure based on how the substation is actually operated, whereas service engineers may use a maintenance structure.
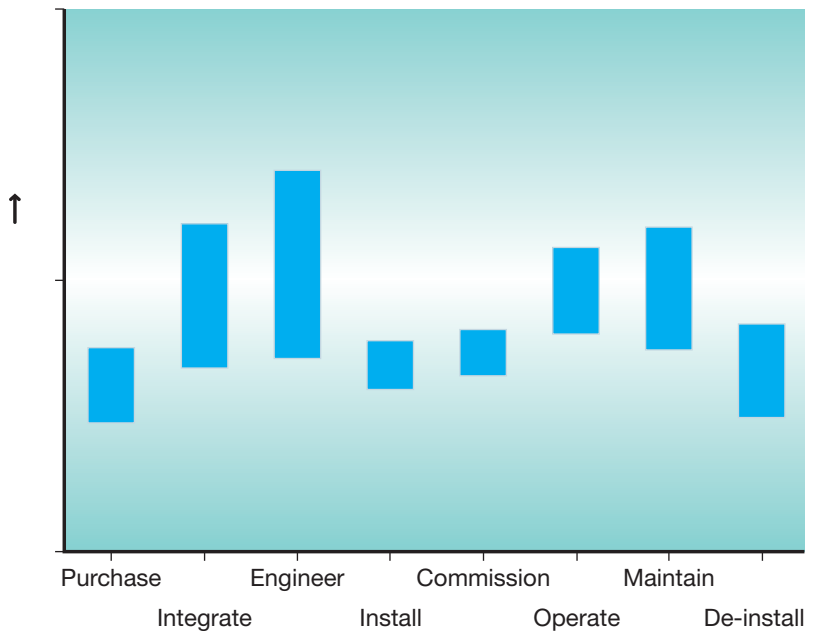
Putting the utility in control in this way considerably improves its asset management and operating efficiency. Also, synergy with future substation operation solutions is provided for through a standardized object model representation (common object/data engineering).

Assessing the business value of enabled products

The benefits of Industrial IT Enabled products may be easy to understand, but assessing their value can be harder. The basic question is, how much more is an enabled product worth than a similar non-enabled product? And when can users expect a return on investment – during installation of the product, or during its operation?

Finding answers to these questions calls for a technique called Incomplete Pairwise Comparison (IPC) [1], which is often used in complex decision-making.

ABB asked 14 senior engineers in-

volved in ongoing customer projects that rely heavily on Industrial IT Enabled products to assess their value using IPC.

First it was assessed, without using IPC, if an Industrial IT Enabled product offers customers any extra value *at all* during the different key lifecycle processes, compared with a non-certified product. The results are shown in **4**.

The figure shows convincingly that Industrial IT Enabled products are considered more valuable to customers during *all* of their lifecycle processes. In fact, in none of the key process areas was there any indication that a non-certified product would be more valuable than a similar product that was Industrial IT Enabled.

The next step was to assess, using IPC, the relative value to customers of enabled products during the same key lifecycle processes **5**. The comparison shows that Industrial IT Enabled products create the most value, compared with similar, but non-certified products when they are integrated with other products, during engineering, and during operation and maintenance. This suggests that Industrial IT Enabled products:

■ Are less costly than similar products when used to build larger systems.

■ Are less costly to operate and maintain. The total cost of ownership is lower.

For ABB, it is also interesting to see the relatively low value assigned to the purchasing phase, the leftmost bar in the figure. This implies that the full potential of simplifying purchasing of Industrial IT Enabled products may not yet have been tapped. The same holds true for the installation processes.

An advantage of the methods used is that they not only rank the different key process areas in terms of how much they benefit from Industrial IT certification, but also that the median *relative* degree of contribution to value can be computed for each area. For example, it is seen that in the cases studied, Industrial IT enabling contributes, in median, 7% of its value during customer purchasing processes. If this value is estimated at 4000 USD for a particular product, the value of Industrial IT enabling in other customer processes can also be estimated. In cases similar to these it has been estimated, based on the findings in this study, that the value of Industrial IT certification during operation of the same product would be 9100 USD

[(4000/7%)x16%], as Industrial IT enabling contributes approximately 16% of its value during this phase. What is more, the value this Industrial IT Enabled product contributes over its entire lifecycle would be 57,000 USD.

Adding value all the time

Returning to our fictional story, having a circuit-breaker that is Industrial IT Enabled clearly has a value that goes well beyond a quick fix when the power is down. Importantly, enabled products – software as well as hardware – provide value across the entire value chain – and keep on adding it during their lifecycle.

Authors

Dr. Lars Bratthall
Lars Gundersen
Johan Hasselberg
Brad Hoffman
Dr. Zbigniew Korendo
ABB
johan.hasselberg@se.abb.com

Patrik Resmalm
Bosch Rexroth
patrik.resmalm@boschrexroth.se

Ann Thörn
Hewlett Packard
ann_thorn@hp.com

References

[1] **P. T. Harker:** Incomplete Pairwise Comparison in the Analytic Hierarchy Process. Mathematical Modelling 9 (1987) 11, 837–848

Further reading

Component certification – What is the value? L. Bratthall, J. Hasselberg, B. Hoffman, Z. Korendo, B. Schilli, L. Gundersen: Submitted to an Int'l conference (2002). Available from lars.bratthall@no.abb.com

Integrating hundred's of products through one architecture – The Industrial IT architecture. L. Bratthall, R. van der Geest, H. Hofmann, E. Jellum, Z. Korendo, R. Martinez, M. Orkisz, C. Zeidler, J. Andersson: Proc. of IEEE&ACM 24th International Conf. on Software Engineering (2002) 604-614.

The ABCs of Industrial IT. ABB Review 1/2002, 6–13.