

Remote Engineering – New Trend in Engineering Practice

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***Abstract:** In today's highly competitive global and extensively networked economy, companies must incorporate the right outsourcing and "off-shoring" strategies in order to survive. Historically, large, centralized engineering staffs have served process automation projects, local to the countries where the projects were being executed. However, with the advent of modern engineering and document management tools, coupled with a large pool of highly educated and motivated engineers around the world, "off-shore" engineering is now a reality. For this reason, large automation projects used to be done by many geographically dispersed engineering teams today. But as project control of the geographically dispersed engineering teams is far from easy, companies must make big effort to find the best solution (i.e. the best project methods, the best project tools and the best project processes) that suits particularities of this global engineering teams' nature. The paper presents an ABB concept of Operation Centers. The Operation Centers are involved in many global ABB projects and must face many interesting remote engineering consequences for these reasons.*

***Keywords:** remote engineering, project methods, project tools, project processes*

1 Introduction

In today's highly competitive global and extensively networked economy, companies must incorporate the right outsourcing and "off-shoring" strategies in order to survive. Historically, large, centralized engineering staffs have served process automation projects, local to the countries where the projects were being executed. However, with the advent of modern engineering and document management tools, coupled with a large pool of highly educated and motivated engineers around the world, "off-shore" engineering is now a reality. For this reason, large automation projects used to be done by many geographically dispersed engineering teams today. But as project control of the geographically dispersed engineering teams is far from easy, companies must make big effort to find the best solution (i.e. the best project methods, the best project tools and the best project processes) that suits particularities of this global engineering team's nature.

2 ABB Organization and ABB Operation Centers

ABB is a leader in power and automation technologies that enable utility and industry customers to improve performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 104,000 people. ABB is headquartered in Zurich, Switzerland. ABB Ltd shares are traded on the stock exchanges in Zurich, Stockholm and New York. The ABB Group was formed in 1988, when the Swedish Asea and the Swiss BBC Brown Boveri merged under the name ABB. Asea's history dates back to 1883. BBC Brown Boveri was founded in 1891.

From the organizational point of view, ABB has five divisions at present:

- Power Products Division (i.e. transformers, high-voltage and medium-voltage switchgears, breakers, automation relays)
- Power Systems Division (i.e. substations, FACTS, HVDC, HVDC Light, power plant & network automation)
- Automation Products Division (i.e. low-voltage products, drives, motors, power electronics, and instrumentation)
- Process Automation Division (i.e. control systems and application-specific automation solutions for process industries) and
- Robotics Division (i.e. robots, peripheral devices and modular manufacturing solutions for industry).

The Process Automation Division (PA) is typically an engineering division and comprises ten following business units (BUs):

- BU Chemical and Pharmaceutical
- BU Force Measurement
- BU Marine
- BU Metals
- BU Minerals
- BU Oil & Gas
- BU Process Industries Products and Operations
- BU Pulp & Paper
- BU Service, and
- BU Turbocharging.

As PA division's projects have a significant impact on productivity and safe operations of a customer's manufacturing plant, it was imperative that PA develops a sustainable business practice to support global and distributed engineering solutions. The solutions would meet the schedule, quality and cost demands of their customers. For this reason, ABB PA division has chosen to build a few large engineering centers to do centralized, professional high volume project execution instead of many fragmented centers around the world. Two of these Operation Centers are based in Bangalore, India, and Ostrava, Czech Republic (see Figure 1).



Figure 1 – Operation Center Czech Republic (in Ostrava) and India (in Bangalore)

3 ABB Operation Center India

Operation Center India was formally started at Peenya, Bangalore, in India in March 2005 with 35 people, but has now reached more than 300 and will have 600 by the end of 2007.

A strategic element of the Operation Center is the requirement to provide engineering services to ABB Process Automation projects around the world. The Operation Center offers hardware and software engineering solutions for various processes on ABB automation product platforms.

4 ABB Operation Center Czech Republic

The foundation of Operation Center Czech Republic in Ostrava is dated back to 2002, when a small engineering group started cooperation with ABB Germany. Since then the team has expanded, now consisting of 65 engineers. The plan for the end of 2007 is approx. 100 or 120 engineers. The Czech Republic Operation Center provides both service projects and R&D support.

The Czech Republic Operation Center is located in Ostrava, the third biggest city in the Czech Republic with 150 years of industrial heritage, where the metallurgical and heavy machinery industries of the Czech Republic are concentrated. At the present time, many companies are investing into high-tech in this region, as well.

Also, this city of 320000 inhabitants includes two local universities with 25000 students and experienced people connected to IT development and its implementation into industrial practice.

Operation Center Czech Republic is fully involved in working out tasks within MES (Manufacturing Execution Systems) and DCS (Distributed Control Systems) levels of processing automation.

For MES, Human Machine Interface is being designed, including web client development and reports configuration for process operators. R & D activities are carried out for Knowledge Based Solution Development Tools, such as Knowledge and Execution Manager.

For DCS, sales, engineering, commissioning and trial runs based on shared specializations and activities are targeted at: Technical clarification, Proposals, Basic engineering, Detail engineering, Cable- and connection engineering, Drives engineering, Plant engineering, Technological control, Staging and FAT (Final Acceptance Test), Commissioning engineering, Erection supervision, Erection, and Trial run.

Operation Center Czech Republic provides a wide range of specialized services for ABB in Germany, Sweden, Switzerland, United Kingdom, Norway, etc. Typical sites, where projects are commissioned, are in Europe and Asia.

The major platform used for building DCS is 800xA, but platforms AC31, MOD300, Melody, Freelance, AC450 are also used. Systems with electric drives are based on ACS800 and DCS800 low voltage converter platforms. Nevertheless, medium voltage platforms and applications are planned for 2008.

5 Remote Engineering

Both Operation Center India and Operation Center Czech Republic apply a project model for remote engineering. The typical engineering model comprises:

- Kick-off meeting with the client
- Assessment and cost estimation based on customer input
- Resource planning
- Project plan establishment and approval in consortium with the client
- Legal compliance, confidentiality and related issues
- Project execution
- Periodical review to maintain successful relationships
- Good communication to bridge cultural differences
- Efficient use of SW and HW tools supporting remote engineering

Experience shows that this remote engineering model can work almost as effectively as local engineering model. But there must be a few necessary pre-conditions fulfilled. Some of them are presented in figure 2. To ensure this, ABB India and ABB Czech Republic perform internal audits that check all processes for compliance.

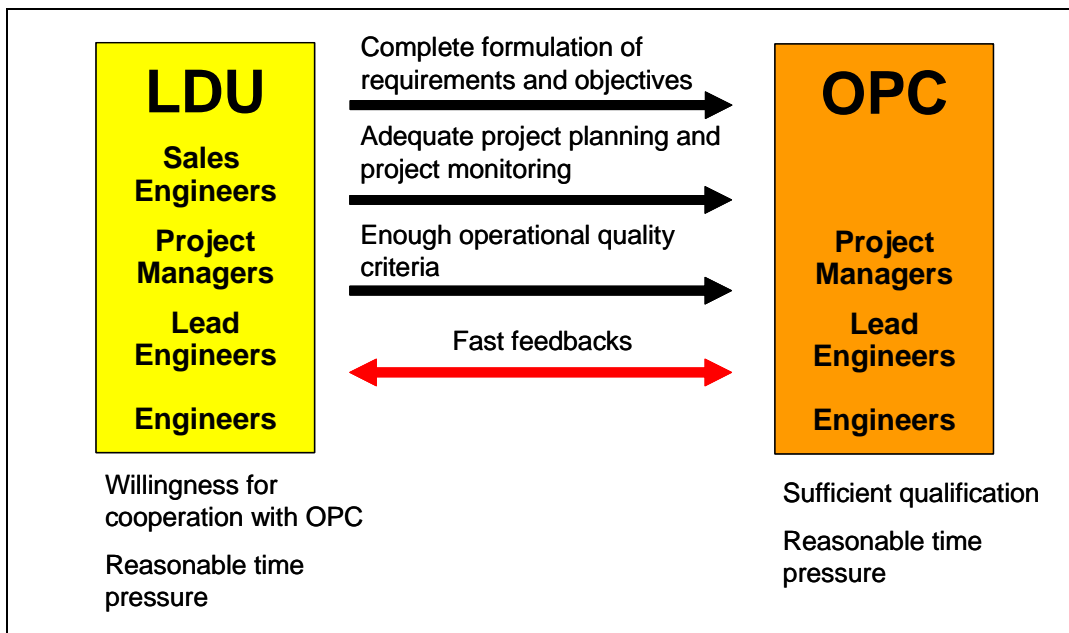


Figure 2 – Necessary pre-conditions of successful remote engineering process (LDU – ABB Local Division Unit; OPC – ABB Operation Center)

For better integration of engineering teams, Operation Center Czech Republic makes use of many tools that allow better project control and better coordination of geographically dispersed teams. For instance there are following ones:

- Electronic Document Management System (EDMS) as the global document management system providing a basic document management environment to support bid and proposal, project execution and generic document management, and a wide range of methods for document distribution. EDMS enables ABB engineers to keep actual and consistent project documents and data without regard to geographical distance among them.
- Lotus Notes for e-mail and databases
- EPLAN Electric P8 and Engineering Base for electrical engineering. EPLAN Electric P8 enables a free choice between graphically and object-oriented work anytime. Engineering Base combines Microsoft Office Visio, with Microsoft SQL Server (the powerful enterprise relational database management and analysis system). Electrical diagrams are drawn with Visio and all data is managed with the SQL Server.

- Remote Desktop Connection that allows engineers to access applications or data stored on a remote computer over a network connection (see figure 3). Remote Desktop Connection allows bringing applications to a single server for use by users anywhere in the world. This centralization also makes upgrades, troubleshooting, and software management much easier than distributed solutions. Remote desktop connection seems to be very perspective for both software and hardware and plant remote engineering.
- Flexible and Comprehensive Conferencing Tools for easy project tracking, etc. The tools help reduction in travel costs and better use of engineering time.

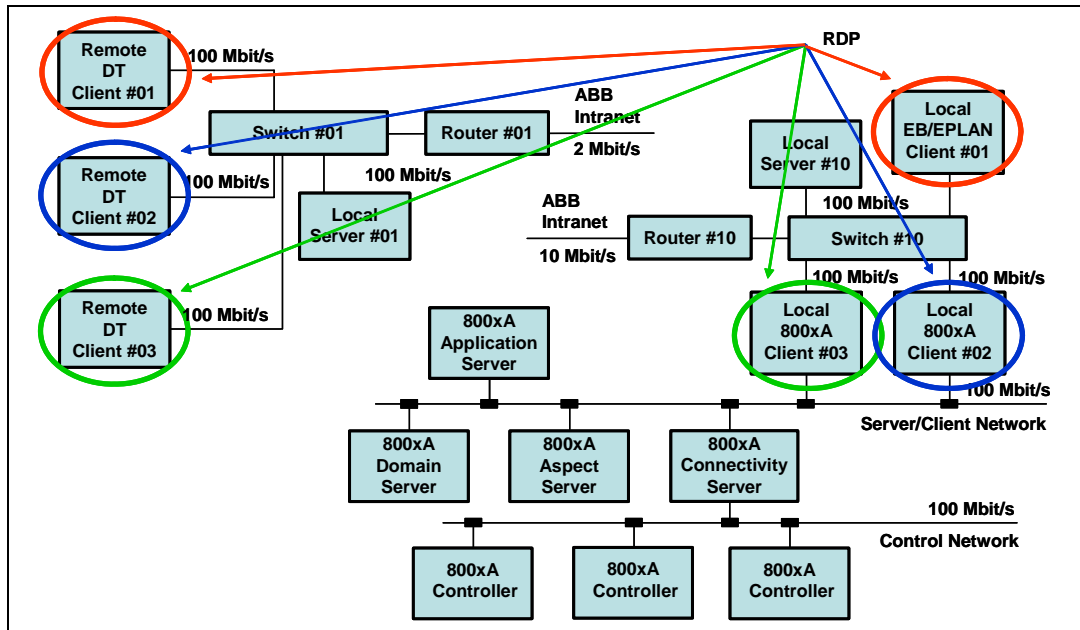


Figure 3 – Remote engineering using Remote Desktop Connection principle (800xA – ABB DCS 800xA; EB – Engineering Base; EPLAN – EPLAN Electric P8; RDP – multi-channel Remote Desktop Protocol; Remote DT – Remote Desktop).

6 Conclusions

Remote engineering is a very interesting way of reduction in project costs. But compared to local engineering, remote engineering processes are much more demanding. There must be very good project management and very strict project discipline. If not, remote engineering can cause huge financial loss and loss of good reputation and customers. Nevertheless, as remote engineering offers many advantages, it seems to be quite big challenge for many engineering companies today. The paper presents a few experiences we came to in ABB.

7 References

<http://www.abb.com>