

Smart manufacturing

NOKIA and ABB working together in a successful productivity improvement partnership

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The Smart Manufacturing Concept has been central to NOKIA's efforts to sharpen its focus on production technologies that enhance the flexibility and competitiveness of its nine manufacturing facilities. The company has successfully adopted a strategy of forming efficient networking with best-in-class partners. One of the latest partnerships is an expanded collaboration with ABB in performance based maintenance.

Demand driven manufacturing

Globalizing world-class concepts has always been a challenge. Telecom companies in particular, such as NOKIA **Textbox 1**, require a combination of flexibility and a systematic approach to maintenance. These features call for excellent change management procedures, and the ability to adapt to constant technology changes in a variety of cultures.

This and more have been achieved at NOKIA's Komárom production plant in Hungary **Textbox 2** and title picture. Not only is this plant proof of NOKIA's capability to ramp-up a world-class production unit in a short time, but Komárom has grown to become a very big mobile phone plant in terms of volume of production.

So what's the secret behind this success?

Performance Service

To begin with, the product range in the telecoms industry is becoming increasingly broader. Market innovations mean new models are pushed into production faster than ever.

Performance Service minimizes the total maintenance spent over the life-cycle of the equipment.

At the Komárom factory, Timo Kahelin, the plant manager, reinforces this point when he says that production volume increased significantly in 2004 to satisfy the growing market demand even as the number of variants also increased substantially. While this in itself is very impressive, plant man-

agement also wanted to develop the factory to be world-class in productivity. According to Kahelin, "we certainly saw big opportunities in plant performance improvement during 2004."

NOKIA understood that a maintenance strategy deeply tied to the production strategy was needed to remain globally competitive. However, according to Timo Elonen, director of Manufacturing Solutions organization, maintenance today is actually "a misleading definition, we rather talk about Performance Service."

Performance Service minimizes the total maintenance spent over the life-cycle of the equipment. Systematic management of internal and third-party maintenance activities is a key contributor to this optimization process, and a key technology is the effective

Textbox 1 NOKIA

NOKIA is a leading international communications company, focused on the key growth areas of wireline and wireless telecommunications. NOKIA is a pioneer in digital technology and wireless data communications, continuously bringing innovations to the highly competitive and growing telecommunications markets. NOKIA is also actively involved in international R&D cooperation, including the development of standards for third generation mobile telephony.

NOKIA's was founded in 1865 by Fredrik Idestam. The ground work for telecommunications was laid in the 1960s, as NOKIA was researching the field of radio transmission in its electronics department. In the late 1970s, mobile phones and telecommunications infrastructure products were developed for both domestic and international customers. It was in the 1980s and 1990s that NOKIA became a global leader in digital communication technologies.

The company's ability to exploit the opportunities created by continuous technological and market change has helped it develop into the company it is today.



Textbox 2 NOKIA Komárom

NOKIA'S Komárom production plant is situated in Hungary. It is ideally located in the heart of Europe close to the motorway rolling from Budapest to Vienna and only 8 km from the Slovakian border, enabling flexible use of the workforce to match continuously growing needs.

After only nine months construction, Komárom delivered its first handset to the European market in 2001.

Key sub-suppliers are located in Komárom's industrial park ensuring fast lead time and seamless co-operation. There is a specific industrial park association with the responsibility to develop the park as a whole and to provide common support processes as well as to manage the industrial relations with the Győr community. The Board consists of plant managers from the industrial park. It meets on a regular basis to direct the sustainable development in the working community of over 10,000 people.

use of a computerized maintenance management system. Integrating maintenance methodology with a focus on the effectiveness of the production, eg, increased line performance, is essential to enhanced productivity. And of course, cost optimization pressure never ceases to exert its influence.

According to Timo Kahelin, it was ABB who opened Komárom's eyes to maintenance as a tool to improved productivity and not just as a tool for fire-fighting and preventive repairs. NOKIA regards ABB as a world leader in maintenance management – in 2002 the company was selected as the maintenance provider for Salo operations in Finland. A performance based service agreement was signed with ABB in March 2005 and by May 2005, the Komárom plant embarked on the creation of a service culture (based on well developed core processes) when 158 line service people and tens of third-party suppliers started systematic service under ABB management. "However this is a big task and there is still a lot do as we move forward from the start-up phase, ABB needs to work hard to keep on track", Kahelin states.

Martti Salomaa, the head of NOKIA Komárom's Engine Operations adds that "ABB's Full Service® concept

Textbox 3 takes into account both technological and cultural issues and is therefore welcomed by our employees at our Hungarian plant. Together we have more knowledge and can cover more issues, and this increases people motivation as well as enhancing overall competence." Today Performance Service is considered one of the key contributors to increased performance of the engine lines and assembly cells.

NOKIA's maintenance strategy has been further refined based on its experiences. ABB has not only had an important role in benchmarking other NOKIA plants, but has also been invited to advise on the formulation of the company's maintenance strategy.

OEE¹⁾, **Textbox 4**, has quickly become a key element to drive maintenance for better performance. Together, NOKIA and ABB have defined an optimal way of capturing OEE from critical equipment as well as from the line as a whole. This common definition provides a sound basis for systematic analysis based on the work that can be assigned to improvement teams. Because the mobile market is growing continuously, an increase of just one percent in OEE has a tremendous bottom line effect.



Life-cycle capability improvements

As part of the manufacturing process in the telecoms industry, ways of increasing the lifetime of production equipment should be included. This means making constant trade-offs between introducing new production technology and using existing equipment for longer periods of time. The flow-through of components over the life-time of a single line in NOKIA's factories is calculated in hundreds of millions rather than in millions.

In answer to this, NOKIA and ABB are jointly researching the lifecycle modeling of production equipment to increase relevant knowledge as the basis for technological decision mak-

Textbox 3 ABB Full Service®

ABB's Full Service® contracts are globally co-ordinated long-term performance based agreements in which ABB commits to maintain and improve the production equipment performance and reliability for an entire facility.

Customization for electronics and telecommunications

By understanding the specific needs of clients in the electronics and telecoms industry, ABB's Corporate Research and the Maintenance Performance Center for Electronics (located in Finland) worked together to develop a full service concept. The result is an industry specific customization of the ABB Full Service®

business concept, which can be deployed globally to key brand owners and their tier one suppliers.

Over the years the ABB Full Service® concept has evolved from traditional maintenance into the performance partner of the customer. Its definition crystallizes how global and local activities are balanced, and it defines the two key performance indicators that must be improved by the implementation of a lifecycle production management agreement.

Textbox 4 OEE – Overall Equipment Effectiveness

OEE is the industry accepted tool to measure and monitor production performance. It can be applied at the machine, manufacturing cell, or plant process level.

It incorporates three basic indicators:

- *Availability* or uptime (downtime – planned and unplanned)
- *Performance Efficiency* (Actual versus design capability)
- *Rate of product quality output* (percentage of good products produced)

OEE = Availability × Performance Efficiency × Rate of product quality output

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ing. This is an area where ABB's experience in the process industry is especially valuable. The production development approaches used within process industries converge with methods applied in high volume discrete manufacturing; hence experiences can be shared productively.

To utilize ABB's total capability for performance improvement, NOKIA and ABB have opted for the widest possible scope in their productivity support model.

Improving production line performance

The co-sourcing of performance services – as NOKIA and ABB have set out to do in Komárom – is revolutionary to the industry. Separate technical service activities are no longer isolated but are managed under one performance based service agreement. To utilize ABB's total capability for performance improvement, NOKIA and ABB have opted for the widest possible scope in their productivity support model. Elements contained in this model include:

- Productivity targets that are cascaded from the production strategy by utilizing a specific strategy process.

This process defines the key issues in terms of an MMMP²⁾. Eleven specific process steps for productivity improvements are then scheduled to be in line with telecoms clock-speed and finally visualized for everybody by clearly displaying the development steps.

- The management keeps all the former decentralized functions under tight control, focusing instead on facts through KPIs. People are trained and motivated to take on the challenges defined by each development step.
- Improvement of OEE is the key. World-class targets are set and maintenance technologies are deployed to boost continuous improvement.
- A large part of the required work is carried out by third-party suppliers. Their role is to develop equipment technologies that perform better and with higher reliability.
- One of the key challenges is to manage the set-up time of a product change in the line. Several techniques, such as SMED³⁾ have been adopted to eliminate downtime and yield loss.
- Equipment aging in this relatively new plant will be tackled with life-cycle studies utilizing FTAs⁴⁾ common with other plants.
- A key requirement of the agreement is that the program be tailor-made for the Hungarian plant, while at

the same time it must be easy to benchmark with other plants.

Bálint Ecker is ABB's resource manager at the Komárom plant and he says that even though the first six months have seen huge changes in what were once considered traditional working procedures, people have embraced this new culture of preventative maintenance. Over time, additional systematic tools, such as CI teams⁵⁾ and MAXIMO⁶⁾ and RCA⁷⁾, will be added.

The task in Komárom has been and will continue to be a challenging one. Because of fluctuating market conditions, the manufacturing process is compelled to respond quickly to change. However, with the support of ABB and other partners, NOKIA managed to stabilize production just as the season reached its peak (which incidentally was in the autumn of 2005). New production records are daily achievements.

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Footnotes

- ¹⁾ OEE = Overall Equipment Effectiveness. Contact ABB Performance Services on our specific solutions for both the discrete and process industries.
- ²⁾ MMMP = Maintenance Management Master Plan, a specific approach which integrates customer's industry specific targets with ABB systematic Full Service[®] concept.
- ³⁾ SMED = Single Minute Exchange of Die, specific approach to shorten ramp-ups and changeovers, one of the key tools customized by ABB.
- ⁴⁾ FTA = Fault Tree Analysis is a specific tool to track and understand possible faults and their mechanism.
- ⁵⁾ CI Teams = Continuous Improvement teams. Contact ABB Performance Services for world-class approach to implement Total productivity Maintenance as part of a service contract.
- ⁶⁾ MAXIMO = commercial maintenance management software with which ABB can quickly implement systematic maintenance.
- ⁷⁾ RCA = Root Cause Analysis tool that ABB uses to analyze production and maintenance data as well as to continuously seek improvement possibilities.