

A photograph of an industrial robotic arm, likely an ABB model, performing a welding task. The arm is orange and is positioned over a workpiece. Bright sparks are being generated from the welding point, creating a dynamic and colorful scene. The background is dark, highlighting the machinery and the welding process.

Wellness for your profit line

A new dimension of customer care with remote service
Dominique Blanc, John Schroeder

Owners of industrial plants rightly expect their production lines to operate at highest performance all the time. Any outage of a component or system in the line directly translates into loss of profit. As technical equipment is not immune to wear and tear, maintenance plant operators have had to simply expect some downtime. But this is changing fast with the ever-increasing drive for enhanced productivity to cope with growing global competition.

With its remote service packages, ABB is now in a position to keep production lines on track 24 hours a day, seven days a week. ABB's remote service combines a number of recent technologies in creating a unique system for customer care. In 2007 further innovative steps were taken to increase ABB's commitment to round-the-clock wellness of customer equipment.

Times have changed, particularly in an industrial plant – a plant operator who recognizes a failure in a production line component no longer has to wait for a service technician to fix the problem. It used to take days to inform the supplier that something was wrong, for the supplier to send a service technician to get an overview, a service engineer to be contacted, spare parts to be ordered and delivered, and the service itself to be done at the customer site. With remote service, most of these time-consuming steps can be short-cut [1,2].

Remote services use existing and cutting-edge technologies to support field engineers, irrespective of location, in ways only dreamed of as little as five years ago. The Internet, together with advances in communications and encryption techniques, has contributed enormously to this end. Remote service developments are a direct result of the changing needs of customers – customers expect more support at lower costs. Remote services are designed to maximize knowledge bases in the most cost-effective manner. The result ensures that the best knowledge is in the right place, at the right time, to support customers' assets. With a large number of different types of products, this can be a complex undertaking.

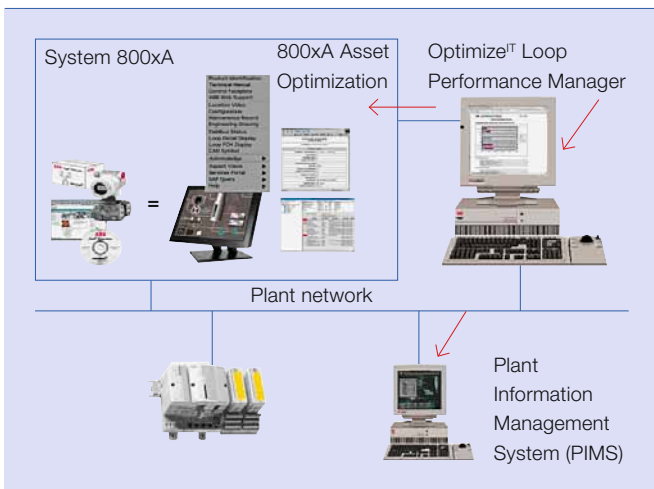
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Elements of remote service

Whether the service is organized in a remote or on-site approach, the equipment performance must be monitored regularly. The traditional way was to check critical operational parameters, like oil pressure, wear of parts or other conditions, and make repairs if needed, or plan for preventive maintenance within fixed intervals.

With sophisticated sensor technology and intelligence built into the device,

1 Performance monitoring features of ABB's System 800xA



performance monitoring today is done continuously and an analysis of the monitored parameters is performed in real-time. Most of ABB's products are equipped with such monitoring systems, and almost all parameters that determine the performance of the devices are permanently measured.

In process control systems like System 800xA, it is the utilization of the CPU and memory, the functioning of alerts and alarms or the network communication traffic, for example **1**. Pulp and paper quality control systems are checked for mechanical, electrical and electronic performance and, for example, for the reliability of the loop controls [3,4]. Drive systems undergo a continuous monitoring of voltage and current, rotational speed, motor torque and shaft power, to mention a few. Rotating machines such as motors, fans, blowers, pumps, compressors or gear boxes are analyzed for their vibration behavior, misalignments or wear of bearings **2**. The knowledge about the influence of those disturbances is evaluated with advanced lifetime prediction algorithms [5].

Instruments to measure pressure, temperature or flow are also devices that need monitoring. Here, it is the change of tolerances, communication issues, sluggishness and stiction¹⁾, for example, that need permanent checking [6]. Circuit breakers are another product to be mentioned in the list: They record a number of operational parameters essential to the service

2 DriveMonitor – Analyzing the system's heartbeat. Drive information can be utilized on various diagnostic levels – from the converter unit to the process section



task and are able to communicate the performance status to a remote center [7].

Remote service includes the automatic alert after a careful monitoring of the performance. This sounds easy, as most people are used to mobile phones and high-speed Internet connections. Reality is more complex, however; as the communication from the devices to a remote service center passes the boundaries of the customer's company and ABB, steps that require high attention with regard to data security. ABB has developed

processes to safely cross as many as three firewalls to provide the highest security **3**.

When the monitored signals arrive at the service center, they are automatically analyzed with the accumulated knowledge of hundreds of years of accumulated experience with the devices in focus. ABB has organized the knowledge about the equipment performance in extensive databases with algorithms to compare the actual performance of a device with the "normal" performance of a whole fleet of devices in the field. This has the

3 Remote access to devices and systems on site, and reporting relevant data to the service engineer

This section contains a network diagram and two screenshots. The diagram shows a 'Remote Access' point connected to an 'Internet' cloud, which passes through a 'FireWall' to a 'Business Network'. This network is also connected to another 'FireWall' that provides 'Direct connection to monitored system' within a 'Control Network'. The screenshots show the 'ABB Case Management System View' and the 'Plant Explorer WorkSpace'.

Task #	Customer	Customer Name	Call Items	Status	PH	Open Date	Call Subject	Product
ABB00000871-0278 0483	Chemicals Inc.	Chemicals Inc.	Remote Service Case	New		01-Sep-2005 12:54 PM	warm bridge heating not when active acknowledge when it will stop they should be	800xA For MCD 300
ABB00001021-0282 0483	Chemicals Inc.	Chemicals Inc.	Remote Service Case	Under investigation or assessment	3	21-Oct-2005 10:31 AM	When the M is resolved we expect servers to be brought to the logs and on being the master trend log will be updated in a future release	800xA For MCD 300
ABB00000634-0282 0483	Chemicals Inc.	Chemicals Inc.	Remote Service Case	Future Issue				800xA For MCD 300
ABB00000412-0103 0483	Chemicals Inc.	Chemicals Inc.	Remote Service Case	Prepared	1	12-Apr-2005 10:24 AM	Customer ID:0403-07, ACS DCS, Harmony, 04/20/2005 10:24 AM, 00-02-CNAM-Harmony Modem Status-Regulatory status	Diagnoses

Severity	Condition	Sub Condition	Unread Messages
1	Unread Memory	CurrentPac	Unread messages
1	Til Loop Mfg Transmitted	CurrentPacSec	Messages to record
1	NIS BusAck	Good	Rate of BusAck
1	ZoneMfg Timeouts	Good	Transmitted times

Process Innovations

advantage that the knowledge-based system can also propose the best suitable strategies for preventive maintenance, immediate maintenance or repair.

Every new case adds to the knowledge, and whenever the stored knowledge is not sufficient to make an optimum decision, the service center is backed up with an expert team to immediately analyze the situation. Once the situation is clear and decided upon, requesting local service personnel and potentially ordering spare parts, as well as generating appropriate instructions for the actual service operation, is a question of minutes with the help of the knowledge-based system.

Talking robots

ABB has a fleet of more than 150,000 robots in operation. These robots weld car parts, fix metal pieces, grind pieces from foundries or sort small pieces of chocolate with very high speed [8].

The robots play a crucial role for high productivity and availability of a production line. Any problem or reduced performance of a robot has a direct negative influence on the output of

the line. The end user's expectation is to avoid delays and disturbances during production.

Still, in case of malfunctioning, a service engineer would look into the "logbook" of the controller and determine the cause of the reduced performance. But this takes some time, especially when the service engineer first has to travel to the site to carry out the diagnosis.

Remote service significantly reduces equipment downtime and the customer's on-site maintenance effort.

ABB has developed a communication module that can easily be plugged into the robot controller for both old and new robot generations. This module reads the data of the controller and sends them directly to a remote service center, where the data are automatically analyzed. This is another example of the ever-growing application of machine-to-machine technology, which ABB has now pioneered in the world of robots. By accessing all relevant information on the robot conditions, the support expert can remotely identify the cause of a failure and provide fast support to the end user to restart the system. Many issues can hence be solved without a field intervention. In a case where a field intervention is necessary, the resolution at the site will be rapid and minimal, supported by the precedent remote diagnostics [4].

This automatic analysis not only gives an alert when a failure with the robot occurs but also predicts a difficulty that may present itself in the future. For that, the robot performance is regularly analyzed and the support team is automatically notified of any condition deviation. The customer benefit achieved with this innovative paradigm shift in the way service is performed, is obvious, and ABB has an impressive track record for realized savings.

ABB is proud of its achievement of providing efficient remote service to

its customers: a service that virtually brings a crew of knowledgeable experts to the customer site in the most cost-effective manner. At any time and from anywhere, a user can verify robot status and access important maintenance information about that robot system by logging into ABB's MyRobot Web page [5].

Remote service significantly reduces equipment downtime and the customer's on-site maintenance effort. With the secure and proven remote connectivity technology, the customer can be sure to have the best experts available 24/7. Remote service is one of the ABB showcases for innovative process management. This new technology is made available to customers as part of a service agreement.

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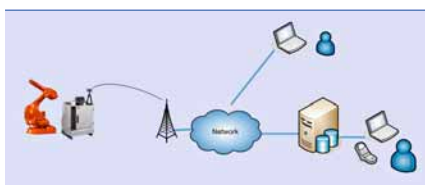
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- 4 Robot controller data are available at the remote service engineer's personal computer via a direct communication link



- 5 Customers can track relevant data of their robots on their personalized MyRobot Web page



Footnote

¹ Stiction is static friction.

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