# Doing more with less

## The drive for greater productivity

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Oil and gas are valuable and finite resources in a world of increasing demand. Dwindling oil and gas reserves mean the days of accessing easy hydrocarbons are all but over. With the downturn in the economy, many companies are trying to boost productivity by implementing cost-saving measures, increasing work efficiency and by being more environmentally friendly. Indeed striving to improve productivity and eco-efficiency may be the only sustainable path through what are increasingly volatile markets. Success partly depends on redefining cooperation and partnerships, and by using technology as the enabler.

With capital, hydrocarbon reserves, human resources and energy severely limited, ABB has been working closely with customers to develop and deliver technologies and services that support a vision of integrated operations (IO). IO brings the problem to the experts who can then effectively support the operations of multiple assets from an operations center.

## Maintenance for productivity

With mature, marginal and remote oil fields, arctic and deep sea locations, not to mention politically unstable regions, global warming and a shortage of qualified people, extracting the oil needed to satisfy an increasingly oil-thirsty world is becoming more and more difficult. Because companies now have to tighten their belts, the fact of doing more with less is not so much a cliché as it is a fact that has to be cleverly managed if companies are to weather the current financial storm.

In a world of limited resources, ABB offers technologies and services that help improve productivity and provide efficient operation and maintenance.

In a world of limited resources – and limited cash flow – ABB offers technologies and services that actually help improve productivity and provide efficient operation and maintenance. These solutions support the vision of integrated operations (IO)[1], which is defined as a set of solutions designed to increase efficiency, enhance recovery and lower operational costs in a time of declining oil output and rising demand.

### Remote access and collaboration

An important part of IO is the information and communications technology (ICT) infrastructure and applications that enable multidisciplinary teams to effectively and remotely support the operations of multiple assets from an operations center.

Even though the concept of remote access and collaboration is more or less mainstream in office environments, in the management of power networks, home computing and entertainment, it was met with a healthy dose of skepticism in relation to the operation and service of oil and gas facilities. Failures can result in serious injury or even loss of life, spills or emissions into the environment and of course substantial financial losses. The targets of improved productivity, and the health, safety and environmental (HSE) impact had to be verified by extensive research and development, piloting and step-by-step roll-out to establish trust and evaluate the benefits. A continuous research and development effort, much of which is carried out in cooperation with Statoil-Hydro and various universities, ensures a constant flow of new IO technologies.

Supporting operations from an operations center enables the definition of new work processes that will increase recovery and daily production, reduce costs and improve HSE performance. To achieve this, technology plays a vital supporting role. As a key service and technology provider for implementing IO, ABB has also exploited the same technologies to improve its own performance.

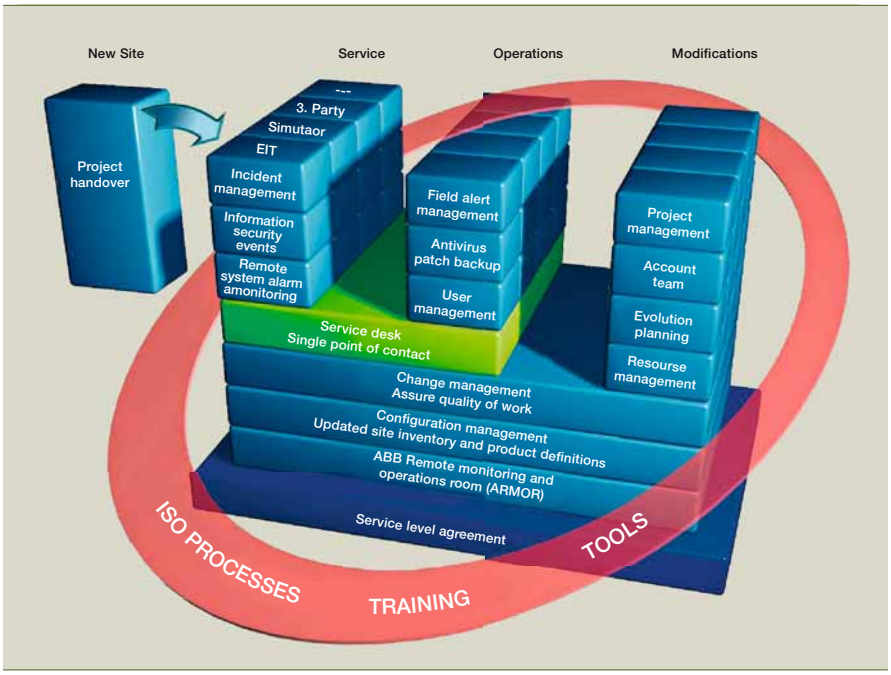
In recent years, automation and information technology in the oil & gas industry has advanced at a rapid rate. These advancements have in turn fundamentally changed the way ABB interacts with its oil and gas customers, and services their assets. In much the same way as customers organize work more efficiently and safely, ABB has developed the Service Environment™ to enable it to utilize expertise and deliveries from various ABB product and service groups, as well as customer resources and third-party supply partners.

### ABB Service Environment™

Where is expert help when you need it? Often it is found within an organization, or with system suppliers and third-party vendors.

Traditionally, the expert has always had to travel to the site to solve the problem. What if the facility could be remotely accessed! This approach would not only slash the time and expense – not to mention the emissions – spent on traveling, but when a problem occurs, experts from anywhere in the world can be "on-site" in a matter of minutes rather than days. Sophisticated condition-monitoring and diagnostic tools combined with secure remote access solve the practical aspects of the logistical problem with faraway experts. It can be said

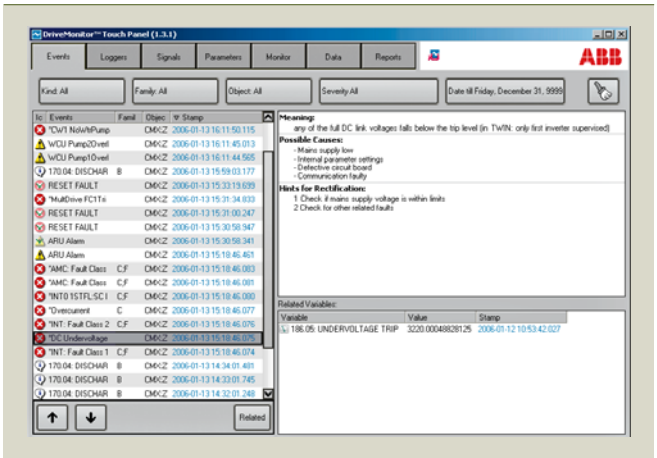
1 ABB's Service Environment™ has emerged from demands in the oil & gas industry and offers a comprehensive range of services that support the requirements of an integrated operations (IO) vision.



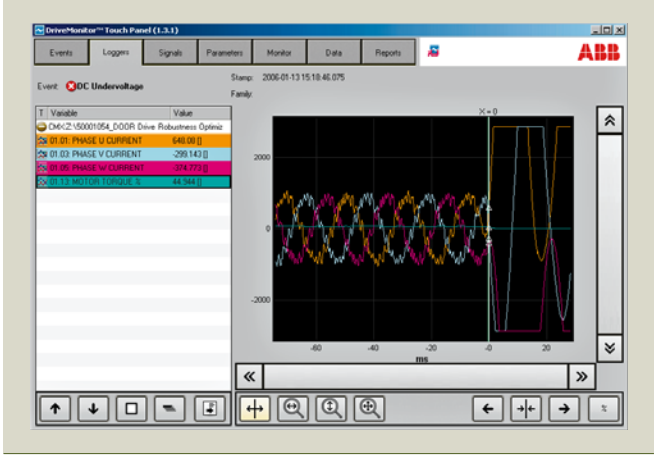

**Footnote**

[1] Statoil defines integrated operations (IO) as "collaboration across disciplines, companies, and organizational and geographical boundaries, made possible by real-time data and new work processes, in order to reach safer and better decisions – faster." www.isa.org/intech/20080401 (retrieved December 2008)

2 A DriveMonitor™ touch panel screenshot. The events list displayed includes alarms, sensitive parameter change notifications and application-specific diagnostic messages.



3 By selecting the "Loggers" tab, all relevant signals sampled at a high frequency prior to and after the selected event will be displayed.



that a timely, safe and consistent response to service requests requires the proper organization of people, work processes and procedures.

ABB's Service Environment provides such a solution. It has been developed for the oil & gas industry to support the vision of IO 1. The technical foundation of this framework is the ICT infrastructure and procedures that provide:

- Data security and integration
- User authentication (physical access and log-on)
- Remote access to ABB and third-party systems in the customer plant
- Collaboration tools to connect the customer, ABB and third-party experts

All remote work carried out on customer systems is done from a dedicated work environment called ARMOR™ (ABB Remote Monitoring and Operations Room), the cornerstone of the ICT infrastructure. A remote job is initiated by a service request that can be:

- Manually initiated by the customer
- Initiated on a time scheduled basis
- Automatically initiated by an alarm generated in a condition-monitoring system from ABB or third-party vendors

The service desk, which is part of the ABB Service Environment, provides a single point of contact for all service requests. From here the requests are routed to the right expert team, which is then ready to mobilize within a specified time. The safety and quality of the work performed by each of the service teams is ensured by an integral set of Service Environment work procedures that comply with the HSE regulations used in the oil & gas industry. All changes made to the system under service are logged and retained by the Service Environment configuration management and change management systems.

ABB's Service Environment™ has been developed for the oil & gas industry to support the vision of integrated operations (IO).

Procedures and a code of conduct play a fundamental role in the daily operation of the Service Environment and ARMOR, in particular to ensure that remote operation in no way feels detached from the real plant. ARMOR is similar to an embassy in the sense that although hosted by ABB, the moment someone steps inside, the rules and regulations of the particular company and site apply.

Asset management applications for condition and performance monitoring, problem analysis and diagnosis can greatly improve the productivity of a company's local operation. Opening these applications up to remote access and collaboration, either by embedding them into the Service Environment or as standalone, further increases their value.

As a leader in power and automation, many of ABB's asset management tools have been developed based on experience from its core technology areas. One such example is DriveMonitor™, an intelligent monitoring and diagnostics system for medium-voltage drives that allows secure access to the drive from any location in the world.

### VSDs and DriveMonitor™

Variable-speed drive systems (VSDSs) are fast becoming the prime mover of choice in the oil & gas industry. When compared with gas turbines, their main benefits include increased availability, better energy efficiency and operational flexibility, as well as improved HSE. A VSDS can be designed to run continuously for up to five years without scheduled maintenance. While they are crucial to an operation, VSDSs in general require little attention. However, failing rotating machinery may cause substantial production losses, and can impact the environment because of flaring. Additionally, limited attention translates into limited experience and therefore few certified experts.

ABB's award-winning tool, DriveMonitor captures, stores and visualizes the comprehensive information available in a VSDS. It offers a structured work

flow for condition monitoring, fault analysis and rectification. The comprehensive information available in an ABB variable-speed drive (VSD) combined with the diagnostic capabilities of DriveMonitor and the competence of certified experts mean the time needed to make repairs is drastically reduced. In general competence is available but normally not on-site, and definitely not in the middle of the night! With DriveMonitor connected to a fleet of VSDSs – either stand-alone or as a component of the Service Environment – expert assistance can immediately be brought on-line from any location within the company or as part of a service agreement with ABB. As opposed to heavy rotating machinery, VSDS repair is normally fast and straightforward once the problem is identified.

**Factbox** Improvement methodology

The "TAIL – Integrated Operations" project began in January 2006. The assigned targets of the project included:

- Increasing daily production by at least 5 percent by reducing production losses caused by operational failure, maintenance stops, and inadequate equipment performance.
- Reducing operating, construction, and maintenance costs by 30 percent.
- Reducing the number of unwanted incidents relating to health, safety, and the environment by 50 percent.
- Extending the lifetime of Statoil's oil and gas fields.

Source: www.isa.org/intech/20080401 (Retrieved December 2008)

## DriveMonitor™, an award winning tool, provides the means to capture, store and visualize the comprehensive information available in a VSDS.

As part of the TAIL IO research and development cooperation with Statoil-Hydro **Factbox**, DriveMonitor has been installed on a compressor at the Kollsnes gas processing and pipeline compression plant. More specifically, it has been integrated into the Statoil-Hydro ICT infrastructure and tested for a set of remote access use cases. DriveMonitor, and the workflows it enables, captures the very idea of IO: it enables the efficient use of scarce resources irrespective of whether they are inside the company, or from technology or third-party vendors regardless of location. More specifically, it captures and organizes information that can be accessed from literally anywhere in a controlled and safe manner. Experts in remote locations can support and cooperate with site personnel.

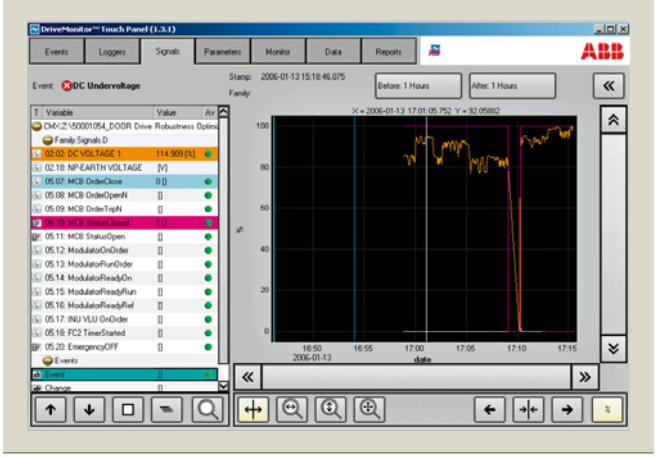
The following key requirements are fulfilled by DriveMonitor:

1) Tracking and storing the history of a VSDS as a basis for faster fault rectification; improved diagnostics, cooperation, and remote expert access and support; and collecting and storing alarms and events, operational data, as well as parameter and configuration changes.
2) Organization, cross-referencing and presentation of the information so that changes and problems can be identified and located.
3) Guidance and support for different levels of expertise: Site maintenance personnel; ABB local support personnel; and ABB Drives factory experts.

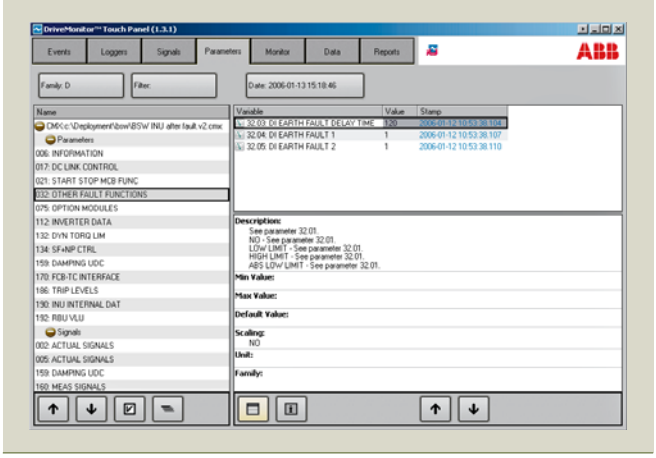
All events are stored together with the logs of measured values and other VSDS data that relate to a particular event. This data can then be retained for the entire life of the VSD. Access to the VSDS history is a valuable source of information for efficient analysis and fault diagnosis.

The user interface is organized to allow for easy navigation between the different views, which in turn provide structured support for condition monitoring, diagnostics and reporting. DriveMonitor comes with predefined settings and information that match different ABB VSD models. This ensures to-the-point expert advice concerning the different event types, sensible trigger criteria and the selection of data for retrieval, as well as the correct grouping and descriptions related to the drive parameters. In addition to the default settings, data capture and analysis can be freely customized with regard to trigger criteria and data selection. DriveMonitor can capture and store any information

4 The "Signals" tab will show a selection of relevant signals from the time a fault was reset.




5 The "Parameters" tab shows the relevant groups of parameters related to the selected event.



available in the VSD control system, discrete events and analog data. Furthermore, all VSD parameters can be viewed together with information detailing when a parameter was changed.

The tab highlighted in the screenshot in 2 displays an event list which includes drive faults and alarms, sensitive parameter change notifications and application-specific diagnostic messages. By selecting an alarm or fault in the list, the user is presented with a description of the problem, a list of possible causes and hints for rectifying the problem.

The information presented in the three consecutive tabs is filtered according to the selected event. The second tab (Loggers) will display relevant signals sampled at a high frequency prior to and after the selected event 3. The Signals tab will show a selection of relevant signals from the time a fault was reset 4. This can be used to verify that fault rectification has had the desired effect.

The fourth tab (Parameters) shows the relevant groups of parameters that may relate to the selected event 5. Each parameter has a time tag showing when it received its current value. The tab view Monitor allows for the ad-hoc capture and storage of data. The user can freely select from all the available signals in the VSD control system.

### Access to DriveMonitor

The VSD is a critical component and must be protected against malicious and mistaken access. DriveMonitor controls access to the information provided by the VSD control system. Those granted remote access will only be able to view the available data. If remote personnel want to change VSD parameters or modify the DriveMonitor configuration, access rights for one specific session must be explicitly obtained from authorized personnel within the customer safe access zone.

Individual oil and gas companies have typically deployed different architectures and tools for collaboration. Consequently, ABB makes its tools with added flexibility, thus enabling them to interface with the most common solutions. DriveMonitor has been field tested with different customers who also work with other collaboration tools such as Citrix, Microsoft LiveMeeting, VNC and IBM Lotus Sametime.

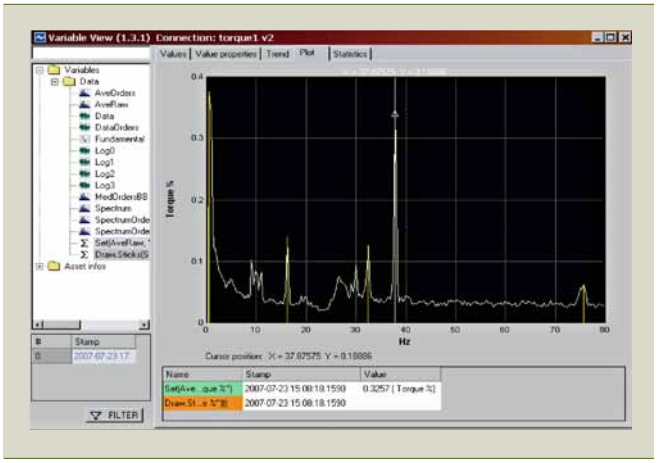
ABB's Service Environment™ and DriveMonitor™ allow problems to be solved faster and with fewer resources.

### VSD as an instrument

In addition to providing monitoring and diagnostic capability tailored to the vital VSD, DriveMonitor also includes a general set of advanced mathematical and statistical tools 6. When used in combination with the valuable and detailed information supplied by the VSD, condition and performance monitoring of the motor, the equipment and even the process can be carried out without having to introduce additional instrumentation. This means an ABB VSD control system will have instant access to fast sampled data. Furthermore the drive's accurate dynamic model of the motor will provide additional calculated data such as motor torque.

DriveMonitor has the flexibility to read data from sources other than a VSD – such as a process control system – thereby allowing more comprehensive analysis of interactions between different subsystems, ie, the VSDS and the process.

6 DriveMonitor™ also includes a general set of advanced mathematical and statistical tools.




### Better access to service drives productivity

ABB's Service Environment and DriveMonitor help bring the problem to the expert rather than the expert to the problem. In doing so, problems can be solved faster and with fewer resources. In some situations they can even be avoided altogether! This lowers the overall cost of engaging an expert. Thirty minutes of collaborative expert assistance or quality assurance of a job rarely performed by site personnel can prevent errors. This type of approach will not only engage site personnel, but it will also increase their competence under the guidance of qualified experts. Similarly, a number of other services can be delivered on a continuous and proactive basis, ie, control loop performance and equipment condition can be monitored on a regular basis with limited effort.

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