

The ladder to success

Risk-based inspection reduces costs

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With today's rapid communications technologies and a highly interconnected world economy, changes in one part of the world rapidly disseminate to another. Whether in times of fast economic growth or times of economic slowdown, companies able to make swift smart decisions that allow them to adapt to an ever-changing environment will succeed where others fail.

To make sound decisions that allow a company to capitalize on a rapidly growing economy or to weather a storm requires expertise, which may not always be available in-house.

ABB offers a consultancy service with expertise in the areas of maintenance and reliability, process safety, and industrial energy efficiency. ABB's consultants have a wide range of experience and a good track record, assisting industries with critically important decisions for their profitability and survival.



Consultants are frequently employed by companies seeking professional advice from experts with high levels of skill, experience and understanding in areas outside the scope of their normal daily business. For example, consultants may be employed to identify the optimal strategy by which a company could survive an economic downturn, or how a company should best renew its plant's equipment to maximize productivity, or identify what a company is required to do to comply with new regulations. Few companies can justify maintaining such specialized skills in-house, especially when the expertise is drawn upon relatively infrequently.

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The aim of ABB's consultancy service is to help clients to navigate through difficult decision-making processes and to increase their productivity, operational excellence and safety in a sustainable manner. ABB provides expertise in the key service areas of energy efficiency, process safety, reliability and maintenance. While all clients have their own specific aims, the main goal of the exercise is to achieve maximum performance from plant and equipment, at minimal cost.

An integral part of any ABB consultancy project is knowledge transfer. By creating a mixed team of consultants and internal resources from the client's organization, ABB can work more effectively. By liaising directly with the people who work in the plant with a full understanding of what they hope to achieve, ABB can make a more time-efficient assessment of what needs to be done. The consultants can also gain a better understanding of the client's industry, allowing them to provide long-term solutions rather than quick fixes.

Equally, when the decisions have been made and it comes to applying new practices and processes, the ABB consultants are able to transfer expertise to the client's work force more efficiently by working in a mixed team and developing solutions together.

An additional advantage of such mixed teams is that, by providing some of the manpower needed to carry out surveys and assessments, a client is able to reduce the cost of the exercise.

Experience shows that simply installing the best products and superior systems is no guarantee for success. Each component and process must be finely tuned to achieve optimal productivity, reliability and cost effectiveness.

To achieve optimal performance, specialized knowledge is required not only of ABB's products and systems but also of equipment produced by other manufacturers, and of the applications in question. ABB has extensive knowledge of products and systems, as well as their applications in a range of industries – a significant advantage over smaller, stand-alone consultancies.

ABB can provide additional training for plant operators and maintenance staff, which can be a critical factor not just when new equipment has been installed, but also when improvements are to be made by implementing new processes or improved maintenance regimes.

During times of growth and ample liquidity, senior managers tend to focus on markets, revenues and the development of new products. Often, staff training, particularly in equipment maintenance, can be overlooked.

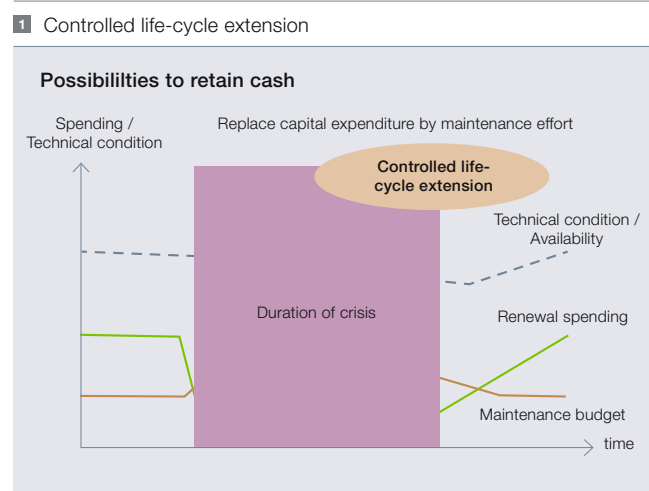
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When faced with an economic downturn, however, management's focus quickly shifts to the issue of curbing expenditure, wherever possible. Planned investments in new equipment are often the first victims of such cuts. This is understandable, since capital expenditure in one area could necessitate more drastic cuts elsewhere. However, simply blocking capital expenditure is not the answer. Such a blanket approach could lead to the breakdown of key equipment, leading to significant losses in productivity and expensive repairs, unless the potential risk of using aging equipment is countered by targeted and adequate measures in maintenance and diagnostics.

The most effective approach to optimizing productivity while minimizing cost is to simultaneously monitor levels of expenditure on new equipment, the cost of maintenance and the resulting performance, in terms of productivity.

If investments in new equipment are deemed inappropriate, adjustments may be needed in maintenance schedules and equipment-monitoring processes to avoid equipment breakdowns.

This approach of improving maintenance processes to extend the useful life of equipment is known as controlled life-cycle extension **1**.



Maintenance for productivity

When capital expenditure is no longer an option, it falls to maintenance managers to implement the measures that will avoid breakdowns and safeguard productivity. Depending on the industry, special simulation, diagnostic and monitoring techniques are required, and a plant can stand or fall by the actions of its maintenance team.

ABB can provide inspection services, safety assessments, and reliability and integrity management.

ABB has extensive experience in maintenance optimization and strategic planning in a range of industries. ABB can provide inspection services, safety assessments, and reliability and integrity management¹⁾. Such assessments can help determine the remaining lifespan of equipment and its future maintenance requirements, and can predict the point at which replacement becomes a necessity. In addition to providing its own engineers to perform these services, ABB is also able to help customers formulate their own controlled life-cycle extension schemes.

Risk-based inspection for BP

Over the last 25 years, ABB has been working on a risk-based inspection process known as RBI+[®] **2**. The pro-

cess is designed to identify critically important equipment and establish an appropriate inspection regime. The regime takes into account the risks associated with equipment failure and the impact that failure would have on the health and safety of personnel, the environment and business operations.

ABB's RBI+[®] methodology follows American Petroleum Industry recommended practices for risk-based inspection (RBI).

The approach can be applied to all types of equipment, including pressure systems, vessels, piping, pressure-relief systems, civil engineering structures and rotating machinery. The procedure identifies an optimum inspection plan based on risk analysis.

A long-term client of ABB, BP Exploration and Production operates a number of on-shore gas terminals in the United Kingdom, including one at Dimlington, in the northeast of England.

The terminal is 20 years old and processes natural gas from the North Sea, prior to feeding it into the UK's national gas transmission system. The Dimlington terminal plays a significant role in providing natural gas to the UK market.

In late 2007, ABB was contracted to carry out a risk-based inspection

review of all vessels and piping at the terminal, prioritizing equipment scheduled for inspection during the next planned shutdown period in the following summer.

The project involved personnel from both BP and ABB, with a wide range of competencies. It was based on ABB's RBI+[®] methodology, which determines the probability and consequences of equipment failure, in combination with BP's own corporate RBI procedure.

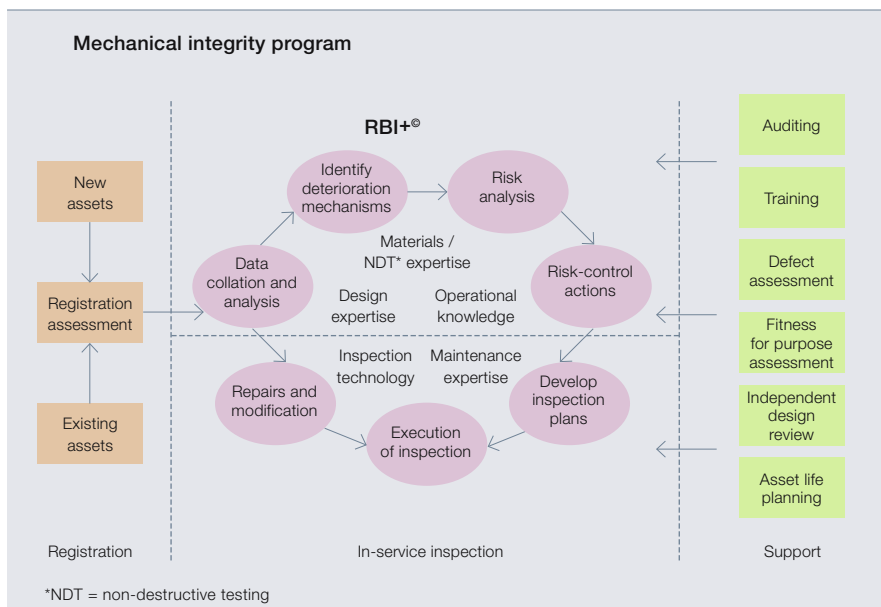
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To date, over 70 pieces of equipment have been reviewed, including numerous pressure vessels and several piping systems. As a result of the RBI review, it was determined that 40 pressure vessels no longer require internal inspection, but can instead be examined using non-invasive techniques. Furthermore, it was found that the period between vessel inspections could be extended from seven to 10 years.

Based on these changes, BP conservatively estimates that it reduced its overall expenditure for 2008 by \$770,000, including preparation costs to facilitate inspection (eg, scaffolding, cranes, cleaning equipment, fitting resource, stand-by men), and the inspection itself, representing a saving of 33 percent.

The change to non-invasive inspection for some items provides a number of significant benefits. Personnel are no longer required to enter the confined space inside a pressure vessel, and the environmental risks associated with cleaning effluent are also reduced. An additional advantage of the non-invasive inspection regime is that the plant can operate for longer as there are fewer inspections that need

2 Risk-based inspection process—RBI+[®]



Footnote

¹⁾ Integrity Management is the process used to ensure equipment is fit for purpose. Reliability ensures that equipment is available when needed.



to be carried out with the plant shut down. In addition, online inspections can be carried out to enable any necessary remedial work to be scheduled for the next appropriate shutdown period, thereby avoiding costly unexpected breakdowns.

ABB's consultancy service operates with some 600 staff based in the United Kingdom, United States, Canada, Mexico and Germany, executing projects in many of the major ABB markets.

In summary, the use of risk-based inspection methodology, built on the combined knowledge and expertise of specialists from BP and ABB, has realized a number of benefits. In particular, reducing the cost and duration of shutdown periods required to ensure the structural integrity of pressure system assets at the Dimlington gas terminal.

A similar approach is currently being used to determine inspection regimes for existing installations at BP's land-based gas terminals at the United

Kingdom's central area transmission system (CATS), Seal Sands in the northeast of the country, and at the Sullom Voe terminal in the Shetland Islands. The RBI+[®] methodology will also be used to define inspection schedules for new plant equipment at both Sullom Voe and Dimlington.

Strengthening customer relations

By working with customers through service and maintenance contracts, ABB can help companies to weather the storm of an economic downturn by offering an alternative to capital investment in new equipment. Working in such close collaboration enables ABB to provide the solution that best fits the company's needs.

In some cases, a plant will ask ABB to take over entire maintenance services, in a Full Service contract. This relieves managers of critical responsibilities and allows them to concentrate on the core functions of their businesses. Full Service contracts often provide the best option for clients, both in terms of cost and in continuity of service. Using different firms to monitor different parts of a processing plant runs the risk that some pieces of equipment will be forgotten or treated in isolation when they form an integral part of a larger process.

ABB maintains a constant dialogue with its service clients, even if they undertake projects only once every few years. This allows changing needs to be assessed and schedules to be rearranged as needed.

ABB's consultancy service operates with some 600 staff based in the United Kingdom, United States, Canada, Mexico and Germany, executing projects in many of the major ABB markets. The main areas of expertise are maintenance and reliability, industrial energy efficiency and functional safety. ABB's consultancy service serves all process industries not only with respect to systems and equipment originating within ABB, but also with respect to the optimization of the design, configuration, operation and upkeep of just about all technical facilities and systems regardless of their origin.

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