From the Reliability Professionals
at Allied Reliability

WHAT EVERY SENIOR MANAGER MUST KNOW ABOUT RELIABILITY

10 Powerful Lessons You Should Learn from One of the Most Expensive Mistakes in Recent History

A Special Report for Corporate Executives and Senior Managers

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10 Powerful Lessons from One of the Most Expensive Mistakes in Recent History

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What's the first thing you think of when you hear the word "maintenance"?

Trouble? Bad news? A necessary evil?

Or just plain boring?

Then August 7, 2006 should be your wake-up call.

That's when oil giant BP admitted a tiny quarter-inch hole was part of a widespread corrosion problem affecting 16 miles of a 22-mile pipeline from Prudhoe Bay.

As a result, BP was forced to shutdown up to 400,000 barrels a day of production from the largest oil field in the United States.

The costs are staggering. However, BP's battles with corrosion in its 29-year-old Alaskan oil pipeline are a reflection of a much bigger concern for many big corporations:

- Aging assets and years of poor maintenance are now taking their toll on profits.

So that's why we published this special report. Here are 10 important lessons you can learn from BP's experience – surely one of the most expensive mistakes in recent history.

The Tiny Hole That Shook an Oil Giant

On March 2, 2006, a BP operator discovered a leak and quarter-inch hole in a pipe delivering oil to the trans-Alaska pipeline. Ultimately, that discovery led to the massive shutdown in August.

BP's decision affected a whopping 8 per cent of the US's total domestic oil supply. In a market with tight oil supplies and near-record prices, BP's shutdown could not have come at a worse time.

For starters, **revenue losses** for BP and its partners, Exxon Mobil and Conoco, reached an astounding **$28 million per day** – or over $1 million *per hour*.

And that could be the tip of the iceberg. The long-term impact of lost customers and lost business is still uncertain.

Here's the point. Most senior managers view maintenance simply as a cost. The truth is, **maintenance has a tremendous impact on the top line** of "asset-dependent" companies – like oil and chemical companies, pharmaceuticals, metals, electric utilities, etc.

Every minute your equipment is shut down for unplanned maintenance means lost product – and lost sales.

Lesson 1: Reliability has a huge impact on revenues. "Small" problems can make big money disappear from your top line.

The Cost Side of the Equation

By all accounts, BP's repair costs will be huge. At this writing, the company is expected to spend around **$100 million** to replace the 16 miles of pipe.

That includes $30 million for new pipe, partly because BP is known as "a distressed buyer" in the steel market. And the costs for skilled workers like welders will come at a premium, since the labor market was already tight.

Plus, BP announced the hiring of three outside experts to come in and recommend improvements for its corrosion program.

Once again, these are just the direct costs for labor and materials. Fines, liabilities and legal costs are still adding up.

Now this may seem like a drop in the bucket for a company the size of BP. After all, BP reported profits for the second quarter of 2006 soared to $7.27 billion.

But **earnings will surely take a hit** from the huge costs of the temporary shutdown. And you can bet this money was not in the budget.

Lesson 2: Reliability impacts <u>both sides</u> of the income statement: sales and cost of goods sold. That's why Reliability causes enormous swings in profits.

The High Cost of Low Maintenance

BP budgeted some $71 million for battling corrosion in its Alaskan pipelines in 2006. That's 15 percent more than 2005 and 80 percent over 2001. And that doesn't include money for replacement and repairs.

Was it enough? Apparently not. After the shutdown, BP admitted **inadequate pipeline maintenance procedures** and "a gap" in their corrosion program.

"We based our corrosion program in cooperation with agencies --- what we thought was an adequate program. Clearly it is not," said Bob Malone, president of BP America.

"Our program was insufficient and will be rectified going forward," Steve Marshall, president of BP Alaska said during an August news conference.

Let's do the math. In essence, **BP was spending $71 million to protect an asset that delivers about $10 billion in annual revenues.**

Now even if you don't know anything about maintenance and reliability, doesn't that sound a little risky?

Shortchanging maintenance is like playing Russian roulette. **Pay now or pay later.**

Lesson 3: Reliability is a long-term investment strategy. It is not the place for turning a quick buck.

The Hidden Costs of Maintenance and Reliability

The fallout from BP's shutdown continues, now that the **blame game has begun.** Here are just a few examples of the nasty criticism and finger-pointing aimed at BP:

- Whistleblowers inside BP accused the company of skirting maintenance issues for years, while BP says it acted responsibly.
- Internal audits pointed to problems with an understaffed maintenance and reliability team, along with management that was "fairly new" to the job.
- Heads are starting to roll as one key manager was "put on leave."
- BP's top executives faced angry grilling from US lawmakers in Washington as the company got blasted for its pipeline maintenance lapses.
- The company was forced to respond to accusations that it engineered the shutdown to manipulate oil prices. "Nothing could be further from the truth," said BP executive Malone.
- Joe Barton, a Texas Republican who chairs the House of Representatives' energy and commerce committee, said:
- "If … one of the world's most successful oil companies can't do simple, basic maintenance needed to keep the Prudhoe Bay field operating safely … maybe it shouldn't operate the pipeline."
- Competitors started taking advantage, chuckling that BP stands for "Big Problems".

All this finger-pointing adds up to one big corporate black eye for BP.

Lesson 4: The hidden costs of poor reliability far outweigh the direct costs of replacement and repairs.

The Most Expensive Word in Maintenance

The following is an excerpt from BP's press release on August 7, 2006 announcing the shutdown of Prudhoe Bay:

"BP … has begun an orderly and phased shutdown of the Prudhoe Bay oil field following the discovery of unexpectedly severe corrosion …"

What's the key word here? **"Unexpectedly".**

In maintenance, **"unexpected" means "emergency**". And **emergency maintenance is absolutely the most expensive form of maintenance** possible.

Why?

Emergency maintenance means immediate shutdowns. Phone calls in the middle of the night. Troubleshooting on the fly. Expediting spare parts. Rush jobs. Working around the clock until the repairs are made.

In essence, emergency maintenance equals pure chaos. Does that sound like a cost-effective way to do maintenance to you?

Lesson 5: The most expensive word in maintenance is "unexpected." That's what happens when you don't do maintenance right.

The Second Most Expensive Word in Maintenance

According to published reports, a BP operator first discovered the leak that ultimately led to the shutdown.

The big problem here is the word "operator". Because **when operators are the first ones to notice equipment problems, it's usually too late.**

That's equivalent to waiting for cardiac arrest as the first sign of a heart problem.

Listen, modern maintenance **is not a repair function** any more. The image of the Maytag repairman sitting around playing cards, waiting for the phone to ring is long gone.

If your maintenance people are waiting for calls from operators, you're skating on thin ice. Yet that's exactly what's happening at the majority of manufacturing plants in North America right now.

There's still way too much maintenance that is emergency maintenance. As a result, **many plants are one small failure away from a major disruption in business.**

Lesson 6: Reliability should not be triggered by an "event." The objective is to create a "non-event."

Time is Money

Despite what you may have heard, the basic maintenance process is really simple:

1. Detect problems
2. Plan and schedule the repairs
3. Make the repairs

And the secret to good maintenance is in the first step: Detecting problems early. Why? Because **there is a direct correlation between early detection and maintenance costs.**

Simply put, **the earlier you can detect problems, the faster, cheaper and easier it is to make repairs.**

You've seen the damage at BP – the costs of emergency repairs can be astronomic. There is a huge difference between emergency maintenance and planned, proactive maintenance:

Emergency Maintenance means:	**Proactive Maintenance means:**
Late detection by operators	Early detection by skilled maintenance technicians using advanced monitoring technologies
Waiting for things to happen	Thinking about things before they happen. Identifying problems that are still small and easy to fix
Immediate shutdowns and indefinite downtime	Planned, scheduled shutdowns to keep downtime to a minimum
Expediting spare parts – regardless of costs	Planning and ordering spare parts in advance
Working overtime, 24/7 until repairs are made	Having everything prepared for – scheduling maintenance crews to do the job right the first time
High costs	Low costs
High stress	Low stress
High safety risk	Low safety risk
Blame, finger-pointing, frustration, distrust, pessimism, waste	Confidence, pride, job security, teamwork, optimism, rewarding

Lesson 7: In maintenance, <u>time is money</u>. Late detection means costly corrections.

The Truth About Equipment Breakdowns

That quarter-inch hole didn't suddenly appear in BP's pipeline overnight. Like most failures, it developed over a period of weeks, months or years.

Fact is, **problems start small and get worse with time. What's important to realize is that the equipment will send off early warning signals** along the way.

These early warning signs might be slight changes in physical dimensions -- like pipe thickness at BP. Or they could be minor changes in temperature, vibration or sound.

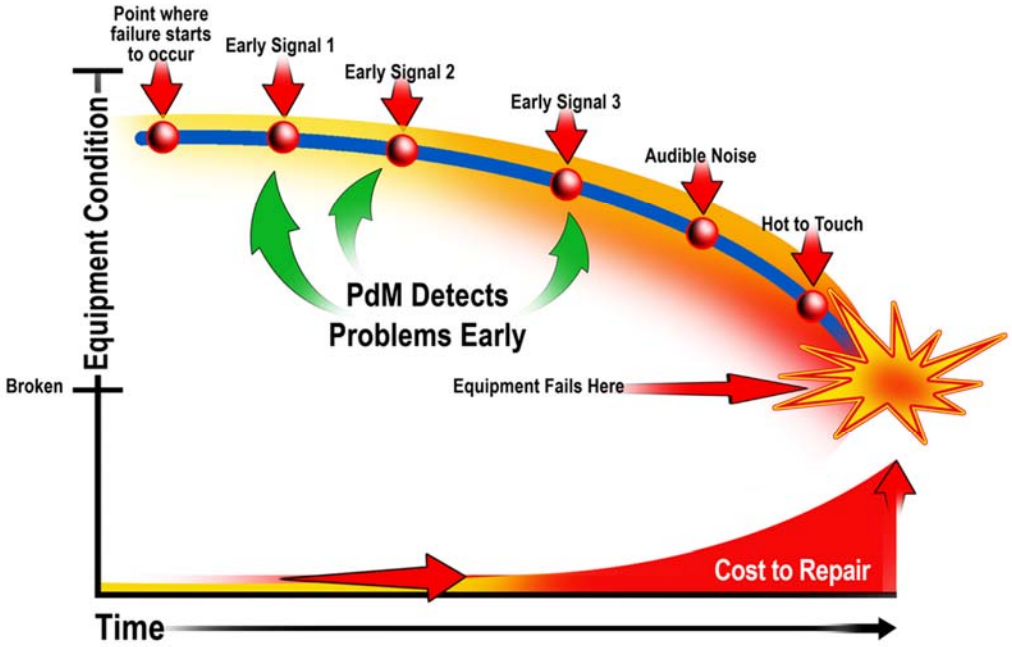
Not all of these changes can be detected by human senses -- but they can be picked up with special equipment designed for that purpose.

And **that's what the whole field of condition monitoring and predictive maintenance** is all about.

With advanced technologies in vibration analysis, infrared, ultrasound, oil analysis, motor current analysis and nondestructive testing -- trained technicians can routinely monitor and inspect equipment, and **detect these early warning signals.**

The difference between the time a PdM specialist detects problems and when an operator sees them are huge. Remember, detection time equals money – big money.

The following graph, on the next page, illustrates how repair costs increase according to the time a problem is detected:



Even though PdM has been around for over 40 years, it is still "new" to some organizations.

That leads to late detections, emergency maintenance, and all the painful costs that come with it.

Lesson 8: Predictive maintenance should be an integral part of your reliability strategy – and account for at least 50% of your maintenance work.

The Disconnect Between Management and Maintenance

Despite the enormous impact on the bottom line, you won't find maintenance and reliability taught in many schools. Zero business schools, in fact.

So, **most senior managers really don't know what's going on in maintenance.** What's worse, they don't even know the right questions to ask.

What they do know is that maintenance is usually the single largest controllable expense in a plant. And if the equipment appears to be running "just fine", **they see maintenance as an easy way to cut budgets and save money.**

Trouble is, they don't realize what the **long-term impact** is going to be. And they usually get away with it – for awhile. Because **it takes about 18 months before shortchanging maintenance takes its toll.**

Then again, those who **do** understand reliability aren't running the companies. So they **struggle to get the support** they need for staffing, equipment and training.

For example, a key reliability management position went unfilled at BP for almost a year before the disastrous shutdown. What does that tell you?

The truth is, most maintenance people are hard workers who care about doing good work. But they don't always have the leadership and support they need to be successful.

The bottom line is that **everyone is responsible for reliability,** just like everyone is responsible for safety.

Lesson 9: Reliability must have support from the top. It is an investment to be optimized, not a cost to be minimized.

How Reliability Creates Wealth and Competitive Advantage

Now for the good news.

Done right, reliability can produce eye-popping gains on income statements and balance sheets. Consider the following:

A major pharmaceutical company slashed maintenance costs by $33 million and increased production rates – **at just one plant.**

A steel maker went from the verge of bankruptcy to the **most profitable steel maker in the world** – cutting inventories by $40 million and maintenance costs by 50%, while production shot up 17% and product quality went up 20%.

A chemical company cut maintenance spending by 22% and **added 15 million dollars to its bottom line** in just two years.

A food processing plant doubled production and achieved a **$45 million swing in P&L** in three years.

How did they do it? By understanding these ten basic truths about reliability.

Reliability …

1. Has a huge impact on sales.
2. Has a huge impact on the cost of sales and therefore drives big profit swings.
3. Is a long-term investment strategy.
4. Contains hidden costs not seen on your income statement.
5. Should not be a reactive, emergency-driven strategy.
6. Should not be triggered by a catastrophic “event”. The objective is to create a non-event.
7. Costs are directly related to early detection of equipment problems. Sooner is always better than later.
8. Relies heavily on predictive maintenance for early detection. Most companies aren’t doing enough PdM.
9. Must have support from the top, yet few senior managers are educated in the basic principles.

And that's what we've attempted to do in this report – get you thinking differently about your business than you have before.

Hopefully, by now you understand how reliability impacts your company as an **employer, business partner** and community **citizen.** You've seen how it influences **revenues, costs, profits** and **share price.**

And finally, that brings us to …

Lesson 10: Reliability is one of the last frontiers for real breakthroughs in wealth and competitive advantage.

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About Allied Reliability

Allied Reliability helps companies build wealth and competitive advantage through world-class predictive maintenance and reliability across a global manufacturing network.

Founded in 1997, Allied Reliability has quickly become the largest engineering firm specializing in predictive maintenance and reliability engineering.

Today, Allied Reliability serves some of the biggest names in manufacturing, including more than 200 plants and facilities in the U.S., Canada, Europe and Latin America.

FREE Reliability Consultation

Every year the gap between the companies who are taking advantage of reliability and the ones who aren't gets wider.

That's why you can't afford not to make significant reliability improvements in 2007. Those who prepare now will reap big dividends in the future … while others will struggle to survive.

There are very few shortcuts. However, one is to make sure you get the right help.

Now you can get answers to your most important questions about reliability with a free, 55-minute reliability phone consultation.

There's no hassle, no cost and no obligations.

Any information you provide is confidential and will not be shared outside of our firm.

To take advantage of this special offer, ask for Jeff:

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