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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What's the first thing that comes to mind when someone mentions the word "maintenance"?

Trouble? Bad news? A necessary evil?

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 – one of the costliest maintenance 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.

Now for 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 both sides of the income statement: sales and cost of goods sold. That's why it can cause enormous swings in profits.

The High Cost of Low Maintenance

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

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 some $10 billion in annual revenues.

Now even if you know nothing about maintenance and reliability, doesn't that sound a little risky?

The point is, shortchanging maintenance is like playing Russian roulette. Pay now or pay later.

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

The Hidden Costs of Maintenance and Reliability

The fallout from BP's shutdown continues, because now the blame game has begun. 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.

Lesson 4: Poor reliability has hidden costs that far outweigh the costs of replacement and repairs.

The Most Expensive Word in Maintenance

Taken from the BP press release 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 …"

The key word here? "Unexpectedly".

Because 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, 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, it was a BP operator who first discovered the leak which ultimately led to the shutdown.

Now the big problem here is the word operator. Because when operators discover the first signs of equipment problems, it's usually too late.

That's like waiting for cardiac arrest as the first sign of heart problems.

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 what's happening at the majority of plants right now.

Too much maintenance is emergency maintenance. And 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 non-events.

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

The secret to good maintenance is in the first step: Detection. Why? Because there is a direct correlation between detection time 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. Understand, there is a huge difference between emergency maintenance and planned, proactive maintenance.

For example:

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, time is money. Late detection means costly corrections.

The Truth About Equipment Breakdowns

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

Fact is, equipment problems start small and get worse with time, giving off warning signals along the way.

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

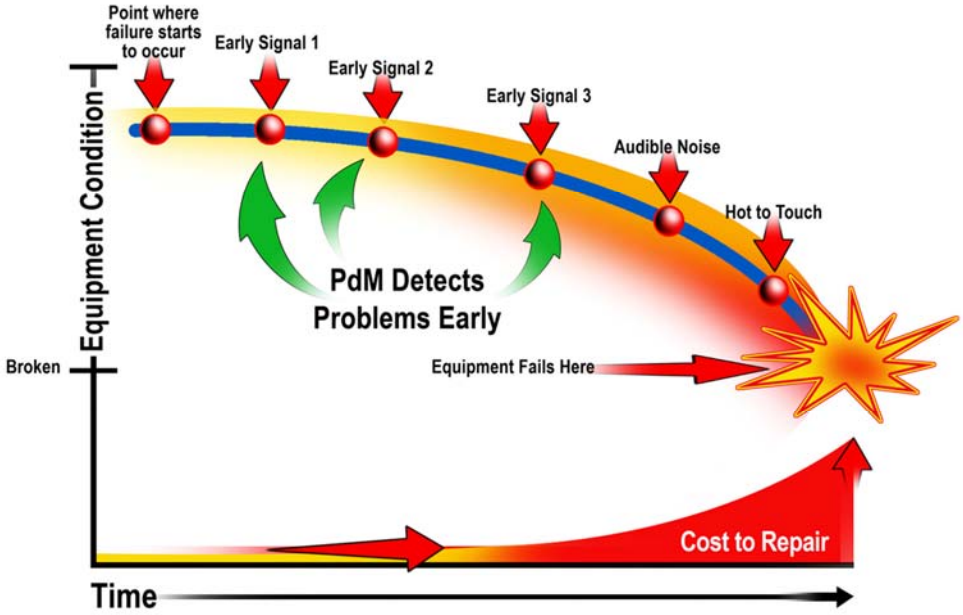
Not all of these changes can be detected by human senses -- but they can be picked up with special equipment designed for that purpose.

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 notices them are huge. Remember, detection time equals money – big money.

The following graph illustrates early detection of problems:



The reality is, most asset-dependent companies are simply not doing enough predictive maintenance. Even though PdM has been around for over 40 years, it is still "new" to some organizations.

That leads to late detections, reactive 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 of maintenance and reliability on the bottom line, you won't find it 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 about maintenance is that it's usually the single largest controllable expense in a plant. And since 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.

On the other hand, the people who do understand the importance of maintenance and reliability aren't running the companies. So they struggle to get management's support for staffing, equipment and training they need.

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

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

Bottom line is, 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 the good news.

Done right, proactive maintenance 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, maintenance costs by 50%, production went up 17% and product quality went up 20%.

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

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

How did they do it? By understanding these simple, basic truths about maintenance and reliability.

A quick recap:

1. Maintenance and reliability has a huge impact on sales.
2. It has a big impact on the cost of sales and therefore drives big profit swings.
3. It is a long-term investment strategy.
4. It contains hidden costs not seen on your income statement.
5. It should not be a reactive, emergency-driven strategy. That is the most expensive – yet most common – form of maintenance.
6. It should not be triggered by a catastrophic "event". The objective is to create a non-event.
7. Costs are directly related to detection time: Sooner is always better than later.
8. Predictive maintenance is the key to early detection. Most companies simply aren't doing enough PdM.
9. Maintenance and reliability must have support from the top, yet few senior managers are educated in the principles.

So that's what we've attempted to do in this report – to 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, Inc.

Allied Reliability helps manufacturers improve their return on asset reliability through predictive, preventive maintenance and reliability engineering services.

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