DAY 1 Details of Enterprise Asset Management Systems Training Power Point (128 slides)

Enterprise Asset Management
(Plant Wellness)

Welcome to ***Concepts*** – Section 1

The important concepts to apply in Enterprise Asset Life Cycle Risk Management.

Presented by Mike Sondalini

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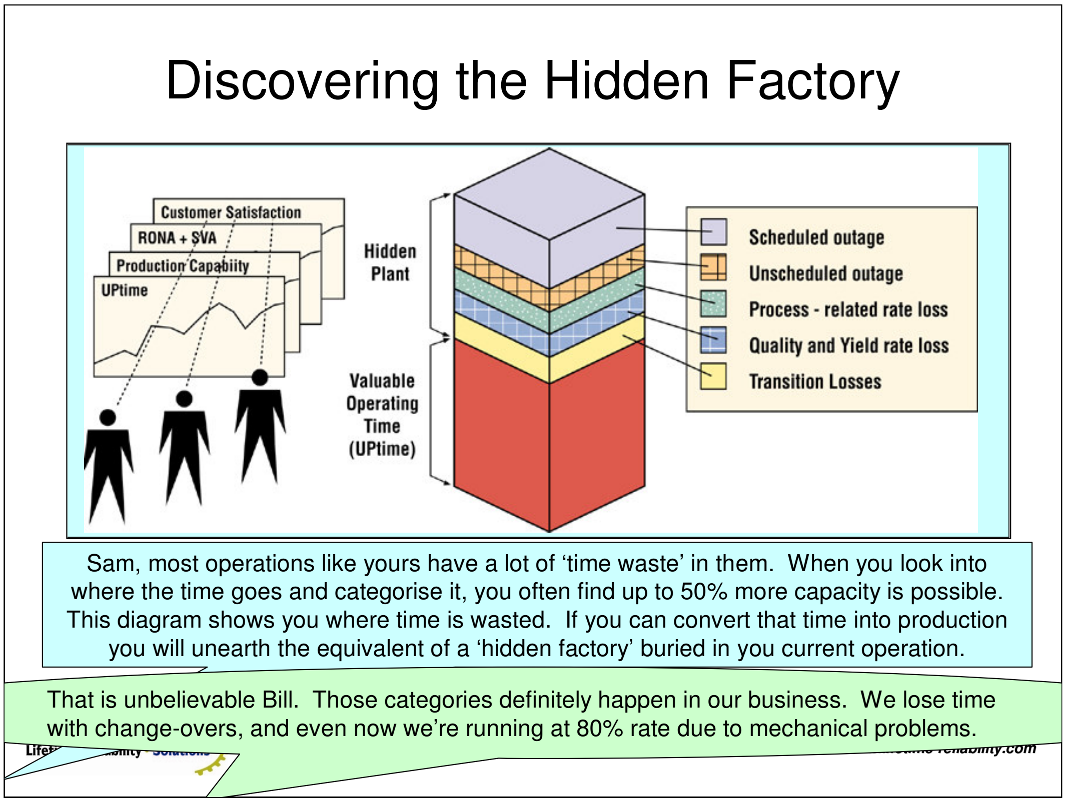
Hello and welcome to this visual presentation from *Lifetime Reliability Solutions* on how to do successful Asset Life Cycle Risk Management. Not only are there plenty of slides, there is also plenty of descriptive text in the Slide Notes.

I hope that you enjoy what you see and in particular get great value from it.

Asset Management considers the total life cycle of equipment in order to develop plans and actions that will deliver high reliability and performance that translates into achieving high availability, continual quality production and sustained profitability from your operation.

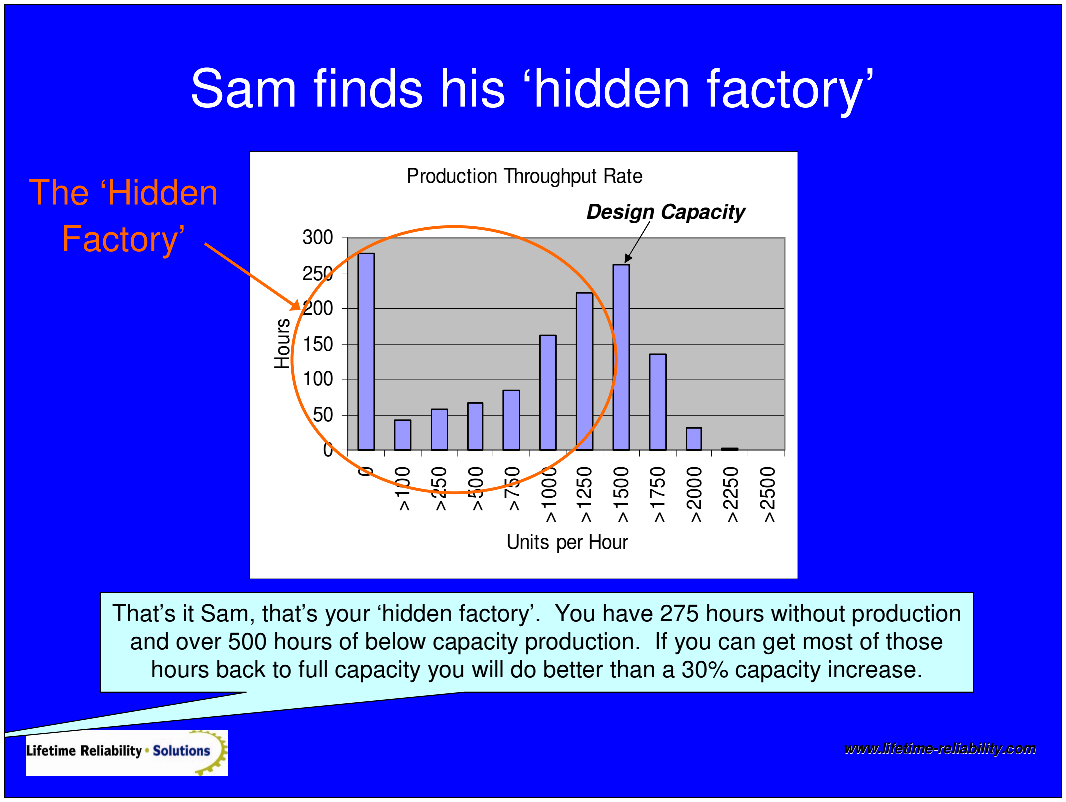
The course covers the complete requirements for establishing a successful asset management program in an industrial operation. There are new ideas and methods presented in this course not available anywhere else. These new insights lead you to the secrets that make for a powerful and successful asset life cycle risk management program.



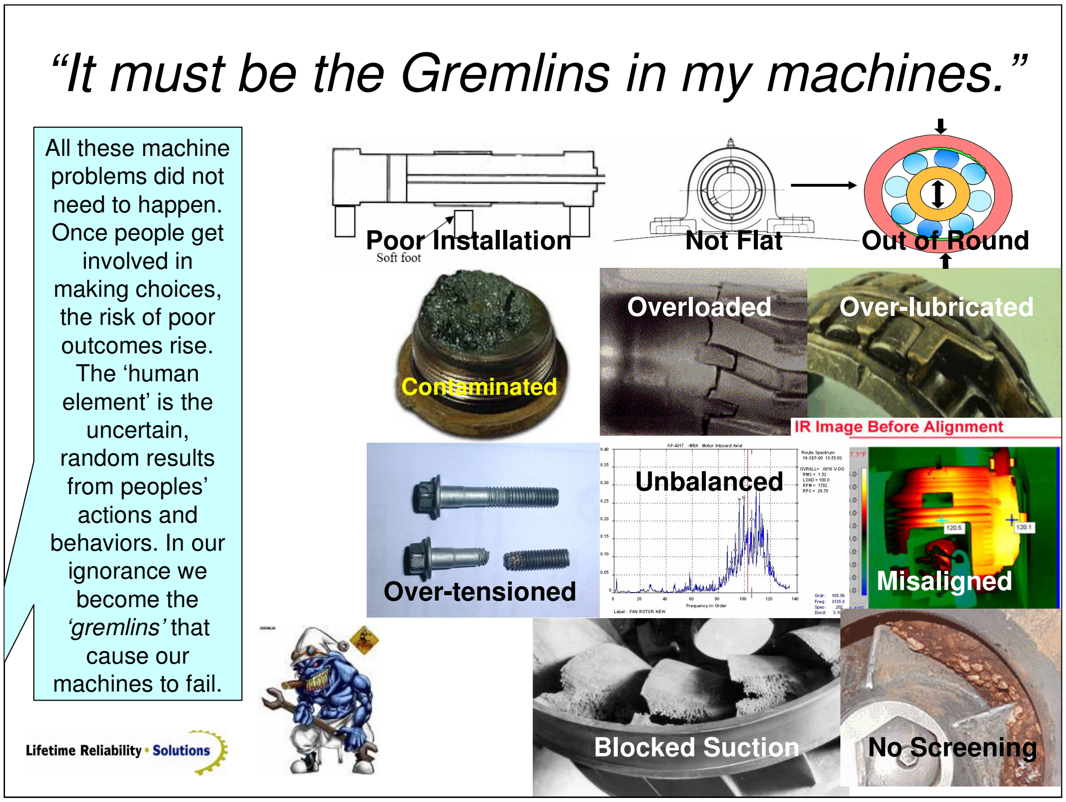
Plant capacity can be increased by putting the 'hidden factory' to work. The 'hidden factory' is all the production capacity lost due to the unnecessary waste of operating time and production rate. It can total to more than half of the plant and equipment capacity in those organisations that are not aware of their time and production wastes.

To find the size of the 'hidden factory' it is necessary to measure actual performance against the maximum rated potential of the operation. The difference between the two - maximum possible and actual achievement – is the size of the 'hidden factory'.

As the plant uptime is increased more production is made in the same time for the same cost. This drives the unit cost down, the return on assets goes up, the profit also goes up, and because customers get their orders sooner, their satisfaction also rises.



This slide shows a graph of how the 'hidden factory' can be spotted. All the lost production and the below-full-capacity production represents the 'hidden factory'.



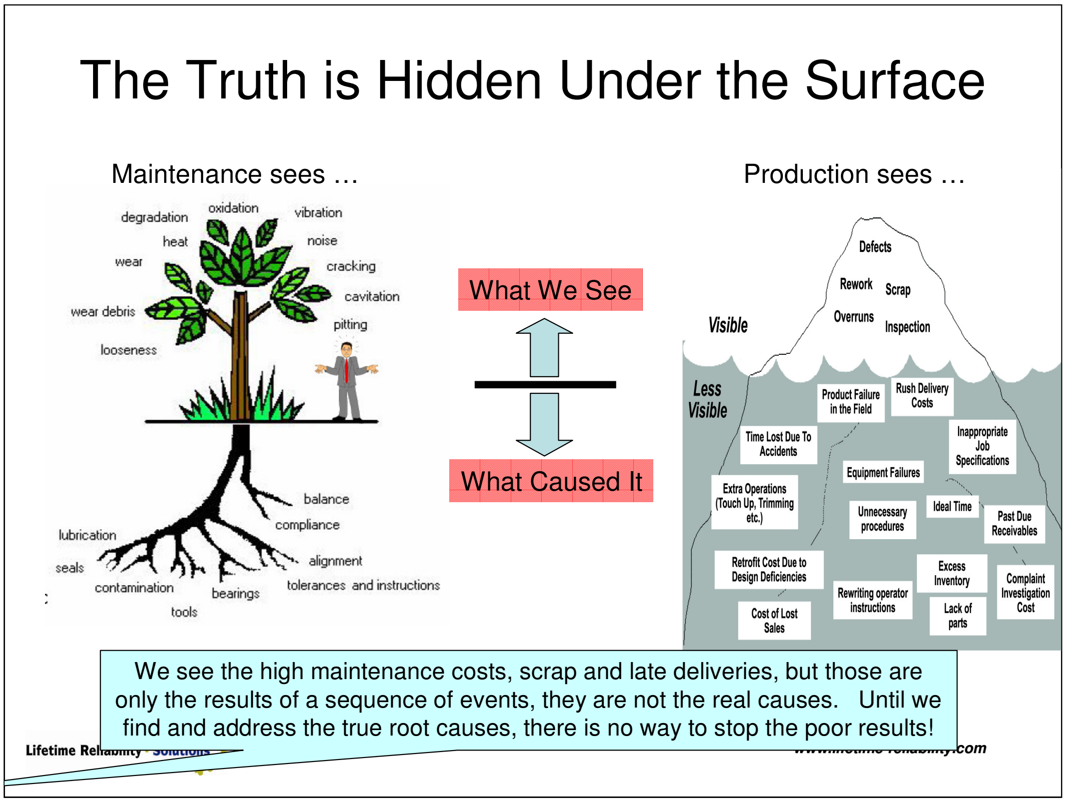
During World War II British airmen referred to ongoing trouble with their aircraft, in spite of mechanics' best efforts, as 'gremlins at work'. A gremlin is an imaginary creature that lives inside machinery and equipment causing trouble in devices and systems of all kinds. The gremlins are us.

Unless we are saboteurs none of us intentionally cause problems. Yet why do problems happen so regularly and, in far too many cases, so disastrously? The 'human element' is now recognised as the single most uncontrolled cause of failure. People cause most problems. The 'human element' is the uncertain, random nature of outcomes from peoples' actions and behaviors. Our technology has advanced the quality and properties of materials, equipment and machines to the point that they are highly unlikely to fail by themselves. It is people that cannot be controlled, it is people who take on tasks they are incapable of doing well or who are incompetent in their jobs. When things go wrong it's most likely the 'human element' at work; we gremlins.

It has long entranced me as to what can be done to address the 'human element' in causes of failure; how can luck and chance, ignorance and incompetence, be turned into certainty of quality results. I believe the answer is surprisingly simple – become an expert at your job, be its master. Know it so well that you know all there is to know about it so that you are in total control.

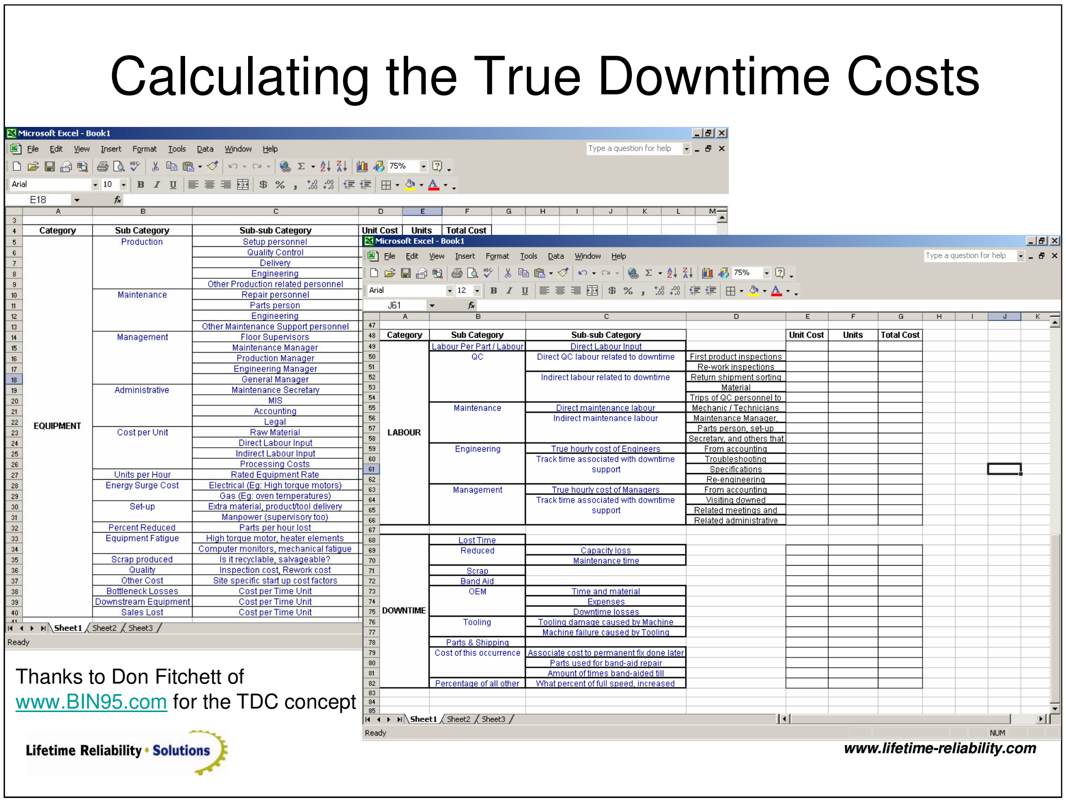
We call people 'expert' when they skillfully apply knowledge and method to deliver the right results. An expert does their work right the first time because they control it with great certainty to deliver the needed result. This definition of 'expert' gives us hope for solving the problem of the 'human element'. If people can become 'expert' they will do their work right and mostly without error. Everyone needs to be expert at their job. We all count on it. In a company of 'experts' all work is controlled to the highest probability of being done right the first time.

Experts focus on failure prevention and defect elimination to ensure their work is done right first time. They do not want to fix problems; rather, they put their effort into not having problems.

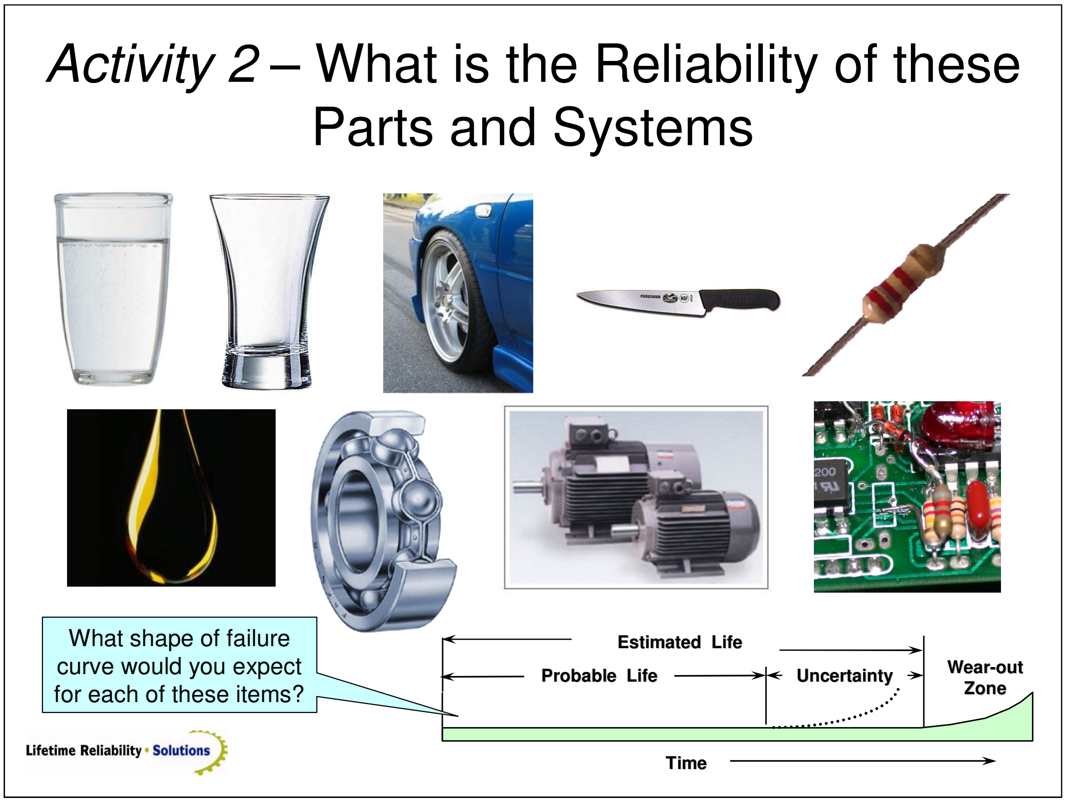


The maintenance costs that you see are not the truth of the situation. Maintenance is the backstop of a business – you call Maintenance in to fix a problem that has stopped a things happening. The problem is the end of a series of situations that led to it. If the problem did not arise there would be no need to call Maintenance. The maintenance costs incurred are Maintenance's portion of a long chain of events; each one with its own costs.

We think the problem is high maintenance costs, but that is only what we see, it is not what caused it.



The total impact of equipment failure is hidden amongst the many cost centres used in a business. For a failure incident to be fully and truly costed it is necessary to collect the numerous costs that surge throughout the operation into a single cost centre. It is not until all the costs, wastes and losses of failure are traced in detail throughout the business that the complete and true cost is known. This is done by following a failure throughout the business using the list of DAFT Costs in a spreadsheet similar to those shown in the slide. REF: For details of TDC (True Downtime Cost), see www.DowntimeCentral.com



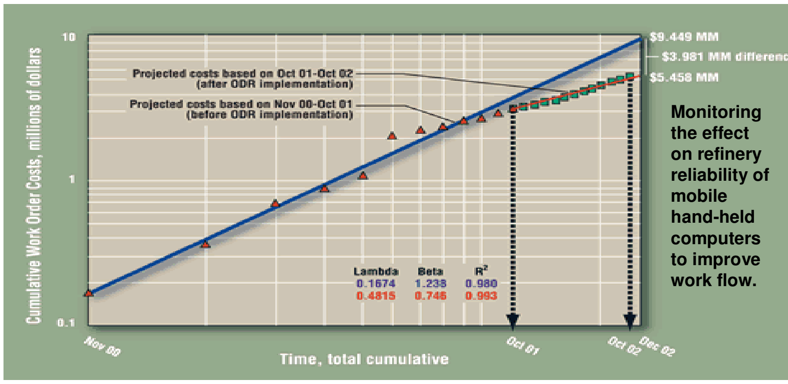
The activity is to work with the group and draw what is the intrinsic reliability curve for these items and 'systems'?

The reliability curve for a part is like the curve on the bottom of the slide – it is called a 'hazard curve' for an individual part (There is a different curve for an assembly of parts). If we can estimate the dates between which it will fail we can change the part with a new one beforehand.

For the parts in the slide we do not have any real data, but using our experiences we can visualise the shape of the probability of failure curve for the items shown. For example the likelihood of the glasses failing due to internal faults is zero. But the likelihood of them failing due to mishandling is real, and people experience it when they break a glass. It is reasonable to expect breakages will begin on the day of purchase and continuing for as long as the glasses are used. Hence we can draw the intrinsic probability of failure for a million identical glasses, or the hazard curve for a glass, as a straight line starting from the day the glass is purchased. The number failing each day is unknown, but our life experience suggests that one glass broken every year in a household is a reasonable likelihood. Hence if 1,000,000 glasses were sold in packs of 12, something like 83,330 households would have the glasses and 83,330 glasses would be broken a year. The chance of the glasses breaking would be a straight line at 8.3% per year. (This is less than when we had 25 glasses in use because the rate of breakage is the same but now the size of the group in which it happens – 12 per household – is less.)

The same analogy can be applied to all the items shown in the slide to show that probability of failure curves can be drawn to reflect the chance of real-world failure.

Measuring the Reliability of Systems - Crow/AMSAA (Army Materials Systems Analysis Activity)

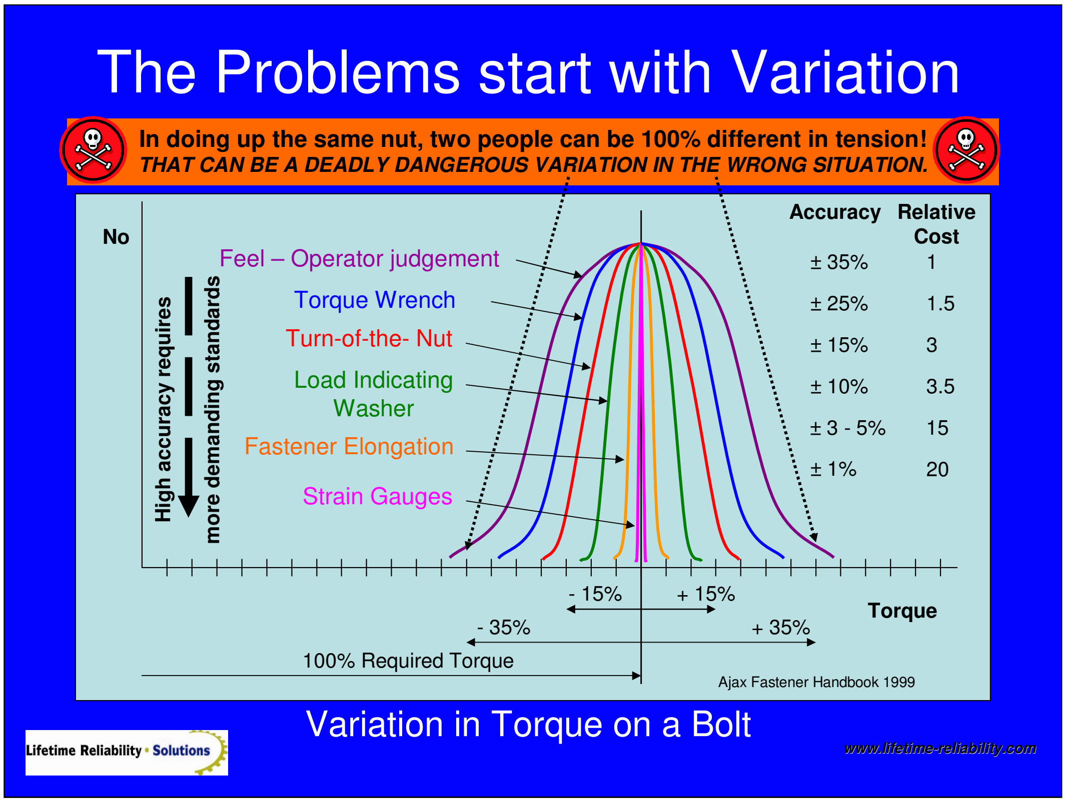


This plot is proof that your reliability can be monitored and controlled. In this case a system-wide improvement (everyone got hand-held computers) improved information flow, which led to better communication and an improvement in system reliability.

- **Reliability growth plots show how the reliability of <u>a system</u> changes over time.**
- **Constant system reliability when plotted on log-log paper makes a straight line.**

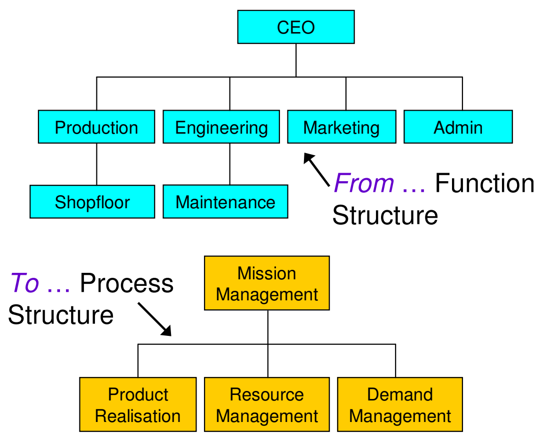
It has been found that many human controlled processes plot as a straight line on log-log paper. This is the case with large 'systems' operated by human beings, such as production processes and business processes.

By graphing selected parameters over time changes in system behaviour can be observed. If intentional changes are introduced into the system their effect can be monitored on the graph.



Variation in outcomes leads to problems. If the variation is unacceptable then more demanding standards must be applied and achieved.

Multifunction Teams Promote Better Equipment Performance



- A cross-functional team is a group of people with a clear purpose representing a variety of functions or disciplines in the organisation whose combined efforts are necessary for achieving the team's aim.
- A standard cross functional team is composed of those individuals from departments within the firm whose competencies are essential in achieving an optimal outcome.
- Define: (1) purpose, (2) duration, (3) membership

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What has been learnt from Total Productive Maintenance (TPM), where teams of operations and maintenance people are given responsibility for equipment performance, is that cross-functional teams perform better in achieving higher equipment reliability. The explanation for the better results is the change in focus from performing a function to delivering an outcome. People are no longer just doing a job; they are instead providing a result.

The process approach to doing work allows people to have ownership of the means and the outcomes. It allows them to put in their best efforts and ideas because they control the results that they produce through their work. This builds a 'pride of ownership' which lifts their productivity and the quality of their workmanship.

A reliability culture promotes cross-functional effort and the development of higher individual skills and knowledge that are used autonomously and spontaneously to continually improve the performance of the operation.