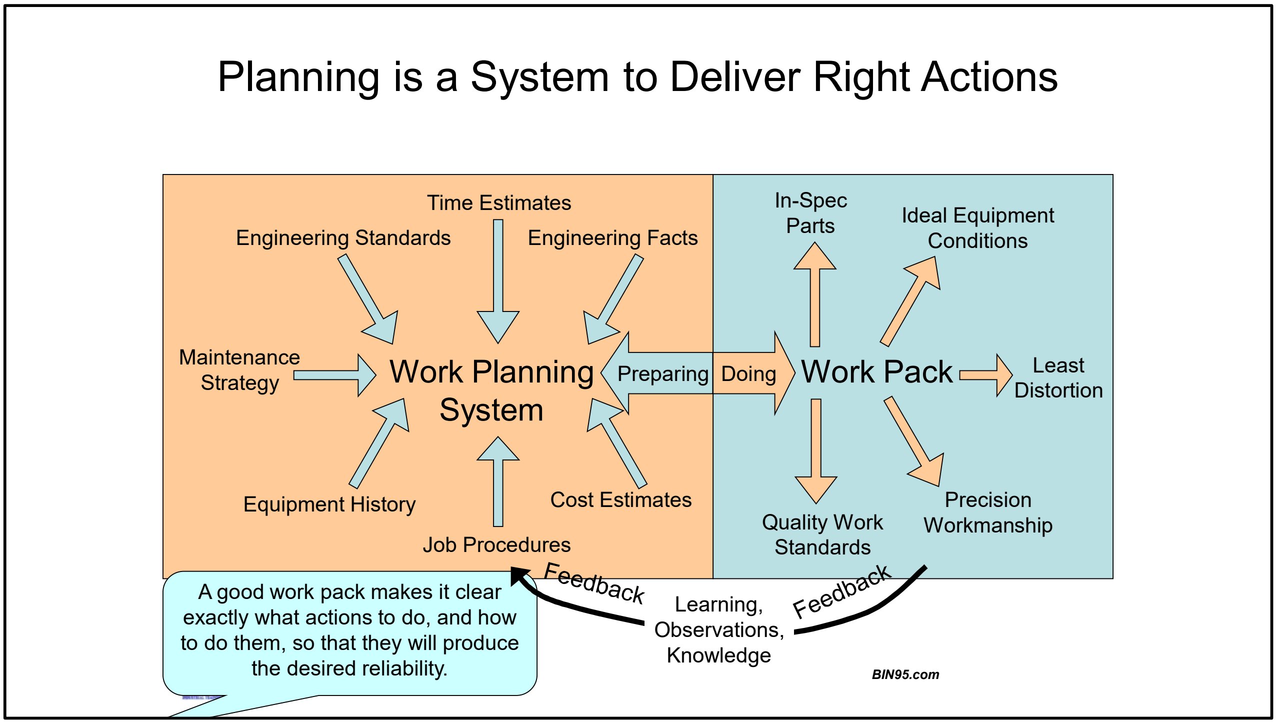
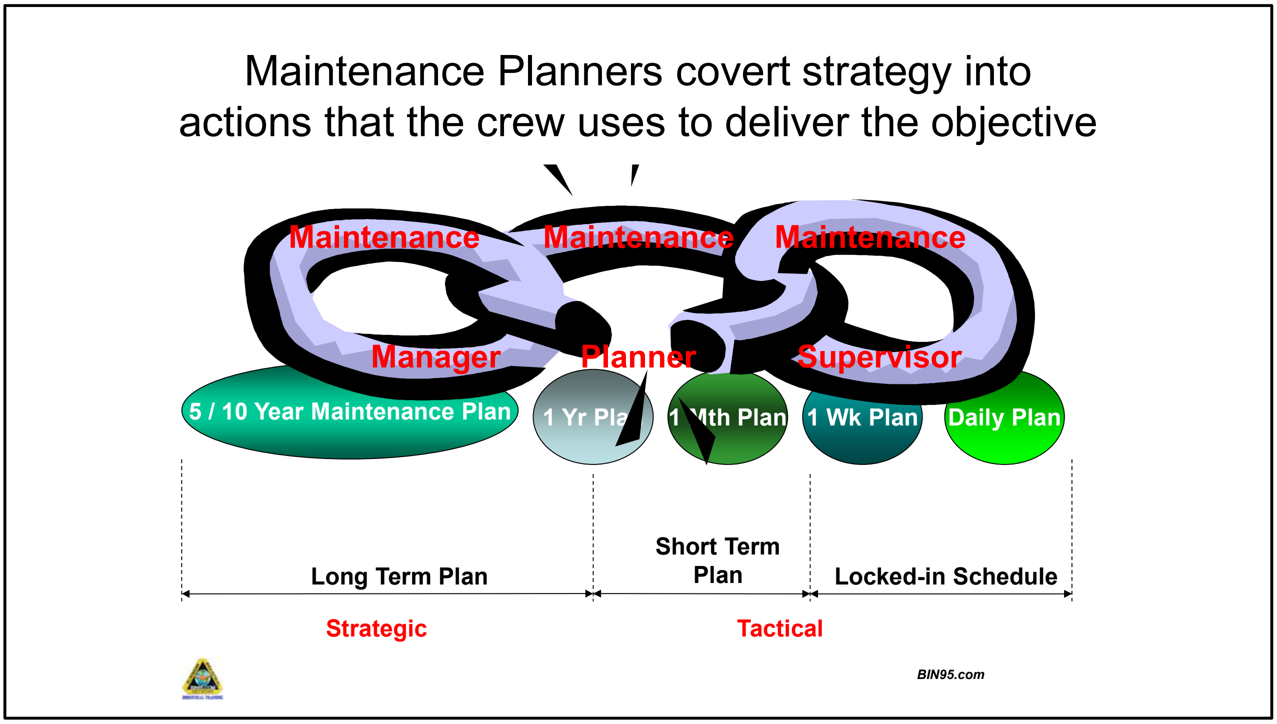
Day 2 sample:



Planning is only useful if the plan is followed. The plan is only useful if it delivers the necessary results and outcomes. A good plan makes it clear exactly what actions to do, and how to do them, so that they will produce the desired results.

A Maintenance Planner needs a systematic approach so they can quickly compile the correct parts, tools and information needed to do the maintenance to high quality standards. This necessitates the Planner to develop specific information management systems for the quick identification and collation of large amounts of engineering facts, equipment history, job procedures, work standards, time estimates and cost estimates while ensuring the maintenance strategies are actually put into place.

Day 2 sample:



The Maintenance Planner is the link between corporate asset life-cycle management strategy and the workforce. They are the person responsible to convert plans into actions that people use to deliver the objectives.

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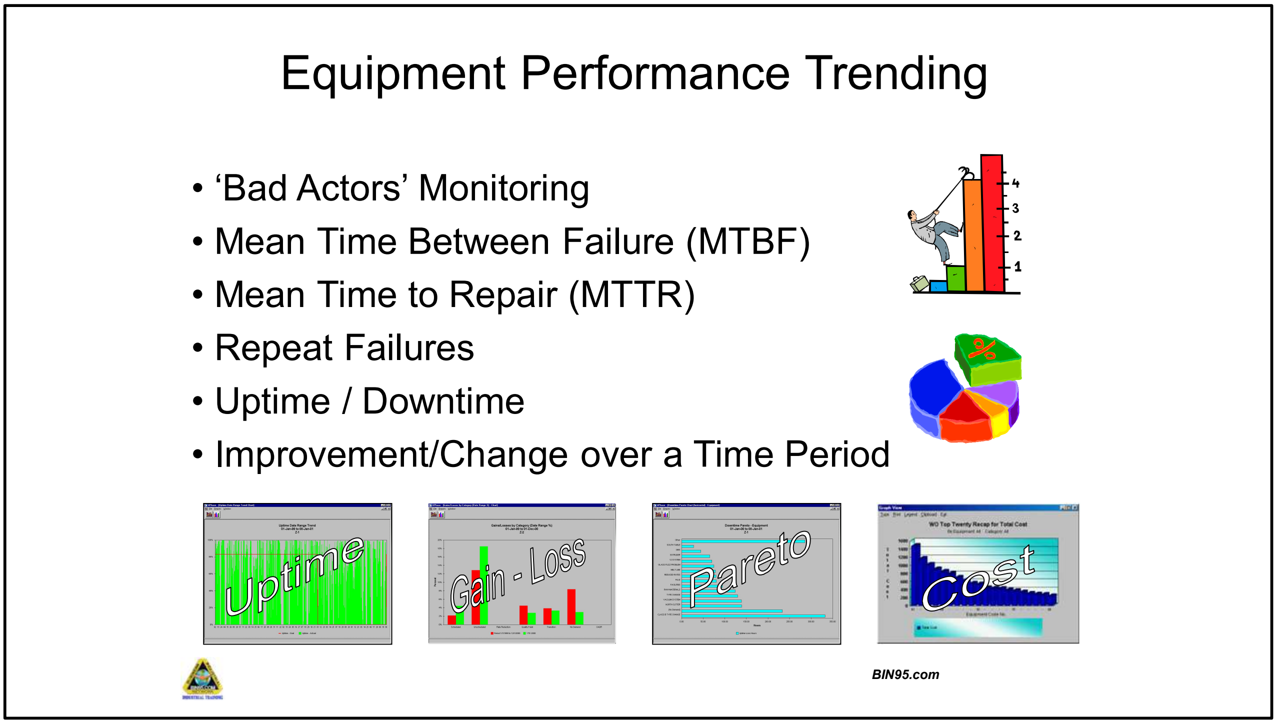
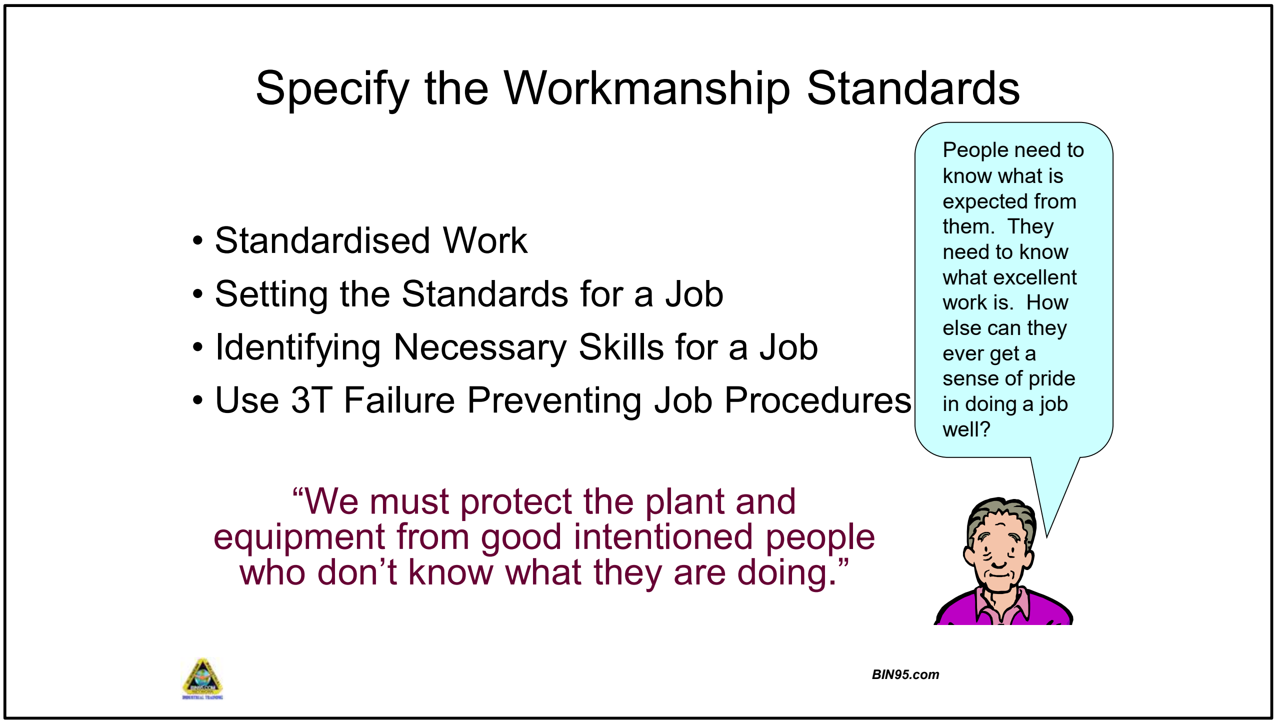


Doing good maintenance, and the maintenance planning effort that goes into it, needs to be seen as being worthwhile and that it is producing worthy results. That is best done by displaying the trends that develop because of the maintenance effort. The slide lists but a few of the types of information that can be presented. The sample graphs along the bottom of the slide are copies of graphs actually used in industry.

Another benefit of identifying equipment and maintenance performance visually is to pinpoint opportunities for focused improvement. The Pareto and Equipment Cost graphs are particularly valuable in showing the 'bad actors' that need to be addressed.



Unfortunately people cause most problems; by a long, long way. You can read the extracts below taken from white papers and books that indicate just how much people are at fault. It's not really peoples' fault that they make so many mistakes, we're all human and humans make errors. The fault that errors are allowed to impact an operation is a business system issue. We do not have enough protection within our business systems to save the business from the error made by the people they employ. We must protect the plant and equipment from good intentioned people who don't know what they are doing. Your only means of protection is accurate documentation which sets the right standard of work performance and training your people to do it the way the procedure says. Finally you need to go out to the work faces and audit them to see for yourself what they are really doing.

Extracts on the Causes of Equipment Failure

"Use Crow-AMSAA Reliability Growth Plots To Forecast Future System Failures", H. Paul Barringer, P.E.

Many mangers and engineers believe most failures have a root cause in the equipment. Data from nuclear power plants (which maintain a culture of confessing failures and the roots of failures—this is in opposition to most industries were the culture is to hide the roots of failures) show the following roots for failures:

Early in the life of nuclear power plants -

Design error	35% [people induced problems - not calculation errors]
Random component failures	18% [process/procedure problems]
Operator error	12% [people/procedure problems]
Maintenance error	12% [people/procedure problems]
Unknown	12%
Procedure error & unknowns	10%
Fabrication error	1% [people/procedure problems]
TOTAL	100%

Mature nuclear power plants -

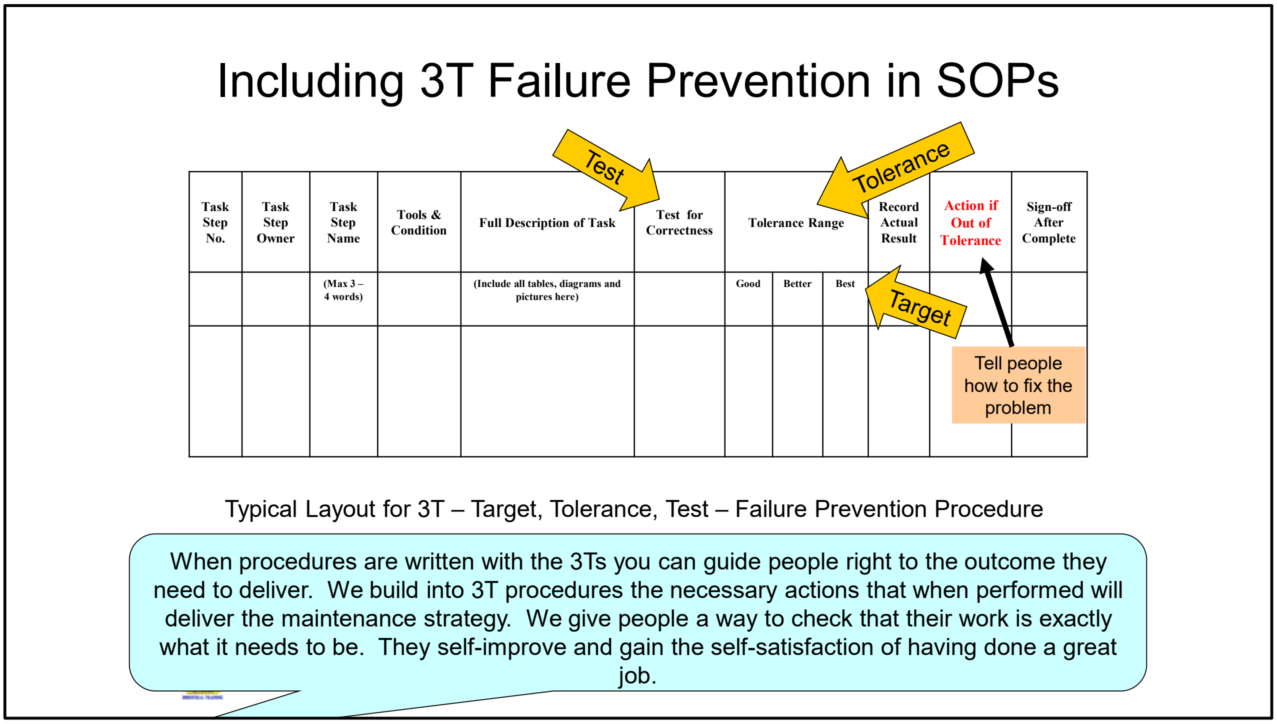
People	38%
Procedures & Processes	34%
Equipment	28%
TOTAL	100%

ASME (2002) shows a similar root for failures. For 10 years, from 1992-2001, 127 people died from boiler and pressure vessel accidents and 720 people were injured. In the 23,338 accident reports, 83% were a direct result of human oversight or lack of knowledge. The same reasons were listed for 69% of the injuries and 60% of recorded deaths. Data shows that if you concentrate only on the equipment you miss the best opportunities for making improvements. Another point to seriously consider is little or no capital expenditures are required for improving people, procedures, and processes which can reduce failures. In case you believe that equipment is the biggest root of problems it will be instructive to download (http://www.bpresponse.com) the Final Report of BP's Texas City Refinery explosion and tick off the reasons behind the explosion which took the lives of 15 people and maimed more than 200 addition people—you will see objective evidence for people, procedures, and processes as the major roots for failures. The #1 problem was not equipment!

Design Paradigms: Case Histories of Error and Judgment in Engineering, Petroski, Henry, Cambridge Press, New York, 1994.

Petroski (1994) on pages 7 and 8 remarks about the role of humans in failures:

"… the major challenge to reliability theory was recognized when the theoretical probabilities of failure were compared with actual rates of failure [and the] actual rates exceed the theoretical values by a factor of 10 or 100 or even more. They identified the main reason for the discrepancy to be that the theory of reliability employed did not consider the effect of human error…… Human error in anticipating failure continues to be the single most important factor in keeping the reliability of engineering designs from achieving the theoretically high levels made possible by modern methods of analysis and materials….. nine out of ten recent failures [in dams] occurred not because of inadequacies in the state of the art, but because of oversights that could and should have been avoided….. the problems are essentially non-quantitative and the solutions are essentially non-numerical."



The beauty of the 3T failure prevention method is its powerful influence for increasing the probability of good outcomes. It is a proactive control measure that drastically reduces defect creation and the future failures they cause. The 3T's provide statistical control over a task by setting clear performance requirements, installing control limits and specifying measures to track performance. Developing procedures that insure accuracy by imbedding targets, tolerance bands and tests in tasks is a highly secure way to meet specifications. They remove uncertainty of outcome. With sound targets and proof-testing used in your business processes, your organization moves from being uncontrolled, or at best quality-conscious if a quality management system is used, to being truly an accuracy-controlled enterprise, an ACE. Without any additional costs and demands on the organization, except to include the 3Ts into its standard operating procedures, and where needed, providing appropriate test devices, a business can be well-protected against all defects and failures.

With 3T defect elimination and failure prevention methods overlaid on standard operating practices the possibility of problems developing and getting deep into a business are greatly reduced. The business systems shrink in complexity because each person is now clearly responsible for product quality and conformity. Accuracy and quality are inherent in the system of work and become the only acceptable way to do a job.

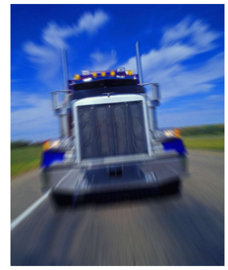
The 3T method reduces the need for having supervisors and managers because each worker can see for themselves when a task is well-done. Employees receive positive feedback and satisfaction from the job itself when they see that their work is of top quality. Employees become their own quality control inspectors and learn to improve their performance until it is up-to-standard.

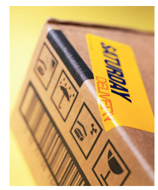
ACE procedures have in-built structure to prevent failure and the introduction of defects. Each task can be done correctly because each has a measurable target and tolerance to work to. When all tasks are done right the procedure is correct. Using the ACE 3T method in standard operation procedures makes them highly valuable work instructions that are far superior to the average standard operating procedures. As well as acting as guidelines for the work, they set clear performance criteria for every step in the job process. They make it clear to the employee the degree of accuracy that must be achieved. Nothing less is suitable. It turns people into experts.

Important Purchasing Information

- Supplier/Manufacturer
- Part Number
- Part Description
- Material Specification
- Quantity
- Delivery Address
- Buyer Contact Name
- Buyer Contact Numbers
- *What else to include?*

E.g. Delivery date, site contact name, phone contact name, delivery instructions, handling instructions, terms and conditions; PARTS PROTECTION AGAINST DAMAGE e.g. vibration of bearings on shafts in transport





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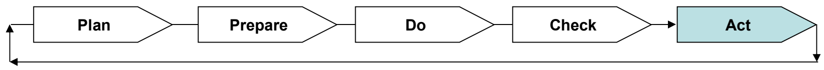
When purchasing maintenance parts and equipment it is critical to provide all the detail necessary to get the right part, and make sure it is delivered to the right location, by the right date.

The End of the Work Planning Process



- Calculating True Cost of the Maintenance / Failure
- Job and Workmanship Feedback
- Post-Job Review
- ‘Lessons Learnt’ Meeting
- Continuously Improving the Planning

When do you know you have done enough? ….

When you know you have done more than enough!

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The Planner has a few more tasks to do once the work on-site is complete.

Day 2 sample:

End of Day 2

- Planning systems – for office and information management
- Parts purchasing and stores management
- Specifying Work Quality Standards for Reliability
- Project Management – plan/prioritize/control activity
- Work Planning Process – Plan/Prepare/Do/Check/Act
- Shutdowns – use project management approach

What's on in Day 3

- ‘Cross-hair target’ Game
- Defect Creation and Prevention
- Getting Work into Statistical Process Control
- Key Performance Indicators
- Scheduling Work

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