How Detailed, Repeatable Procedures Cut Failures and Improve Asset Life

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If the statement above is valid and the cost of asset failure is not essential to our operation, then your staff must have unlimited, infallible memory – congratulations!

Human Variation: The Hidden Driver of Maintenance Failures

The human error rate is high, and without repeatable, effective maintenance procedures, failures occur. Maintenance professionals actually think procedures are not required because they “know how to do it”. However, this couldn’t be further from the truth. Throughout our careers, we have seen thousands of examples of human variation leading to equipment failure.

We as humans are built to produce variation in almost everything we do. Most people deny that this human variation exists. However, when managers are asked whether they have ever lost their car keys, they look at me sheepishly and say, “Yes, great point.”

Many companies honestly believe their maintenance staff members are paid to “know how to do it” without procedures, specifications, step-by-step instructions, etc. What if a maintenance employee does “know how to do it” every time?

One must consider skill level, current mental state, and current working conditions to mitigate human error. In addition, what would happen if new information emerged from failure data? The only way to ensure this new information is used effectively would be to write or change a procedure.

Why Procedure Discipline Is Essential for Reliability

Well-designed maintenance procedures and a solid procedures feedback and follow-up process will mitigate human-induced failures and allow for continuous improvement to occur naturally.

If a company wants to optimize asset reliability, then repeatable, effective procedures cannot be optional.

Did you know that the most complex equipment ever built was a nuclear submarine, and that the first nuclear submarines experienced failures due to a lack of effective procedures, resulting in catastrophic failures?

If safety is number one in your organization, then repeatable, effective work procedures should be as well. Figure 1 shows the correlation between injury rate and OEE.

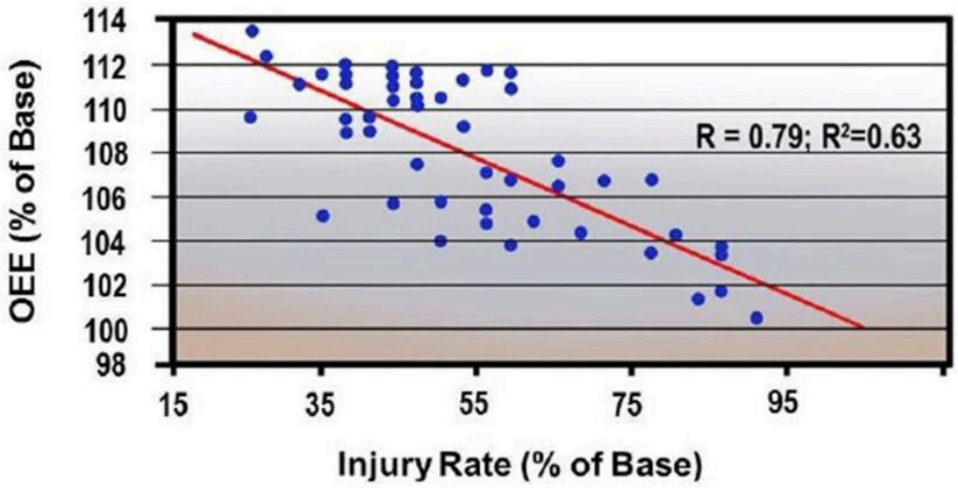

Figure 1: Injury Rates vs OEE

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We may not know why the bearing in Figure 2 failed. It is easy to surmise that the correct lubricant, quantity, and re-lubrication interval were likely not clearly specified in the maintenance instructions related to the equipment.

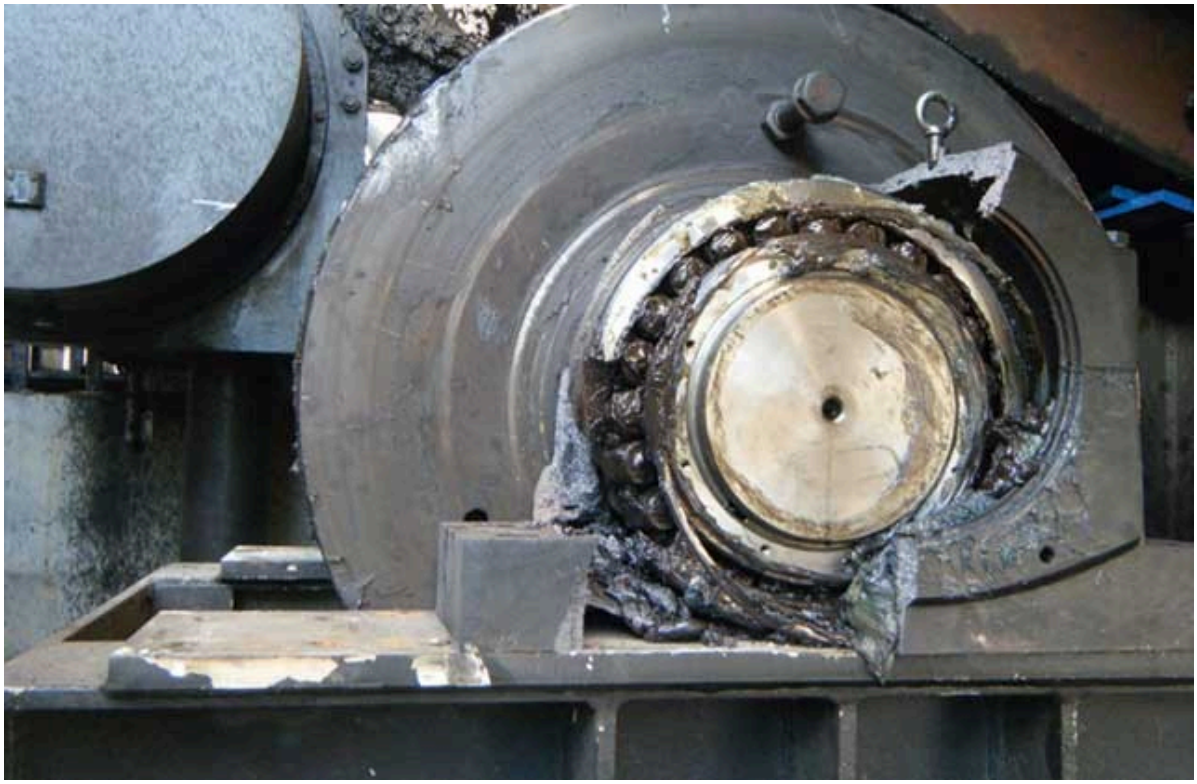


Figure 2. Bearing Failure Example

In the field of maintenance, the traditional approach has been to rely upon the intuitive knowledge and skill of the craftspeople who conduct it. There is a corollary that accompanies all of this that many skilled craftspeople believe and would like management to believe firmly, “There are too many variables in maintenance, making compliance with written procedures impossible and impractical; that the ’way we’ve always done it’ is the best and only way to conduct maintenance.”

The bottom line is that effective, repeatable procedures are required if a company wants a true continuous improvement process to optimize asset reliability. Then, repeatable procedures cannot be optional.

There is a big problem when moving from the current state to this future of repeatable, effective procedures, and that is change. Change is not easy. Here are proven steps to success in this area:

- Send a few hard-core individuals to be trained in developing repeatable, effective Be sure they will come back excited, so select the proper training.

- Upon return from the training, sit down with the employees who received the training and work with them to develop a plan to move from the current state to the future state with effective, repeatable
    - Be sure this plan has embedded the following items:
    - Training for maintenance technicians, planners, supervisors, managers, reliability and maintenance engineers (2-4 hours for most)
    - Develop a process map for procedure development and approval, along with defining roles and See Figures 3 and 4

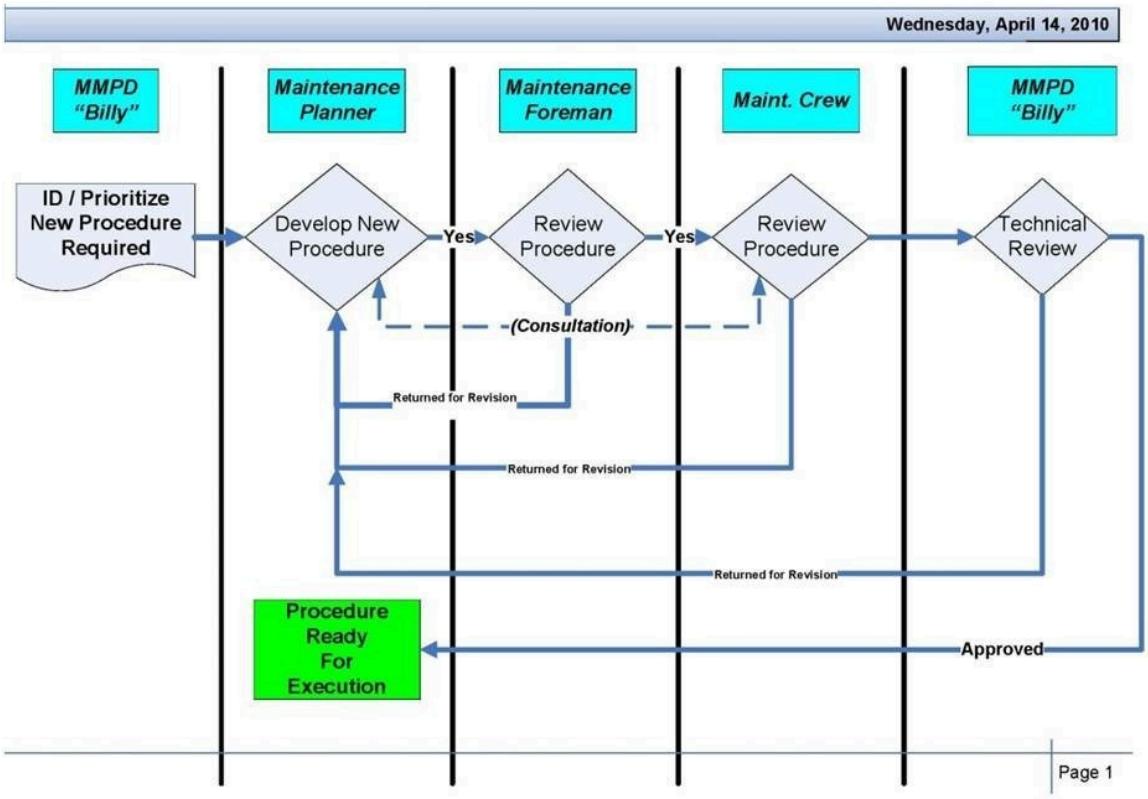
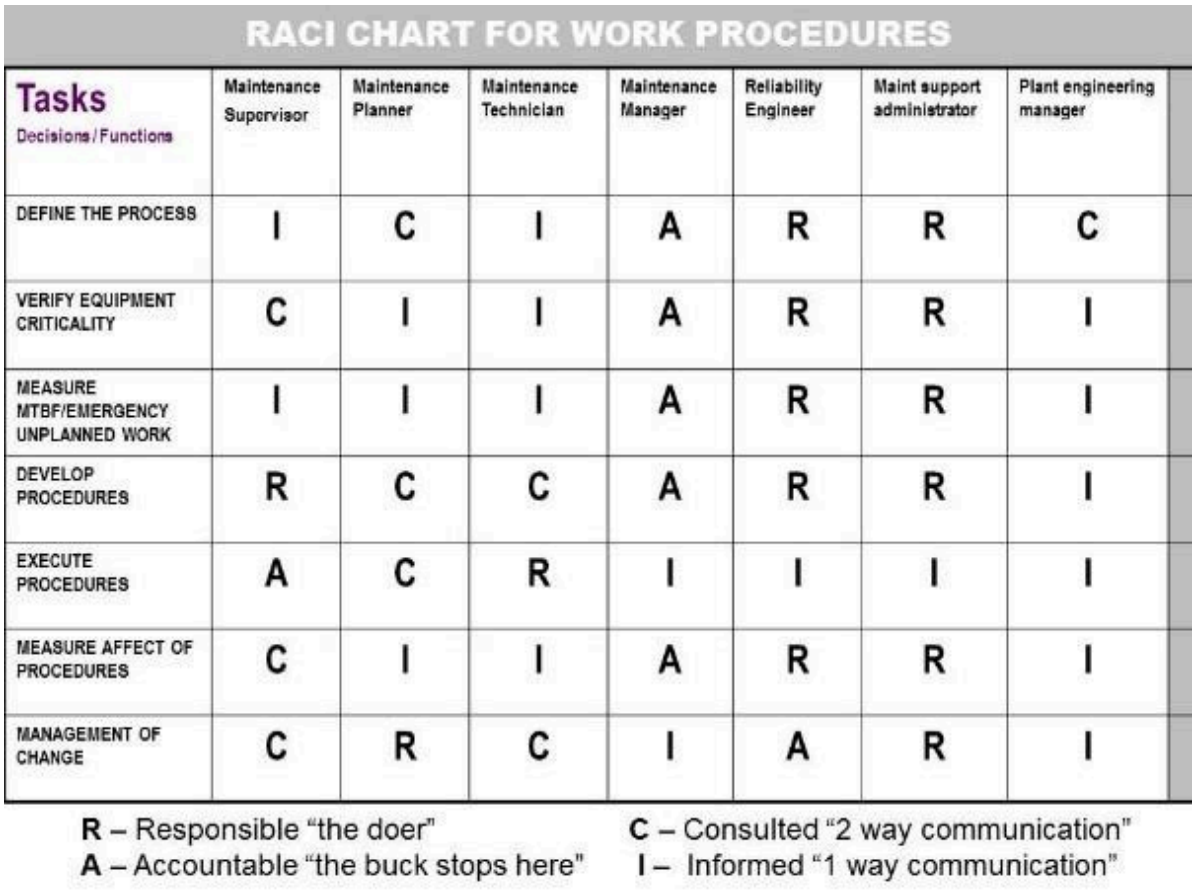


Figure 3 – Example: Procedure Process Map



RACI CHART FOR WORK PROCEDURES

Tasks Decisions / Functions	Maintenance Supervisor	Maintenance Planner	Maintenance Technician	Maintenance Manager	Reliability Engineer	Maint support administrator	Plant engineering manager
DEFINE THE PROCESS	I	C	I	A	R	R	C
VERIFY EQUIPMENT CRITICALITY	C	I	I	A	R	R	I
MEASURE MTBF/EMERGENCY UNPLANNED WORK	I	I	I	A	R	R	I
DEVELOP PROCEDURES	R	C	C	A	R	R	I
EXECUTE PROCEDURES	A	C	R	I	I	I	I
MEASURE AFFECT OF PROCEDURES	C	I	I	A	R	R	I
MANAGEMENT OF CHANGE	C	R	C	I	A	R	I

R – Responsible "the doer"
A – Accountable "the buck stops here"
C – Consulted "2 way communication"
I – Informed "1 way communication"

Figure 4 – Example: Roles and Responsibilities

There is really no valid excuse, today, for not moving towards procedure-based maintenance. The basic conclusion is worth repeating. The more detailed the procedures and the more insistent an organization becomes on compliance with them, the more precise and less error-prone its maintenance will be. The result will be an increase in reliability as close to the limit as design and other factors permit.

If one decides not to use effective, repeatable procedures, one must be prepared to accept the consequences, which include higher equipment failure, higher maintenance costs, and greater safety and environmental risks.

> Every skipped procedure is a silent vote for higher failure and higher risk.

Developing effective, repeatable procedures is the only option an organization has if it wants to mitigate risk and drive continuous improvement in the reliability of its assets.

Mitigate human-induced failures and optimize reliability and costs through effective, repeatable preventive, predictive, and corrective maintenance and operator-care procedures.

- Does anyone know the hydraulic fluid micron level required for their hydraulic systems?

- Are PMs executed with PM variation? For example, a 30-day PM may be scheduled for the 3rd of this month and the 20th of next month, resulting in equipment PM is a “controlled experience” and, as such, requires repeatable, effective, and on-time procedures. (See Figure 5.)

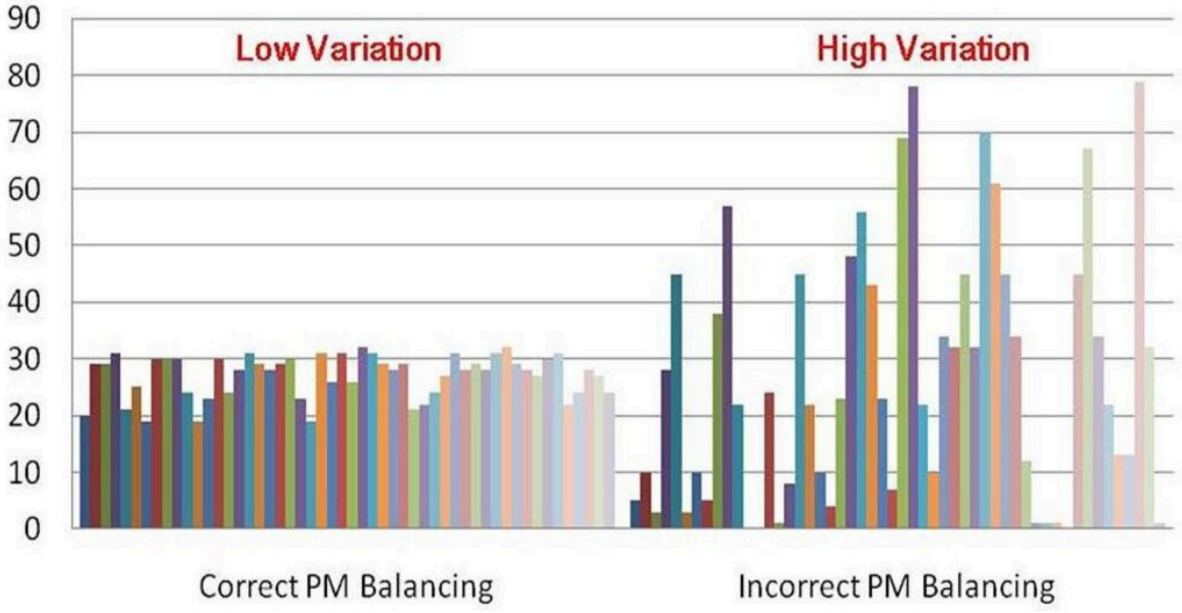


Figure 5: Balancing Your PM Execution for the Year (Sample)

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Ricky Smith, CMRP, CMRT is the Vice President of World Class Maintenance and a leading Maintenance Reliability Consultant with over 35 years of experience. He holds certifications such as Certified Maintenance and Reliability Professional (CMRP) and Certified Maintenance and Reliability Technician (CMRT). Ricky has worked with global companies like Coca-Cola, Honda, and Georgia Pacific, delivering expert maintenance solutions across 30 countries. His career began in the U.S. Army, advancing to leadership roles, including a position at the Pentagon as Facility Investigator for the Secretary of Defense. Ricky is also the co-author of *Rules of Thumb for Maintenance and Reliability Engineers* and *Lean Maintenance: Reduce Costs, Improve Quality, and Increase Market Share.*

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