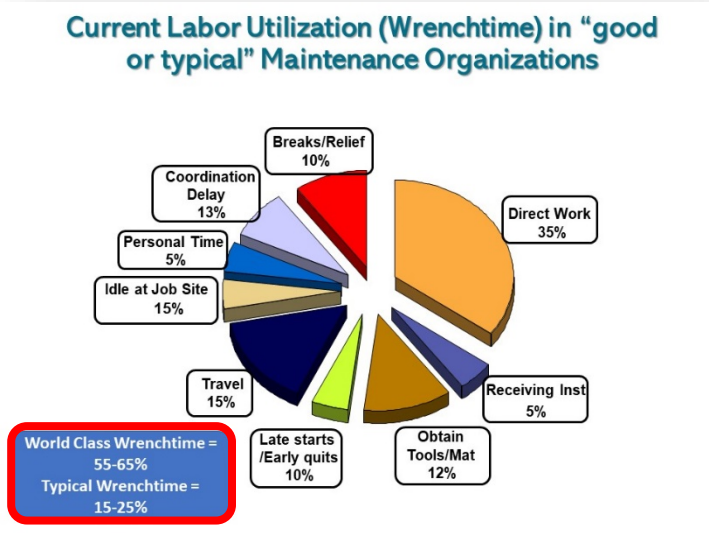
# Best Maintenance Repair Practices

**By Ricky Smith CMRP, CMRT**

**What are "Best Maintenance Repair Practices"? Best Maintenance Repair Practices are known and used by many of the best performing organizations in the world. One such plant is Alcoa Mt Holly which was ranked by HSB-RT as the first plant meeting "World Class Maintenance Standards" where I worked as a Maintenance Technician in the 1980s.**

**Why apply "Best Maintenance Repair Practices"?**

- **To reduce/mitigate unacceptable equipment failures**
- **To keep your best employees**
- **To reduce stress of production and maintenance personnel**
- **To increase Maintenance Wrenchtime**




- **To reduce total cost**

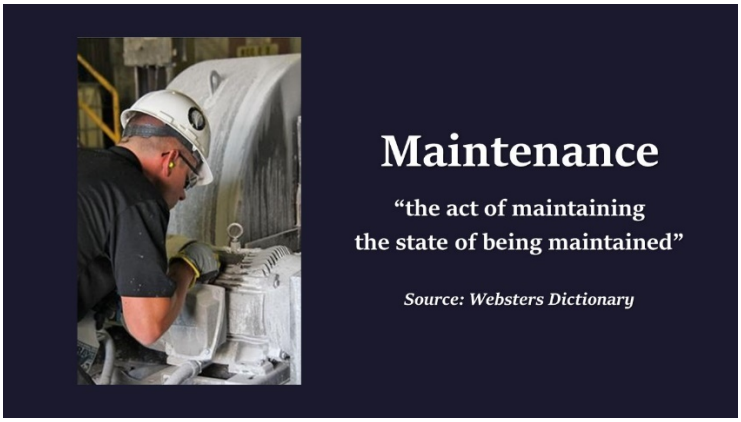
TABLE 7.2. Maintenance Costs in Typical and World-Class Companies

| Metric | Typical | World Class |
|---|---|---|
| Maintenance cost/replacement asset value | | |
| Maintenance cost must include labor (including overtime), materials, contract maintenance, and capital replacements, and maintenance (replacing worn-out assets because they were never properly maintained) | 3.5–9% | 2.0–3.0% |
| Maintenance materials cost/replacement asset value | | |
| Maintenance materials cost must include material in storeroom stock plus material in other locations (maintenance shop, plant floor, etc.) | 1.0–3.5% | 0.25–0.75% |

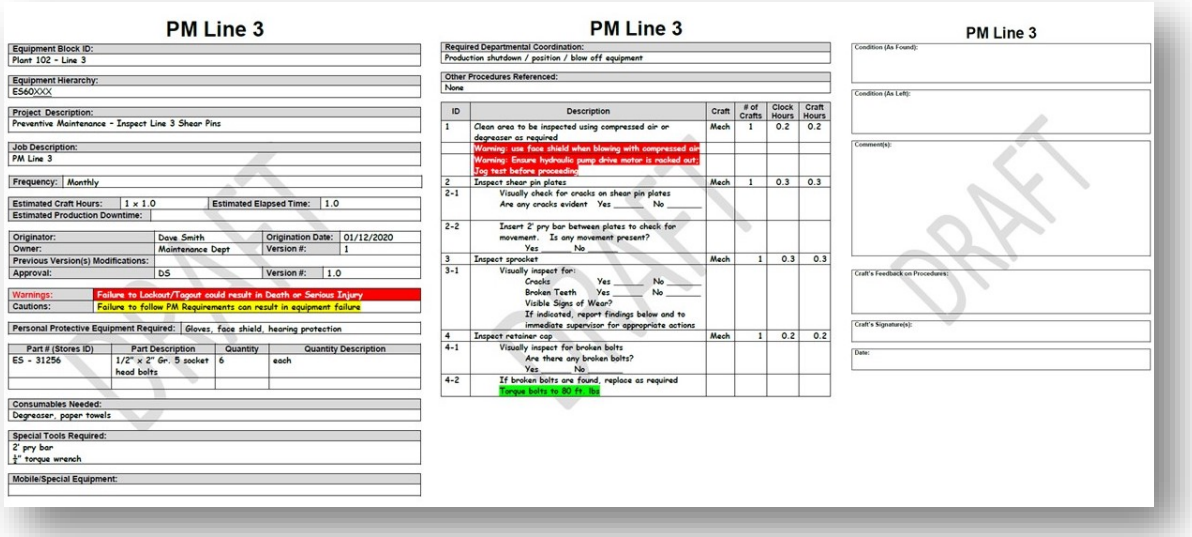
**Source: Alcoa Mt Holly – World Class Maintenance Model**

**A few of the most common reasons that organizations do not follow "Best Maintenance Repair practices" because:**

1. **There is not time to make a repair to specifications because of production demands**
2. **Management is not supportive, and/or does not understand the consequences of not following the best practices (real understanding must involve a knowledge of how much money is lost to the bottom line) Remember Maintenance Cost as a % of RAV**
3. **Maintenance is reactive and does not follow the definition of maintenance, which is to protect, preserve, and prevent from decline.**



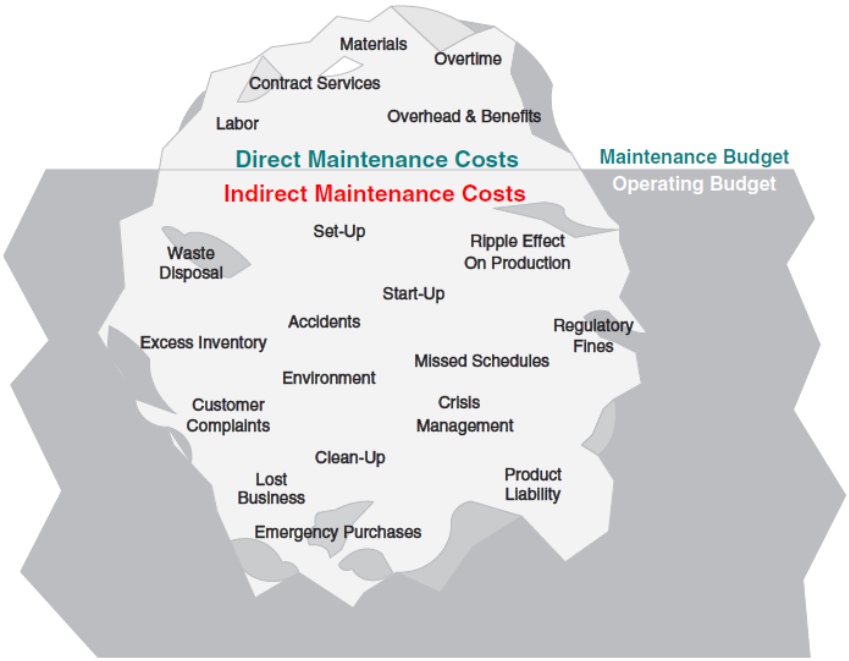

4. **Maintenance personnel do not have the requisite skills.**
5. **The maintenance workforce lacks either the discipline or direction to follow best maintenance repair practices.**
6. **Maintenance do not have or do not follow "Repeatable Procedures"**




## In order to solve the problem of not following Best Maintenance Repair Practices, a sequential course of action should be taken to:

**First, identify whether a problem exists (i.e., track repetitive equipment failures, review capacity losses in production and identify causes for these losses, and measure the financial losses due to repair issues). (NO BLAME or FINGER POINTING)**

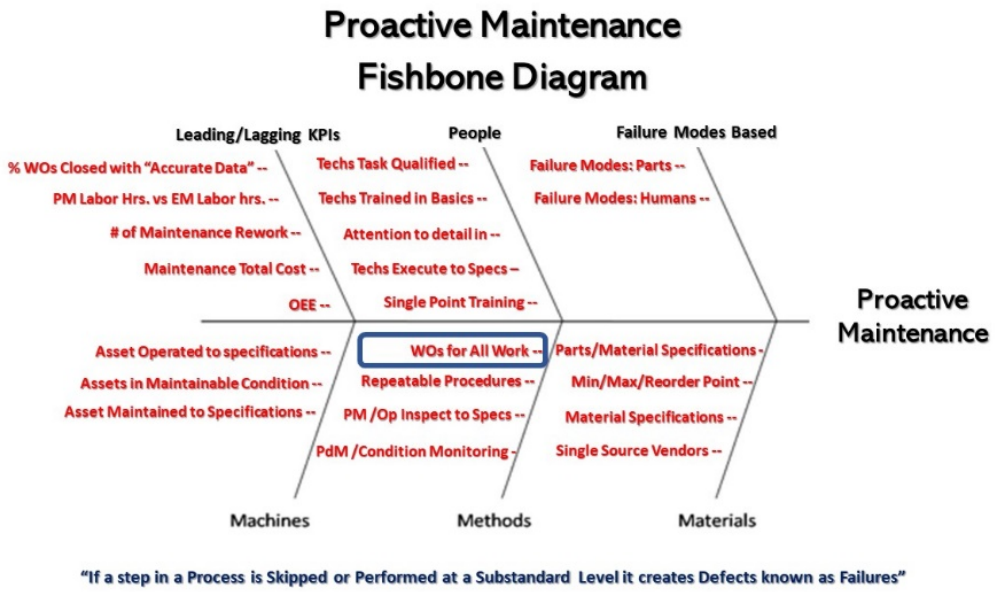
**As shown in the illustration below "Direct Maintenance Cost" is low compared to the "Indirect Maintenance Cost", this illustration demonstrates we focus on direct maintenance cost without understanding it's impact on "Indirect Maintenance Cost" which must higher.**



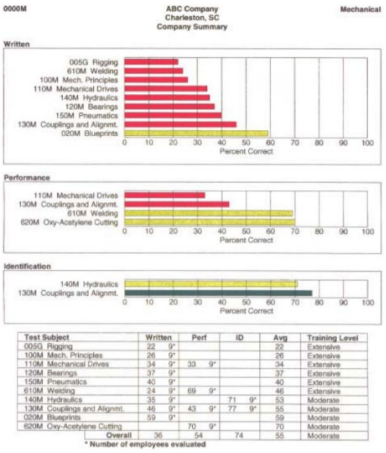

**This illustration was created by one of the smartest maintenance engineer I ever met, Don Nyman allowed us to use this illustration in Keith Mobley and my book, "Industrial Machinery Repair" by Elsevier Publishing.**

**Second, identify the source of the problem (this could be combination of issues):**

- **Perform a Root Cause Analysis to identify the cause or causes of the problem using a cross functional team.**



- **Identify current gaps in the Maintenance skill level: Perform skills assessment (written and performance based) to evaluate whether skill levels are adequate to meet "Best Maintenance Repair Practices" for your specific maintenance organization.**

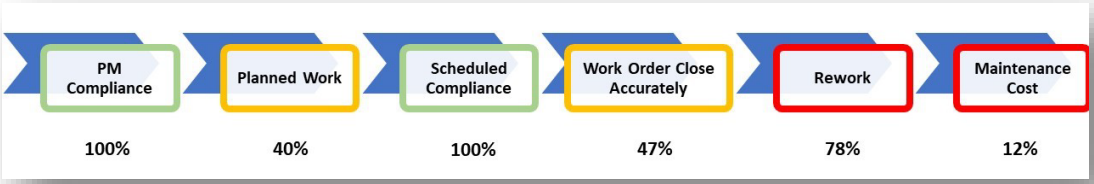



**(Warning: This information can only be used for training and not for pay or job obtainment with the use of a formal "Job Task Analysis" for the position)**

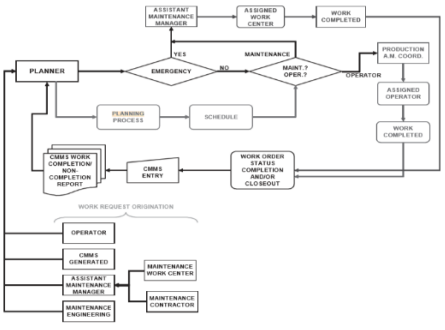
**Third, a change in an organization's is required and is best managed using Best Demonstrated Practices, this includes…**

- **Maintenance culture: Provide training to all maintenance and management relative to a change in maintenance strategy and how it will impact them individually (e.g., increase in profit for the plant, less overtime resulting from fewer equipment breakdowns, etc.)**

- **Track and measure the changes and display the results to everyone.**




- **Maintenance strategy: Develop a plan to introduce or optimize one's current proactive maintenance model with "Maintenance Best Practices" at the top of priorities. This will provide more time to perform Maintenance to specification using "Best Maintenance Repair Practices.**



- **Implement the changes needed to move toward following "Best Maintenance Repair Practices" and measure the financial gains.**
- **Defined Roles and Responsibilities using the RACI Process**

**Proactive Maintenance RACI**

| Task/Functions → | Maint. Planner | Maint. Engineer | Maint. Supervisor | Maint. Technician | Production Manager | Maint. Manager |
|---|---|---|---|---|---|---|
| Work Identification (From PM/PdM and Work Request) | | C | A | R/C | R | I |
| Plan Work | R | | C | C | C | A |
| Schedule Work | R | | C | I | A | I |
| Execute Work | | C | A | R | I | I |
| Work Order Close Out | | C | A | R | | I |
| FRACAS "Failure Reporting, Analysis, Corrective Action System | R | R | C | C | C | A |

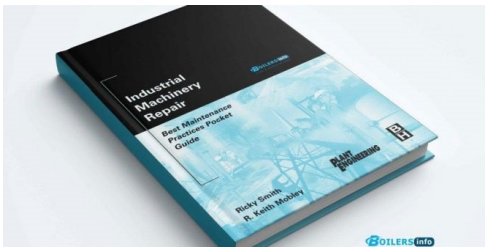
| | |
|---|---|
| Responsibility | "the Doer" (could be multiple people) |
| Accountable | "the Buck stops here (one person) |
| Consulted | "in the Loop" (2 Way Communication) |
| Informed | "kept in the picture" (1 Way Communication |

**Fourth,** **Leadership needs to be aware that financial rewards could be great why however it is not easy to achieve. Several of the reasons why implementing a program of change is difficult such as the one discussed and can be doomed to failure to include these reasons:**

1. **Management not committed**
2. **Lack of discipline and direction**
3. **Lack of effective training**

**Fifth:** Everyone will need to be see the same vision and **Education in Maintenance Best Practices and Best Maintenance Repair Practices are critical through different tools to include…**

- **Best Practices Training**
- **Tool-Box Talks**
- **Certifications (CMRP / CMRT)**
- **Books on Best Practices**




**Sixth:** **Provide Opportunities for Maintenance Technicians to obtain Certifications such as:**

- **Certified Maintenance Reliability Technician (CMRT)**

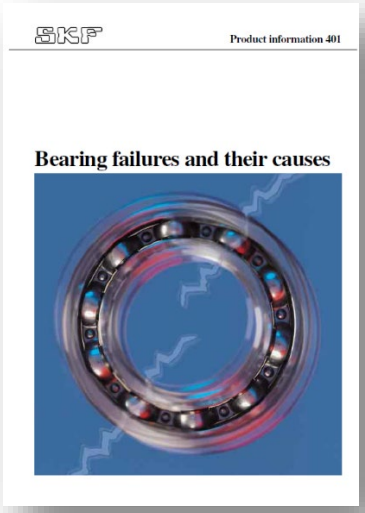
SMRP | CMRT
Certified Maintenance & Reliability Technician

- **Certified Maintenance and Reliability Professional (CMRP)**

SMRP | CMRP
Certified Maintenance & Reliability Professional

**Seventh: Bring in Vendors to provide short education tips how to use their products such as:**

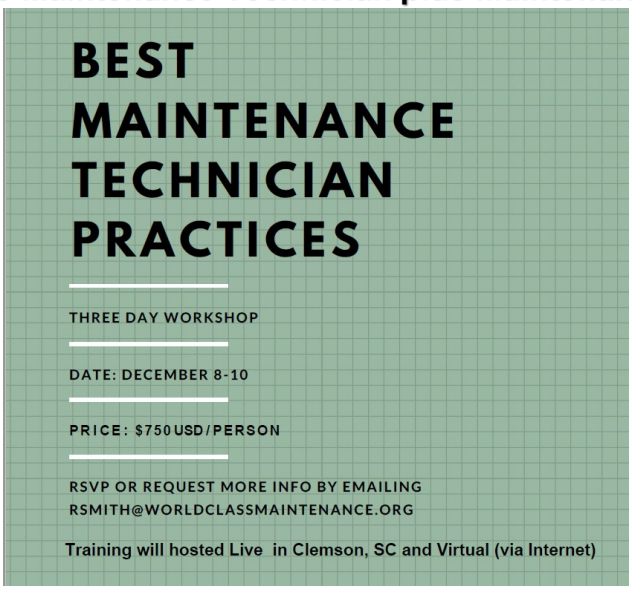
- **Bearings**




- **Loctite**

| | LOCTITE® PRODUCT | MAIN ATTRIBUTES | APPLICATIONS |
|---|---|---|---|
| RIGID ASSEMBLY FLANGE SEALANTS | 504™ GASKET ELIMINATOR® FLANGE SEALANT | Rigid, low viscosity, self-shimming, 0.030 in. gap fill without primer | Rigid flange applications |
| | 509™ GASKET ELIMINATOR® FLANGE SEALANT | Flexible at temperatures up to 300°F (149°C), fluorescent, blue | Gearbox, engine casings |
| | 510™ GASKET ELIMINATOR® FLANGE SEALANT | Resists low on-line test pressures, uncured | General gasketing |
| | 515™ GASKET ELIMINATOR® FLANGE SEALANT | Flexes with flanges that move in service | General gasketing |
| | 518™ GASKET ELIMINATOR® FLANGE SEALANT | Resists low on-line test pressures, uncured | Gearbox, engine casting |
| SEALANT / DRESSING FOR EXISTING GASKETS | QUICKSTIX™ 534™ HI-TACK GASKET SEALANT | Vertical applications, uses less product, repositionable | Holds gaskets in place (rubber, cork, paper, felt and metal) |
| | GASKET SEALANT 1 (SOLVENT-BASED) | Extended gasket life, fast drying, rigid cure | Threaded connections, air ducts, plumbing connections |
| | GASKET SEALANT 2 (SOLVENT-BASED) | Extended gasket life, slow drying, flexible cure | Valve cover and oil pan gaskets, threaded connections |
| | HIGH TEMPERATURE GASKET MAKER (SOLVENT-BASED) | Reliability at high temperatures, seals up to 5,000 psi | Aircraft heating systems, steam lines |
| | HI-TACK GASKET SEALANT (SOLVENT-BASED) | Prevents seizing, corrects gasket alignment, easy disassembly | Weather stripping, waterproofing electrical connections |
| | AVIATION GASKET SEALANT (SOLVENT-BASED) | Close tolerance flanges, slow drying, flexible cure | Aviation and marine engines, threaded connections |
| | COPPER GASKET ADHESIVE (SOLVENT-BASED) | Improved heat transfer, fills surface imperfections, repositionable | Cylinder head, exhaust manifolds, turbo charger flanges, carburetor gaskets |

**Eighth: Send one or two Maintenance Technician plus Maintenance Supervisor to:**




**For more information send me an email at rsmith@worldclassmaintenance.org**
**or go to www.worldclassmaintenance.org**