



FUSS & O'NEILL
Manufacturing Solutions, LLC



LEAN SHOULD MEAN BETTER, NOT LESS

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WHAT IS MAINTENANCE?

- “Those actions required for the care of machinery, a building, etc., to keep it clean and in proper functioning condition, and to prevent or forestall damage due to normal use”.



WHAT DO YOU THINK?

- Do you have a maintenance department or a repair department?

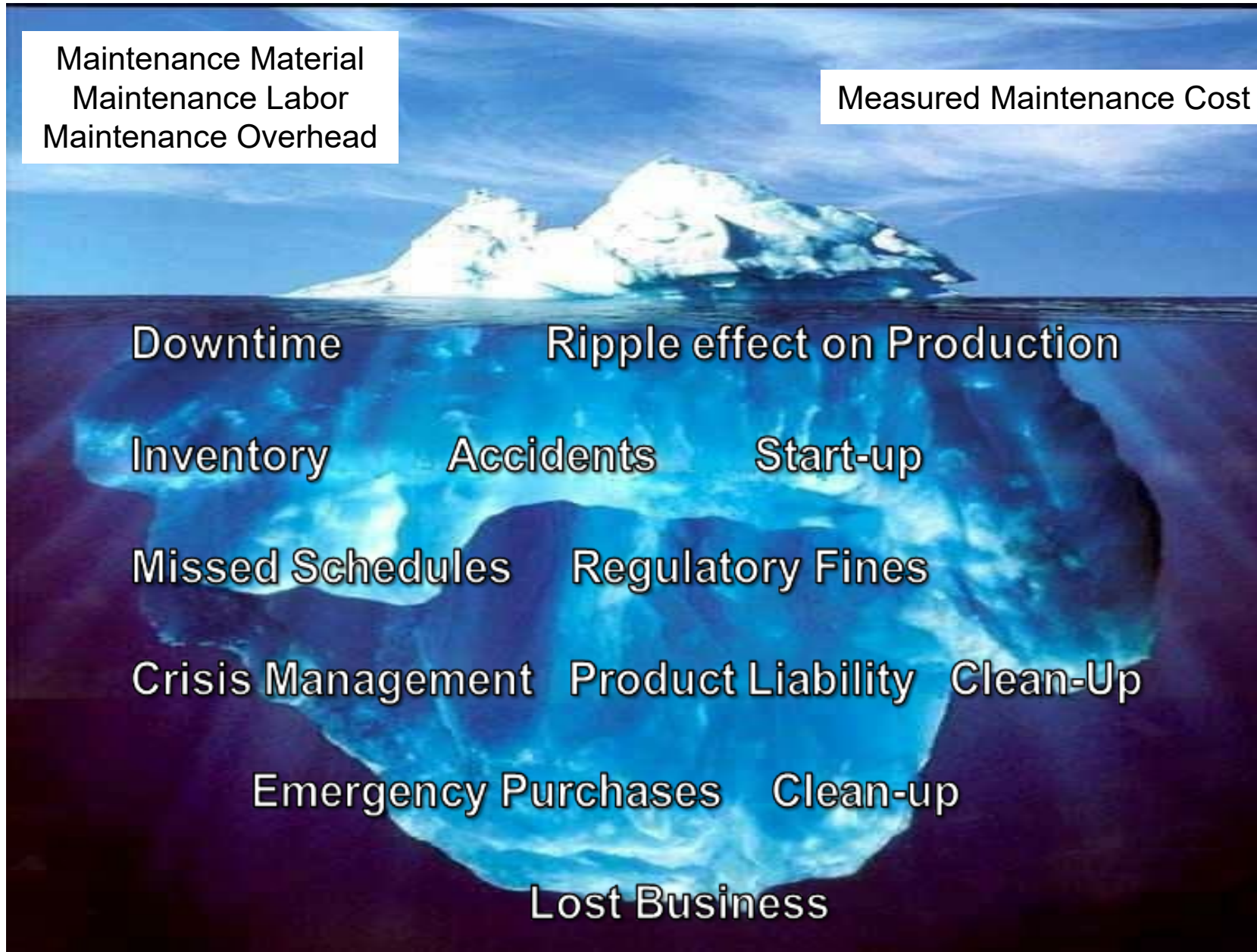
MAINTENANCE



OR



ACTUAL MAINTENANCE COST/HIDDEN WASTE



BILLIONS SPENT ON WASTEFUL MAINTENANCE RELATED PRACTICES

What are some of these??

- Waiting at the parts crib
- Looking for parts
- Looking for consumables; bolts, nuts, pipe fittings, set screws, etc.
- Looking for and getting out maintenance tools; drills, saws, etc.
- Travel time.
- Making repairs that could have been prevented with PM.
- Making repairs that are larger and more costly (10X) than earlier during a PM.
- Making incorrect repairs.
- Replacing parts that do not need replacing.
- Replacing parts with poor quality (low cost) parts.
- Replacing parts with bad (broken) parts, by mistake.
- Emergency parts shipment (Fed-ex) costs.
- Maintenance overtime performing emergency repairs.
- Switching from one emergency to another.
- Making temporary repairs.
- Lack of maintenance training.
- Poor lubrication basics.
- Poor communication between shifts.

MAINTENANCE STORAGE ROOM, CRAMMED WITH NEEDED ITEMS...?



WHAT DOES MAINTENANCE PRODUCE?

Proper Maintenance has tangible, measurable effect on:

- Safety
- Quality
- On-time delivery
- Manufacturing cost

\$ Plant Capacity \$

Why is viewed as a “cost center”?







LEAN MAINTENANCE IS....

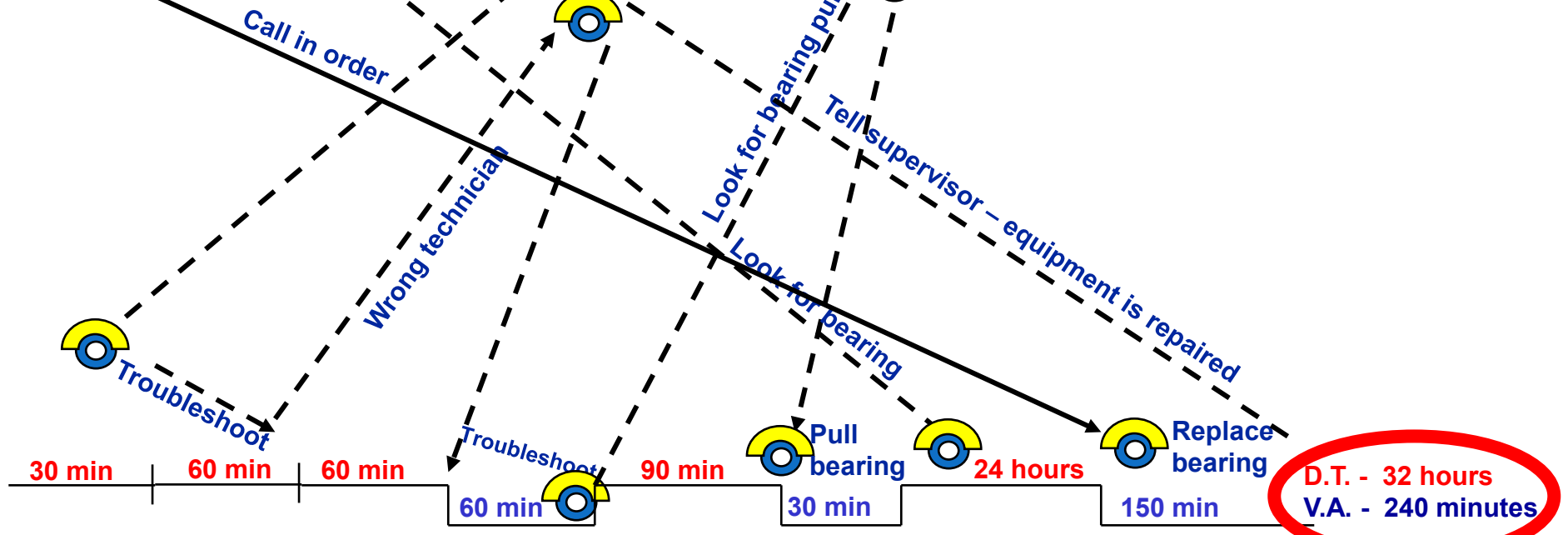
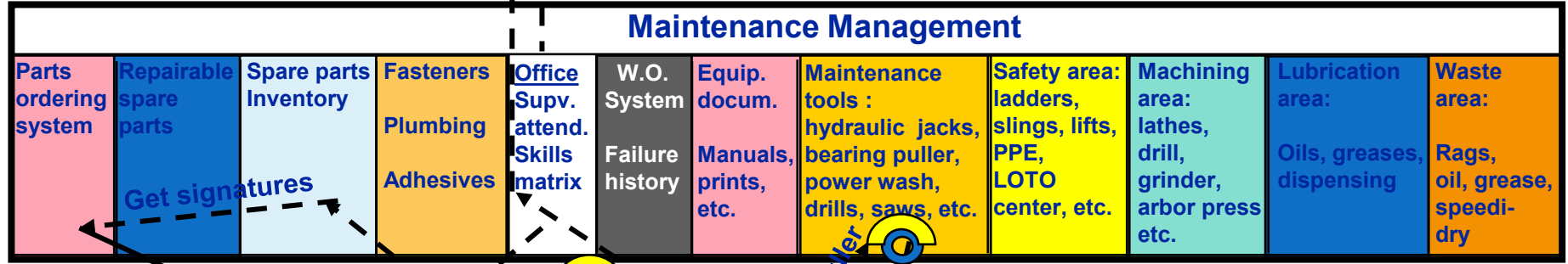
- Employs planned and scheduled maintenance activities
- Uses total productive maintenance (TPM) practices
- Uses reliability centered maintenance (RCM) decision logic
- Practiced by self-directed action teams
- Uses the 5S process
- Performs routine Kaizen improvement events
- Incorporates autonomous maintenance activities
- Multi-skilled, maintenance technician-performed maintenance
- Committed use of their work order system CMMS
- Supported by a distributed storeroom that provides parts and materials on a just-in-time basis
- Backed by a maintenance and reliability engineering group
- Performs root cause failure & failed parts analysis
- Planned maintenance optimization (PMO)
- Trends and analyzes condition monitoring results.

CURRENT STATE MAINTENANCE MAP

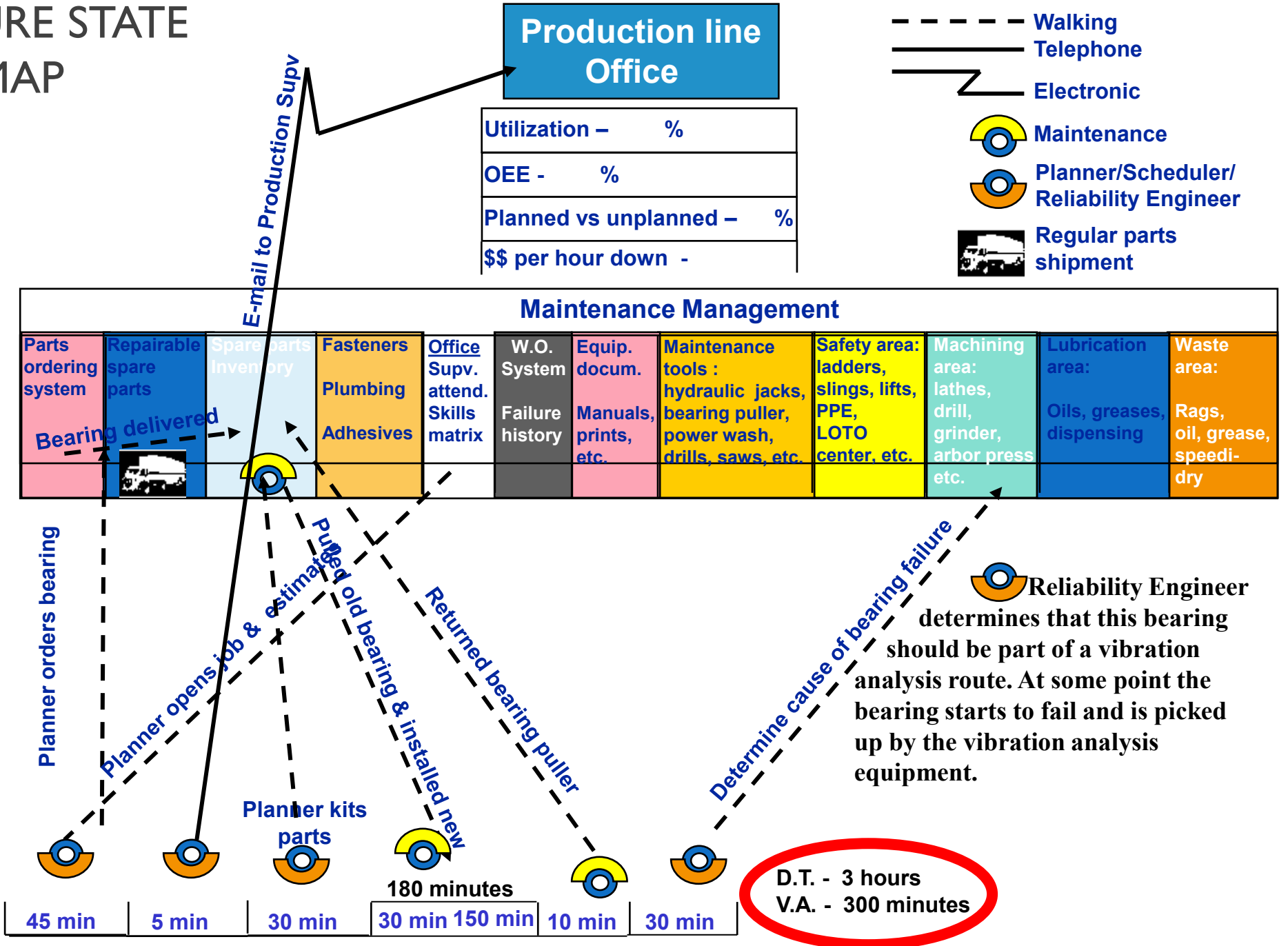
**Production line
breakdown**

Utilization -	%
OEE -	%
Planned vs unplanned -	%
\$\$ per hour down -	\$

-  Walking
-  Telephone
-  Electronic
-  Maintenance
-  Regular parts shipment
-  Emergency air Shipment



POTENTIAL FUTURE STATE MAINTENANCE MAP



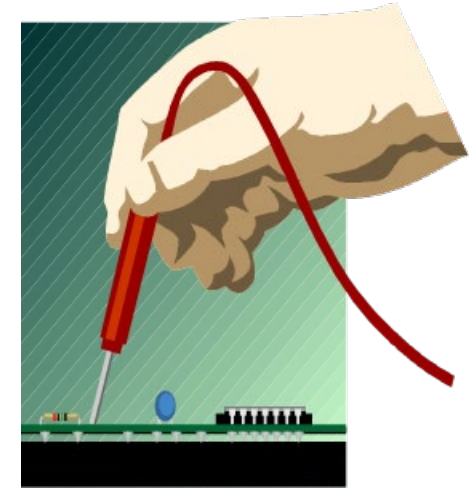


PREDICTIVE MAINTENANCE



PREDICTIVE MAINTENANCE

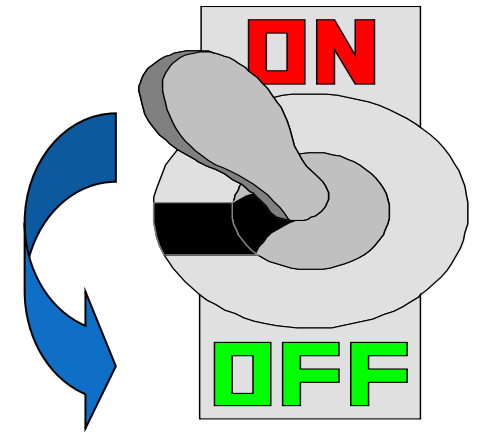
- Use of predictive tools while equipment is running/producing



- Provides early warning



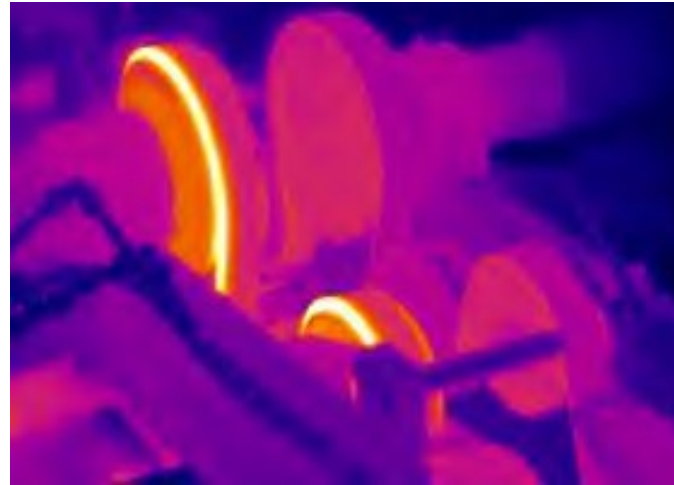
- Allows for planned maintenance



TYPES OF PREDICTIVE MAINTENANCE TOOLS



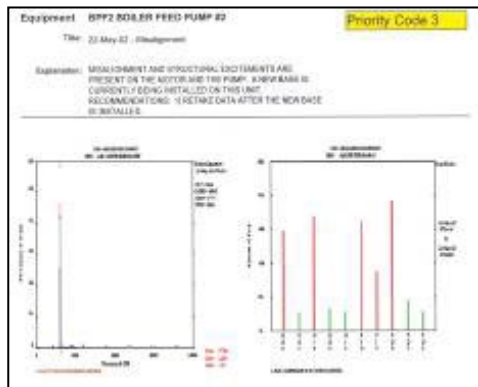
Oil Analysis



Thermographic Analysis



Ultrasonic Analysis



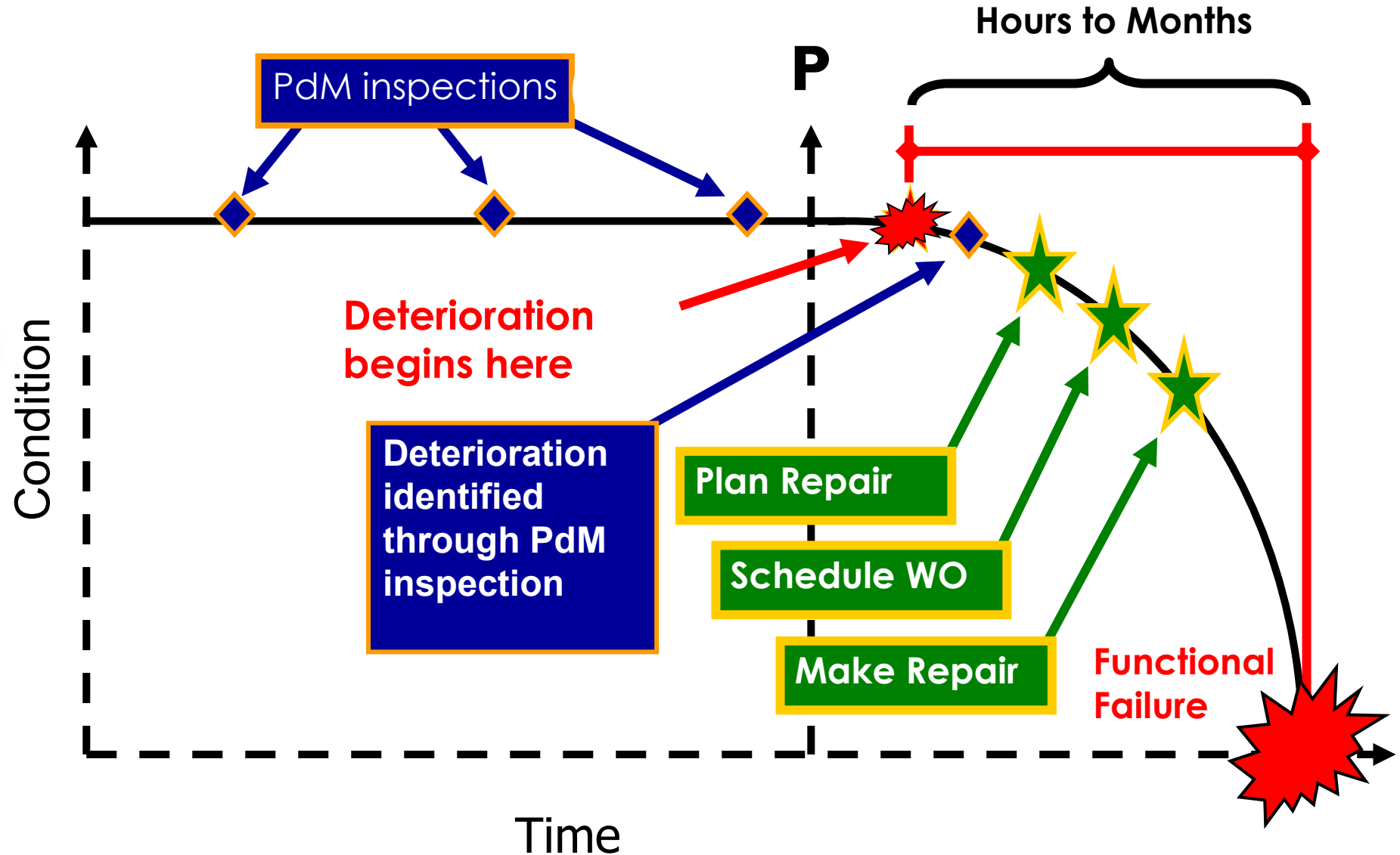
Vibration Analysis



Accuracy Checks
- Ball Bar
- Laser Interferometer

POTENTIAL FAILURE TO FUNCTIONAL FAILURE INTERVAL “P-F INTERVAL”

The P-F interval allows us to proactively plan and make the repair before the equipment fails. Effective inspections are essential.

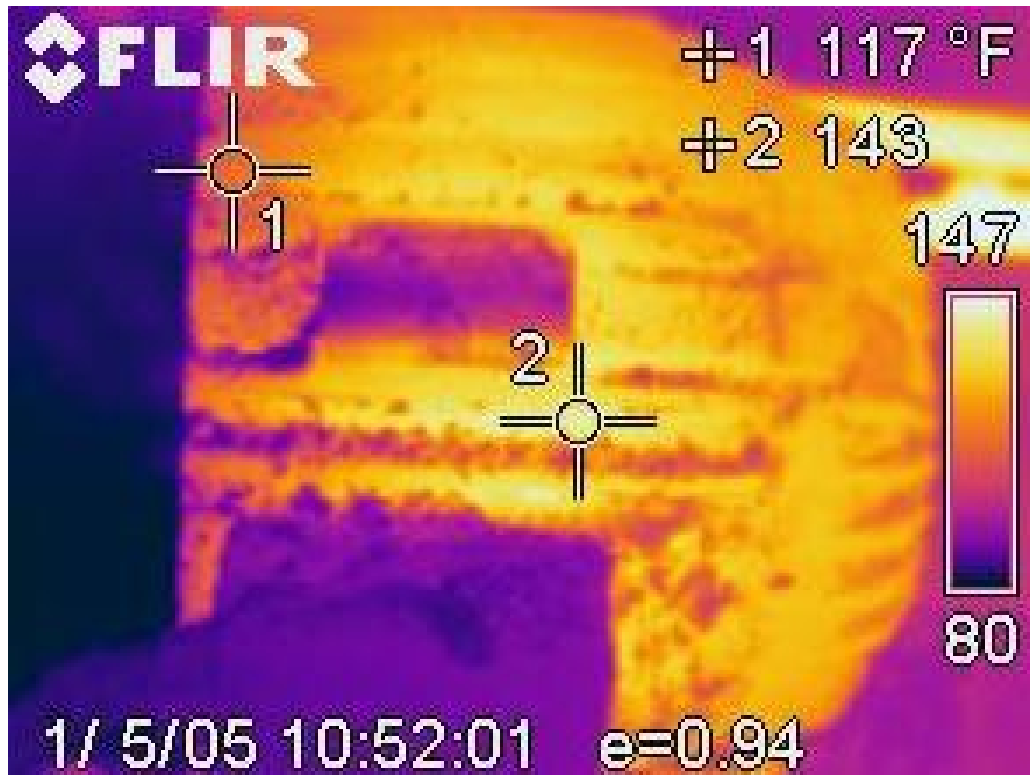


SOUNDS FROM ULTRA PROBE

Bearings (good or bad)



- Eastman Kodak study with a TEFC motor – @ 175 °F every 10 °F increase you cut motor life by 50%



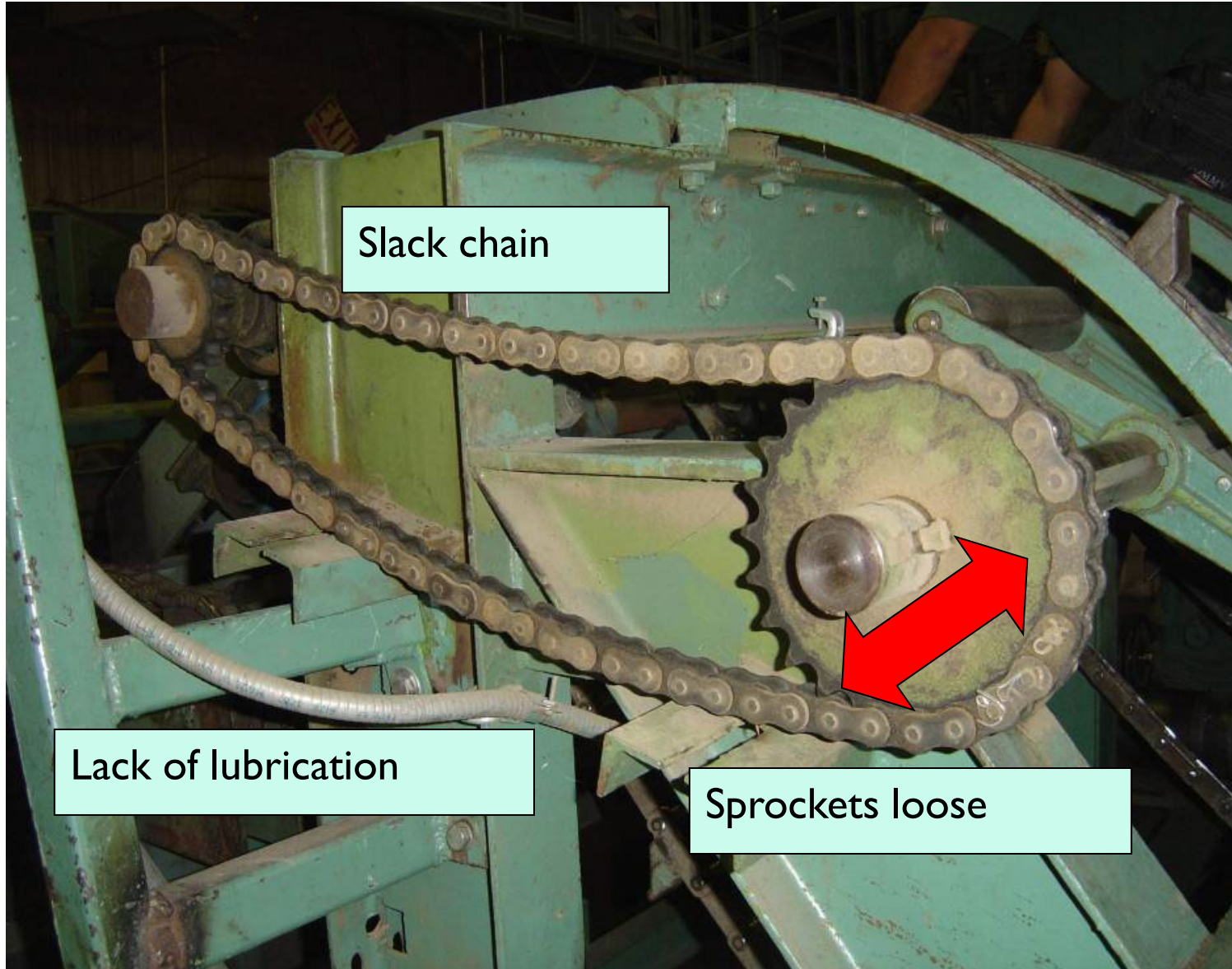


WHAT ELSE CAN WE DO?



WHAT'S THE CONDITION OF THE DRIVE CHAIN???



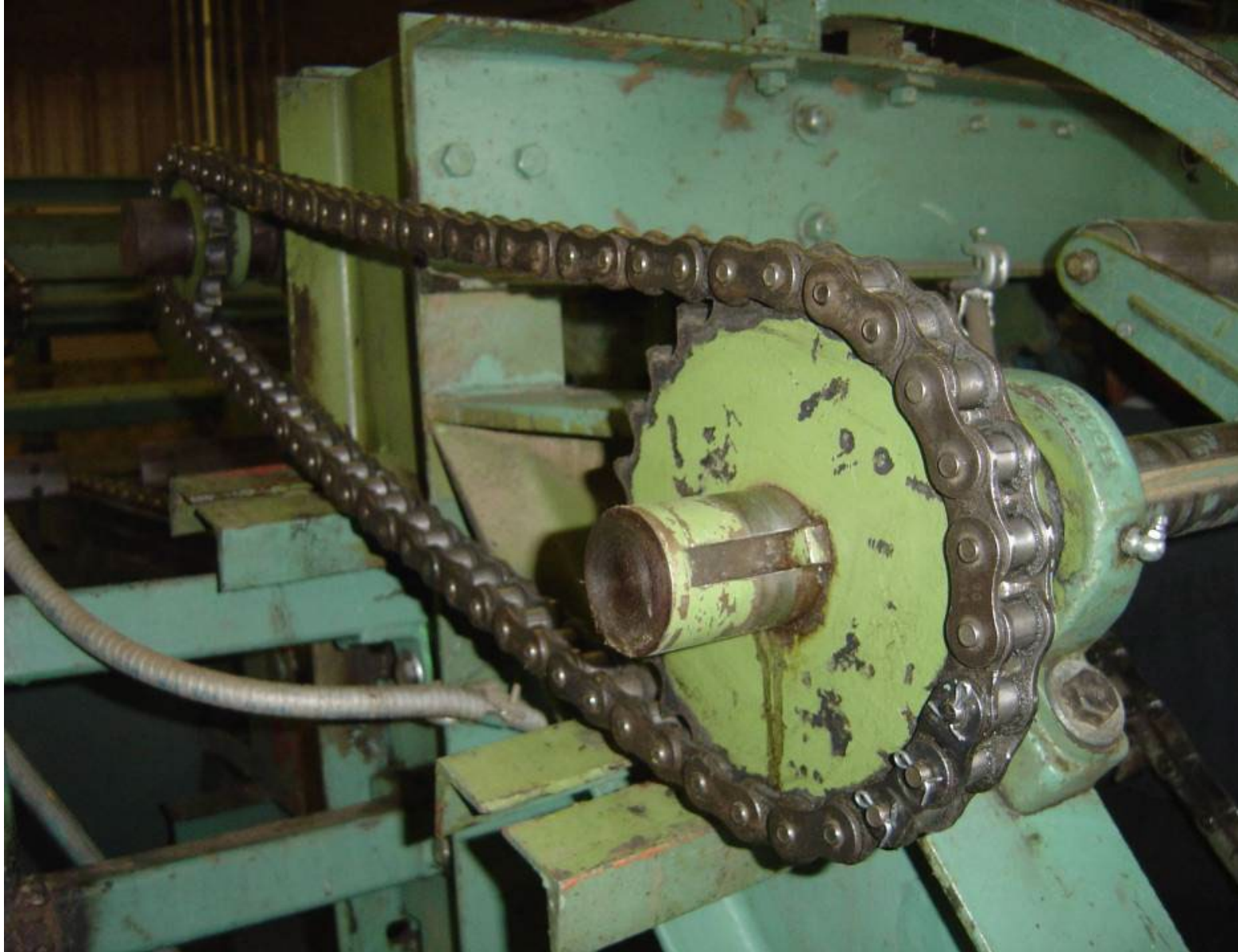


Slack chain

Lack of lubrication

Sprockets loose

CLEAN, ADJUST, AND NOW HOW TO MONITOR...



Cleaned, inspected and modified....

2

INSPECT CHAIN

LUBE POINT

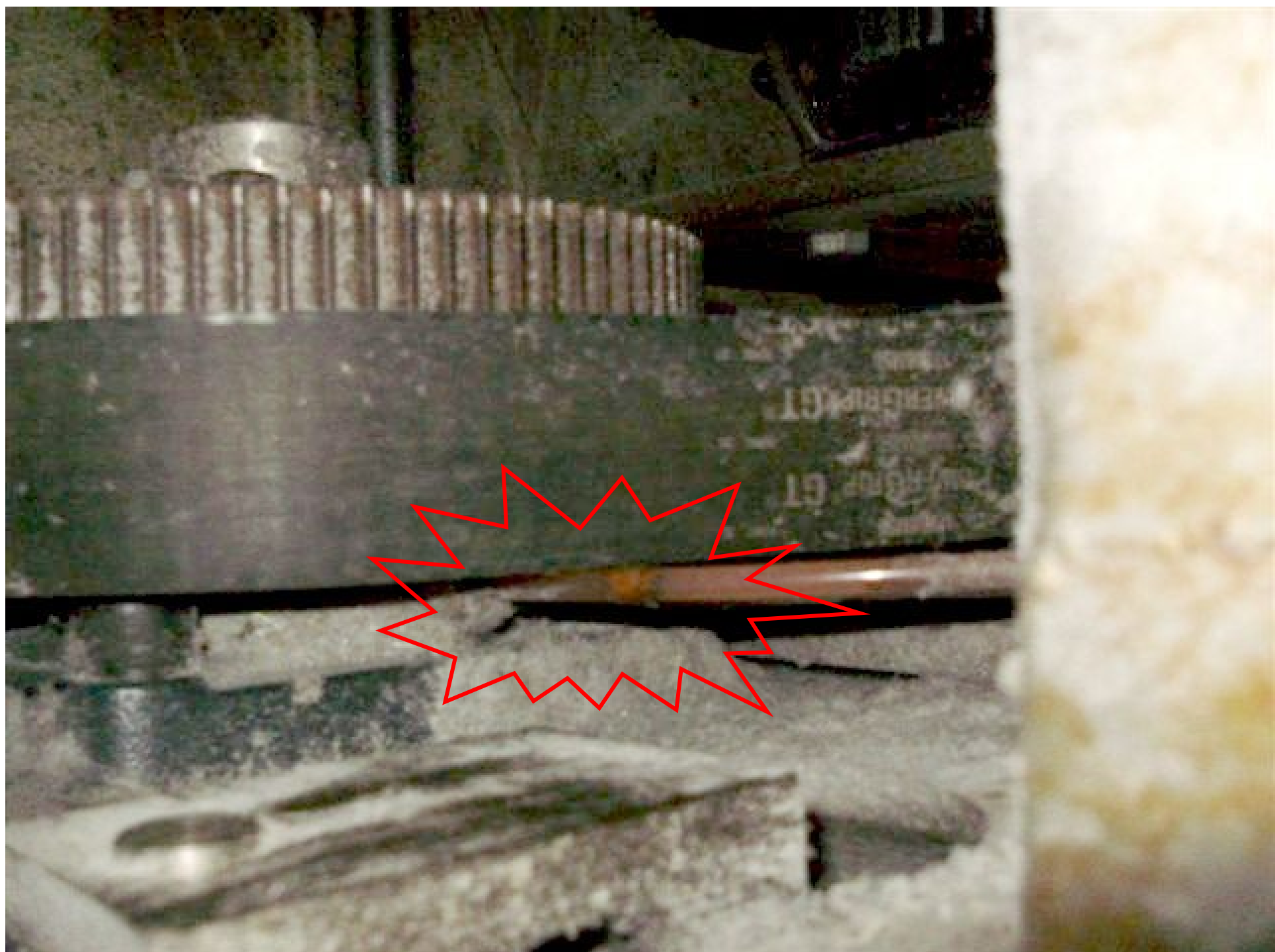


**We can inspect chain condition and lubricate without locking out ...
OEE Improved.**



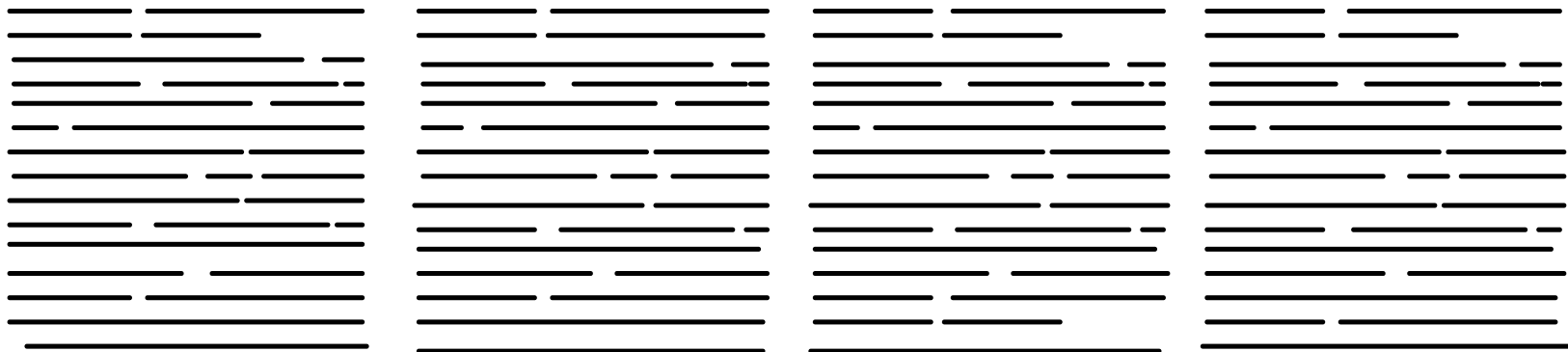
IS THIS ENOUGH DETAIL TO DO THE JOB RIGHT?

- Step 1. Safety | Lock-Out Machine as applicable-Refer to Machine Lock-Out Procedures,
- Step 2. Safety | Once all required services / checks are completed
- Step 3. Safety | Ensure that proper PPE is used.
- Step 4. Lock-out Tag-out procedure | Locate Lock-out Tag-out procedures
- Step 5. Lock-out Tag-out procedure | Lock down the Machine.
- Step 6. Lock-out Tag-out procedure | Review Lock-out Tag-out procedures for updates
- Step 7. Lock-out Tag-out procedure | Check all mechanical guards.
- Step 8. Payoff #1 60" unit | Lubricate 4 zerk fittings with.
- Step 9. Payoff #1 60" unit | Lube open gears
- Step 10. Payoff #1 60" unit | Lube 2 Screws
- Step 11. Payoff #1 60" unit | Check 1 Gearbox
- Step 12. Multi-pay-offs | Lubricate 27 zerk fittings.(in between pay-off yellow cover on the floor. 1 fitting on shaft.
- Step 13. Multi-pay-offs | Lubricate 65 zerk fittings total.
- Step 13. Multi-pay-offs | Lubricate 65 zerk fittings total.
- Step 14. Multi-pay-offs | Check 2 Gearboxes
- Step 15. Multi-pay-offs | Lubricate 3 zerk fittings on main shaft
- Step 16. Tape Unit #1 | Lubricate 2 zerk fittings each.
- Step 17. Tape Unit #1 | Check for oil level in gear boxes of main machine and tape units.
- Step 18. Drain Wire Applicator | Lubricate 2 zerk fittings.
- Step 19. Tape Unit #2 | Lubricate 2 zerk fittings each.
- Step 20. Tape Unit #2 | Check for oil level in gear boxes of main machine and tape units.
- Step 21. Capstan | Lubricate 8 zerk fittings.
- Step 22. Capstan | Check Gearbox oil levels
- Step 23. Take Up | Lubricate 10 zerk fittings.

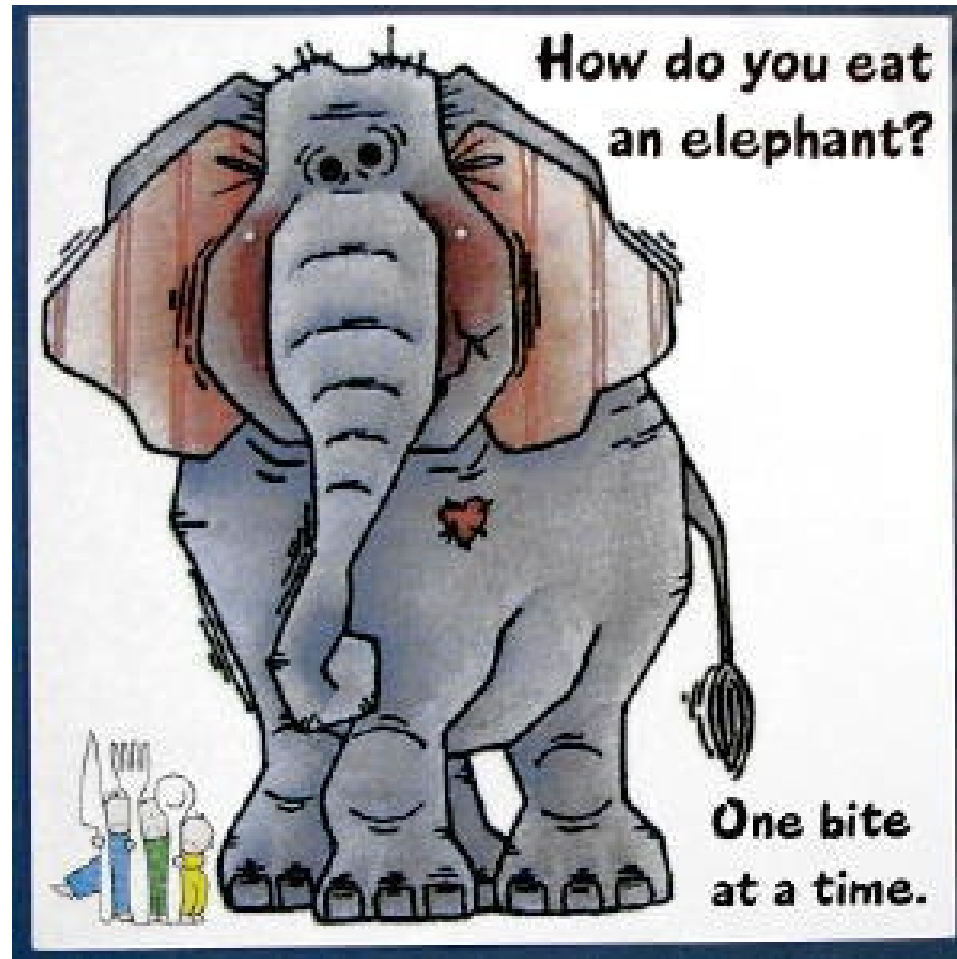


EXTRA!!! The Times EXTRA!!!

**If you do not schedule time
on your equipment for planned
maintenance, your equipment
will schedule that time for you!**



WHERE TO START?



Fuss & O'Neill Manufacturing Solutions
thanks You for your hospitality...

Jeff Craig, CMRP, MS
Senior Project Manager

