

The webcast will begin at 12:00 pm Central Standard Time

Doing TPM? Take a Tip From Vince Lombardi

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Vice President, Vesta Partners

Part 2 of the
Masters of Maintenance & Reliability Webcast Series

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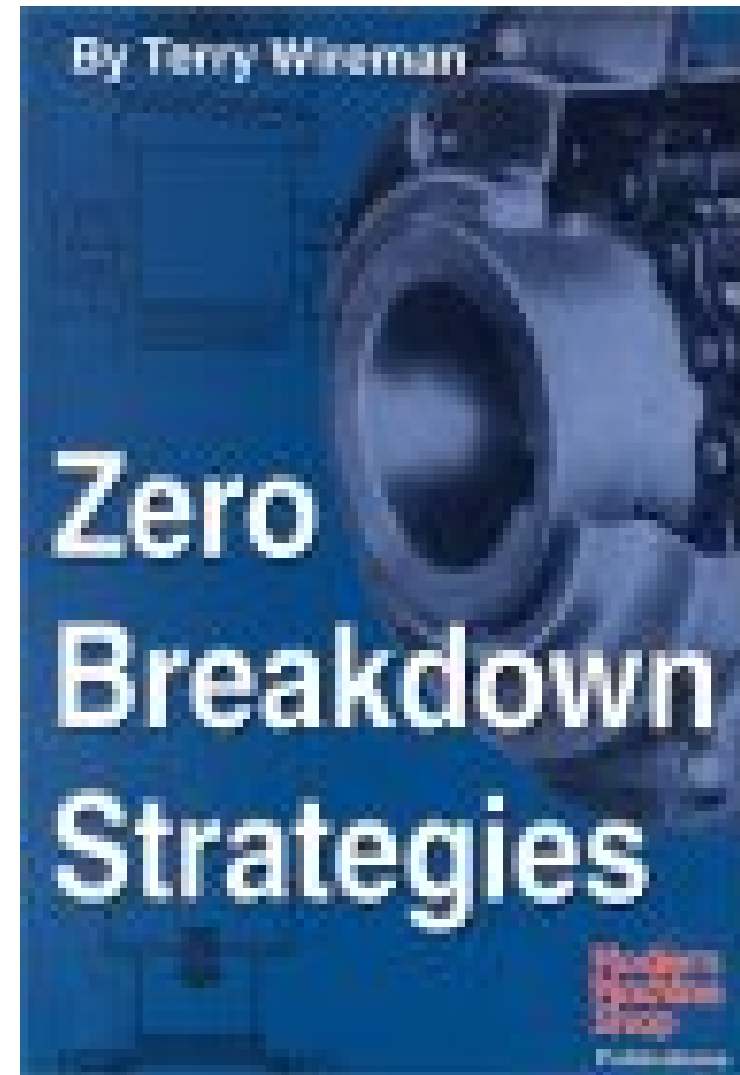


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Zero Breakdown Strategies

- The presentation material is taken from this textbook



Vince Lombardi – Words of Wisdom

If winning isn't everything...
why do they keep score?

Agenda

- TPM, Zero Breakdown Strategies, and the Basics
- Understanding Basic Component Design
- Five Steps
 - Maintain Basic Conditions
 - Maintain Operating Standards
 - Deterioration Prevention
 - Improving Design Weaknesses
 - Preventing Human Error
- Beyond the Basics

Zero Breakdowns

Is this really achievable at your plant or facility?

More Words of Wisdom

We would accomplish many more things
if we did not think of them as impossible.

Zero Breakdowns

- Why Not???
- Zero Defects??
- Six Sigma Quality
- Zero Breakdowns??
- Six Sigma Reliability

Zero Breakdowns

- At what cost??
- When does the cost of reliability exceed the benefits achieved??

Profitability

- Plant Profitability is affected by equipment capacity and maintenance costs.
- One cannot be separated from the other.
- All decisions must factor in the cost of maintenance and the value of lost capacity due to a failure.

Zero Breakdowns

How expensive would the tools to get to zero breakdowns really be....??

More Words of Wisdom

The quality of a person's life
is in direct proportion to
their commitment to excellence,
regardless of their chosen field.

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Component Design, Operations, and Maintenance Basics

- Fasteners
- Lubrication
- V-Belts
- Roller Chain
- Gears
- Couplings

More Words of Wisdom

- Dictionary is the only place that success comes before work.
- Hard work is the price we must pay for success.
- I think you can accomplish anything if you're willing to pay the price.

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 - **Cleanliness** – Tightness - Lubrication
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Maintaining Basic Conditions

- Equipment Cleaning
 - Why do we clean equipment?
 - Technical Reasons -
 - Heat...
 - Motors
 - Gearcases
 - Hydraulic Systems
 - Not just breakdowns, but unnecessary replacement and related costs
 - Maintenance and Lost Availability

Temperature and Motors

- In some electrical motors the useful life is cut in half for every 10 degree centigrade temperature rise above design operating temperature.

Hubert - PM of electrical equipment

Temperature and Wiring

- A 50 degree C temperature increase causes approximately a 20% increase in the resistance of annealed copper.
 - Hubert - PM of Electrical Equipment
- More resistance creates...?

Temperature and Hydraulic Systems

- For maximum oil life, the temperature of the oil should never be over 140 degrees F.

Frankenfield – Rexroth

Temperature and Hydraulics

- In an average hydraulic system, about 20% of the input horsepower is turned to heat.

Henke – Penton

Heat and Hydraulics

- Air implosions on the outlet side of the pump can generate temperatures of 2100 deg. F.
- Fires the oil – resinous products and burnt odor.

– Fluid Power 2 – Parker Hannifin

Heat and Hydraulics

- Percent of oil life expectancy has a 50% loss for every 15 degree increase in operating temperature above 140 degrees F.
- At 215 degrees the expected life is 3% of design.

Hydraulics and Pneumatics Magazine - 12/73

Bearings and Heat

- 52100 bearing steel can be operated at temperatures as high as 250 degrees F
- Standard seals have a useful temperature range of -70 degrees F to a maximum of 225 degrees F
- Standard greases will provide satisfactory performance at temperatures up to 175 degrees F

Bloch & Geitner - Machinery Component Maintenance & Repair

Electronic Equipment

- **Electronic components of many commercial and industrial systems are temperature dependent.**
- **Common temperature ranges include 0° to 40°C (32° to 104°F), 0° to 50°C (32° to 122°F), and 0° to 60°C (32° to 140°F). Exceeding these temperature ranges (either above or below the specified range) can cause unexplained problems.**
- **For example, the component may produce a fault code suggesting a component failure like internal error, memory error, or processor fault.**

Electronic Equipment (cont.)

- However, upon returning the component to the manufacturer and subsequent testing by manufacturer, the device is reported as "NO PROBLEM FOUND" by the test department (when tested at room temperature - - 22°C [72°F]). This is because many of these problems are 'temporary' or 'self-curing' and vanish when the component is returned to the proper temperature range.

Facilities

This adds another dimension

Floors

- No matter how hard you work to enhance a school building's appearance, dirty floors can immediately detract from a facility's overall image and reputation.
- That can become obvious in the winter: a building that accumulates one pound of dirt on its floors in the summer can collect 12 to 15 pounds when the weather is cold and wet.

Importance of Prevention

- **Effective entrance matting can remove nearly 100 percent of dirt and water from people's shoes by the time they reach a floor surface.**
- **As much as 80 percent of the dust, dirt and grime in a building is tracked through entrances and can damage floors and carpets permanently. According to reports by the International Sanitary Supply Association, it can cost more than \$500 to remove a pound of dirt after it has been tracked into a building.**

Importance of Prevention

- Further studies indicate that without adequate matting, just 1,500 people entering a building will remove 42 percent of a floor's finish within the first six feet of an entrance.

More Words of Wisdom

Winning is not a some time thing

It's an all time thing

You don't win once in a while

You don't do things right once in a while

You do them right all the time

Winning is habit

Unfortunately, so is losing

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Maintaining Basic Conditions

- Proper Fastening Procedures
 - Tools for Fastening -
 - Channel Locks - Crescent Wrenches
 - Torque Wrench
 - Hardness of Fasteners

Fasteners

- 50% of all fastener failures occur due to:
 - Improper Assembly
 - Incorrect Torque

Fasteners

- Which do you turn when tightening bolts in a coupling?
 - The bolt or the nut?
- The nut - since turning the bolt will wear material from it
 - This is destructive since coupling bolts are body fit bolts.

Fasteners

- Leaks in many flanges, piping systems, gearcases, etc. can be traced to improper fastening procedures, especially bolt torquing.

Flange Leaks

- Uneven Bolt Torque
- Poor Flange Alignment
- Poor gasket installation
- Poor condition of flange faces
- Excessive piping strain

Fasteners

- Do not use a nut more than twice.
- Bolts and nuts should be match weighted.
- Grade of bolt for coupling??
 - Elongated holes in coupling

More Words of Wisdom

Some of us will do our jobs well

And some will not,

But we will be judged by only one thing –

The result.

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Maintaining Basic Conditions

- Proper Lubrication
 - The right lubricant
 - The right quantity
 - The right application method
 - The right frequency
- Power Grease Gun
- Bearings & Lubrication

Maintaining Basic Conditions

- Proper Lubrication
 - Gearcase Breathers
 - Clogged
 - Missing
 - Replacements

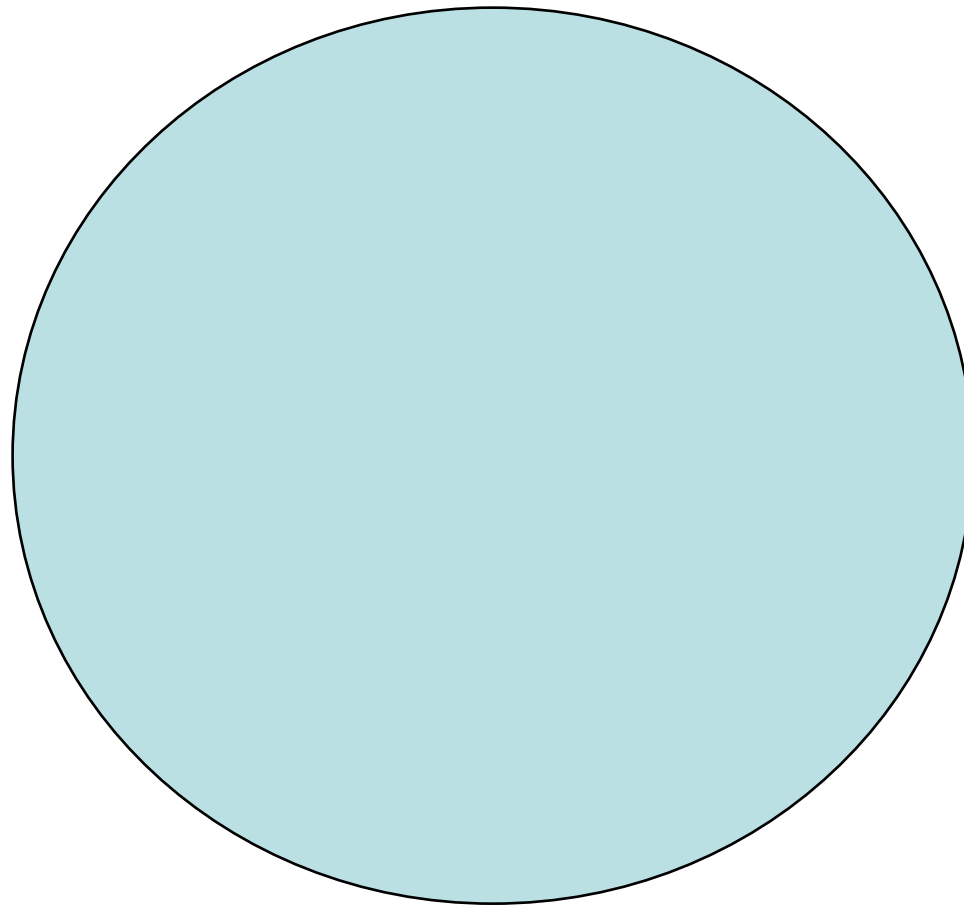
Maintaining Basic Conditions

- Lubrication
 - Water
 - .03% to .2% = 50% to 17% life expectancy
 - 1% = 6.3% of life expectancy
 - 2% = 4% of life expectancy
 - With Mineral Oil, 20ppm of water, the roller bearing life is reduced by 48%
- Storage
 - Vertical or Horizontal?
- Mixing
 - Compatibility Charts

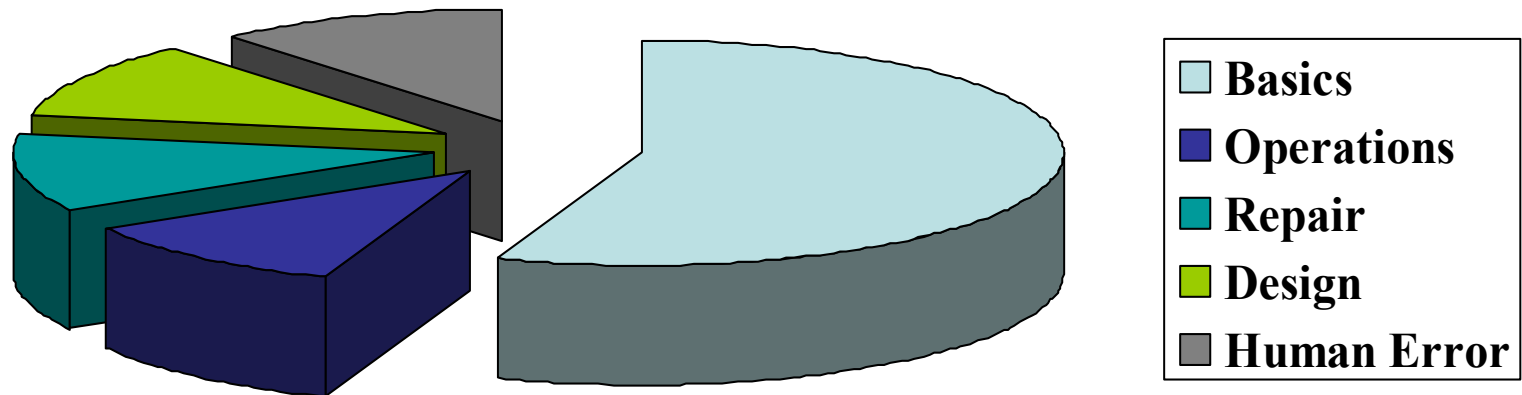
More Words of Wisdom

Once you learn to quit, it becomes a habit.

- What Percentage of all Your Equipment Breakdowns have a root cause in any of these areas?



Zero Breakdowns - Basics



Engineer's Digest Study

More Words of Wisdom

Some people try to find things
in this game that don't exist.

But football is only two things –
blocking and tackling.

Excuses

- We are different!
- They are not in food processing, automotive manufacturing, primary metal production, etc
- They don't have our business constraints.
- Our managers are not that smart!
- Our workforce doesn't have the skills!

Excuses

In almost every industry, under the same rules and with the same players, the successes of a few companies rebut the excuses of the many.

Reengineering the Corporation – Hammer and Champy

Final Question

- These five steps may not have eliminated all of your equipment problems...
- But...

Final Question

...

- How close to zero will the five steps get you...
- And...

Final Question

- How much did these five steps cost you?
- What would your return on investment in a zero breakdown program be???

Final Words of Wisdom

Perfection is not attainable

But if we chase perfection

We can catch excellence.

OK, Just One More...

The achievements of an organization
Are the results of the combined efforts
Of each individual.

Questions & Answers

Type your questions into the Q&A box at the bottom right of your screen.

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- Presenter: Ellis New
- Senior Mgmt Consultant, Productivity Inc.
- Time: March 27, 2009, 12:00 pm CST

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Comments / Suggestions

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Thank you for participating!