IJC PREDICTIVE MAINTENANCE PRACTICES AND ITS IMPACT ON RELIABILITY

Indo Jordan Chemical Co

IJC PREDICTIVE MAINTENANCE PRACTICES AND ITS IMPACT ON RELIABILITY

ABOUT THE COMPLEX

- The Phosphoric Acid Complex consists of
  - 700 MT P2O5 / day Phosphoric Acid plant, based on Hydro Agri's (Norway) Single Stage Hemi Hydrate process.
  - 2,000 MT H2SO4 /day Sulphuric Acid plant, based on Monsanto's (USA) Double Conversion Double Absorption process.
  - Associated Utilities.
- In addition, Phosphoric acid storage facility at Aqaba consists of
  - 4 X 5,000 m3 capacity storage tanks.

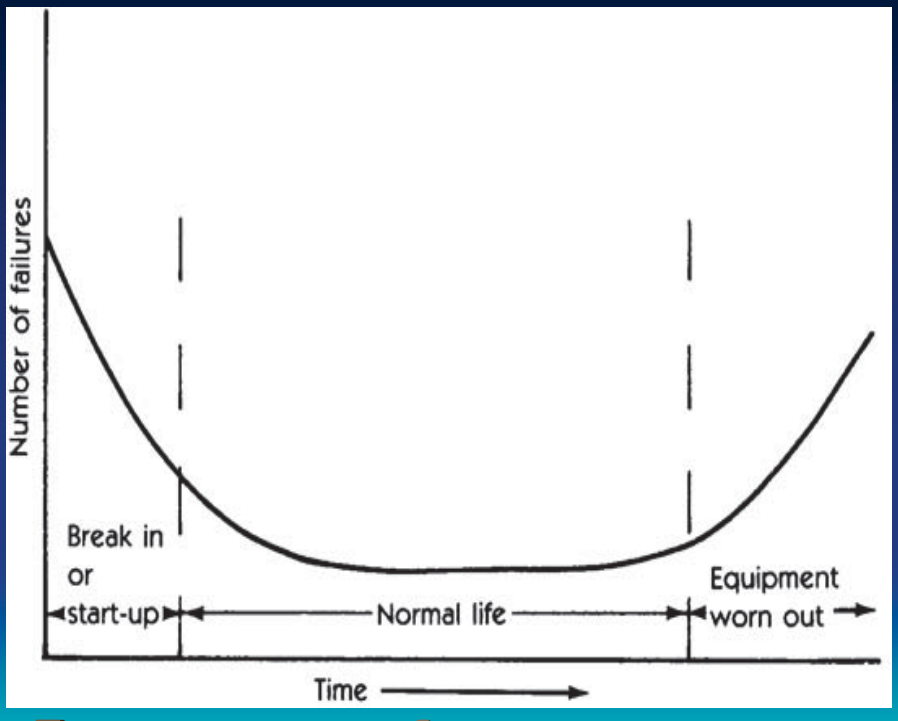
Contents:

1. Difference between preventive maintenance and predictive maintenance.

Preventive maintenance:

- Preventive maintenance is maintenance that is regularly performed on a piece of equipment to reduce the chance of failure .
- Preventative maintenance is performed while the equipment is still working, so that it does not break down unexpectedly.
- All preventive maintenance programs are **time-driven**, that is mean that maintenance based on history .

- Preventive Maintenance depend on MTBF



Predictive maintenance:

- The aim of predictive maintenance is to predict when equipment failure might occur.
- To prevent occurrence of the failure by performing maintenance.
- It is philosophy, or attitude, simply stated, uses the actual operating operation condition of plant equipments and system to optimize total plant operation.
- Predictive maintenance is a **condition- driven** preventive maintenance

2. IJC Implemented predictive maintenance in addition to preventive maintenance.

Preventive Maintenance	Predictive Maintenance
• Routine of scheduling.	• Data about the equipment is collected and analyzed .
• Performing repair tasks before it becomes necessary.	• Performing repair to predict a machine breakdown or failure.
• Unneeded repairs can happen.	• Repairs are made as needed.
• More cost.	• Less cost.
• Reliability is less.	• Reliability is high.

3.Steps Were Followed To Implement Predictive Maintenance.

Objective

- Minimize unscheduled equipment failures.
- Minimize maintenance cost.
- Minimize lost production.

Procedure

- Determine the equipments should be monitored.
- Determine the parameters that describe the operating condition.
- Finalized the required technique need to be followed for each equipment.

Documents

- Create standards. It is important to create standards for the implementation of the technology, analytical standards and reporting standards.
- Prepare the required documents need to be filled by the team.

3. Steps Were Followed To Implement Predictive Maintenance.

procurement

- Identify what type of instrument to be used.
- Procurement for required instruments. (vibration monitoring, thermometer

Training

- Dedicated and accountable personnel
- Train the required team for the task.
- Train the team to use the tools. Tools manufacture can help to train them.

Feed Back

- Check the accuracy of the data.
- Share the result with your team.

Predictive maintenance technique

1- Vibration Monitoring

- Portable Vibrometer is used.

- Identify the location for measurin and reference reading.
- Vibration readings were plotted.
- RCA for high vibration.
- Future plan: introduce the vibration analyzer.

2- Tribology

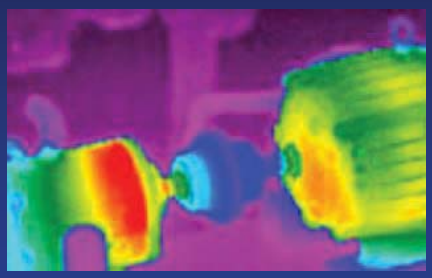
- Lubricating oil analysis.
- Conserve and extend the useful l

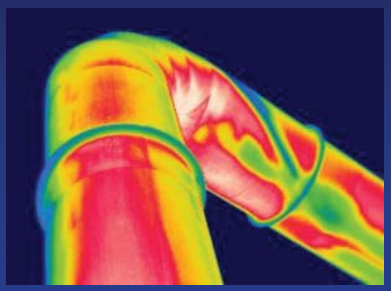
lubricants.

- Wear particle analysis provides direct information about the wearing condition of the machine.

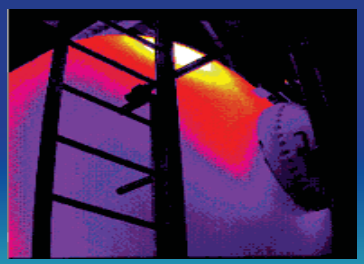
3- Thermography

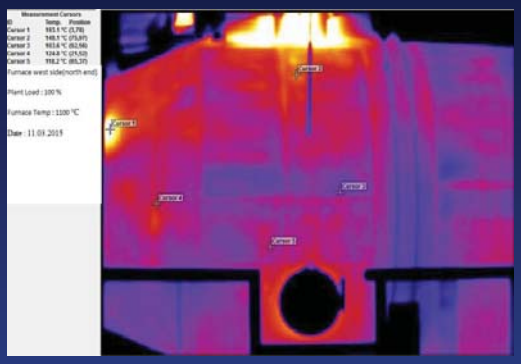
- Identify the high temperature in equipments, that is indication for high friction.
- High Temp in lines, vessels.

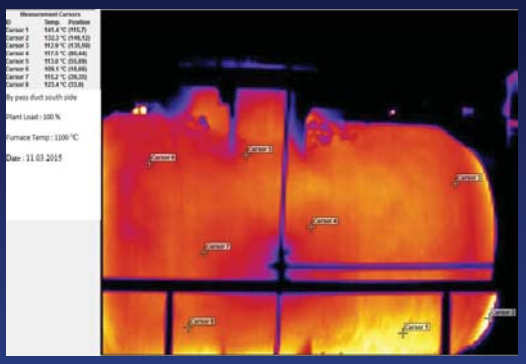




- High Temp in electrical items.







4- Visual inspection

a) Ultrasound

- Use to monitor the noise level.
- The turbulent flow of liquids and gases through a restricted orifice (i.e., leak).
- Ultrasonic has been, and continues to be, a primary test methodology for materials testing

2) Visual inspection

- This can vary from one to others plants.
- Checking for any up normal condition.
- Checking for any external effect on the equipments.

Boiler Details

Boiler Reg. No.	: FM-038 / 52
Make	: M/s. Thermax Babcock & Wilcox Limited.
Year of Commissioning	: 1997
Boiler Capacity	: 30.6 TPH
Steam Pressure	: 12 Bar
Steam Temperature	: 192 °C (Saturated)
Duration of Study	: October 14th to October 17th 2014

Test scope and procedure

SR. No.	COMPONENT	AREA / LOCATION	TESTS TO BE CARRIED OUT
1	Steam Drum	• Drum internals • 100% ligaments	• Visual Inspection. • Florescent Magnetic Particle Inspection (FMPI)
2	Mud Drum	• Drum Inside. • 100% ligaments	• Visual Inspection. • Florescent Magnetic Particle Inspection (FMPI)
3	Water wall tubes	• Overall • On every alternate tube on RHS and LHS and rear wall. • Tube Sampling (3 Nos.)	• Visual Inspection • Ultrasonic Thickness Gauging. • Furnace wall tube sample for Laboratory testing.
4	Boiler bank tubes	• Overall • On accessible locations (Front and rearmost rows) at 2 elevations • On randomly selected tubes through drums	• Visual Inspection • Dimensional Measurement • Ultrasonic Thickness Gauging • Fiber optic Inspection
5	Boiler Operation & Maintenance	• Failure History study. • Boiler Operation Study. • Preservation methods study, if any. • Boiler maintenance study. Log sheet data study.	• Since commissioning

5. Achievement and Impact on Reliability.

- Ability to minimize the sudden break down for all rotary equipments.
- Increase the belt life in our horizontal vacuum belt filter to 4 years compare with before 3 years life. By close monitoring for the hardness and visual inspection.
- Replacement the waste heat boiler just on time before catastrophic failure.
- Replacement the turbine rotor just on time to improve the efficiency and prevent high vibration in turbine.

- Re gasket for plate heat exchanger before efficiency get reduced.
- Minimize the over-time cost.
- Minimize the inventory.

Conclusion

If we don't apply the Pdm

- Maintenance always need to be standby.
- Maintenance Over-Time will be increased.
- Damage will extend further.

If we apply the Pdm.

- Simply Maintenance team and Management will be happy

  - No surprise break downs
  - Reduced need for “back up” equipment
  - Minimize maintenance resource

THANKS