RE-ENGINEERING AND BEST MAINTENANCE PRACTICES


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Abstract :

We at PSPD Kovai unit adopted TPM as Business model. TPM is a great competitive weapon that reduces costs, improves quality and improves bottom line.TPM Practices are the current system of operation, which cover all the employees and managers of the plant and works on the multi-skilling concept.

Introduction

ITC Limited, PSPD, Unit Kovai is situated at Mettupalayam, in the Coimbatore district of Tamilnadu. The Unit was taken over by ITC in the year 2004.The Plant is having a production capacity of 1.2 Lac tons per annum coated paperboard with 100% recycled paper. The Unit has a full-fledged waste paper processing plant, along with a 3 liner multi wire Board Machine with Machine Glaze (MG) and on-line coating.

Key Aspects of Maintenance in TPM methodology

- ⊡ Develop a maintenance master plan to improve overall maintain capability
- ⊡ Selection of Critical equipment
- ⊡ Need to Ensure getting the most value investment
  - ↙ OEE Improvement at right cost
- ⊡ Evaluate Predictive technologies
- ⊡ Adopt early equipment management philosophy
- ⊡ Drive improvements in maintenance planning/Scheduling

Key Themes/Elements of TPM:

- ⊡ Autonomous maintenance
- ⊡ Visual Controls
- ⊡ 5S
- ⊡ Predictive technologies
- ⊡ RCM – Reliability Centered maintenance
- ⊡ Re-Engineering to eliminate issues
- ⊡ Mistake proof systems
- ⊡ Setup Reduction
- ⊡ Understanding downtime losses (OEE, Loss tree etc)
- ⊡ Return equipment to " Ideal Conditions"
- ⊡ Trainings

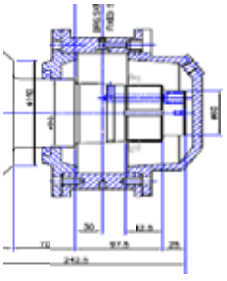
We now go through some of the success stories which yielded a break through results in Key Performance Indicators by adopting the above said TPM approach

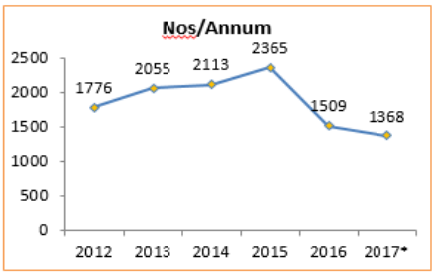
Case Study 1 - Reliability Action for Bearing consumption reduction

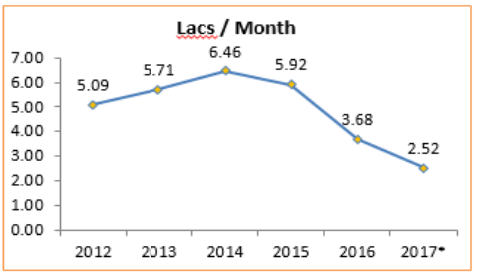
Trend of Achievement of bearing Consumption reduction through Best Maintenance Practices

List of Maintenance practices evolved

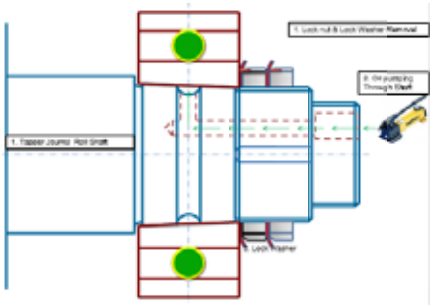
1. Autonomous Maintenance of Equipment through Clean Lubricate Tight Inspect (CLTI) tools by Operators
2. Vibration Analysis for all bearings
3. Low RPM bearings example – MG monitoring with ultrasonic instrument
4. Wear Debris analysis for Oil.
5. Elimination of suction press roll bearing failure through addressing the design related issue.
6. All Dryer felt roll journal change to Taper Journal in phased manner.



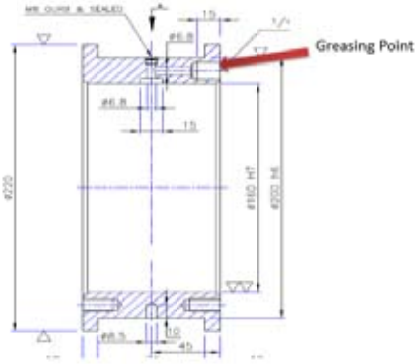




7. Grease sample test for felt roll bearing- To asses bearing condition.
8. Dryer felt roll bearing size increasing at high wrap angle locations eg : Stretchers.
9. Double locknut provision made for all

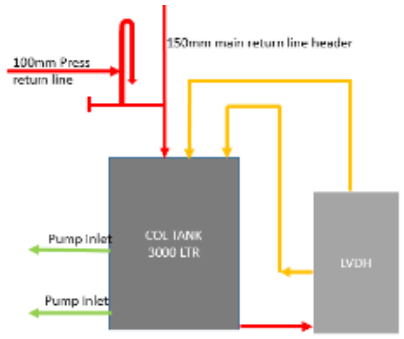


10. Dryer felt roll bearing lubrication point changed to Center point of housing to ensure proper lubrication.

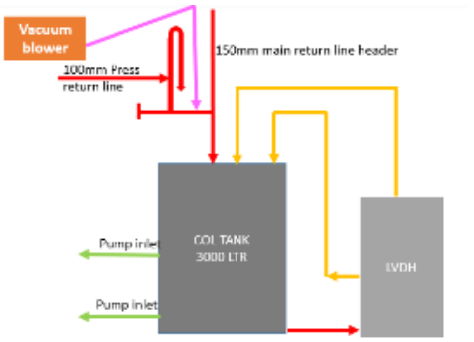


11. Standardizing Dryer Felt roll design to suit to increased machine speeds.
12. Modification of rope pulleys design to reduce failure.
13. Selecting a suitable grease for high temperature applications.
14. Vacuum blower installed in Main COL Line to address the low oil input to dryer bearings.

Vacuum blower to increase oil flow & arrest Oil leakage – In the Board Machine dryer cylinder bearings are oil lubricated. Bearing failure was persisting and root cause identified was insufficient oil flow to bearing block. The Oil flow to the dryer bearings is quite low ranging from 0.2 – 0.5 LPM which is the main issue which is resulting in low lubrication at the required zone, thus the flow is to be increased. The oil used to overflow from brg housing whenever the flow is increased, as the return oil header slope is insufficient.As correcting the slope of return header calls for major downtime and investment alternatives were identified through brainstorming. A vacuum blower was installed and connected to the return header to maintain negative pressure. This helped in increasing the oil flow to the dryer bearing and failures reduced.

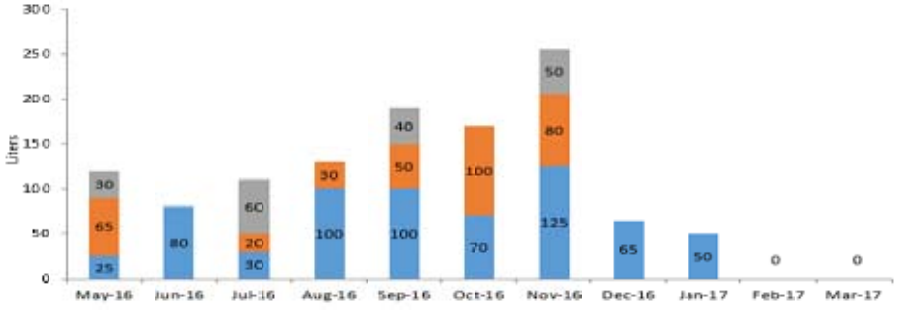


Before System



After System

Other linked Results – COL Oil Consumption report

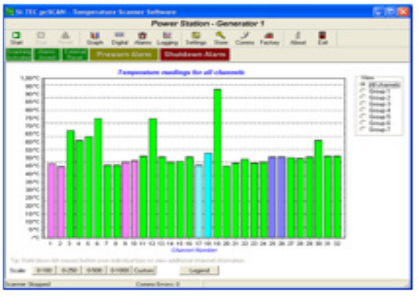


15. Temperature Scanner for dryer felt roll bearing

In Paper Machine, dryer hood felt rolls are grease lubricated. Since its within hot hood, human accessibility is not possible for bearing checking. Installing remote vibration sensors is a expensive solution. RTD scanner is cheapest solution for monitoring felt roll bearings. Any abnormalities can be identified through temperature profile.

Temperature Indication

Sensor Installation



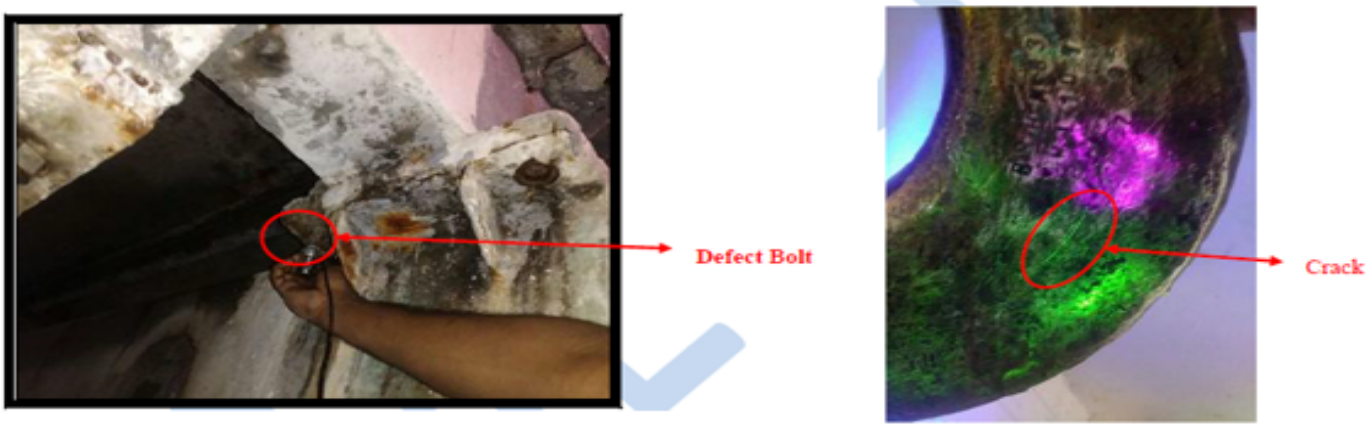
16.NDT Test for rolls for identifying roll cracks

Problem: Failure of Felt Rolls due to Journal cut.

Constraints: With the present condition monitoring technique, defects in the journals cannot be detected. Every failure results in downtime and damage of the felt or screen

Solution:NDT test was carried out for all Press &wire rolls to identify journal defects.

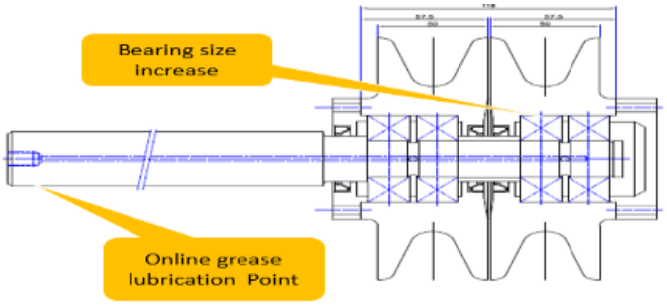
Images of the defect identified



17. Rope Pulley Failure rectification through TPM tools

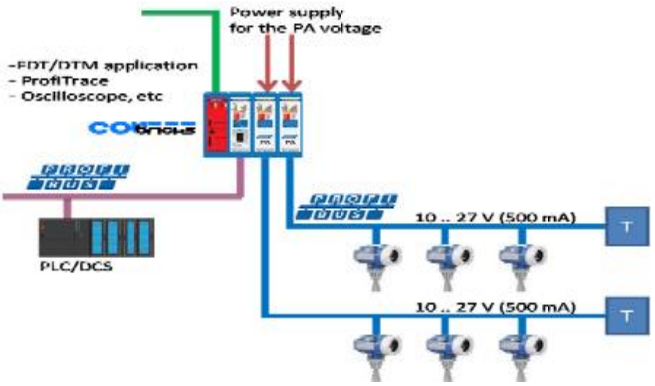
In Paper Machine, there are more than 200 rope pulley to carry & guide rope.Repetitive failures use to occur in rope pulleys like bearing failure & pulley crack. A structure 4 M approach was taken up and major cause of cause for Bearing failure was identified as insufficient grease. This area doesn't have online lubrication facility, in shutdown lubricating 200+ locations is a cumbersome work.

Thus PM team evolved a three stage correction in the system to eliminate the same. 1. Changed MOC of Polypic Pulley to Metal pulley with online greasing provision, 2. To Provide Oil seal provision of rope pulley bearing 3. The Bearing size increased from 6006 to 6306(As illustrated in schematic below)



Case Study 2 - ComBricks to detect Profibus Communication Failures

Paper Machine sectional drives has 50+ drives.All drives are communicated to PLC thru serial communication via Profibus network. Since its serial communication, any interruption in communication link will lead to stoppage of machine.Identifying such failure location is time consuming. Thus through re-engineering technique, a ComBrickswas provided which will monitor Profibus healthiness in online & will indicate strength during normal operation.It will alert weak junction well before failure and it can be rectified.



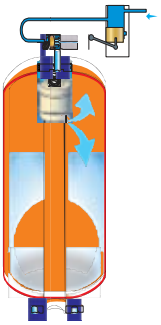
ComBricks to detect Profibus Communication Failures

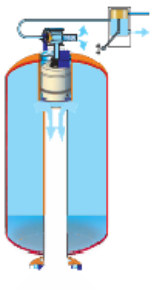
Case Study 3 - Air Blaster for Boiler Bunker

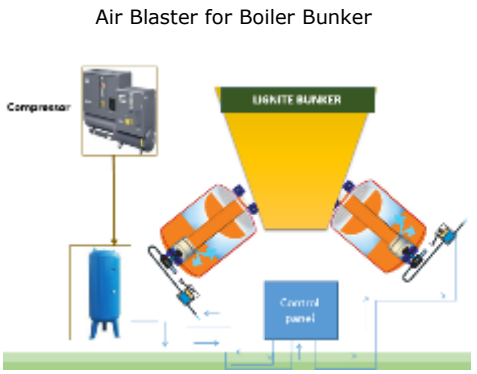
Objective: Boiler bunker capacity is 300 Mt, But due to sticky nature (45% Moisture) of fuel, not able to utilize the bunker capacity beyond 30%. Coal handling was operated in all 3shifts for about 3 hours/ shift.

Outcome of RCA tool - Air blaster Installed to avoid stickiness of fuel in bunker.

Benefits Outcome - Coal handlingoneshift operation eliminated. Fuel flow ability improved from bunker to drag chain feeder without any intervention thus resulted in Manpower reduction also.

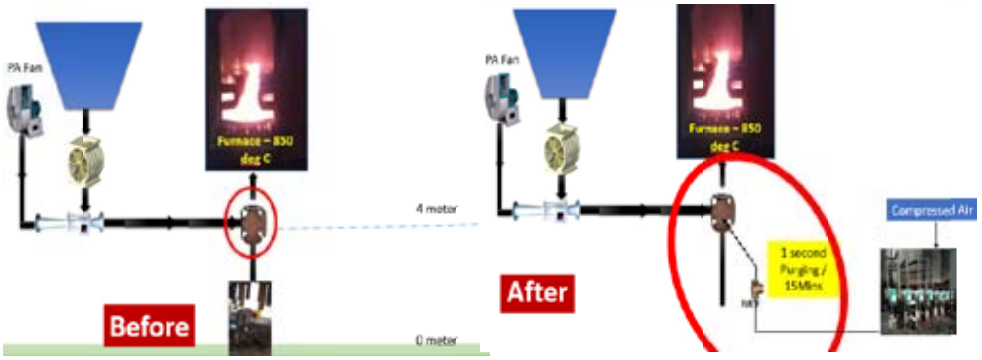






Case Study 4 - Online fuel feed line cleaning

Objective : Boiler fuel line cross cleaning is a regular & risky activity for boiler operation.



Benefits:

1. Safety risk mitigated.
2. Furnace area house keeping improved.
3. Reduce manpower.
4. Fuel line frequent jamming reduced.

Case Study 5 - Self Cleaning Screen for Boiler Fuel Handling System

Past Scenario:Lignite is our predominant boiler fuel and lignite naturally has high moisture (>50%) and it chokes existing flip flop screen mesh openings (8mm). Because of mesh blockage, screen throughput came down drastically and screen acts like a bottleneck for other conveyors.

Present Scenario: Through root cause analysis, to handle such high moisture fuel, self-cleaning type screen is installed which will clean mesh by itself. Overall system throughput increased and operating hours has come down drastically and proportional energy savings achieved.

Conclusion:

With the above case studies it clearly implies that the linkage in establishing the use of overall TPM approach will result in effective utilization of assets through

- Establishing a common comprehensive approach
- Utilize the right problem solving and improvement tools
- Systematic approach
- Equipment performance optimization through total employee involvement from top to bottom
- Leverage best practices so we can all get better in quicker fashion.
- Optimize what we have before adding new equipment.
- Ensures we are driving total organizational value.