ITC Limited - PSPD Unit – Kovai

Re-Engineering & Best Maintenance Practices

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Kovai Unit @ Glance

Mill Profile :

ITC Ltd. , PSPD , Unit: Kovai is located 42 km North of Coimbatore, Tamil Nadu

- Acquired in March 2004
- Manufacture Duplex Board from 100 % recycled fiber
- Production capacity of 1,20,000 Tons / year

Certifications:

- ISO 9001 : 2015; ISO 14001 : 2015; OSHAS 18001 : 2007
- Certified for Forest Stewardship Council (FSC)
- First Indian Manufacturing unit to gain WWF's Global Forest Trade Network Membership
- Greenco Platinum Rating
- Under GREEN POLICY, ITC Kovai is committed to monitor and improve our efforts for a cleaner environment and a better future for everyone
- Excellent Water Efficient Unit, 2007, '08, '09, '11, CII National Award

Accolades

First Greenco – Platinum rated Paper Mill in India, 2015	CII National Award
Safety award -2012 & 2015	National Safety Council of India
Productivity Award 2013, '14	Coimbatore Productivity Council
Excellent in Energy Management 2014, '15 , '16	CII National Award
Best Environmental performance-Innovative Project, 2013	CII National Award
1st Position at Green Award 2013	TNPCB, Government of Tamil Nadu
2nd Position at Green Award 2014	TNPCB, Government of Tamil Nadu
EHS Excellence Award, 2013	CII National Award
5 Star Safety Rating, 2007, '08,'10,'11	British Safety Council
5 Star Environment Rating, 2011	British Safety Council
International Safety Award, 2010	British Safety Council
Globe of Honor for Environment,2011	British Safety Council
Excellent Water Efficient Unit, 2007, '08, '09, '11	CII National Award
Excellent Energy Management, 2010, '14	CII National Award
National Energy Conservation Award, 2010	Bureau of Energy Efficiency

Organization Approach

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.

The Key Aspects of Best Maintenance Practices

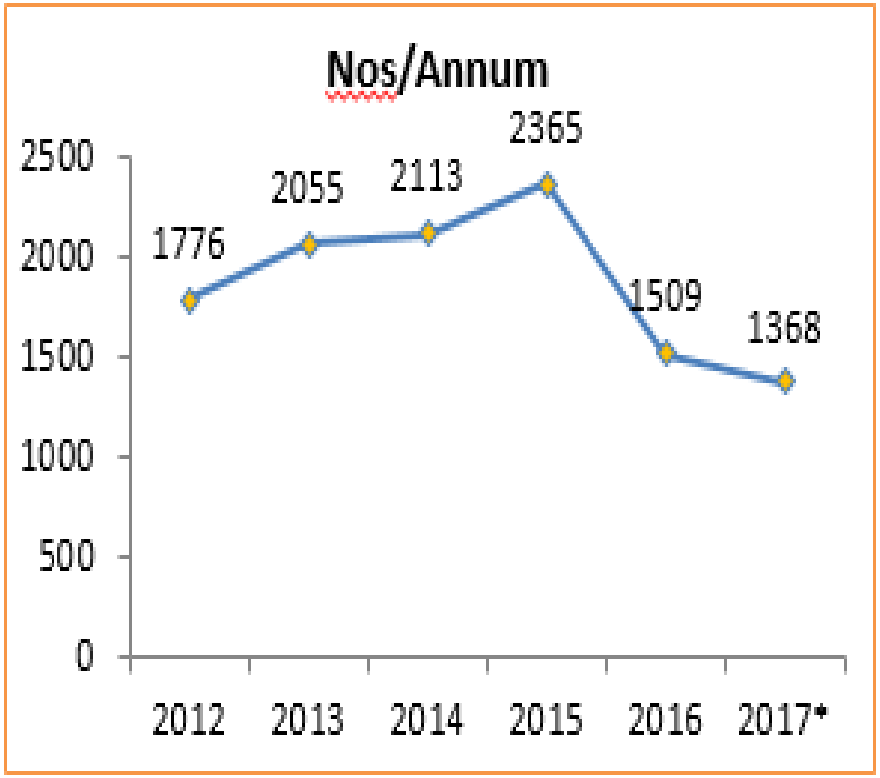
- Develop a maintenance master plan to improve overall maintain capability
- Selection of Critical equipment
- Need to Ensure getting the most value for investment
  - OEE Improvement at right cost
- Evaluate Predictive technologies
- Adopt early equipment management philosophy
- Drive improvements in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

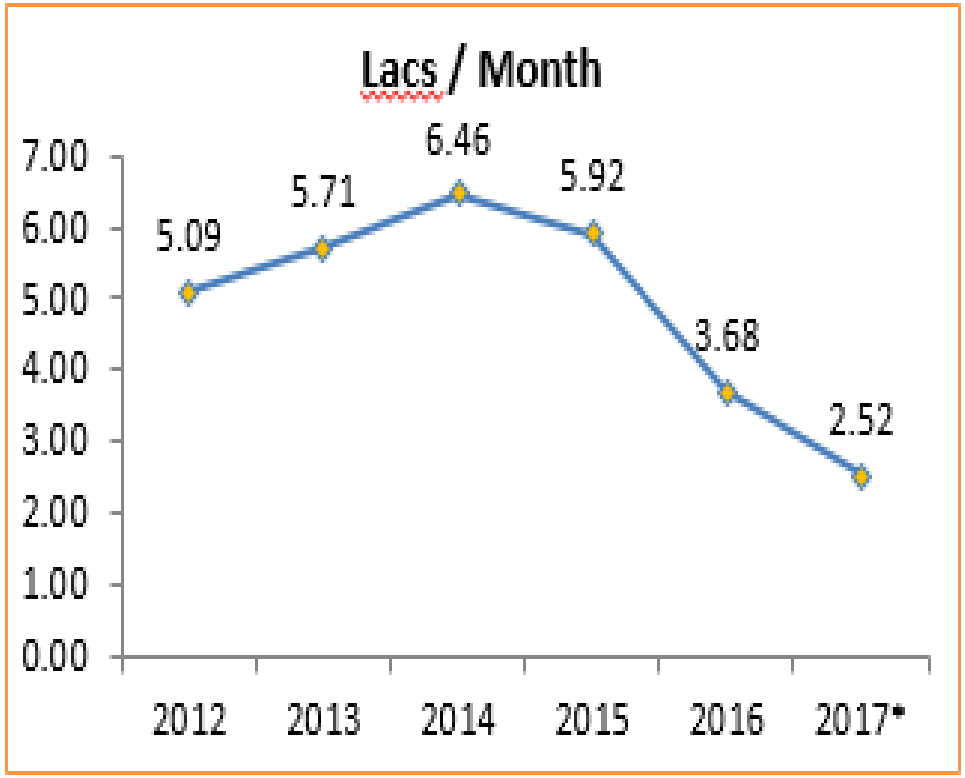
The Key Tools adopted for Best Maintenance Practices

- 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

Case Study 1 - Reliability Action for Bearing consumption reduction

Results – Bearing Consumption/Cost trend - YOY





List of Bearing Maintenance Practices

1. Autonomous Maintenance of Equipment through Clean Lubricate Tight Inspect (CLTI) tools by Operators
2. Vibration Analysis for all bearings
3. Low RPM bearings condition monitoring with ultrasonic instrument. Eg: MG Cylinder Bearing
4. Wear Debris analysis of lube Oil.
5. Grease sample test for felt roll bearing- To asses bearing condition.
6. Selecting a suitable grease for high temperature applications.
7. Temperature Scanner for Non Accessible dryer felt bearing.
8. NDT Test for rolls for identifying roll journal cracks.

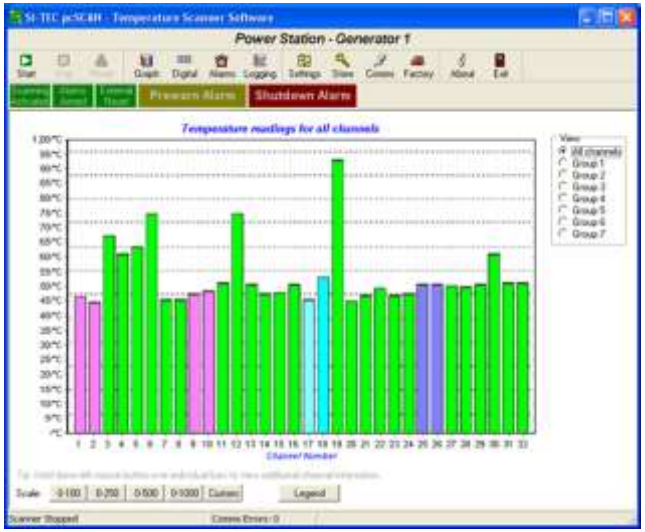
Temperature Scanner for Non Accessible dryer felt bearing

- In Paper Machine, dryer hood 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 thru temperature profile.

Temperature Scanner for dryer felt roll bearing

Temperature Indication

Sensor Installation



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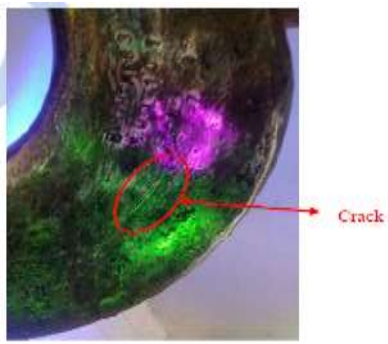
NDT Test for rolls for identifying roll cracks

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 :

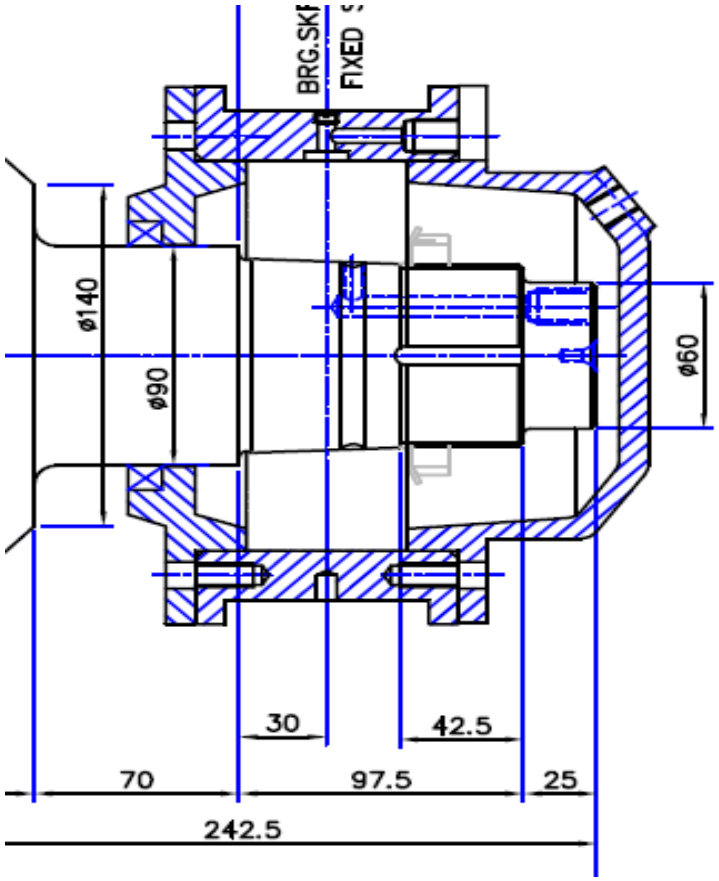
- NDT test was carried out for all Press & wire rolls to identify journal defects.
- And subsequently for all supporting bolts



Re-Engineering

1. Elimination of suction press roll bearing failure through addressing the design related issue.
2. Dryer felt roll bearing size increasing at high wrap angle locations
   Eg : Stretchers.
3. Standardizing Dryer Felt roll design to suit increased machine speeds.
4. All Dryer felt roll journal change to Taper Journal in phased manner.
5. Dryer felt roll bearing lubrication point changed to Center point of housing to ensure proper lubrication.
6. Vacuum blower installed in Main COL Line to address the low oil input to dryer bearings.
7. Modification of rope pulleys design to reduce failure.

Felt Roll – Modified Journal Design



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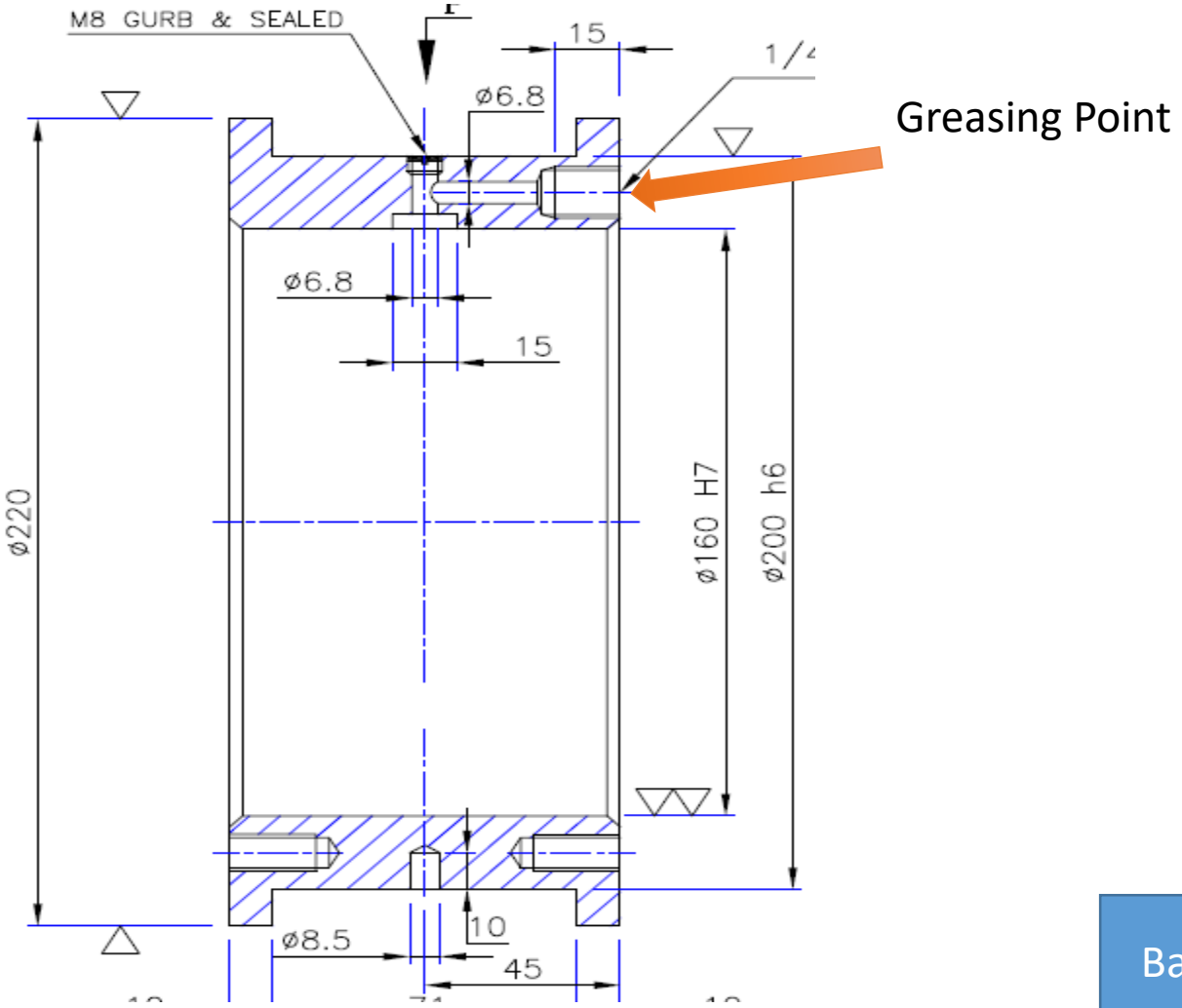
All Dryer felt roll journal change to Taper Journal in phased manner.

Felt Roll Bearing Housing Design

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



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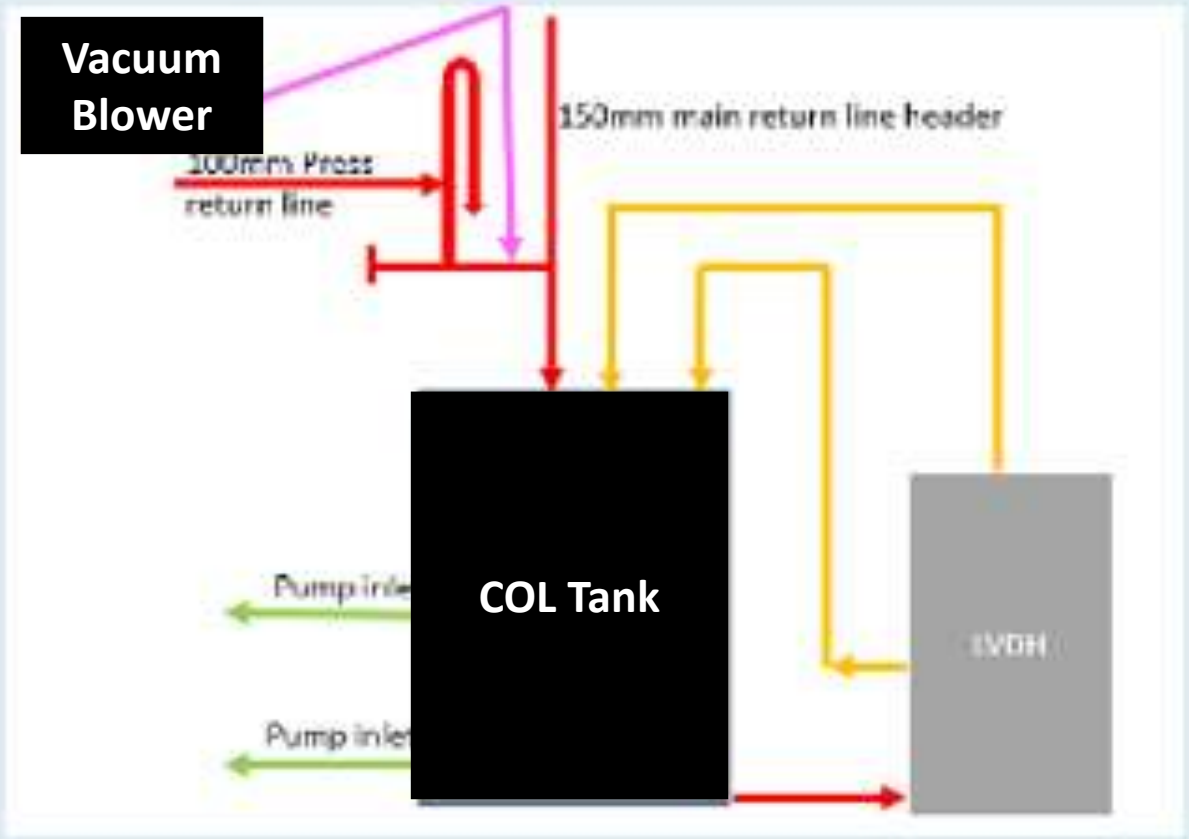
Vacuum blower to increase oil flow & arrest Oil leakage

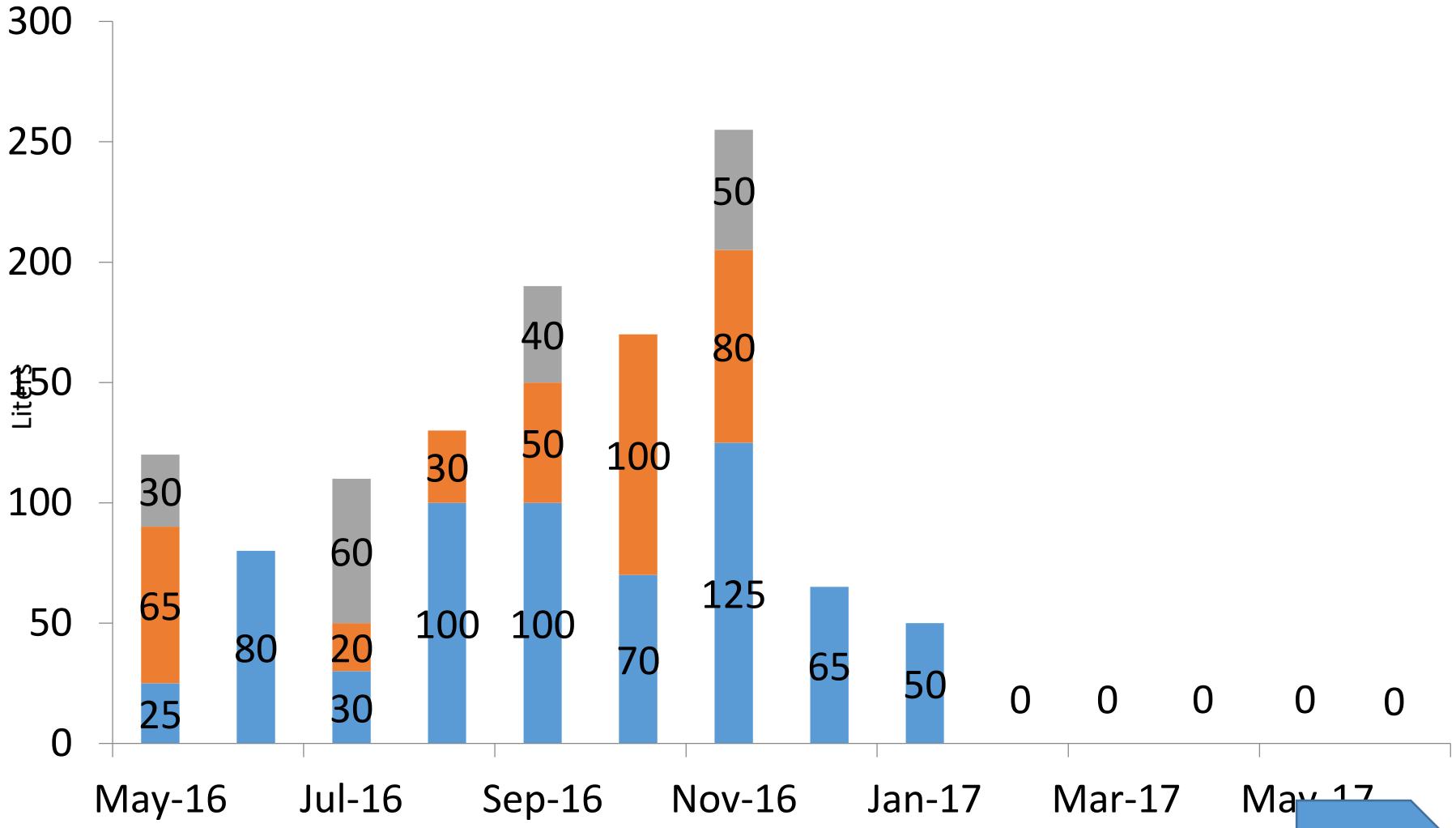
- Board Machine cylinder bearings are oil lubricated.
- Bearing failure was persisting and root cause identified was insufficient oil flow to bearing block.
- The Oil flow to the dryer bearings is quite low than required
- If the flow is increased, then there is an overflow from the dryer bearing housing.
- Oil leakage was also observed from bearing blocks & joints.
- **Root Cause Identified**
- Insufficient slope in return oil header to COL tank

After Improvement



- Blower has created a negative pressure in return line.
- It helped in increased oil flow to bearing blocks
- Also oil leakages were eliminated from circuit

COL Oil consumption trend



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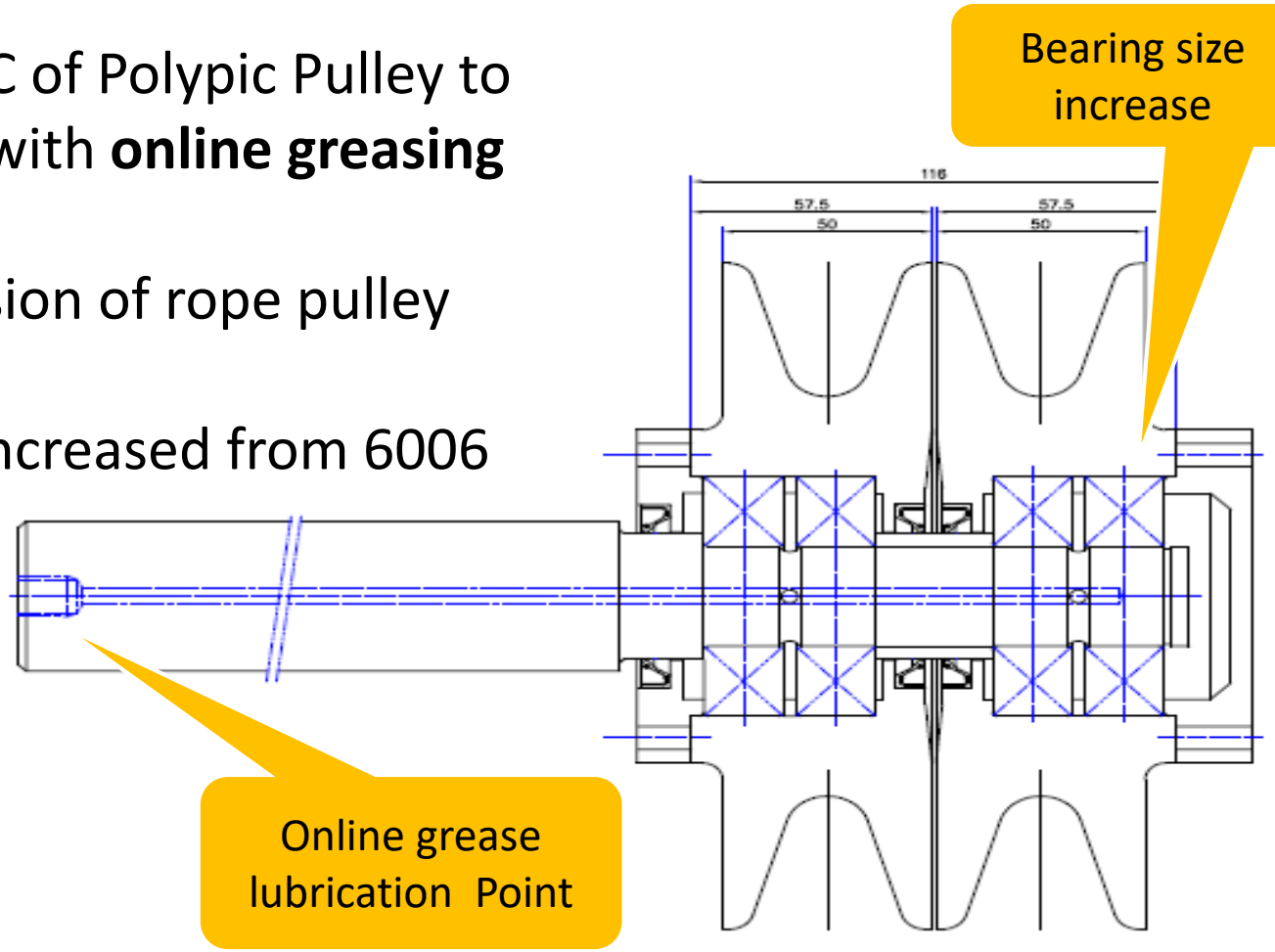
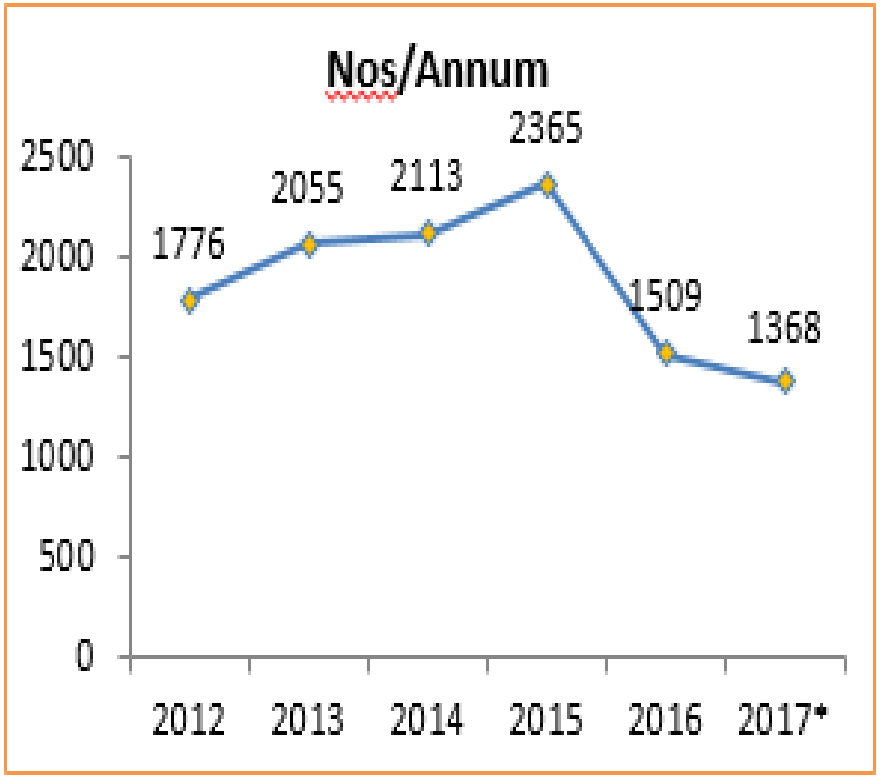
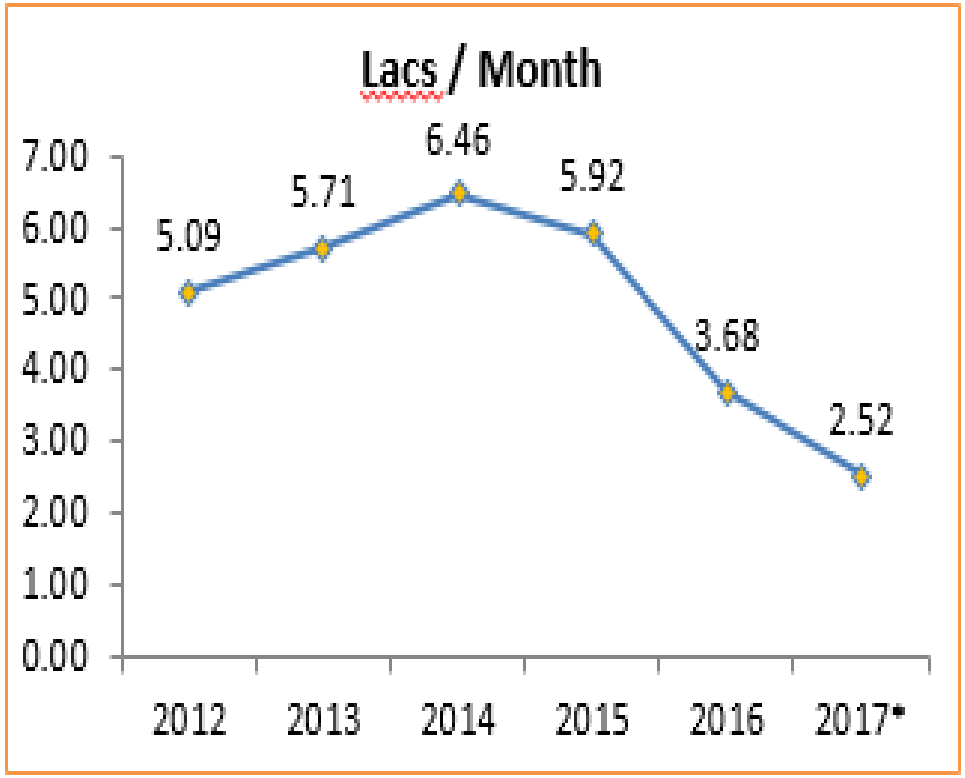
Rope Pulley Modification

1. Changed MOC of Polypic Pulley to Metal pulley with **online greasing provision**
2. Oil seal provision of rope pulley bearing
3. Bearing size increased from 6006 to 6306



Results – Bearing Consumption/Cost trend - YOY



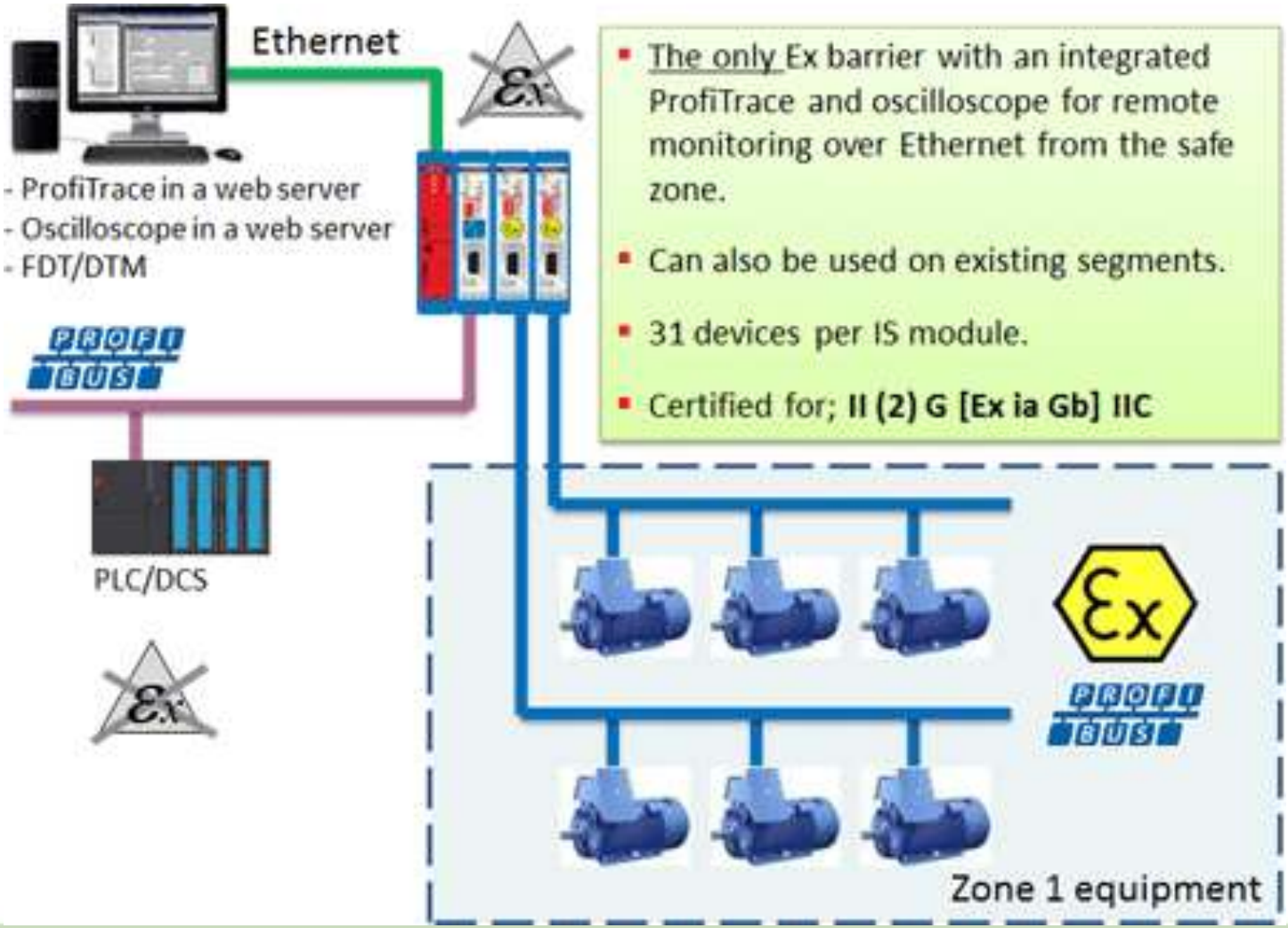


Case Study 2 - ComBricks to detect Profibus Communication Failures

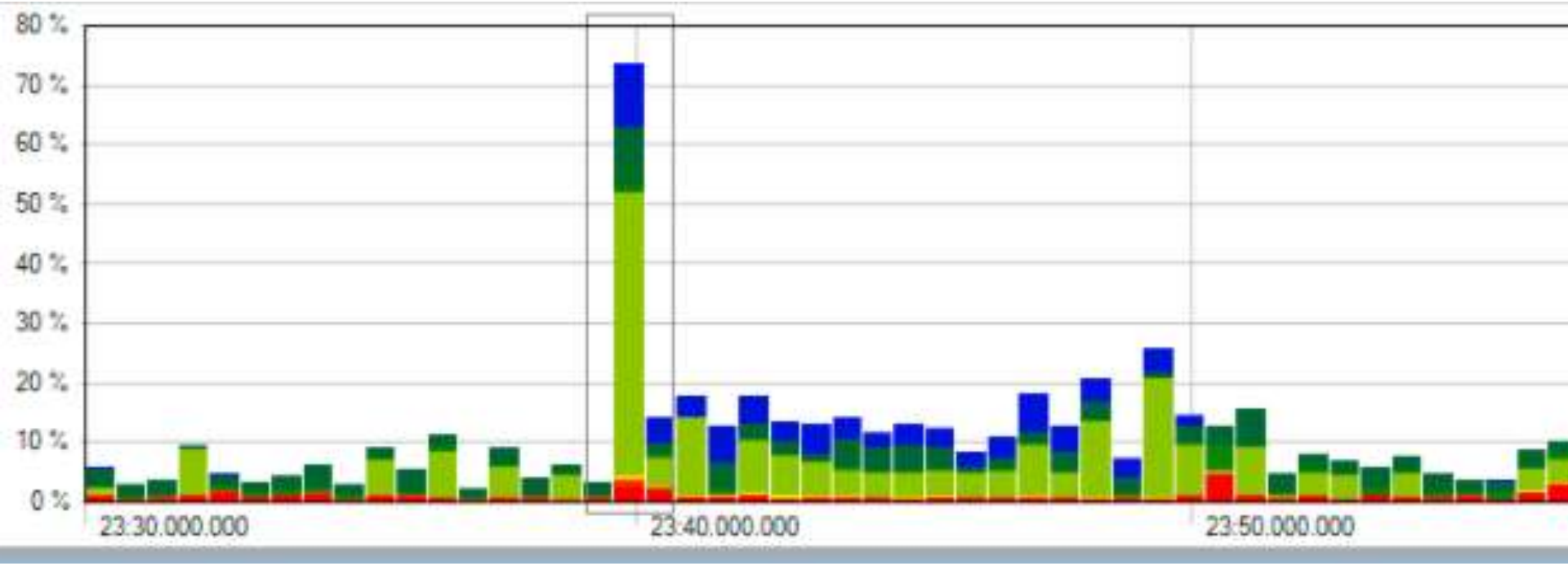
ComBricks to detect Profibus Communication Failures

- 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.
- ComBricks 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

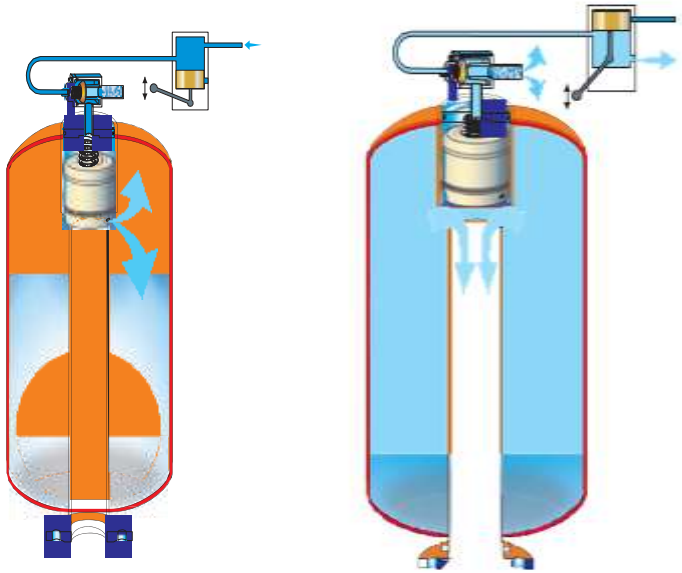


ComBricks to detect Profibus Communication Failures



Case Study 3 - Air Blaster for Boiler Bunker

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.

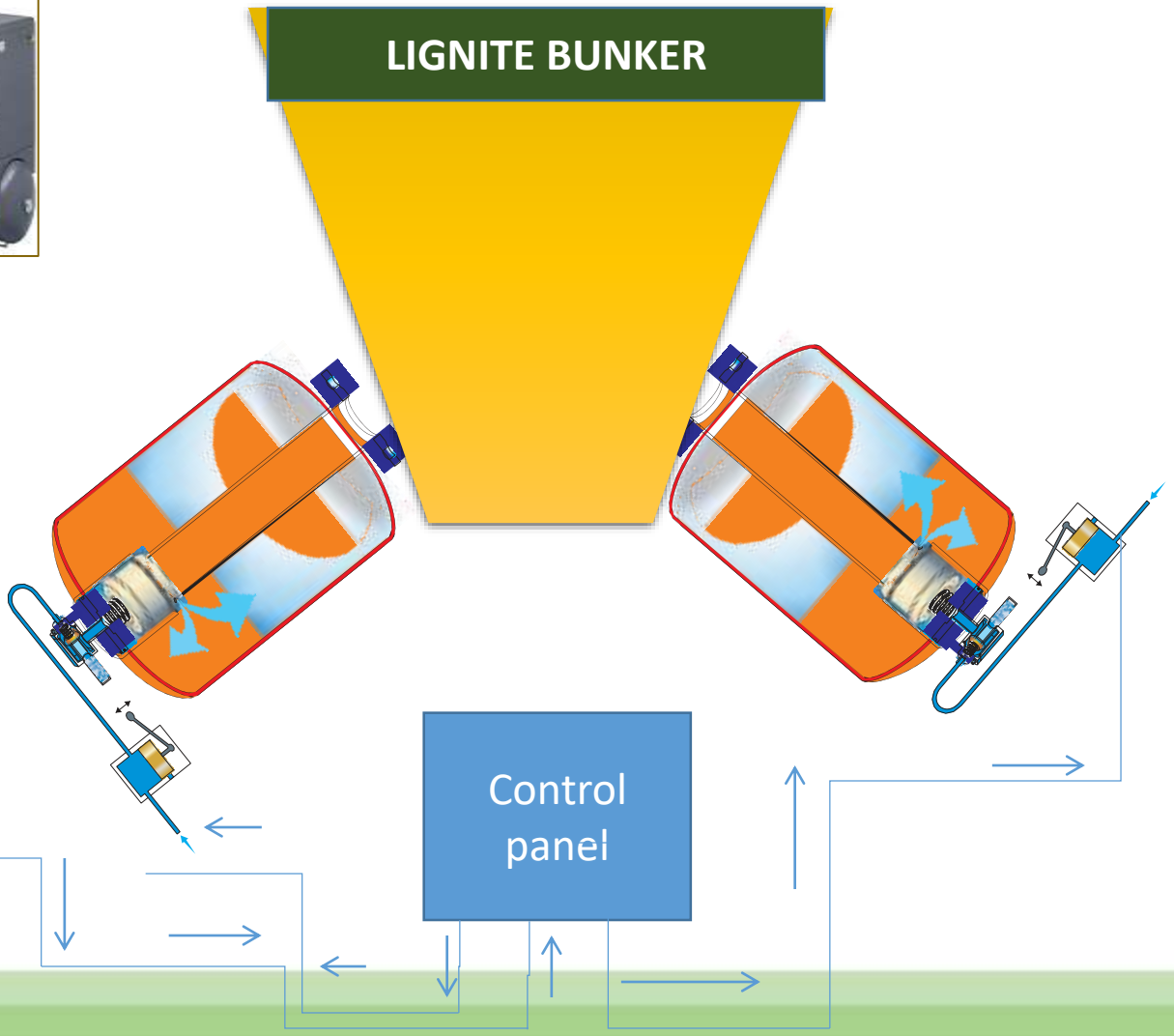
- **Air blaster Installed to avoid stickiness of fuel in bunker.**

Benefits Outcome

- Coal Handling A & B shift operation eliminated.
- Fuel flow ability improved from bunker to drag chain feeder without any intervention.
- Manpower reduction

Air Blaster for Boiler Bunker

Compressor



Case Study 4 - Online fuel feed line cleaning

Online fuel line cleaning

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

Boiler Fuel Line Cleaning - Manual

1

2

3

4

Before

Auto Online Boiler Fuel Line Cleaning

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

Self Cleaning Screen for Boiler Fuel Handling System

Enduring Value

Past Scenario :

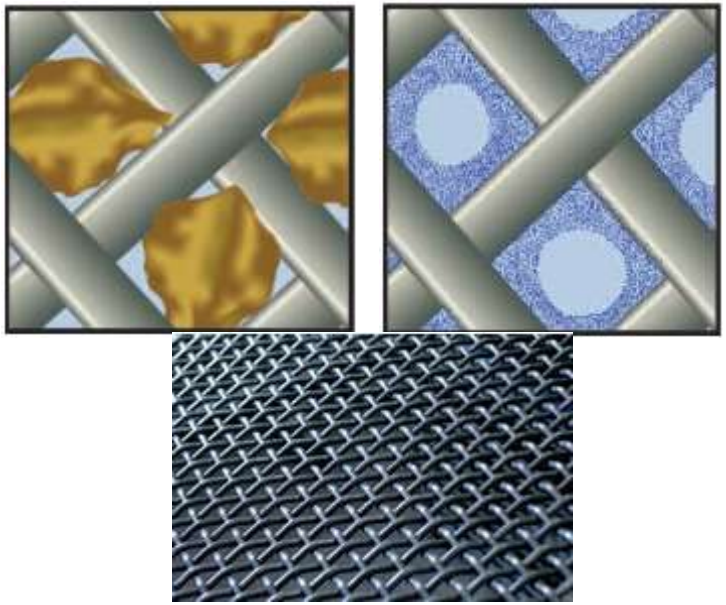
1. Lignite is our predominant boiler fuel and lignite naturally has high moisture (>50%) and it chokes existing flip flop screen mesh openings (8mm).

2. Because of mesh blockage, screen throughput came down drastically and screen acts like a bottleneck for other conveyors.

Present Scenario:

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.

Choked Screen Mesh



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.

Thank You