



An investigation into the asset integrity of AA115 overhead crane based in the Cold Mill at Port Talbot Steel Works

Rhys Jones

Supervisor: Peter Charlton

School of Engineering

BEng (Hons) Mechanical & Manufacturing Engineering



Figure 5. AA115 cold mill crane

Introduction

AA115 crane is an ageing asset which has been in service since 1961 and is well over its expected 25 year life span. It is in a bad condition, requiring regular maintenance and repairs with the need for it to be closely monitored to ensure its safe operation.

Background Information

AA115 crane has a SWL of 35T for its main hoist and 25T for its auxiliary hoist. It has several signs of wear with many faults/ defects on the crane, so requires effective and efficient maintenance.

Project Aims & Objectives

- To ensure the safe operation of AA115 crane until a new replacement crane can be delivered.
- Optimise the maintenance approach and any maintenance work carried out.
- Gain a greater understanding of the maintenance work being carried out on AA115 crane.
- Research maintenance approaches and NDT (Non-destructive testing) methods.

Maintenance Approaches

1. Breakdown maintenance.
2. Preventive maintenance.
3. Centralised maintenance.
4. De-centralised maintenance.
5. Outsourced maintenance.
6. Condition-based maintenance.
7. Reliability centred maintenance.
8. Total productive maintenance.



Figure 2. Total productive maintenance approach



Figure 3. Condition based maintenance approach

Non-Destructive Testing Methods

1. MPI (Magnetic Particle Inspection).
2. UT (Ultrasonic Testing).
3. AE (Acoustic Emission).
4. ACFM (Alternating Current Feld Measurement).
5. Visual inspection.

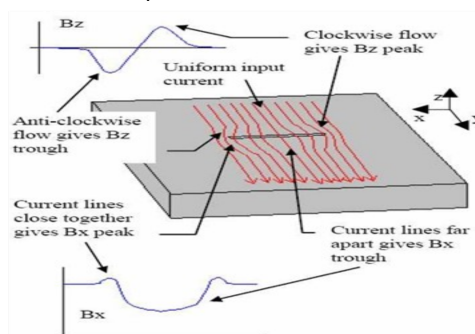


Figure 4. ACFM testing method process

Conclusion

- A qualified NDT technician hired in to carry out inspections on cranes main structure on a weekly basis when there is downtime in production.
- Use the ACFM testing method to detect/ monitor surface breaking defects for the best results.
- Carry on using a preventive approach to maintenance, but with the use of techniques associated with total productive maintenance with outsourced maintenance for an NDT technician.
- Add additional information to the current maintenance schedule to assist with future maintenance work.

Future Improvements

Even with the improvements made ultimately a new crane still needs to be delivered and erected in AA115 cranes place. The maintenance improvements made should be kept in place for the new crane when it is erected in place and operational.

Acknowledgements

I would like to thank my family, girlfriend and friends for all the support given throughout my degree. I would also like to thanks TATA Steel for allowing me to study for my degree part time whilst working and giving me the support when needed. Lastly, I would like to thank my supervisor Peter Charlton and Andrew Thorn for their support throughout.

References

- Figure 2. (Jonathan, Trout (2019). Total Productive Maintenance: An Overview).
- Figure 3. (Shin, Jong-Ho; Jun Hong-Bae (2015). On Condition Based maintenance Policy. Volume 44, pages 119-127).
- Figure 4. (M, Lugg; B, Blakeley; C, Roberts; M. Ph, Papaelias (2010). Interrail: Development of a novel integrated inspection system for the accurate evaluation of the structural integrity of rails).



Figure1. Crack in AA115s structure weld repaired

Costings Related To AA115 Crane

If AA115 breaks down the cost to production is approximately £3600/hour.

The cost of a qualified NDT technician is £415 for an 8 hour shift.