

Evolving the Maintenance Strategy at Tata Steel's Speciality Steels business -A Case Study

Abstract

Over the past two years Applied Maintenance Technology Ltd. (A.M.T.) has been assisting Tata Steel's Speciality Steels business [Stocksbridge] with the evolution of their maintenance strategy and practices. Complementing Tata Steel's internal maintenance concepts program, A.M.T. have introduced targeted predictive maintenance activity on critical plant machinery. They are currently executing a site-wide condition monitoring program including Vibration analysis, Ultrasonic inspection, tribology (Oil analysis) monitoring and Infra-red Thermal inspections.

Work completed

- **Identify the opportunity**

Two short surveys were conducted. Sample machinery was tested from a condition perspective. This data was analysed and revealed defects due to a combination of general wear, incorrect installation and a lack of precision maintenance.

- **Identify critical equipment**

Walk-round inspections were conducted with area engineers to determine critical equipment that should be subject to predictive maintenance.

- **Develop appropriate measurement**

The critical equipment list for each area was analysed by equipment type and accessibility and the most appropriate predictive technique selected.

- **Measure machinery condition**

Initial predictive measurements were made to understand the current

equipment condition and to establish a baseline condition. Major defects found were identified and corrected.

- **Routine data collection**

Inspection routes were created for each area and the relevant hardware and software applications were purchased by

**Alastair Meyers, Lead Engineer
Stocksbridge Billet Mill for Tata
Steel;**

"A.M.T.'s strategic understanding of professional maintenance positioned them perfectly to assist in the process of evolving the site maintenance strategy. With minimal investment from a Tata Steel perspective we have established a predictive maintenance platform across most areas of site and proven the benefits through identifying potential failures using advanced maintenance techniques. A.M.T. are actively participating in the synthesis of a new maintenance strategy through a detailed F.M.E.C.A process. They are now executing the majority of the site condition monitoring program."

A.M.T. to execute routine data collection.

Results

The results of the initial surveys revealed many defects such as bad bearings, lubrication deficiencies and precision

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maintenance related defects such as imbalance, misalignment and looseness and also potential resonance issues relating to incorrect installation.

The current scope of the predictive maintenance activity extends to seven developed vibration routes encompassing

Graham Simpson (Managing Director A.M.T. Ltd);

"Tata Steel in Stocksbridge was a challenging site in terms of predictive maintenance. The bulk of the installed base does not run continuously and frequently the movements are momentary. Access was a big issue too with many of the machines being protected by perimeter guards. Therefore the classical application of predictive maintenance was not always possible. Several predictive maintenance tools and measurements were required to capture the spread of equipment identified as critical by the area engineers. We took our standard program and evolved it to match the specific needs of the equipment; so for example where we would typically use Vibration analysis and were prevented by access we explored an alternative measurement. The result is a tailored program matching the available resources that will advance Tata Steel from the heavily weighted time based maintenance program."

~400 data points, undertaking 20 regular oil debris samples (as a pilot in 1 area) and executing three extensive thermal imaging survey(s) on a quarterly basis.

To date this has revealed 72 defects that could lead to potential failures in plant and equipment. The graph in fig.1 shows the split of defect by predictive measurement type.

Benefits

The benefits of the work relate directly to preventing equipment breakdown! That is an item of machinery failing to "meet its function" when expected to do so.

This involves two types of financial implication:

1. Cost to repair the machine in question
External Labour (Overhaul costs, Spare parts....etc.)
2. Consequential loss to the business of not producing finished goods and general o/head recovery (Wages, energy...etc.)

These are best described generically as averaged cost avoidances. On the types of machinery in question the average downtime is presented as 4 hours with an average all inclusive repair cost of £2000.

So for an average failure (some will have much longer duration!) then the total loss in financial terms can be approaching the £82,000.

Assuming 10% of defects identified are successfully investigated and corrected then a cost avoidance to date approaching £650,000 is easily obtainable from the program.

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Next Steps

The routine monitoring of equipment will identify maintenance activity. A.M.T. will make clear recommendations in simple unambiguous report formats. The aims are:

- Reduce unplanned failures
- Increase plant availability
- Reduce maintenance expenditure
- Save money!

A.M.T. aims to undertake an effective program of training with site engineers and maintenance staff to give an understanding of predictive maintenance strengths and requirements for an effective program.

Precision maintenance standards will be identified and working with Tata Steel, cemented into installation and repair procedures. It is perceived that the predictive maintenance program will grow as the percentage of plant covered by Tata Steel's strategy grows. Hard to access equipment will be addressed as and when financial constraints allow and new technology will be trialled and introduced if benefits can be established.

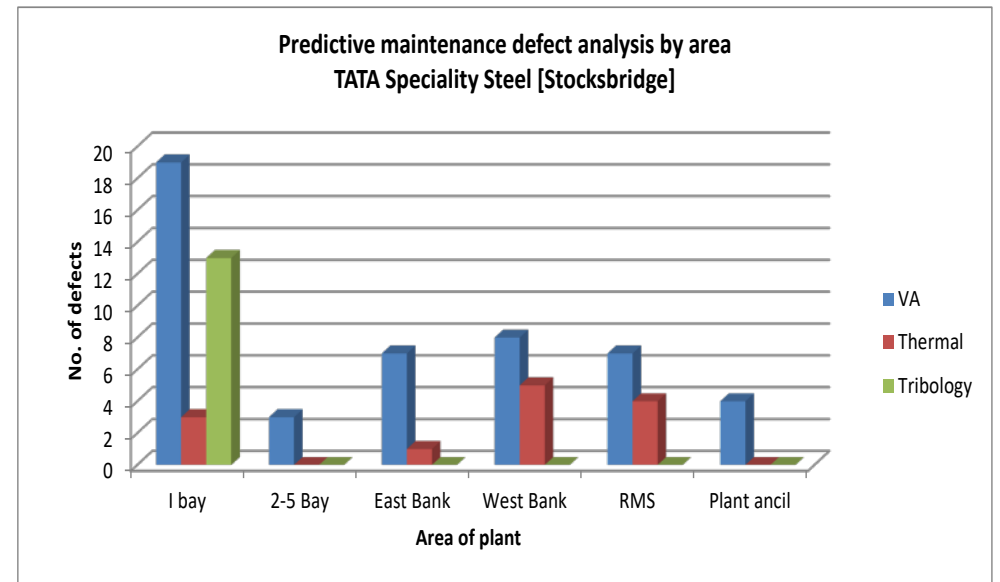


Figure 1 Predictive Maintenance defects by measurement type and plant area

Note: Tribology pilot extends to one area at the date of publishing this document