

Machines ‘talk’ and it pays to ‘listen’

The Condition Monitoring division of Stockport based AV Technology Ltd (AVT) has been awarded an important predictive maintenance contract by Anglesey Aluminium Metal Ltd/Aliwminiwm Môn (AAM) and the structured program is already paying dividends.

AAM produce high quality aluminium in the form of rolling ingots, extrusion billets and remelt ingots for its two equity partners, Rio Tinto and Kaiser Aluminium and Chemical Corporation, who are responsible for marketing the finished product through their respective trading organisations, Rio Tinto Aluminium and Kaiser Aluminium International Incorporated.

The plant at Holyhead, which was opened in 1970, currently employs over 500 people and produces approximately 145,000 tonnes of aluminium per annum from imported alumina (aluminium oxide) by the Hall-Héroult electrolytic process. Continuous improvements and modernisation to the plant have lifted production well above the original design capacity of 100,000 tonnes. The raw material is brought in by ship to Holyhead harbour and then transported via a belt conveyor which travels through a tunnel under the harbour and into the plant.



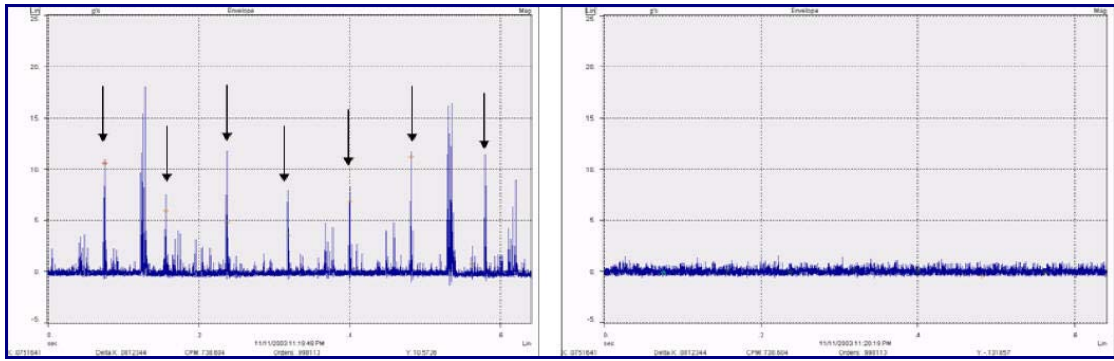
AVT are primarily responsible for all the vibration monitoring on equipment both within the plant and at the AAM jetty. AAM identified the critical machines for monitoring throughout the site and then AVT selected the appropriate monitoring interval for each monitored machine. The monitoring intervals vary between one and six months, based on the duty and expected failure modes. The AVT engineer spends approximately one and a half weeks each month collecting data on site using a portable SKF CMVA60 data collector. The results are uploaded to a PC for trending and analysis using Rockwell's Entek 'Odyssey' software.

The company has significant experience in collecting and analysing condition monitoring data. However, as Andy Mellor, Consulting Engineer for AVT explains: *“Successful predictive maintenance requires more than just being able to collect and analyse large amounts of data and a number of key factors need to be considered. We not only have a deep understanding of condition monitoring techniques, but also extensive experience of the machinery and equipment itself, in terms of how and where it operates and what can go wrong. By identifying trends and patterns, AVT can predict possible failure scenarios.*

Effective communication and good relationships with a wide range of plant personnel is also vital. By working closely with management, engineers, craftspeople and contractors, we gain an understanding of their process and the opportunities for maintenance improvements at different areas within a plant. All this allows us to make the right recommendations, at the right time, to the right person, so that appropriate action is taken. Putting together a good report is no good if it is not acted on in a timely fashion.”

As Mellor concludes: *“Troubleshooting problematic machinery and persistent failures is another important facet of our work. Again, close co-operation with the maintainers and OEM's is required. Putting operational experience, maintenance history and design information together with our measurement and analysis capabilities gives us the capability to not only identify problems, but also to offer solutions.”*

The alumina ships, carrying around 25,000 tonnes, dock every four to six weeks from as far away as Jamaica and are off loaded at the AAM jetty using four suction exhauster unloading booms powered by Rootes Blowers. Off loading typically takes four to six days and the equipment operates around the clock to minimise demurrage charges. As a result any problems arising during this procedure are very inconvenient and expensive. Prior to the predictive maintenance contract being put in place, AAM typically did not find out about a problem until it was too late. A prime example of this was in 2002 when the bearings on the motor on one of the exhausters failed catastrophically, presenting AAM with a total repair bill of almost £80,000.



No 1 Exhauster

No 2 Exhauster

AVT's current contract started in August 2003 and within two months the site engineer had identified abnormal vibration patterns coming from the motor on Number 1 exhauster. A detailed analysis was undertaken and the results, as shown in the photograph above, clearly show impacts on each revolution, together with other impacts between revolutions. On close inspection, extensive fatigue damage was found on the top drive shaft end bearing and on the adjacent ball bearings.



There was also evidence that the inner ball races were moving on the shaft or relative to the spacers. Acting on the AVT's findings the AAM Reduction Services Maintenance team were able to remove and overhaul the exhauster in a planned and controlled manner in between ship dockings. As a result, there was no affect on production, and the cost for repairs was only £8,000, ten times less than the cost incurred in 2002.

Adrian Jones, AAM's Maintenance Systems Specialist, is very upbeat about the program and believes its implementation has made his job easier. As he points out: *"Although this is not the only success story, it is the most significant. We now know about problems before they happen, allowing us to take appropriate action. AVT's experience is also helping with the analysis of data from other condition monitoring work carried out around the site. We have come to realise that machines talk and we should pay attention and listen to what they are telling us. 'If it ain't broke don't fix it' is certainly not a policy we advocate."*



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