

AAM was engaged by Kembla Products to assist with a damaged tube reducing line. The machine runs a shaft between three bore holes which keeps the machine going.

The two activities that were identified as critical to bringing the line back to service were:

1. Re-machining the central bore on the machine
2. A high precision alignment of the new machined bore in relation to the existing bores and its shaft

The Challenge

Aligning the remachined middle bore of a device that had been running for a long time and was not sitting on a levelled base.



The Solution

Hardware

AAM supplied portable metrology services and Furmanite to provide mobile machining services. Due to the high accuracy requirements and the intricacies of relating all measurements to a relative datum within the machine, a portable Laser Tracker was chosen.

AAM owns an API Laser Tracker which is ideal for machining, welding and alignment applications as well as reverse engineering. When a portable metrology device like this is coupled with industrial surveying experience, the range of solutions and applications within the industry are widely broadened.



Large assembly measurements, in process and part inspections have been the drivers for the development of these portable metrology instruments. With an envelope of work of more than 50m and an absolute accuracy of ± 10 ppm at 5m, portable metrology solutions were identified as the most reliable technique to solve the problem.

Software

A 3D CAD package was utilised on site for iterating and guiding the process to locate the correct dimensioning.

While on site, the coordinate system was re-referenced to fit the alignment of the inclined plane of the support, so that the shaft would fit in its correct place, avoiding future wear and tear.



Right: 3D survey of all centre bore holes, including gear box

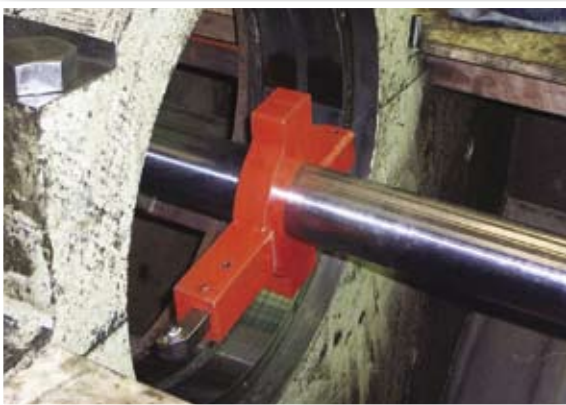
Process

Once the inclination of the support was calculated, a new reference frame was set as the default for the job. This meant that every dimension taken would be correlated to the internal datum of the machine, rather than the usual vertical Z axis.

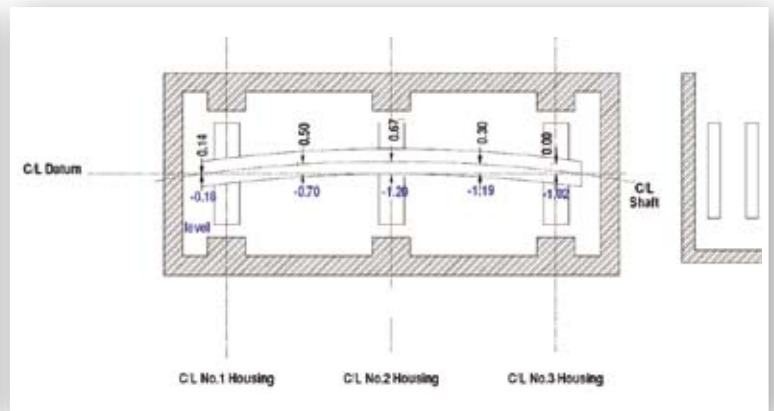
Following that solution, alignment and relative levels for the shaft were calculated for each iteration. After each survey, Furmanite would receive the data and adjust the machining as to suit the solution. The number of iteration was drastically reduced when compared to other similar jobs since every time a dimension was taken a precise value was provided.

Conclusion

Laser tracking is a portable metrology solution. When coupled with adequate machining systems it produces excellent results for aligning shafts on site. The costing benefits associated with producing these jobs on site are significant. The exercise could be extended to many other similar cases. The challenge was solved on site, without the need to carry the whole machine to a lathe, reducing time and costs. Similar exercises could be carried out in mines, industrial sites and processing plants.



Above and below: These images illustrate the process AAM completed for the project.



Above: Shaft locate in between bores: iteration two

Below: Shaft locate in between bores: final position with middle bore machined

