

Importance of Machinery Alignment Records

Written by John Piotrowski, Turvac Inc.
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Recording coupling alignment data can be tedious, but it is worth the effort. Future jobs go faster and smoother. Sample forms provide the basis for designing your own recording and reporting sheets.

Over the past 20 years, awareness of the beneficial effects of accurate and precise shaft alignment has increased dramatically. It would appear, therefore, that precision shaft alignment is taking a more important role in installing and maintaining machinery. However, this perception may be somewhat difficult to prove because it is quite rare to find historical records on the alignment of rotating machinery.

Condition-based maintenance programs incorporate periodic collection of vibration data, oil samples, and infrared images on which comparative analysis is made to detect unhealthy changes in these parameters that may indicate potential problems with the machinery. But if you ask the people involved in these highly successful programs to show you their alignment records, rather than information, you typically get a blank stare and a quizzical look - asking: "Why should we keep that information?"

There are several good reasons for keeping alignment records and checking shaft alignment periodically. Most people assume that once you align a drive system, it stays aligned forever. This cannot be further from the truth.

A chemical plant that checked the alignment of its rotating machinery annually for the past 3 years found that 80 percent of the machinery did not stay aligned for a long period. How did they find that out? They kept records of their work and compared the "as found" alignment to the "as left" alignment the last time it was checked. Do you do this? If not, why not? If you were to shut down one of your drive systems today and check the alignment, how confident are you that the randomly selected piece of rotating machinery is aligned?

If you keep alignment records and find that a drive system has shifted its position, what caused the shift to occur? If it is a pump, compressor, or turbine, could there be an excessive amount of static or dynamic piping strain? Is there poor contact between the machine case and baseplate due to a soft foot condition causing shim packs to work loose, shifting the machine? Is the foundation shifting its position over long periods of time? Not only should shaft position measurements be kept, but also information on the preliminary checks such as shaft or coupling hub runout conditions, soft foot information and shim shapes, and static piping stress tests.

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Not every alignment job is straightforward. In special cases, information on how the alignment measurements were taken can be invaluable.

At one steel plant, a fairly complex finishing mill screw down drive train comprising several flexibly coupled machine cases was experiencing premature failures on several components. An integrated flexible coupling and drum brake assembly was installed between two of the machine cases. The plant had a laser alignment system but was unable to use it for this setup because the stationary brake shoe assembly surrounding the drum blocked the laser beam sight line.

The shaft alignment measurements were taken using a face and inside rim reading to capture the measurements. Photographs of the procedure were used to develop an alignment procedure for the unit which requires both laser and dial indicator measurement systems.

Another company was experiencing failures on the bearings and mechanical seal of a motor-pump drive system. Initially, the motor and pump were removed from the baseplate, the bearings and seals were replaced, and the unit re-aligned. After two more failures within a 10-month period, the alignment was checked before the motor and pump were removed only to find the "as found" alignment measurements did not match (or even come close) to the "as left" alignment after the last rebuild.

Upon further investigation, it was discovered that the pump foot bolts were loose and a "soft foot" condition existed on all the pump feet, and the suction and discharge piping was exerting a considerable strain on the unit, slowly shifting its position over time. Since the alignment measurement system the company was using forced it to name one machine stationary and the other movable, the technicians named the motor as the movable machine, never bothering to check the foot bolts on the pump.

I was once told: "If something is important enough to measure, then it's important enough to write it down and save it." Historical records of the "soft foot" conditions, runout on the shafts and coupling hubs, piping stress checks, "as found" and "final" off-line shaft alignment position measurements, and machinery dimensions can take some time and effort to compile. However, there is a good chance that this information might save you or one of your co-workers as much or possibly more time than it took to generate the records in the first place. **MT**

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