

PRUFTECHNIK *success story*

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PRUFTECHNIK ALIGNMENT KEEPS A COASTER ROLLING



The Challenge

To welcome riders for the busy 2016 summer season, an American amusement park roller coaster required alignment. At the end of last season the coaster's driving assembly, the mechanism that pulls cars up the hill at the start of the ride, experienced a bearing failure. Damage to the gearbox was significant. Following the manufacturer's repair and overhaul of the damaged parts, the gearbox had to be re-installed. Proper alignment was crucial. The park operators called in PRUFTECHNIK to make sure this alignment was done right.

The Solution

The roller coaster operating unit combines a 100 horsepower motor whirling at almost 1800 rpms with a heavy sprocket chain-drive that moves much more slowly; the rebuilt gearbox had to be inserted and carefully aligned between these dissimilar ends of the assembly.

The original bearing failure had occurred on the input shaft of the gearbox. Because as many as 50% of machine failures can be attributed to misalignment, PRUFTECHNIK engineers used the ROTALIGN® Ultra iS to assess the initial alignment condition. They evaluated the coupling tolerances on either side of the gearbox. The fast-moving, rigid coupling on the motor end of the assembly had only a very narrow range of alignment tolerances; the slow-moving, fluid coupling on the sprocket chain side had a little more "wiggle room".

The initial assessment exposed an alignment far outside the acceptable range. However, by using the ROTALIGN® Ultra iS, PRUFTECHNIK engineers were able to align the motor, gearbox, and chain assembly to well within tolerances defined as "excellent" for this setup. But they did not stop there. Following the alignment, PRUFTECHNIK's engineers used the VIBXPERT® II and OMNITREND® software to collect and analyze vibration data. This final step allowed PRUFTECHNIK to examine the overall functioning and health of the gearbox and to verify that proper alignment had indeed been achieved.

Outcomes

At initial installation, the gearbox showed a misalignment offset of nearly 56 mils, almost 17 times greater than what it should have been. However, using the ROTALIGN® Ultra iS, PRUFTECHNIK engineers were able to improve the alignment of the motor and gearbox coupling to within 0.6 mils, well surpassing the standard described for alignment excellence!

Likewise, the gap or angled disjunction at the motor coupling started out at 18 mils. Following the alignment, the gap was reduced to 1.4, again well into the range defined as an “excellent” alignment.

On the sprocket chain side of the assembly, PRUFTECHNIK’s engineers also handily beat their alignment targets. They achieved excellent tolerances along both axes, finishing the job with offsets of 3.5 and 1.5 mils and gaps of 1.2 and 6.7 mils.

During the final check to confirm the proper alignment, PRUFTECHNIK engineers attached sensors to the gearbox and collected vibration data at each bearing location. Using the VIBXPERT® II Data Collector and Signal Analyzer with OMNITREND® software, they recorded vibration amplitudes that showed no sign of misalignment. The data from the bearings was smooth and steady.

Partnering the strict alignment requirements of these critical machine junctions with the remarkable capabilities of the ROTALIGN® Ultra iS and the VIBXPERT® II, PRUFTECHNIK experts left this coaster geared up and ready to roll. ■



Fig.1 Bearing Failure



Fig. 2 Assembly alignment assessment with ROTALIGN® Ultra iS



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