APPLICATION NOTE
AN1708

Rotating equipment reliability monitoring using optical metrology

trilion

Problem overview

Validation of hot alignment procedures is vital for ensuring the reliability of critical service pumps. Current laser alignment methods do not account for thermal expansion due to friction caused by misalignment. A rotodynamic study is investigated using optical metrology to provide vibrational data, torque as well as alignment accuracy in six degrees of freedom.

Test setup

A 3D Digital Image Correlation system, using Photron AX-200 cameras, was used at 3.2kHz to capture shaft startup of a critical service vacuum bottom pump system.

This DIC-ARAMIS point tracking capability is used to measure shaft displacements. A constellation of trackable points around the shaft was created to allow for measurements throughout entire revolutions of the shaft.

Notes

TRITOP (portable CMM) was used in conjunction with ARAMIS to create a constellation of points trackable in 6 DOF around the shaft. The shaft centerline was identified allowing for discernment of shaft orbit as well as torsion across the coupling. The torsion measurement permitted for a calculation for torque which has long been the endgame for rotating equipment specialists.

The Figure 1 presents the results for the axial thrusting of the shaft during startup and highlights the impact on the double mechanical seal system.

The Figure 2 shows real-time torsional measurement acquired during operation.

Conclusion

Optical metrology solutions such as the ARAMIS technology, were able to accurately discern shaft orbit as well as destructive frequencies of interest for reliable pump operation. These results can be further used to perform operating deflectional shapes analysis and ensure smooth operation of the system increasing the MTBF period.

For more information on this ARAMIS application, please contact Trilion Quality Systems, world leader in custom optical metrology application development.

Keywords: *Optical metrology, MTBF, Direct Torque Measurement, Vibrational Analysis, Rotating Equipment, ARAMIS, TRITOP*

Figure 1

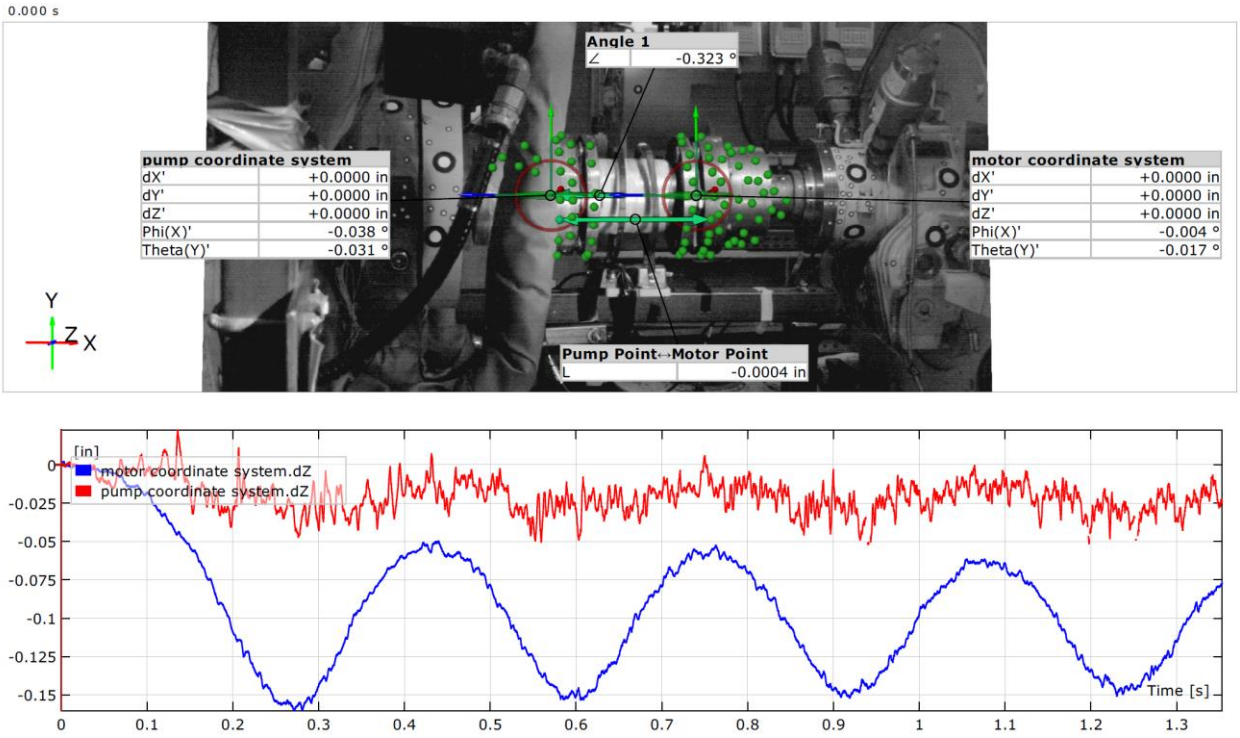

Figure 2