

Grease Level Monitoring in a Rock Crusher Bushing Housing

The feasibility of implementing a grease level monitoring system in a Sandvik rock crusher has been investigated. After researching and testing several different sensors, a final concept has been tested in a running rock crusher.

While investigating different types of sensors, a tuning fork-level sensor was found interesting for this application. The tuning fork level sensor was tested and compared to a more conventional capacitive sensor in a running rock crusher. The tuning fork level sensor was concluded to be best suited and a good choice for this application. The sensor works by measuring the change in resonance frequency depending on how much of the sensor is submerged in the fluid. The sensor will then calculate the resonance frequency and can thereby derive the level.

How the sensor was mounted was just as important as the sensor choice itself. Thorough research into mounting positions was done and many tests were run to find the most optimal position. The testing was done in parallel with both sensors to allow a comparison of the results. Concluding those tests it was found that the sensors had the best response when mounted close to the moving axle in the middle of the grease chamber, and slightly angled.

The objective was to develop a system that monitors when the grease level in the bushing housing is running low. This system's purpose was to maximize operational time and make it easier to monitor and plan maintenance. Maintenance would then entail swapping or refilling the grease and thus minimizing the chance of the grease completely running out and the bushing wearing out. Having an optimally greased system also aligns with Sandvik's goals of reducing waste and maximizing energy efficiency, as it will minimize wear and make the crusher run more efficiently.

The result was a level monitoring system based on a tuning fork level sensor. The system will monitor when the grease level becomes too low and trigger a warning that it is time for maintenance. The sensor would be mounted to the bushing using a sheet metal bracket made of steel secured by one of the bushing bolts. This solution does not require any changes to existing parts in the rock crusher and will not interfere with the maintenance procedure used today. The figure on the right shows the sensor during testing. The position it is mounted in was deemed the most optimal.

