

Online Monitoring Averts Major Gearbox Failure

Steel Roll Mill Temperature Monitoring

Site: NUCOR Steel
Area: Roll Mill
Asset: F1/F2 Mill Stand Gear Drives

NUCOR Steel Arkansas undertook a major upgrade to its gearboxes driving the F1 and F2 mill stands. The upgrade represented a capital investment of nearly \$24 million. Due to the low speeds of these very large machines, traditional vibration monitoring was of questionable value. However, monitoring of the bearing temperatures in these massive gearboxes was recommended by the gearbox OEM. The company used Azima DLI's network based temperature monitoring technology to all 16 bearings in the gearboxes. This advanced technology allowed for trending, alarming and immediate notification of both Azima DLI experts and relevant plant personnel. The system was commissioned along with the startup of improved mill stand drives.



The Azima DLI remote monitoring system immediately identified bearing temperatures at two specific locations that were well above expected limits due to excessive mill loads and speeds. The data was exported to Azima DLI's hosted web portal where vibration analysts with special knowledge of mill stands were able to review it and confirm that the mill speeds and loads were directly correlated with the temperature data.

The company also applied Azima DLI's thermal imaging technology to the gearboxes in order to confirm the data from the temperature monitoring systems. The thermal imaging results revealed that the lubrication feed oil piping temperatures were much higher than anticipated, suggesting a malfunction in the lubricating system. Further thermal imaging tests discovered a fault in a large water-cooled heat exchanger used to regulate lubricant temperatures. The findings revealed a leaking bypass valve that was allowing hot oil to cross over into the cooled lubricant stream to the gearboxes, with the effect of overheating the bearing. A simple correction to this valve promptly lowered lubricant temperatures. The application of multiple condition monitoring technologies provided a quick and simple solution that greatly improved the mill's equipment performance and reliability, and mitigated the risk of costly damage to a new \$24 million gearbox.

NUCOR Steel Arkansas is a world-scale flat rolled steel mill producing in excess of 2.4 million tons of steel annually. It is a state-of-the-art facility and is recognized as one of the most modern and efficient mills in the

world. Azima DLI has operated a turnkey comprehensive condition monitoring program for the mill that includes all aspects of condition monitoring technology, including advanced remote machinery monitoring. NUCOR Steel Arkansas is one of the largest remotely monitored machine sites in the world.

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Azima DLI is the leader and premier provider of predictive machine condition monitoring and analysis services that align with customers' high standards for reliability, availability and uptime. Azima DLI's WATCHMAN™ Reliability Services utilize flexible deployment models, proven diagnostic software and unmatched analytical expertise to deliver sustainable, scalable and cost-effective condition-based maintenance programs. The company's bundled solutions enable customers to choose comprehensive, proven programs that ensure asset availability and maximize productivity. Azima DLI is headquartered in Woburn, Massachusetts with offices across the U.S. and international representation in Asia-Pacific, Central America, Europe and South America.

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