

Challenge

A large automotive manufacturer had issues with chatter marks—micron-level surface abnormalities—in a cam shaft grinding operation. Chatter marks are caused by small variations in the grinding process such as coolant flow or temperature, grinding wheel speeds and feeds, machine and grinding wheel condition. Chatter in cam shaft impacts engine NVH and accelerates engine component wear. This complex grinding process was subjectively evaluated by operators rather than by scientific data. The challenges were to identify and apply proper quality and process parameters, while improving yield and reducing the costs associated with defects.

Solution

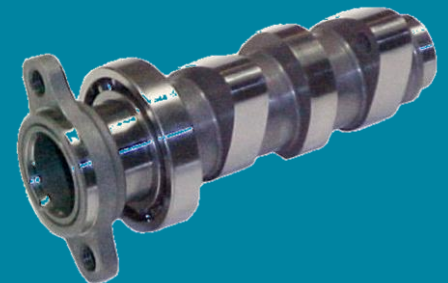
The manufacturer needed objective quality parameters, a tool to monitor machine health and the ability to facilitate process improvement. A key component was learning the required dressing frequency of the grinding wheel to maximize throughput without detrimental impact on the surface finish of the cam shaft.

Sciometric was able to solve the problem with the cam chatter issue, utilizing a combination of Sciometric process monitoring hardware and advanced analysis software. This installation provided measured vibration quality control and condition-based wheel dress frequency by observing the vibration level and plunge count at which unacceptable cam lobe finish occurred.

The Sciometric system measured vibrations induced into the part during the grinding process at a rate of many thousands of times a second. Data processing by Sciometric advanced software proved that vibration level is a reliable indicator of part quality and wheel dress condition.

CAM SHAFT GRINDING APPLICATION TEST KEY FEATURES

- Monitors machine health to predict maintenance requirements and allows repair of machines before part quality is affected
- Uses advanced analysis software to identify where and when quality issues would typically occur
- Advanced part defect detection
- Extends life of grinding wheel through grinding wheel balance and condition monitoring



the science
of quality

Process data was analyzed using advanced analysis software to identify where and when quality issues would typically occur within the process. This analysis helped to determine the thresholds for acceptable cam shaft quality.

Results

As a result of the implementation of Sciometric's solution, the manufacturer improved quality in the cam shaft grinding operation. The manufacturer:

- Identified parameters to be used as objective thresholds of part quality to stop defective parts and improve overall quality
- Gained a process visibility tool to obtain and analyze objective data to facilitate continuous process improvement
- Could determine machine health to prolong wheel life by reducing wheel dress frequency and to monitor for signs of maintenance requirements. In this case, wheel dress frequency was extended by 330%!
- Ability to monitor grinding machines for signs of maintenance requirements means repair of the machine can be done before part quality is reduced.



SCIOMETRIC SOLUTIONS

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