

### Challenge

End-of-line leak tests were not catching some brake caliper defects. Process anomalies such as small debris pieces, or “chips” in the seal groove were resulting in very subtle defects which were impossible to detect. Caliper defects were being discovered by vehicle assembly plants or by customers, which led to expensive warranty repairs and productivity disruptions. The manufacturer required a solution with minimal tooling and fixturing modification that would reliably improve caliper quality without affecting yield.

### Solution

Sciometric resolved the problem by seamlessly installing our proven leak testing system. Its leading signature analysis technology identifies defects that often go undetected in other types of conventional testing. The advanced defect techniques were applied upstream in the assembly line to identify and eliminate the affecting “chips”, which would result in costly repairs and product returns. To ensure production stability and eliminate false rejects, Sciometric developed a proprietary advanced waveform analysis routine greatly enhancing the ability to bring the small chip irregularity from the background to the foreground while immersed in a cluttered waveform foundation.

The LVDT sensing signal is obtained by traversing the entire 360 degree inner diameter while contacting the surface of the rubber seal (which tends to “mask” and smooth out very small irregularities which are caused by debris in the groove under the actual o-ring). Statistical thresholds were then established and returns monitored for one year to validate the methodology.

### DETECTING DEBRIS UNDER BRAKE CALIPER TEST KEY FEATURES

- Identifies defects upstream before final assembly
- Advanced analysis routine for debris detection
- Uses signature analysis for most accurate root cause verification
- Complete traceability: data, including signatures, are automatically stored in a central database and cross-referenced by serial numbers(s)



the science  
of quality

## Results

By combining statistically derived signature boundaries and user specified signature characteristic limits, Sciometric's leak system delivered an objective and repeatable verdict on caliper quality. Over one million calipers have since installed with no returns due to the former defect.

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