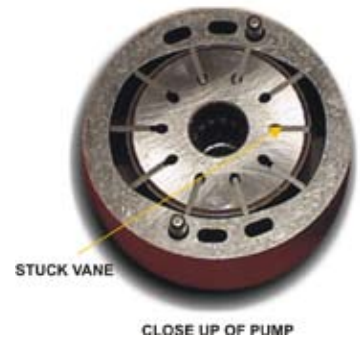


■ Power Steering Pump: Vane Defect Detection Using Signature Analysis

Highlights:

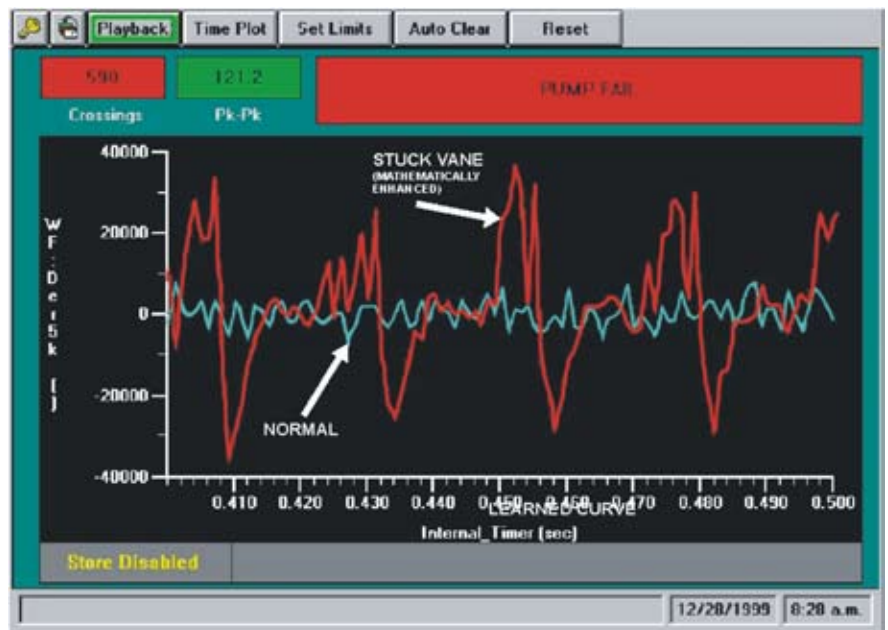
- Qualify average discharge pressure
- Traceability
- Qualify peak to peak pressure
- Detect vane defects :
 - Nicked
 - Bent
 - Missing
 - Fully stuck
 - Slightly stuck

In an effort to achieve a zero defect reliability goal, manufacturers must not only consider functional performance but also potential impacts to NVH (Noise Vibration and Harshness). A power steering pump manufacturer had previously been testing their pumps mechanically for delivery rate and nominal output pressure. However, once the pumps were mounted in a vehicle, very subtle abnormalities of manufacturing and assembly often manifested themselves as objectionable noise resulting in potential warranty repairs or costly replacements. The relative size of more subtle defects such as a slightly stuck vane were veiled under the larger output discharge pressure and as a result were completely missed by conventional average pressure measurement techniques.



Sciometric®'s Test and Analysis System combined with InSpeXion® operating software was configured to observe the pressure waveform. The complete set of waveform Signature Analysis tools contained in InSpeXion® were able to analyze the captured waveform to determine the nominal discharge pressure and flow, thereby allowing easy detection of missing and fully stuck vanes. Advanced mathematical modules then re-process the signal to bring out or enhance the subliminal abnormalities of the waveform so that small deviations from normality are now easily observable such as the more sophisticated detection of vanes which were slightly sticky (due to fine metal debris), slightly bent or nicked. In addition, should a field warranty occur the Sciometric® system has the capability of traceability by storing each waveform for subsequent analysis based on serial number.

This entire application was easily configured. In lieu of writing complex and hard to support custom code, InSpeXion®'s powerful analysis tools are pre-written and graphically dragged to the appropriate location in the self documenting test sequence script. Sciometric®'s Test and Analysis System combined with InSpeXion® operating software provided a cost effective way to detect masked defects within the short cycle times required in the pump manufacturers automated assembly lines.



InSpeXion® Screen showing Signature Analysis Waveforms Identifying Normal and Stuck Vanes.