Damper Door Adjuster: Motorized Gear Assembly Verification

Highlights:

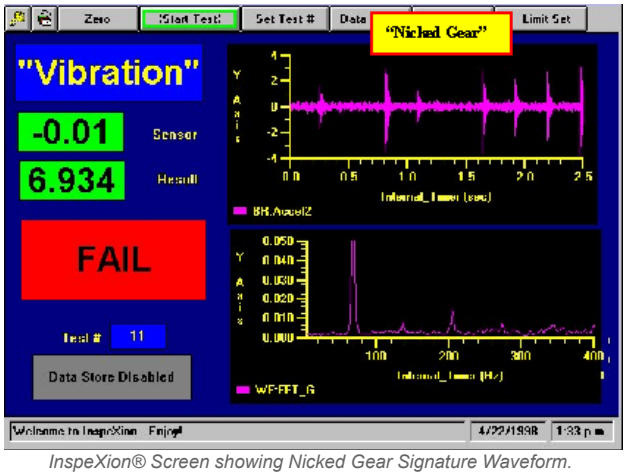
- Defects Detectable:
  - DC servo motor
  - Terminal volts “com bar” noise defects
  - Amps (torque)
- Feedback potentiometer “Wiper” integrity:
  - Open circuit
  - Non-linearity
  - Impedance
  - Electrical “noise”
- Mechanical (gear) defects:
  - Binding
  - Nicked (“clicking”)
  - Out of round
  - Output shaft angular position

An electro-mechanical device as simple as a defroster damper door adjuster can present significant production test challenges. Consequences of electrical and mechanical defects can result not only in objectionable audible noise, but also in indirect safety risks.

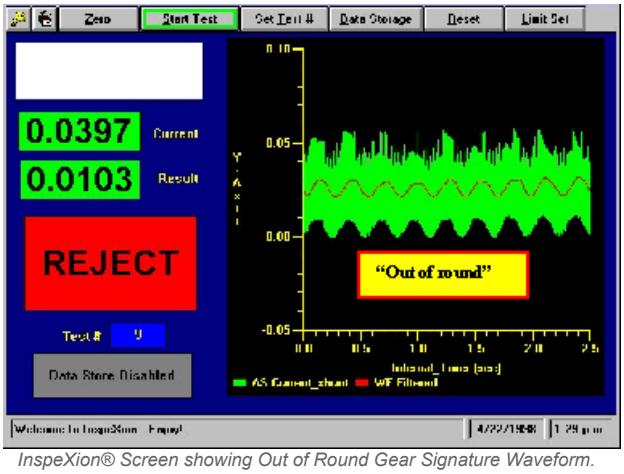
The DC brush motor drives an output control shaft through a series of reduction gears to ultimately position the defroster damper door. An integral potentiometer “pot” sends a feedback position signal to the control system processor. Aside from various clicking, grinding and whining noises, any failure in positioning of this shaft could result in a mis-direction or loss of heat in the vehicle.

InspeXion® software is capable of capturing and analyzing signals from various sensors to help identify the root causes of noise and potential mechanical deficiencies. Binding, or out of round gears can be detected by a low frequency hunting of the current (amps) signal (see actual plot below). Nicked gear spikes are easily detected by a low frequency accelerometer placed on the outside plastic case. During electrical activation, frequency domain analysis of the terminal volts (com bar integrity) is compared to a 3 sigma learned FFT template.

Constant current is simultaneously applied to the integral retransmit potentiometer and monitored for linearity, open circuit and or dirty elements (detected by a derivative plot).



InspeXion® Screen showing Nicked Gear Signature Waveform.



InspeXion® Screen showing Out of Round Gear Signature Waveform.

AN157

www.sciemetric.com
email: inquiries@sciemetric.com
Tel: 1-877-931-9200 in North America;
Visit or website for International contact info

Rev. 1. August 2007