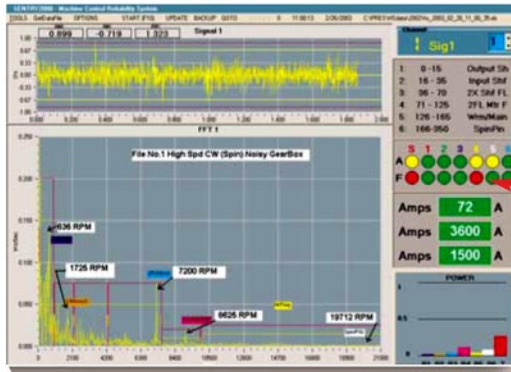


Sentry ICMS System Motor/Gearbox Defect Detection 1

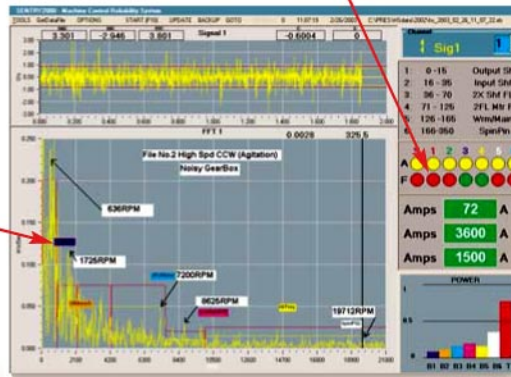
Screens below illustrate a Quality Control Application for Gearbox defect detection



Gearbox
Noisy Gearbox High Speed CW

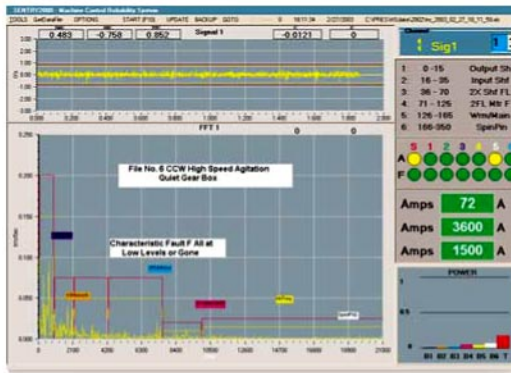
Fault (red) alarms for both waveform and in spectrum bands

Gearbox
Noisy Gearbox High Speed CCW
Note: Each FFT band is ID's on the spectrum



Gearbox
Quiet Gearbox High Speed CCW

Alarms can be ported to Plant Network,
Data for each gearbox saved for SPC analysis



Machine Characteristics Fault Frequencies

Motor:

1. Line Frequency=Assume 60Hz (3600 cpm)
2. Assume 1X RPM 1725 RPM (high speed) = 1725 RPM (29 Hz)
3. 2X Line Frequency (2FL) = 7200 CPM (120Hz)

Gearbox: 5/49 teeth worm gear to main gear ratio, main and spin gear common shaft
112/31 teeth spin gear to pinion gear ratio

4. Gearbox Input Shaft Speed = 1X or 1725 RPM (29 Hz)
5. Gearbox Output Shaft Speed 1725 RPM x (5/49) = 176 CPM (3 Hz)
6. Worm/Main Gear Mesh 1725 RPM x 5 = 8625 CPM (144 Hz) Gear Mesh Frequency
Side Bands: Input High Speed Shaft = 8625 CPM (144 Hz)
Output Low Speed Shaft = 176 CPM (3 Hz)
7. Spin/Pinion Gear Mesh 176 CPM x 112 = 19712 CPM (330 Hz) Gear Mesh Frequency
Side Bands: Input Low Speed Shaft = 176 CPM (3 Hz)