Hood Technology™ Corporation

Blade & Vibration Monitoring System

Rotor Under Test

Hood Technology™ Corporation’s system measures a wide variety of rotating machinery, including axial and centrifugal compressors and turbines. The same technology is employed for 5cm diameter turbochargers and 4m diameter steam turbines. Using different types of sensors, measurements can be made on rotors of different materials (e.g. ferrous, composite, ceramic) over a wide range of temperatures (cryogenic to more than 1000°C).

Devices under test can be in laboratories in evacuated spin pits, on engine test stands or in situ. Hood Technology™ has recently developed a self-contained system qualified for the high vibration and shock environment of in-flight testing and monitoring.

Non-Contacting Blade Tip Sensors

The type of sensor selected depends upon a number of factors including, environment, standoff distance, resolution, duration of test and whether blade tip clearance monitoring is required. Hood Technology has built a large number of optical and eddy current sensors for testing on many different platforms. In many cases the sensor housing is custom designed to meet the needs of the customer. Additionally, Hood Technology™ equipment seamlessly interfaces with 3rd party sensors - capacitive, active eddy current, beam probes, microwave and others.

Sensor Cabling

Sensors typically have 3m pigtails to reach the preamplifier. However, in custom applications, longer cables have been used. In the case of optical sensors, fiber extensions can be used. When using eddy current sensors, longer cables mean more capacitance and act as signal lowpass.

Sensor Preamplifier
The sensor preamplifier buffers the incoming sensor signal and performs some preliminary conditioning to allow the signals to travel much longer distances (>150m) with no degradation. Optical preamplifiers have embedded laser sources and photodiodes.

**Preamplifier Cabling**

Cabling serves two purposes. First, it brings power to the preamplifiers. Secondly, it brings the signals to the data acquisition system. Signals from the preamplifiers can travel more than 150m without degradation. For longer runs, signal repeaters/buffers are used every 150m for long cable runs.

**Data Acquisition System**

The Hood Technology Data Acquisition system consists of National Instruments PXI-based timer cards and A/D cards in conjunction with Hood Technology™ Blade Vibration Sensor Interface (BVSI) units. The BVSI turns analog sensor signals into a precise timing signal. Sensor signal conditioning parameters and triggering parameters are controlled with software or with the built-in user interface.

There are three software programs that work together to fulfill most of our customers’ needs:

**Hood Technology™ Acquire Blade Data** software obtains data from blade tip timing sensors and displays real time vibration, clearance and twist measurements.

**Hood Technology™ Analyze Blade Vibration** software provides a more detailed, offline analysis with many result-exporting features.

**Hood Technology™ Monitor** software is for long term trending of data.

Diagram of Basic Hood Technology™ Monitoring System
Data System

Proprietary Software:
• Acquire Blade Data
• Analyze Blade Vibration
• Monitor

Optional Remote Connection

Sensor Cabling (Typically 3 meters)

Preamplifier

Preamplifier to Data System DB-9 Cabling
(Typically 35-150 meters)

Data System

Sensor

Rotor