

Hood Technology™ Corporation 30 August 2009
Blade & Vibration Monitor Model 5000

Overview

This system accommodates the signals from many different types of non-contacting blade tip sensors including: light probes, eddy current sensors, AC or DC capacitive sensors, inductive sensors and microwave sensors.

Selecting the appropriate sensor to use depends on the application. General requirements for a preamplified sensor signal are:

- Amplified sensor signal $>80\text{mV}$ for each blade passage.
- One steep rising or falling edge for each blade passage.
- Signal to Noise ratio $>40\text{dB}$.
- Hood Technology™ Sensors and Preamplifiers designed specifically for this system

Console Housing

The system is housed in a durable shipping crate on casters. This allows for easy positioning for use, simple packing for moving locations and onsite operation.

Size: 36" deep x 26" wide x 40" top to ground including casters

Weight: Varies with contents –75 kg typical



Basic Equipment

National Instruments PXI chassis

Computer Controller, Monitor, Keyboard and Mouse

Internal rack can hold up to 10 BVSI units to support 30 channels. BVSI converts sensor signals to time of arrival blade pulse and amplitude.

All sensor signals available on BNC outputs for archiving raw sensor signal data

Acquisition software allows user to easily configure sensor triggering parameters and view in real time synchronous and non-synchronous vibration responses.

Sensors and Preamplifiers

Hood Technology™ Corporation can supply sensors and preamplifiers. This includes sensors and preamplifiers for:

Light Probes

Single fiber probes, 7 fiber probes, line sensors, Skewed Dual Light Probes (for measuring tip clearance), uncooled high temperature probes and air-cooled high temperature probes.

- Each preamplifier has three channels of lasers and photodetectors and mates with a three-channel module of BVSI board and PCI-6602 counter/timer card.

Eddy Current Sensors

Sensors of various types and sizes with 5mm to 25mm diameters. These are capable of observing blade passage through thin metallic or non-metallic walls. An air-cooled high temperature version with embedded thermocouple is available as well for extreme heat environments. These sensors can be calibrated to measure tip clearance.

- Each preamplifier accommodates 3 sensors and mates with a three -channel module of BVSII board and PCI -6602 counter/timer card.

Hood Technology™ Blade Vibration Sensor Interface (BVSII) Model 5.3

The BVSII board accepts analog signals and converts each analog signal into a TTL pulse train, which is accepted by the PXI-6602 counter/timer card. Additionally, each blade pulse's maximum amplitude is encoded in a secondary pulse for each blade passage. This is used for measuring tip clearance.

Each BVSII board drives one PCI -6602 counter/timer card. Specifications:

National Instruments PXI-6070 A/D

TTL pulses generated by the BVSII board are timed with a National Instruments PXI -6602 Counter/Timer board. The board uses a 32 bit counter and operates at 20MHz or 80MHz.

Additionally, PXI -6251 A/D cards are used to view analog signals to allow for adjusting conditioning parameters.



The total acquisition rate is limited by 1.5Mpulses/second. This rate must be considered when specifying a system. To calculate maximum required sample rate, multiply the maximum rotor speed (in Hz) by the blade count and number of sensors used . Multiply again by 2 if blade pulse amplitude is of interest. If the limit of 1.5Mpulses/second limit may be exceeded, the measurement will require two or more data systems.

Personal Computer and Software

A PXI chassis with computer controller, with a 3.0GHz Pentium III and Windows XP or better is used. Two software routines allow the user to acquire data and then view and analyze it.

Hood Technology™ Acquire Blade Data™ Software
Standard software designed for operating data acquisition and viewing real time results.

Hood Technology™ Analyze Blade Vibration™ Software
Allows more detailed off line analysis with more report generating utilities.

Customized Software

In many applications customized software is required. Most notably, real-time low cycle fatigue applications have been developed for customers.

Cabling

All necessary cables are included with the system.



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