Skewed Dual Light Probe – SDLP 24 November 2009

Hood Technology™ Blade Vibration Monitoring

Overview

This probe measures each blade's tip clearance, rather than provide an average measurement. It also measures blade bending (blade tip timing).

Data Gathering Capabilities

- **Blade Clearance**

Measures the distance between the blade tip and the probe tip with 15 um resolution, each revolution.

- **Vibration and Blade Lean**

Measures blade tip timing with 5 um resolution.

Principle of Operation

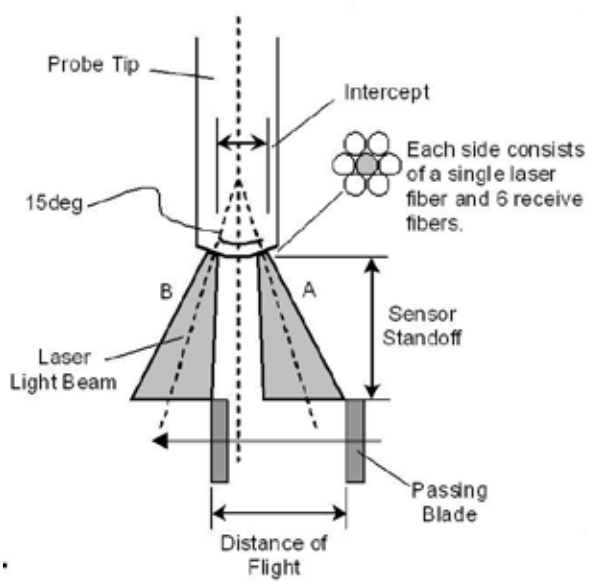
The Skewed Dual Light Probe is made up of two optic bundles. Each bundle has a single light sending fiber in the center. This is surrounded by 6 light receiving fibers. The bundle is protected by a flexible steel conduit and is routed out of the engine to the fiber optic preamp.

The two fiber bundles are fitted into the probe head with a 15degree angle between them. This directs non-parallel laser beams at the blade arrival and departure measurement points.

- Quality of measurements can be improved by blade tip preparation.

- Probe head Diameter -
  Standard 0.20 inch / 5mm
  - Can be customized as required

- Lead Length – Standard 3 meters / 10 feet
  - Custom lengths available



Operation

The SDLP is positioned in the wall of the rotor housing so that the blade tip moves directly across it. For measurement purposes, each fiber bundle within the probe is treated as a separate optical sensor. As the blade passes each sensor within the probe, its arrival is reported. The difference between the arrival times between the two fiber bundles in the probe is calibrated against tip clearance.

By precisely monitoring the position of each blade, patterns in their movement are observed and determinations made about the performance of the rotor blades.

- Determining the time of flight between the sensors in the probe measures the clearance to the probe tip.

- Measuring the time of arrival provides vibration data.

Probe Models

There are 3 Probe Models. Each has a different maximum temperature threshold:

- Standard Fiber – Max Temperature
  700 degrees F / 370degrees C
- Gold Clad Fiber – Max Temperature
  1,200 degrees F / 650 degrees C
- Air Cooled Gold Clad Fiber – Max Temperature
  2,000 degrees F / 1,100degrees C

Additional Factors:

- Maximum RPM that can be measured
  – No Known Limit
- Blade Edge Geometry Variations
  – Most shapes can be accommodated
- Maximum and Minimum Fan Sizes
  – No Known Limit

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