Philtec Application Note

No. 78
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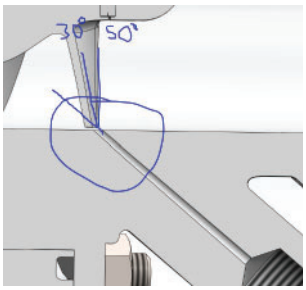
Angle Polished Probes for Turbine Speed Detection

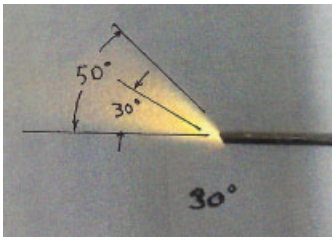
THE PROBLEM

A customer wants to measure turbine speed by detecting the passage of 1 mm thick turbine blades. However, access to the blades can only be made at a 50° angle.

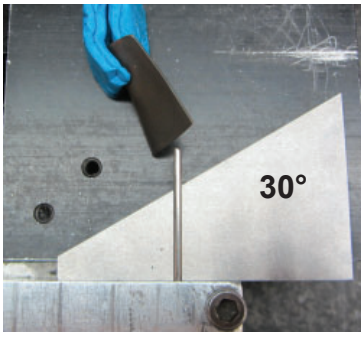


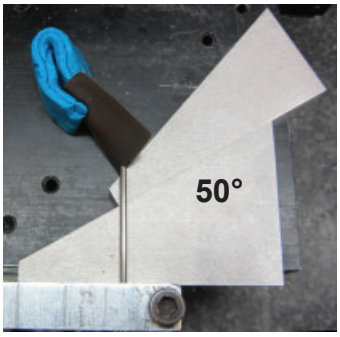
TEST METHOD

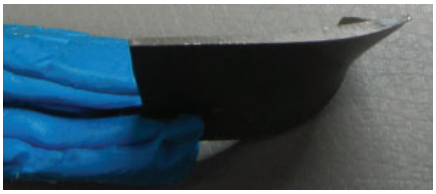
A Ø 1.5 mm test probe was made with the fibers polished to a 30° angle. The emittted light beam was observed to spread over a 50° angle



- A 1 mm turbine blade was placed on a linear stage and mounted at 30° and 50° angles to the test probe.
- The probe output was recorded as the blade was moved across the probe's light beam.





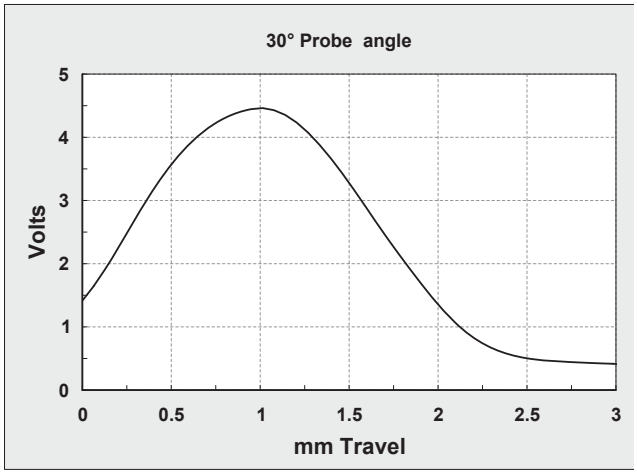


1 mm Wide
Turbine Blade

RESULTS

30° Angle

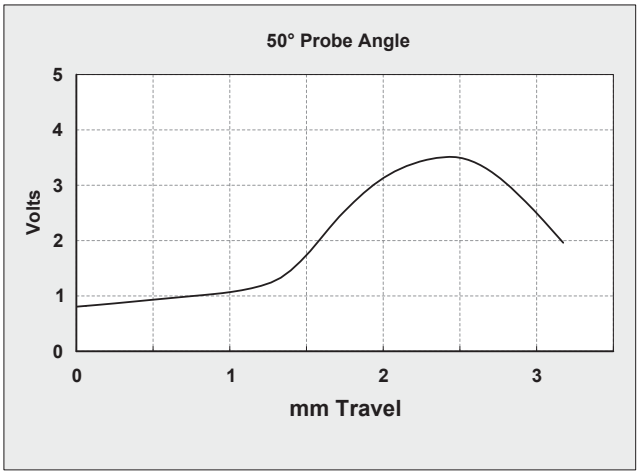
4.5 = peak volts over the blade
0.5 = minimum voltage off blade
SNR = 9



RESULTS

50° Angle

3.5 = peak volts over the blade
0.8 = minimum voltage off blade
SNR = 4.4



CONCLUSION

Angle polished probes can detect turbine blade passage up to a 50° access angle.