Philtec Application Note Vol. 6, No. 26

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Retro-Reflective Targets Enhance Automotive Engine Diagnostics

The Problem - To Measure Large Displacements of Car Engines While Running

When the Car Engine Moves, There is a Combination of Translation and Rotation

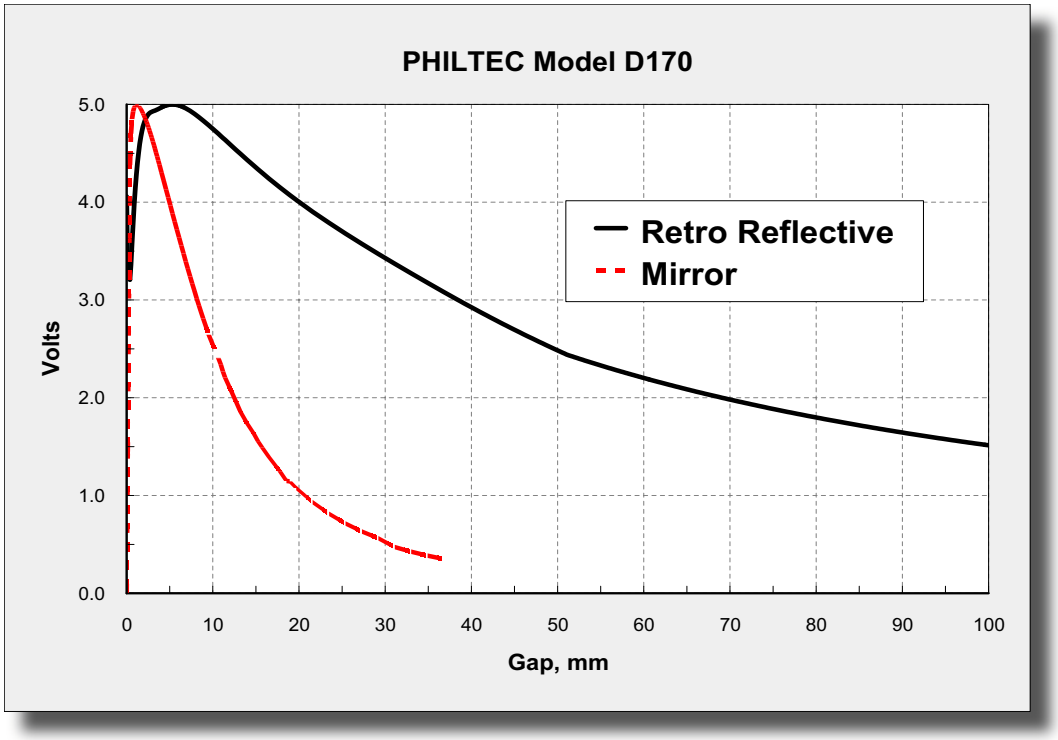
Required - 3 Sensors for X, Y & Z Axis Displacements

- Displacement Range of 50 mm
- Working Distance 80 to 100 mm
- Rotation of 10 to 15°

The Solution - The model D170 sensor meets all the requirements of the application when retro reflective tape* is applied to the target.

RANGE

The model D170 sensor achieves a five-fold increase in range when used with reflective tape.



*Retro-reflective tape, also referred to as reflective tape or safety tape, is used on anything you want to see at a distance, or in the dark, or on life-saving equipment. Light rays striking reflective tape reflect at 180° to their angle of incidence.

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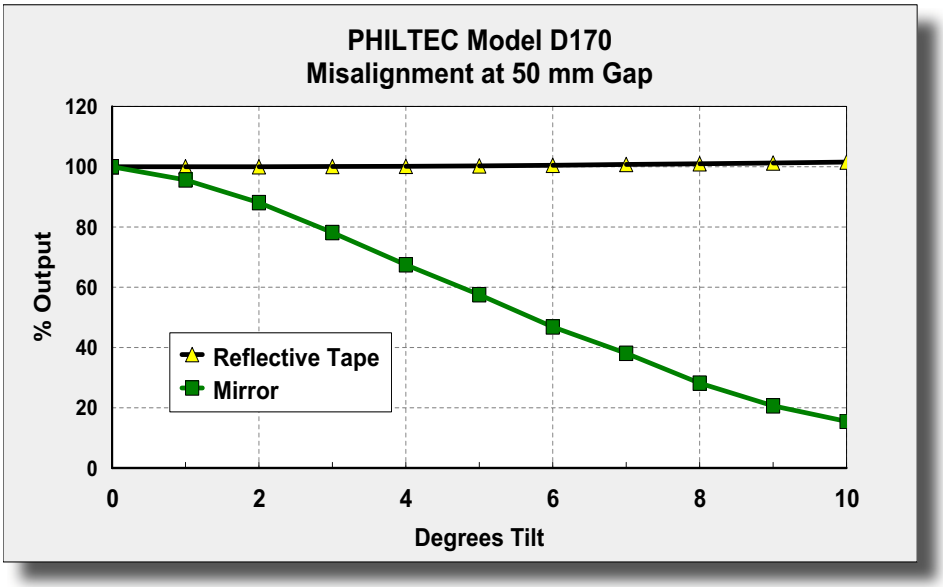
Misalignment

It is the nature of reflective tape that it returns light rays directly back to their source of illumination. Reflective tape is therefore inherently insensitive to tilt or misalignment.

The charts here show the output of the model D170 sensor at a gap of 50 mm. With an ordinary reflective surface, such as a front surface mirror, the sensor's output is extremely sensitive to tilt: about 50% of the output power is lost at 5° tilt.

With reflective tape the sensor shows no loss of output at 5° tilt, and it can be used with great efficiency at angles up to 45° or more.



PISTON STROKE

The precise measurement of Top Dead Center (when a piston reaches the end of its stroke) is enhanced thru the use of reflective tape.

- Reflective tape is applied to the piston head.
- Philtec's sensor is mounted in a spark plug hole.
- The engine is externally driven without ignition.