

SCAN_LASER

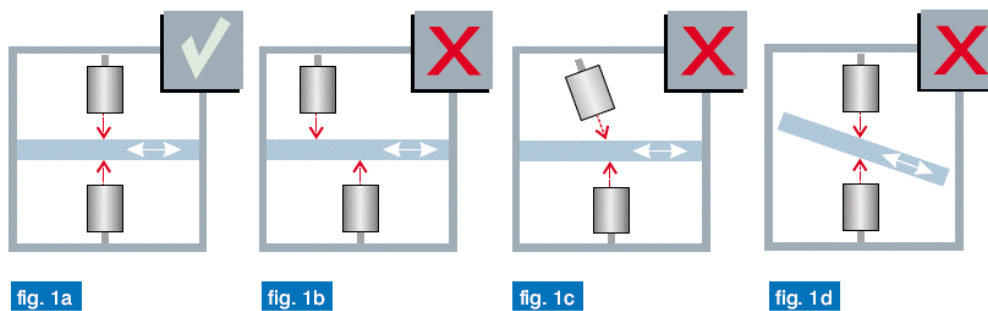
TECHNICAL GUIDE FOR ON-LINE THICKNESS AND PROFILE MEASUREMENT

Non-contact displacement sensors are often used in industry for thickness measurement. This short document provides information for successful and accurate thickness measurement. The points discussed in this document are valid for single piece measurement and also continuous process measurement.

Displacement sensors are offered with various measuring principles: eddy current, capacitive, laser, LVDT and others. Many Factors do influence selection of best sensor type: Target material and performance, environment, mounting conditions, measuring range, accuracy and many more. Applied Industrial Systems will be pleased to propose a sensor for your application.

ALIGNMENT OF SENSORS

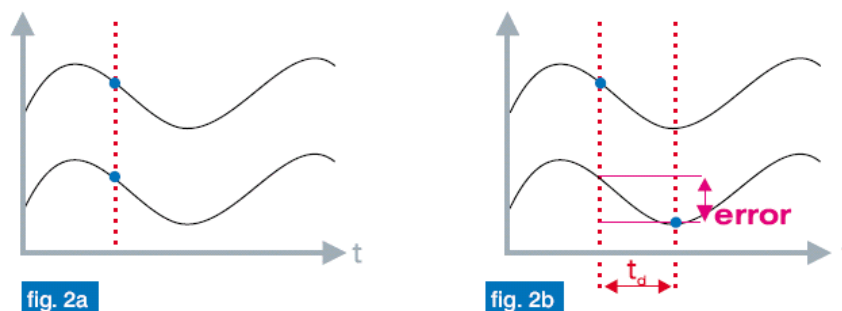
When using two sensors mounted they have to be aligned correctly (fig. 1a). There is no offset allowed (fig. 1b), no misalignment (fig. 1c) and no inclination of sensors with respect to the target (fig. 1d).



Example: At 1 mm offset 2° inclination gives error reading of 35 µm, with 10 mm target thickness that even increases to 41 µm.

SYNCHRONISATION

Both sensors must be synchronised (i.e. make their measurement at the same time) to avoid errors due to movement of the product. Additionally the signal processing unit (PC) has to process both sensor signals at exactly the same time (fig. 2a). Taking both sensor signals subsequently (fig. 2b) will create errors caused by micro-vibrations of the target.



Example: Delay of 1 ms will create 125 µm error (assuming 1mm vibrations at 20Hz)

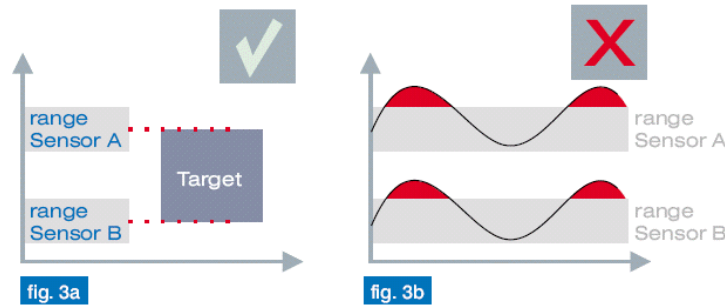
ACCURACY / RESOLUTION / LINEARITY

In order to achieve the correct readings, it is necessary to choose a sensor that provides the required measurement performance. AIS supply only digital sensors as they provide better accuracy and stability than the older analog sensors for the industrial environment

With most displacement sensors, accuracy is mainly defined by the linearity of the sensor. But also target properties may influence accuracy. AIS will normally conduct some simple measurement trials before recommending a specific type of sensor.

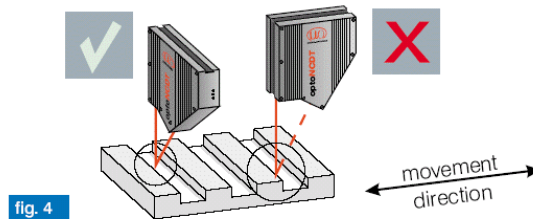
SENSOR POSITIONING / MEASURING RANGE

Installation of sensors must be done with respect to target position, sensor range, thickness variation and vibration amplitude (fig. 3a). If the target appears outside the sensors measuring range, an error will occur (fig. 3b). Care should be taken at special operating conditions (start, stop, changing speed).



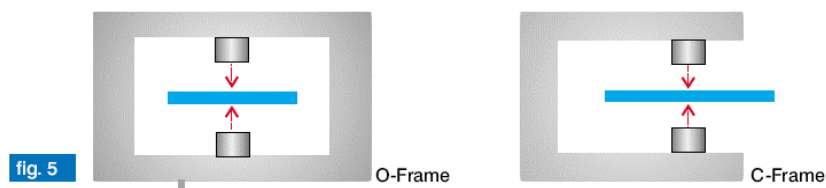
ORIENTATION OF LASER SENSORS

Laser sensors based on the triangulation principle need to be mounted after consideration of the moving direction of the target (as shown in fig 4). This gives higher accuracy and less effects caused by target surface.



SENSOR MOUNTING

The fixture should fulfill the requirements of sensor alignment and positioning (see above) and keep the sensors at a stable position. O-frames are more stable than C-frames (fig. 5), although C-frames are acceptable if of a solid construction. Frames should generally be mounted off the floor rather than off the machine, so as to reduce vibration.



TURNKEY MEASUREMENT SYSTEMS

Applied Industrial Systems Ltd. offers total solution systems for thickness and profile measurement, including mechanics, electronics and software. See www.applied.co.uk for further details.

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