Thickness Measurement Instrument

Instrumentation and Sample Preparation

Model:

- Produced in-house. *(Figure 1)*

Sample Preparation:

Samples can be analysed as-received (as a metallic flake). *(Figure 2)*

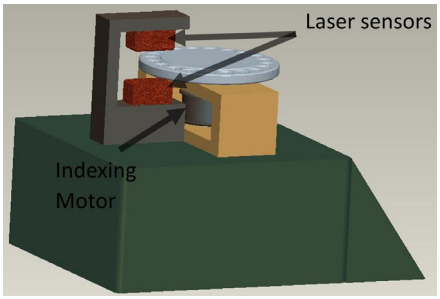

Figure 1: Diagram of Less Common Metals Thickness Instrument

How does it work?

Instrument Calibration:

The instrument is calibrated with a 16-point calibration of known thickness gauges, ranging from 0.1 – 0.6 mm. *(Figure 3)*

The typical limit for strip cast materials at LCM is 0.2 – 0.4 mm, well within our calibration range.

The Laser:

A laser projects a pulse of light onto a surface, which is reflected back and detected by a pixel sensor. This can measure the distance between the laser and the metallic sheet or flake. This is done from both surfaces (above and below) which gives two distances. Where the total distance is known, the thickness can be calculated by:

D thickness = (dA+ dB)
(Figure 4/5a)

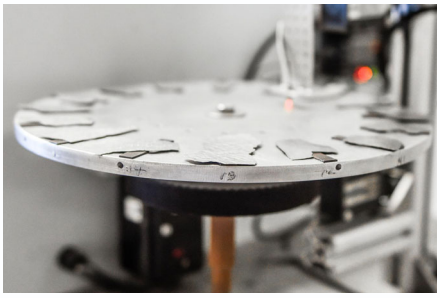

Figure 2: Less Common Metals Strip Cast Material

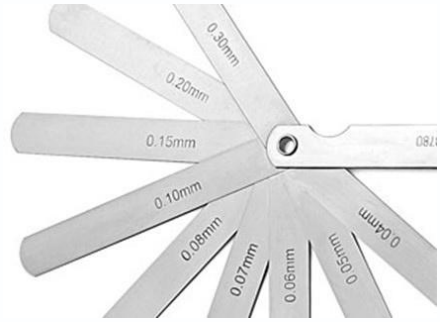

Figure 3: Thickness Feeler Gauge

What does it detect?

Flake Thickness Detection:

Read values could be affected by the curvature of the sample. But if the distance to the upper sensor is reduced it is compensated for by the lower sensor providing an increased reading. The thickness measurements are sampled over an area and averaged. *(Figure 5a)*

A diagram of how the laser sensor operates is shown below – and works by using the principles of triangulation.

Although the sensors have an operating range of +/- 10 mm, it's best to measure at the optimum distance of 50 mm. *(Figure 5b)*

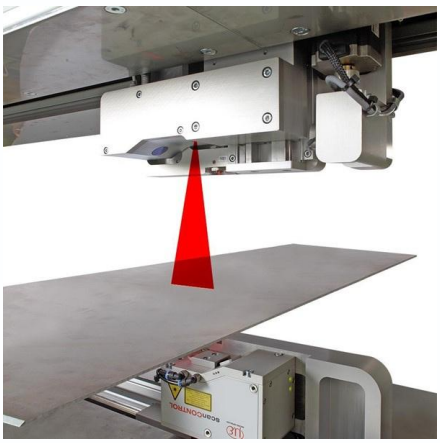

Figure 4: Laser Thickness Measurement

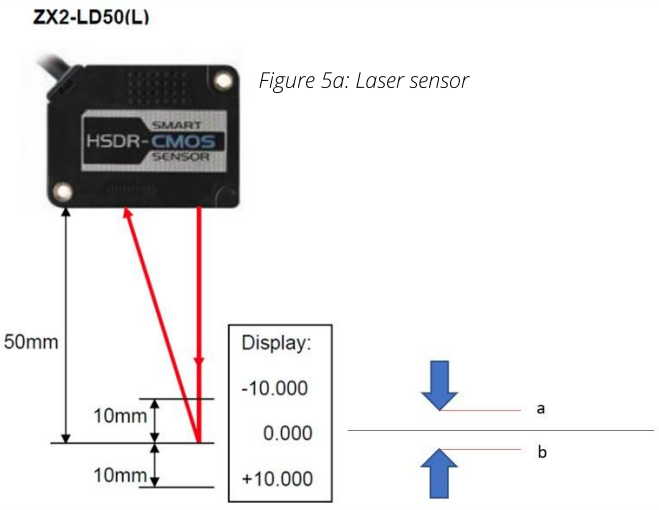

Figure 5a: Laser sensor

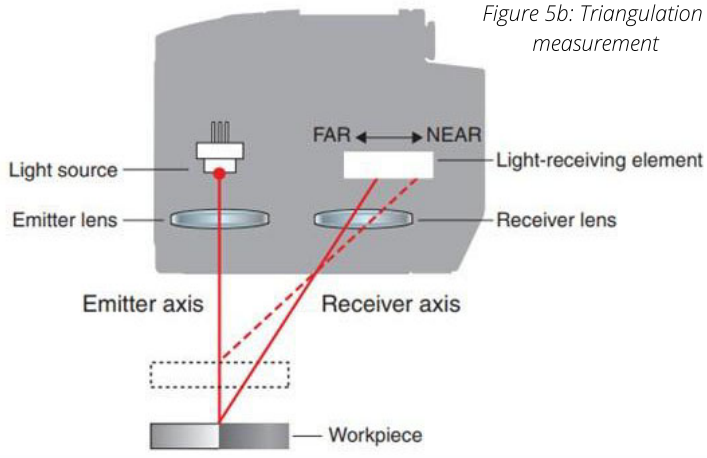

Figure 5b: Triangulation measurement