

(420) DEVELOPMENT OF AN INDUSTRIAL BEAM DIMENSIONS MEASURING DEVICE

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In order to produce H-beam within accurate dimensional tolerances, the rolling mill operator must measure the main parameters describing the shape of H-beam cross section.

This may be done manually on cold samples. However, on-line automatic, continuous measurement is by far more suitable for yield improvement and quality control. Gamme-ray absorption technique allows continuous measurement of flanges and web thickness.

Other dimensionnal factors are the width of each flange (b_1, b_2), the height of the beam (h) and the position of the web with respect to the flanges (symmetry a_1-a_2).

In order to measure those parameters, IRSID has developed a non-contact gage combining several optical principles and components (fig.1).

- By means of laser beam triangulation method, the positions of the upper face of the web and of the outer faces of the flanges are determined. Two triangulation devices are used for each face.
- By means of the projected shadow principle, the total heights of both flanges are measured. Therefore, light sources are located between the upper and lower half flanges. Four linear photodiode array cameras measure the flange edge positions by optical contrast analysis.

All those ten sensors are movable. Their positions are automatically pre-set according to the type of H-beam to be rolled.

Mechanical pre-setting and signal treatment are controlled by several microprocessor units.

The industrial prototype of the gage is located on the rolling mill of USINOR Longwy, before cooling bed.

For any given beam, the measured parameters of the cross section are determined at 200 positions along the 80 meters long bar and displayed on a colour screen (fig.2).

The measurement accuracy as determined from comparisons made between gauge and manual measurements (fig.3) may be characterized by a standard deviation estimation :

- 0.2 mm for flanges widths and beam height,
- 0.4 mm for symmetry.

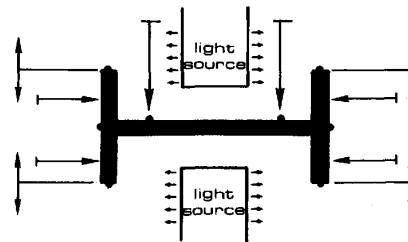


Fig.1. Measurement principle.

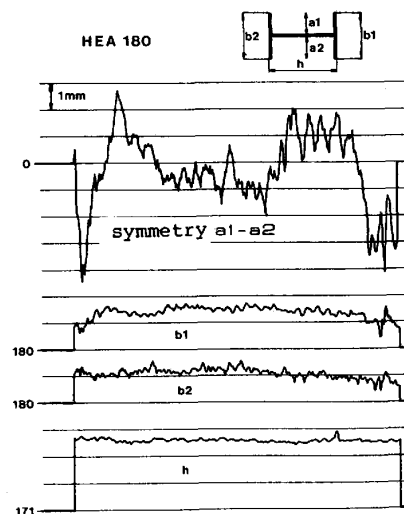


Fig.2. Examples of recordings.

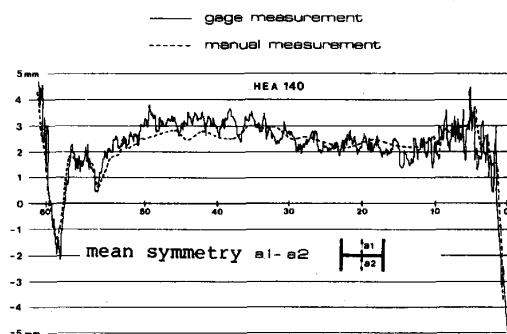


Fig.3.