



Pentaprisms, requirements of the measuring set-up



Fig 1: Pentaprisma 1“

Principal:

A pentaprism deflects an arriving (laser) beam onto the X/Z plane (*fig. 9*) by exactly 90 degrees. This deflection depends on the location of the prism in relation to its rotation around the Y-axis.

Gepard application:

For every application of the 2-dimensional "GEPARD" measuring system, the limitation applies, that the Y-axis is only given by the spatial position of the prism when this prism is put in the path of the laser beam in order to deflect it. The GEPARD measuring system uses the co-ordinates X (horizontal) and Y (vertical).

Set-up for measuring -up rectangularity / parallelism with the Gepard measuring system:

- Adjust the laser beam in relation to the reference and measuring plane (*fig. 10*)
- Recording of the reference line, receiver at Pos E1 (MP 1), then Pos E2 (MP 2)
- Recording of the measuring line, receiver at Pos E3, then Pos E4.

Introduction of the prism means that the WIN-GEPARD evaluation software virtually creates two parallel lines, the angular error of which to each other, can be calculated or shown.

Definition of the co-ordinate systems used:

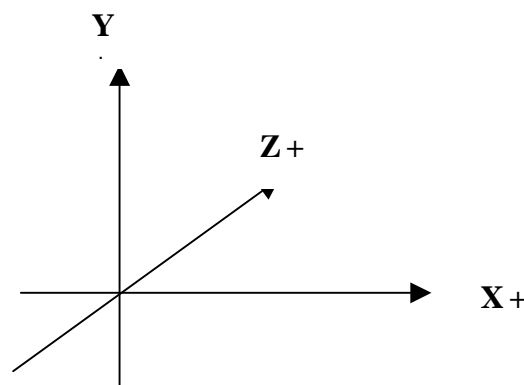




Fig. 9: Prism plane



Special requirements regarding the position of the prism:

In order for the pentaprism to also achieve the given beam deflection of 90 degrees with approx. 3 sec. accuracy during measuring, it is **absolutely necessary** that both the planes are determined by:

- laser beam plane (*fig. 10*, plane 1) and
 - pentaprism plane (base of the prism), (*fig. 10*, plane 2),
- are very exactly positioned, i.e. that they are parallel. This is ensured if the beam hits the receiving area of the prism in the Y-axis at a right-angle. Every deviation from this results in an increase in size of the 90-degree angle (in the X direction). The resulting X-error is dependent on the Y-angle deviation at entry of the beam in the prism (an exact right-angle is necessary) and the dimensions of the prism.

Accurate adjustment of the planes to each other is best achieved when the reference line, the measuring line and the prism are in water (nivalled).

If this is not possible, the prism plane should be parallel to the reference axis plane. (*Fig. 11*)

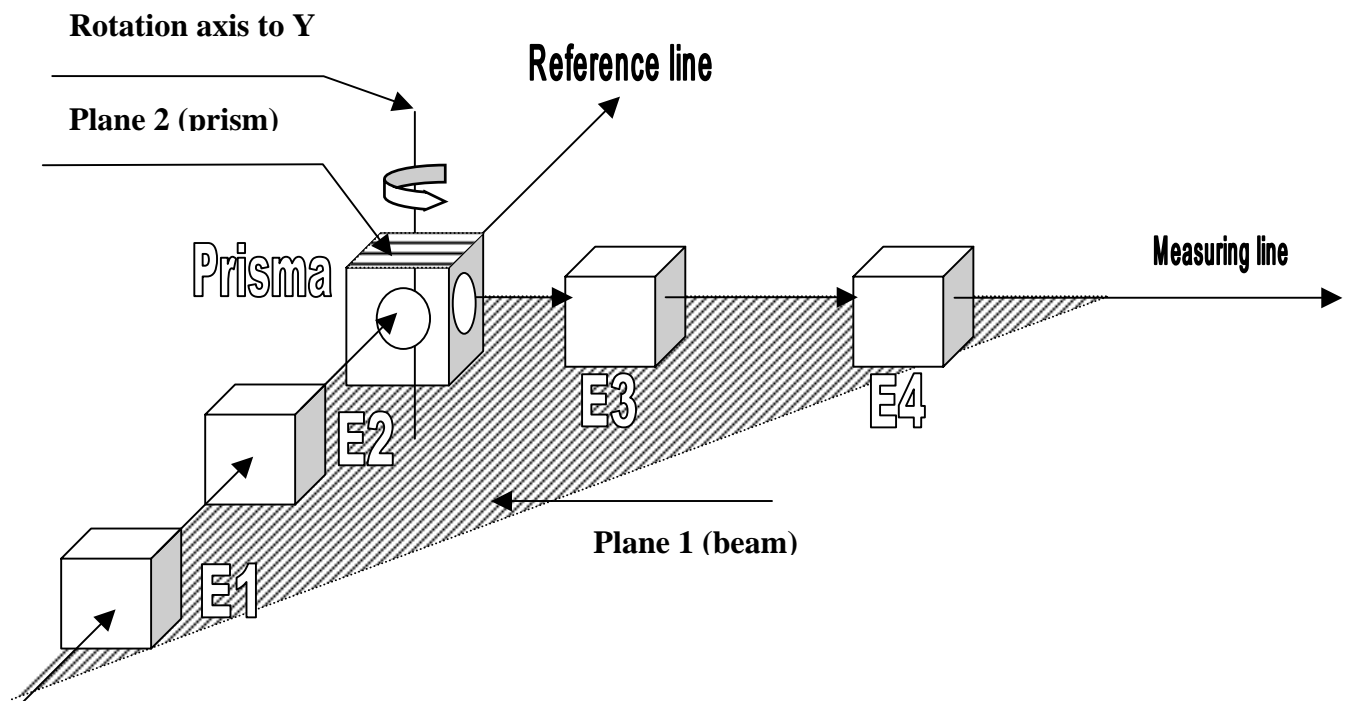


Fig. 10 : Reference and measuring plane



Side view:

This shows the reference plane: in *Fig. 11* the reference and prism planes correspond (they are parallel).

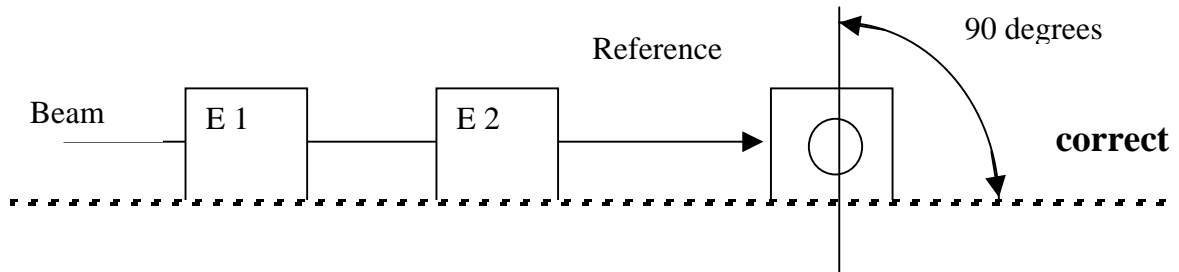


Fig. 11: Correct reference and prism planes

A measuring set-up according to *fig. 12* results in the above-mentioned angular error of the 90° angle.

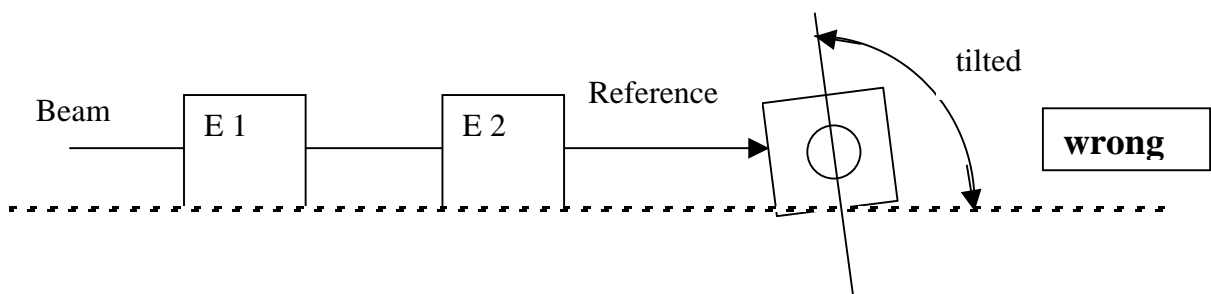


Fig. 12: Incorrect reference and prism planes

Final comment:

When using the pentaprism, accurate measurements can only be obtained if attention is paid to the exact positioning.



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Februar 2003 / Fi