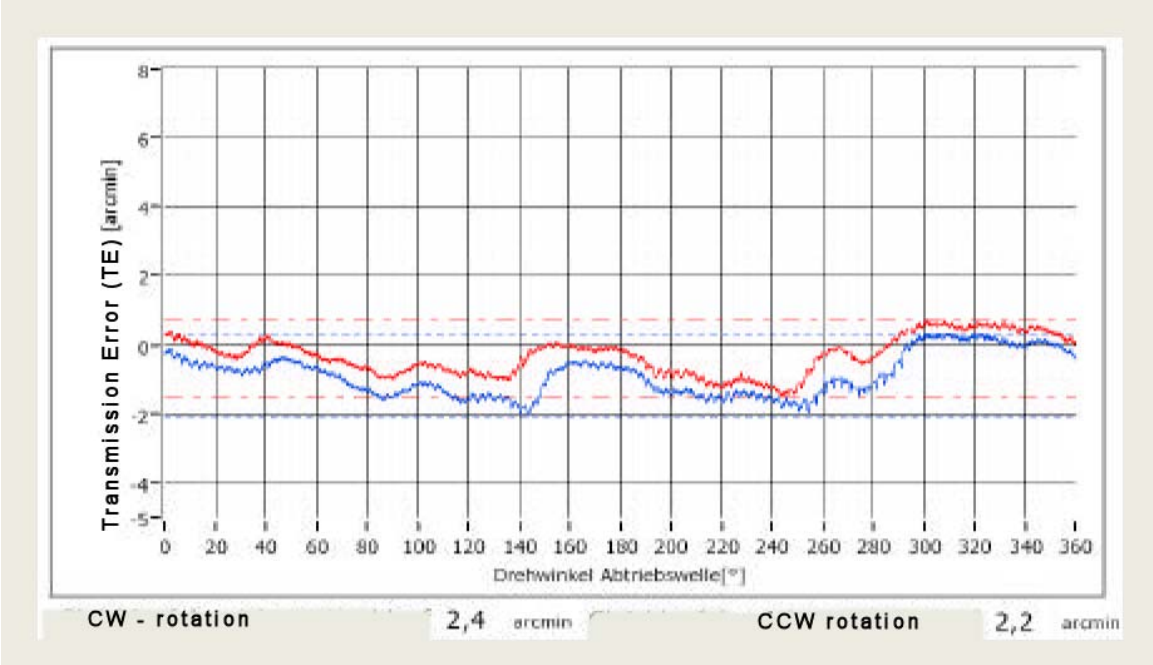
Gear / gearbox transmission error (TE)

Transmission error of a gear, gear set, or of a complete gearbox is defined as the deviation between the theoretical angular position the driven gear (output) should have and its actual position, when driving the input at a constant steady rotation.

It is normally plotted as deviation in arc min over a full 360 degree rotation of the output.



Measured TE of a PLN precision planetary gearbox

Main influencing factors of the transmission error are the gear inaccuracies, tolerances, deviations from the theoretical profile and lead, inconsistencies in tooth width, eccentricity, pitch deviations, etc. In short, the quality of the gear is the major influencing factor. Hence, high quality / precision gears have a lower TE than lower quality class gears.

The gears in a Neugart gearbox are manufactured and hard finished by honing to an ISO / DIN quality of 6 or better (AGMA 12 quality or better) the TE of a Neugart planetary gearhead is exceptionally low, about 2-3 arc min in the S-class an about 4 arc min in the E-class.

In a complete gearbox assembly, next to the gears also some of the gearbox components can influence the TE such as shaft eccentricities, run outs, housing bores etc.

The TE is not influenced by the backlash, just like low backlash is not a quality criterion. On the other hand the uniformity, consistency of the backlash does influence the TE.

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