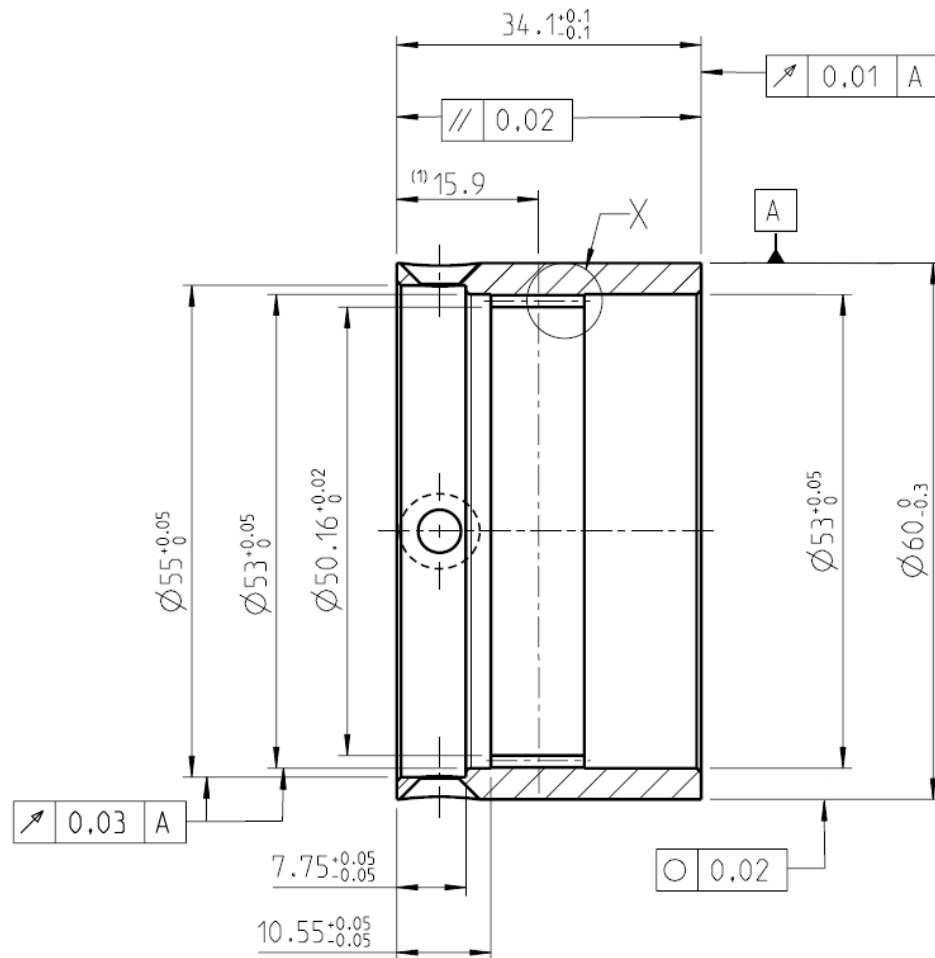


NEWS IN MEASURING OF INTERNAL GEARS



Classic example – external surface of planetary gearbox



Requirements:

- quality of tothing related to datum A
- constant backlash
- measuring over balls for all teeth
- measuring of datum A roundness
- quick exchange of clamped gears

Possible difficulties

- clamping of measured gear
(**price / time / comfort**)
- master gear error
(e.g. DIN4 → F_r **up to 5 μm**)
- runout of master gear arbor
(may be up to **2 – 3 μm**)

Common solutions

- perfect clamping fixtures – if possible
(2 – 3 μm → **up to 1900 EUR/piece**)
- quality of master gear DIN 2
(price up to **1200 EUR/piece**)
- extremely precious solutions
(very sensitive for operatives
erudition)

Solution by GEARTEC.CZ

Simple & cheap clamping fixture of measured gear suitable for measuring of the same parts

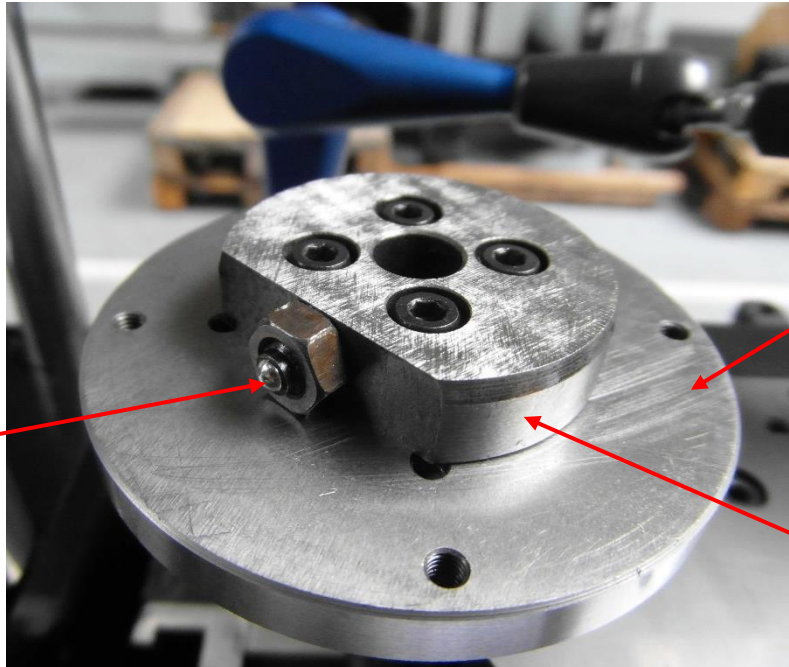
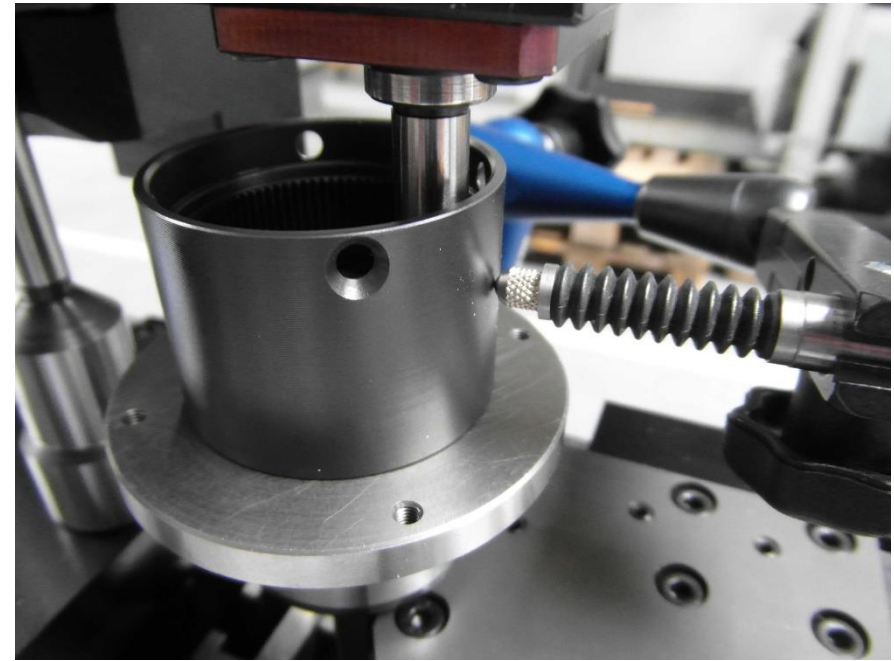


table
ø 60mm

Clamping
fixture
body



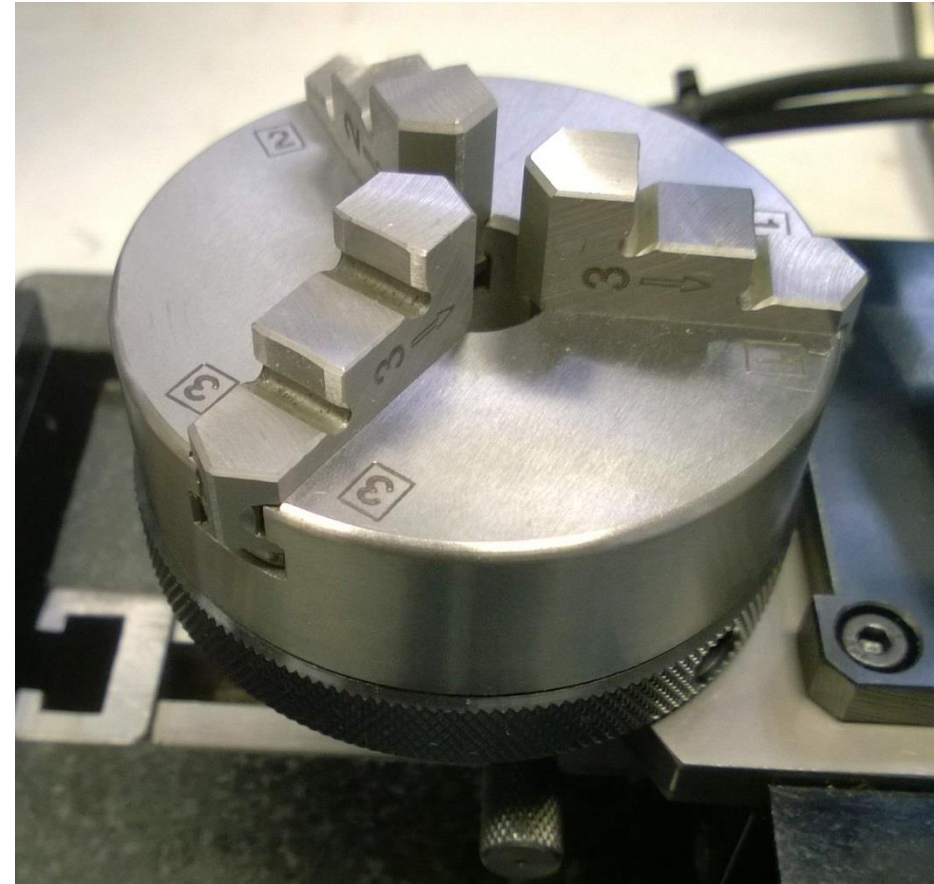
cancellation of clamping error and optionally
cancellation of master gear radial runout

time required for exchange is 3 seconds
clamping accuracy 0,05 mm

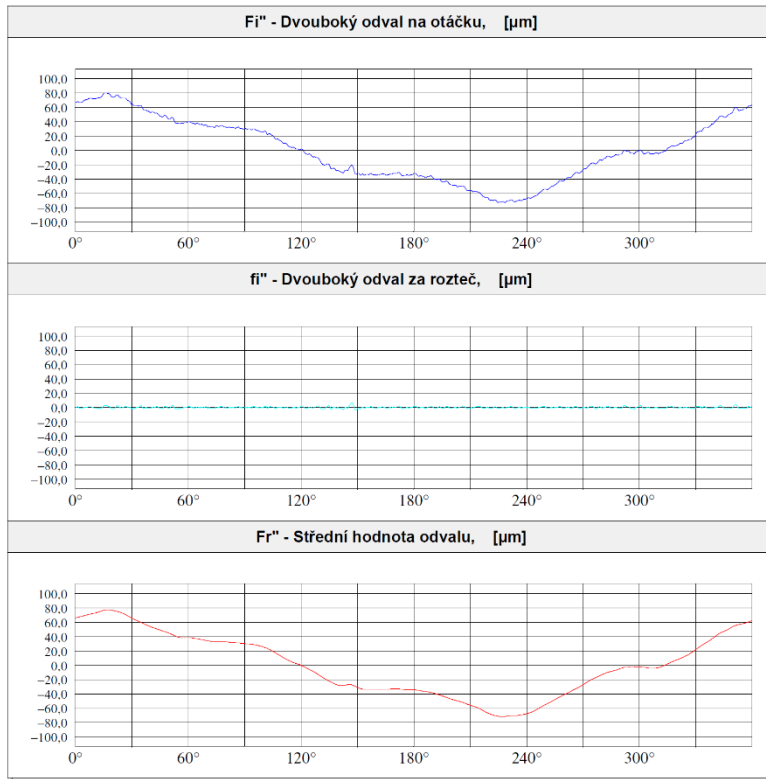
A gear is clamped by the spring-loaded screw in an inner diameter. Inaccuracy of clamping (runout) is measured and subsequently cancelled.

Solution by GEARTEC.CZ

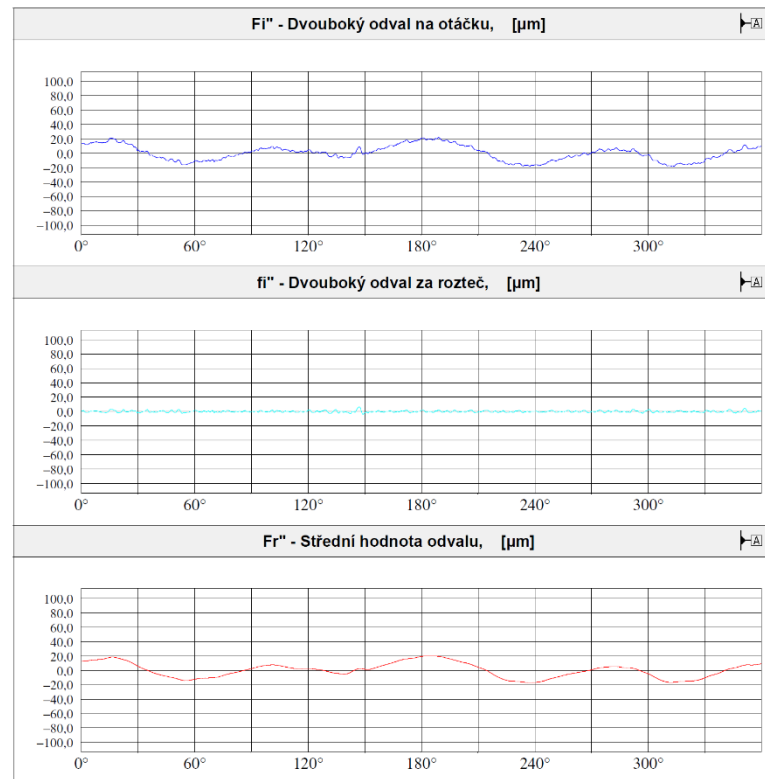
Simple & cheap clamping fixture of measured gear suitable for different diameter of measured parts



Clamping fixture error cancellation



| Měřené hodnoty | Norma : DIN 58405 | Povoleno | Naměřeno |
|--------------------------|----------------------------|----------|------------|
| Dvouboký odval na otáčku | F_i'' [μm] | 36,0 8 | 152,8 -- |
| Dvouboký odval za rozteč | f_i'' [μm] | 12,0 8 | 12,7 9 |
| Střední hodnota | f_{im} [μm] | | 4,5 5 |
| Střední hodnota odvalu | F_r'' [μm] | 25,0 | 148,9 |
| Kolísání os. vzdálenosti | $A_{ai}^* - A_{ae}^*$ [mm] | | |
| Odchyłka os. vzd. | A_a^* [mm] | | |
| Míra přes kuličku | M_{dk} [mm] | | |

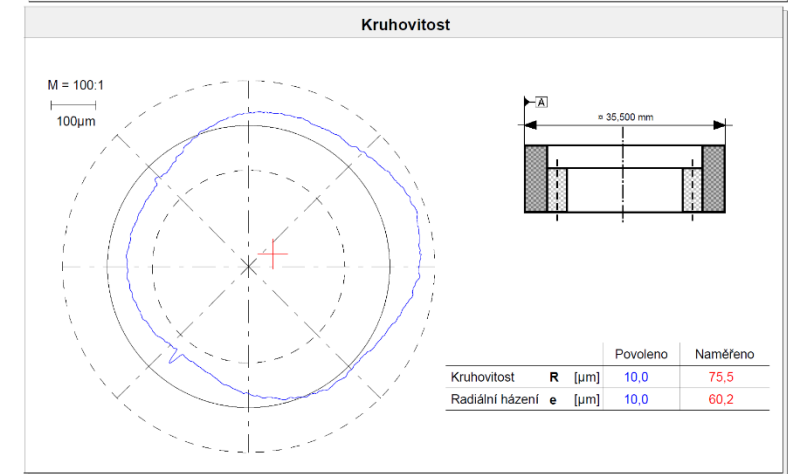


| Měřené hodnoty | Norma : DIN 58405 | Povoleno | Naměřeno |
|--------------------------|----------------------------|----------|----------|
| Dvouboký odval na otáčku | F_i'' [μm] | 36,0 8 | 39,9 9 |
| Dvouboký odval za rozteč | f_i'' [μm] | 12,0 8 | 13,4 9 |
| Střední hodnota | f_{im} [μm] | | 3,8 5 |
| Střední hodnota odvalu | F_r'' [μm] | 25,0 | 36,6 |
| Kolísání os. vzdálenosti | $A_{ai}^* - A_{ae}^*$ [mm] | | |
| Odchyłka os. vzd. | A_a^* [mm] | | |
| Míra přes kuličku | M_{dk} [mm] | | |

measured gear is
clamped inaccurately

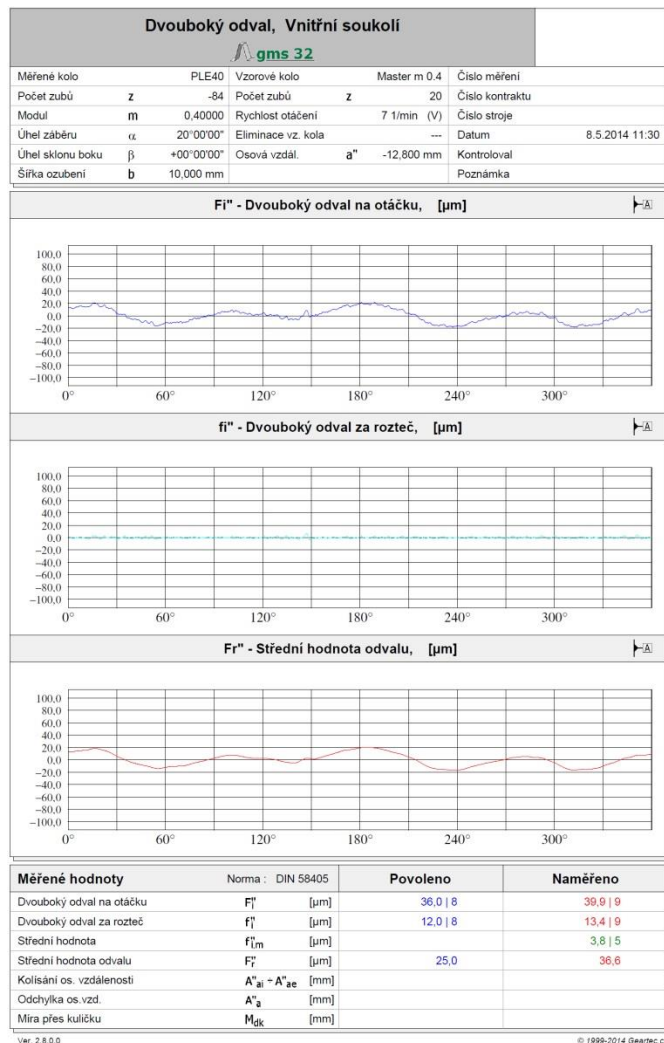
clamping fixture error
cancelled

| Dvouboký odval, Vnitřní soukolí | | | |
|---------------------------------|--------------------|--------------------|----------------|
| Měřené kolo | PLE40 | Vzorové kolo | Master m 0.4 |
| Počet zubů | z -84 | Počet zubů | z 20 |
| Modul | m 0.40000 | Rychlost otáčení | 7 1/min (V) |
| Úhel záběru | α 20°00'00" | Eliminace vz. kola | --- |
| Úhel sklonu boku | β +00°00'00" | Osová vzdál. | a" -12,800 mm |
| Šířka ozubení | b 10,000 mm | | |
| | | Číslo měření | |
| | | Číslo kontraktu | |
| | | Číslo stroje | |
| | | Datum | 8.5.2014 11:30 |
| | | Kontroloval | |
| | | Poznámka | |

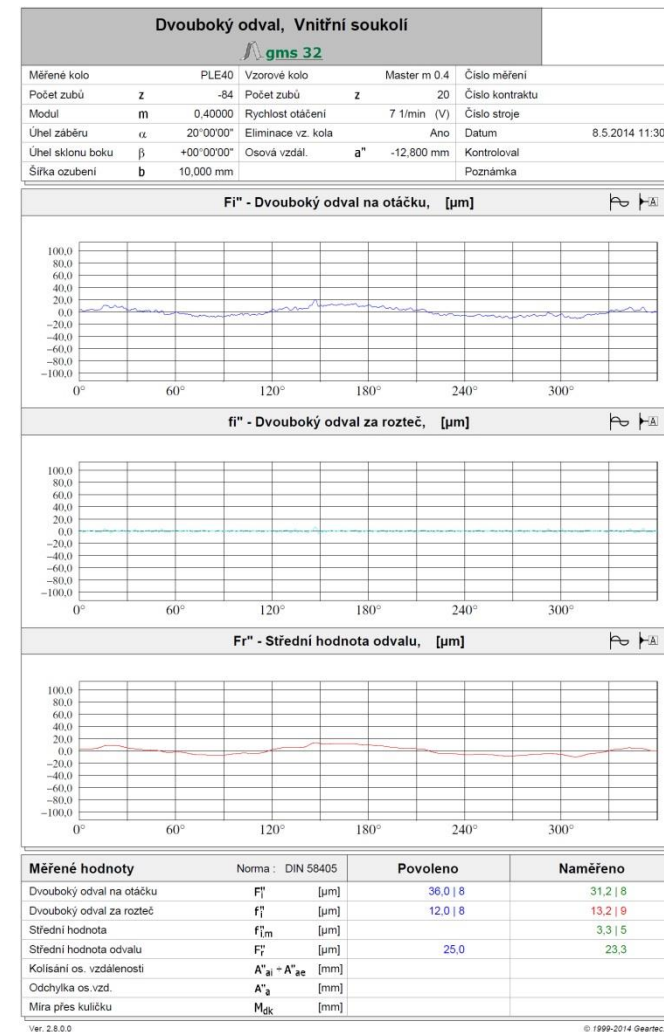


Clamping accuracy
approx. 60 μm

Master gear error cancellation



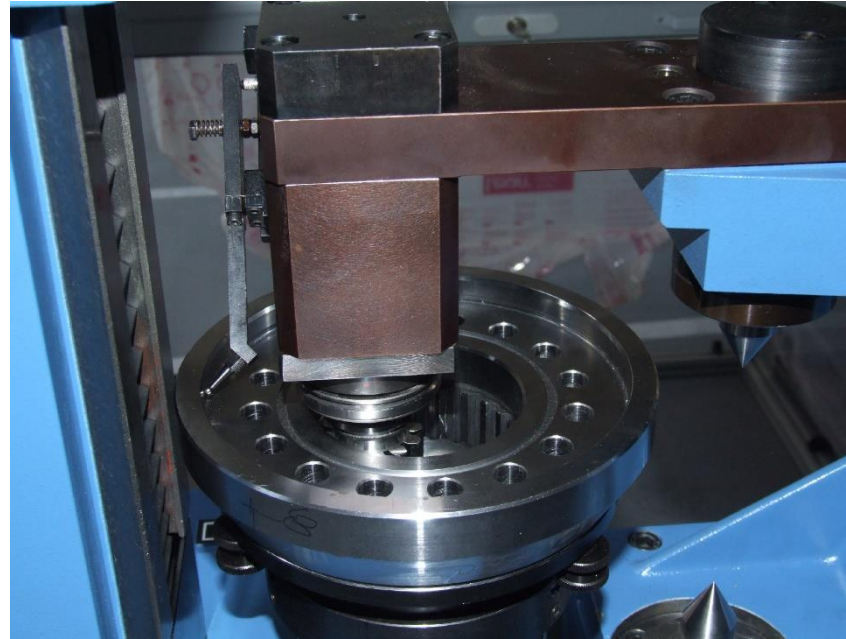
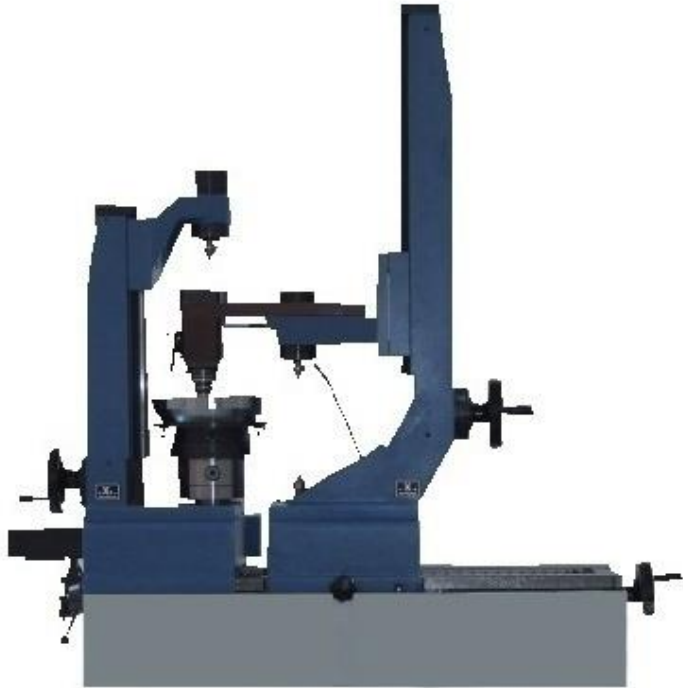
without master gear radial runout cancellation but
with clamping inaccuracy cancellation



with both master gear radial runout cancellation
and clamping inaccuracy cancellation

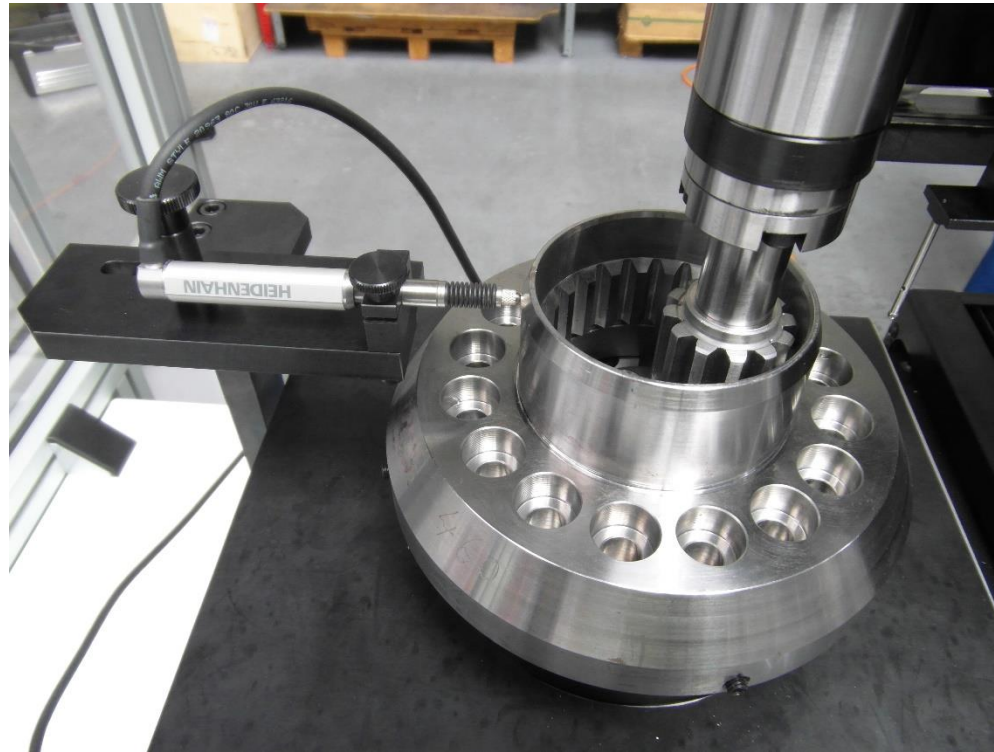


Other machines for internal (external) gears



GTD200 machine for internal and external gears incl. possible cancellation of clamping inaccuracy and master gear error

Other machines for internal gears



GT300S machine for internal gears incl. possible cancellation of clamping inaccuracy and master gear error

Thank you for your attention

