Samputensili Master Gears

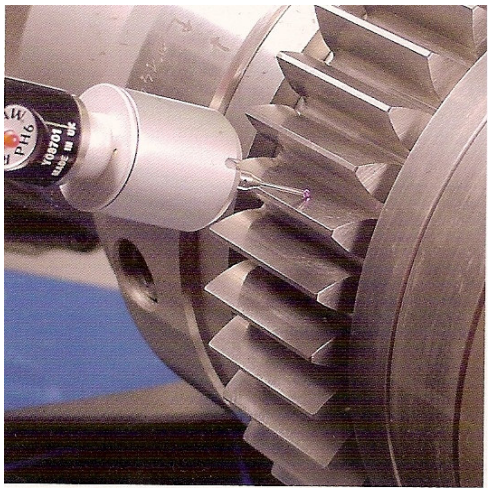

Figura N°1- *Master gear ground and checked by Samputensili machine mod. S400GS*

When we talk about master gears we talk mainly about two types of applications: master gears for checking gears and master gears for the calibration of equipment.
While the first type rolls against the flanks of the workpiece to detect errors, the latter is used to calibrate equipment.
Master gear are designed according to customers applications or according to the DIN standard.
The master gear design brings us to a more interesting characteristic: can two different designed master gears check the same workpiece? And –if so- isn't there only one ideal design for the appropriate master gear ?
The question can be explained with a simple example of two rather estreme master gear design.
Different tooth addendum modifications, different tooth forms aa well as centre distance are obtained.
When regrinding master gears the addendum modification changes without any effect to the application (of course provided that centre distance can be adjusted).
The following comparison shows two different master gears designs, which can be used for the same workpiece with the following characteristics:

- *Normal Module* $M_n = 2$ mm
- *Pressure angle* $\alpha = 20°$
- *Helix angle* $\beta = 18°$ R.H.
- *Number of teeth* $Z = 48$
- *Outside diameter* $D_k = 106{,}86$ mm
- *Root diameter* $D_t = 94{,}95$ mm

The first example, figure N°2, shows a master gear with positive addendum modification.
This master gear checks the complete active involute length of the workpiece.
In this case the master gear has a comparatively narrow tooth tip.

The second case, figure N°3, shows the same master gear with negative addendum modification. In this case the master gear check the workpiece tooth tip close to the base diameter of the master gear.

Also with this different master design the active involute of the workpiece is completely checked.

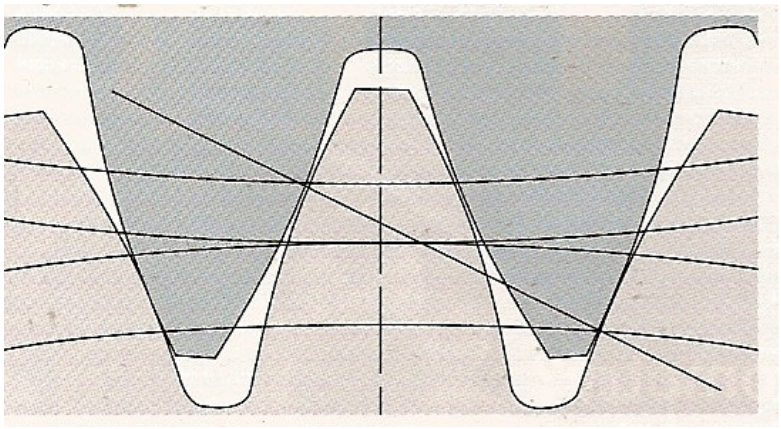

Figura N°2

The master gear data are the following:

- *M_n = 2 mm*
- *α = 20°*
- *β = 18° L.H.*
- *Z = 54*
- *D_k = 122,96 mm*
- *D_t = 110,95 mm*
- *Shift of profile Xm = +2*

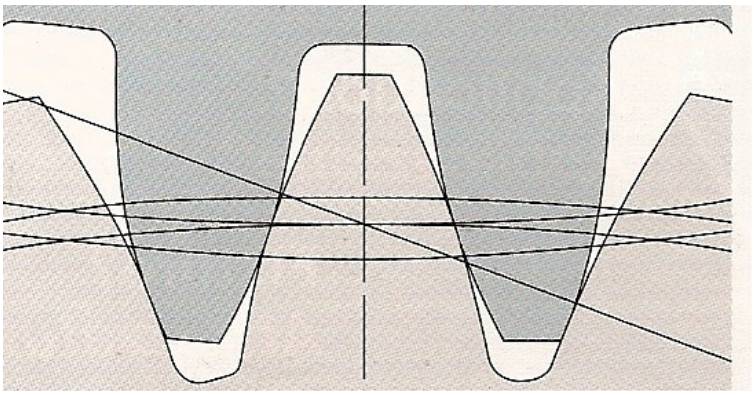

Figura N°3

The master data are the same with exclusion of:

- *D_k = 116,96 mm*
- *D_t = 104,95 mm*
- *Shift of profile Xm = -1*

The master gears are measuring and testing instruments. Therefore they do not have to resist stress like cutting tools.
PM steel or bearing steels are used for the master gear production.
If master gears are coated for longer life, they are always made from PM steel because of the high temperatures in the coating units.

Calibration gears are normally not coated since they are not subject to a considerable wear.
The most common coating for Samputensili's checking master gears is the Samputensili Sunite TiN, reducing the wear and the friction during mating.
Master gears for testing purposes which are subject to wear should be reground to reassure an optimum profile quality.
But regrinding makes only sense if the centre distance between master gear and workpiece can be adjusted.

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