Master Gears for all Requirements
Highest standard - technically perfect
General Information

Master gears enable you to carry out single and double flank gear rolling inspections as part of an integrated process within production - thus saving you both, time and money. The qualities of master gears are defined in DIN 3970:2010-04.

The most relevant issues can be summarized as follows:

- Area of application from module 0.2 mm
- Division into three accuracy classes, A, B and C
- Definition of a wear limit for the monitoring of measuring instruments (1.5 x new condition) and regulations for the regrinding procedure
- Master gears must have a clocking band
- Tooth flank modifications can be agreed on customer request
- Definition of tolerances for the tooth thickness

Quality

The following table shows the accuracy classes A, B and C of DIN 3970 in comparison to those of the DIN 3962/3963.

The quality class A of master gears is mainly needed to inspect work pieces of tolerance class DIN Q4 and Q5. Quality A cannot always be manufactured.

The quality class B of master gears is mainly needed to inspect work pieces of tolerance class DIN Q6 and Q7. This is the quality standard for uncoated master gears.

The quality class C of master gears is mainly needed to inspect work pieces of tolerance class DIN Q8 and higher. Standard accuracy for coated master gears are classes B and C.

Note: The classes of DIN 3962 and DIN 3963 correspond approximately to the classes of the new ISO 1328-1.
Products

Standard

Going by the name “pure perfection”, all master gears are state-of-the-art.

Short delivery times for master gears in standard quality plus test certificate.

- Quality class B according to DIN 3970
  With pitch and helix being the two critical parameters, both are more accurate than Q3
- Gauge steel CSP (low-corrosion)
  Low-corrosion material, coating (optional)
- Base body according to DIN 3970
  The sizes are defined in DIN 3970 – with the clamping equipment being available, the master gears are of excellent value
- Uncoated, no modifications
  ...yet of the highest quality – including a test certificate from our accredited DAkkS laboratory

Optional Extras

“pure perfection” - with optional extras to your requirements

Longer lifetime due to coating, protection of the test surfaces due to tip chamfers, modifications and much more.
Useful options for many applications.

- Quality class A according to DIN 3970
  For tolerance classes DIN Q4 and Q5
- According to other standards like AGMA, ISO
- High alloyed powder steel SX
  Increased lifetime - even uncoated
- Tip chamfers
  Impact protection for high-precision surfaces
  Improved running properties
- TiN, TiAIN or TiCN coated - quality class B or C
- Modifications
- Special pressure angles
Tip Chamfers

Tip chamfers improve running characteristics and protect the master gear against damage. The damage is not usually detected during the monitoring process of inspection equipment and can be quite “sneaky”.

Without tip chamfer
The sharp edge of the tip diameter touches first while the flank contact is running in.

With tip chamfer
Tip chamfers serve to break this edge so that no damage can arise on the master gear and the measurement is reliable.

Coatings

Coatings protect the surface against wear. The coating is much harder than any steel and also more wear resistant. At the same time, the layer serves as rust protection.

As the coating process has to be carried out at high temperature, the base material to be coated must be suitable. The standard version of FRENCO’s master gears are made of material (CSP) that can be coated.

Modifications

Modifications are desired deviations of profile or helix from the ideal shape. In the case of master gears, this is usually accomplished as an adaptation of the specimen modifications.

Modifications can be symmetric or asymmetric in relation to the left or right flank.

Nearly all modifications and their combinations are possible.

However, the manufacturing demands rise sharply for asymmetrical helix modifications in particular.
Special

Master racks, master gear worms, master pinion gears for rack measuring devices, internal helical master gears and setting masters – as long as our manufacturing technology can do it, we can do it!

- quantity: 1 – that’s what we are used to
- coated or uncoated
- „pure perfection“ quality with test certificate

Just contact us!
Wear Measurement

The inspection of master gears contains the measurement of the total profile, the helix, the total runout, the total pitch and the single pitch deviation on a high precision inspection machine. Additionally the bore and the major diameter are measured.

Even the uncertainties of high precise inspection machines are big in relation to very small tolerances. Therefore master gears are not rejected until the tolerance is exceeded by more than the measuring uncertainty. This principle is also used for wear inspection to make sure that functional master gears are not rejected because of the measuring uncertainty.

Master gears will slowly wear during their usage. That’s why it is necessary to check them periodically. This wear inspection is to be carried out on the same conditions as the inspection of a master gear in the new condition, provided that the allowed single deviations may increase to 1.5 times of new conditions or in line with tolerance limits of the gage drawing. The inspection intervals during usage should be made at of 25% of the estimated service life. FRENCO offers wear inspections of master gears.
Regrinding Procedure

Master gears wear depends on their intensity of usage, of hardness, the surface und the quality of the workpieces being inspected.

Often worn master gears can be reground if there is enough material between the minor form diameter and the base diameter and if there is enough material on the tooth thickness. DIN 3970:2010 describes rules for reworking.

The flow chart for rework service at Frenco is shown right next.

Compared to new master gears for reworked master gears cost saving is about 20% for the same quality conditions.

Master gears shall be reground if parameters exceed 1.5 times tolerances of new conditions.

Coated master gears can be reground and reworked as well.
Experience, competence and innovation in gear metrology.

Our Products:
- Spline Gauges
- Toothed Artefacts and Masters
- Master Gears
- Tools and Clamping Systems
- Size Inspection Instruments
- Double Flank Gear Inspection
- Gear Flank Analyser
- Universal Measuring Machines
- Rack Inspection Machines
- Software

Our Services:
- DAkkS Calibration
- Gear and Spline Inspection
- Gear and Spline Manufacturing
- Seminars
- Service
- Support and Calculation

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