

## Gear and Spline Manufacture

Precision begins with one piece

 *pure  
perfection*

**FRENCO**

# Welcome to the World of Gearing

FRENCO produces gears and splines made to specification and in small batches.

FRENCO is specialised in high-precision gearing.

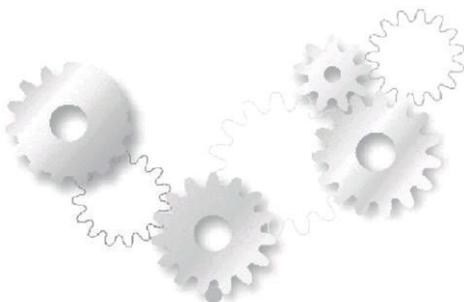
In cooperation with our partner company, we offer the production of complete parts to your specifications.

Benefit from our extensive experience with gears and splines. After all, who doesn't like to have a partner who has made "pure perfection" his business and achieves it every day?



*pure  
perfection*

**FRENCO**

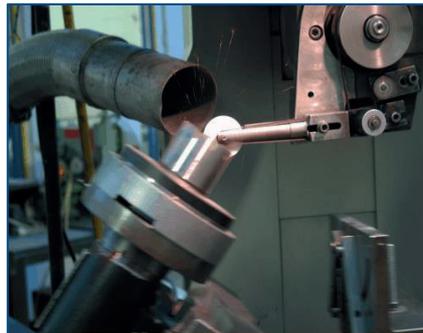
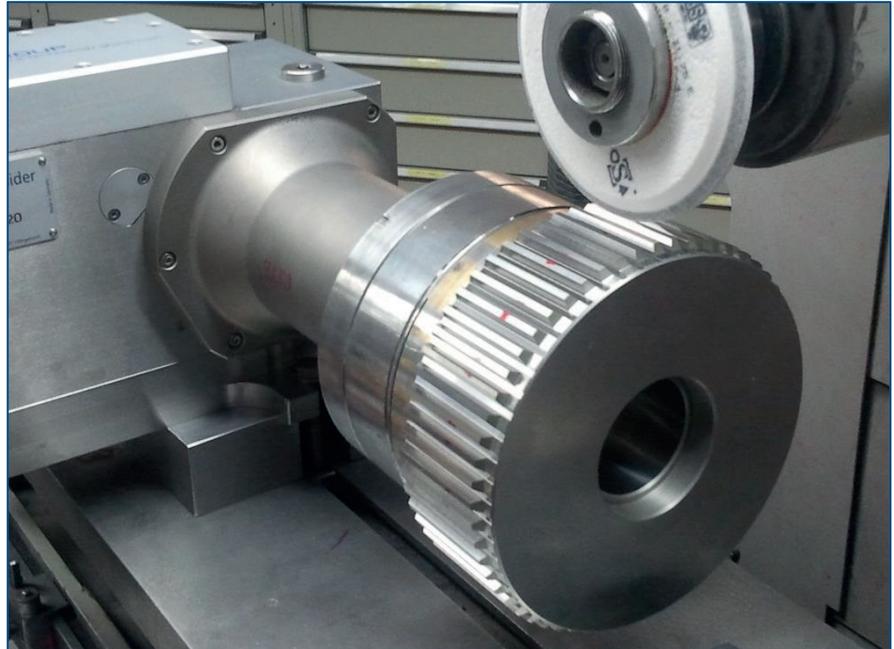


# Gear and Spline Manufacture

## Grinding of special tooth profiles

Even today it is often advantageous to manufacture spur toothed profiles using semi-automatic grinding processes.

That, however, demands high expectations from the grinding specialists. The interaction of machine, metrology and grinding specialists generates tooth profiles with micron precision.



<b>Max. workpiece length</b>	external gear/spline		560 mm
	internal gear/spline		300 mm
<b>Max. profile length</b>	external gear/spline		500 mm
	internal gear/spline	pitch circle from 35	70 mm
	internal gear/spline	pitch circle to 60	110 mm
	internal gear/spline	pitch circle to 150	150 mm
<b>Max. through hole diameter</b>			300 mm
<b>Max. pitch circle diameter</b>	external gear/spline		300 mm
	internal gear/spline		approx. 250 mm
<b>Min. pitch circle diameter</b>	internal gear/spline	> 35 without helix	16-18 mm
<b>Max. workpiece weight</b>			50 kg
<b>Material</b>			steel, copper
<b>Tooth profile accuracy</b>	DIN 3962		Q3
	DIN 5480		Q3

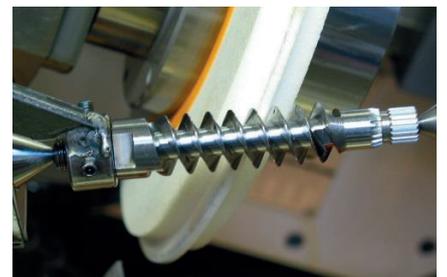
# NC Grinding of External and Internal Gears/Splines

NC grinding of the profiles is carried out on a KAPP VUS 55 P and a VUS 57 P machine. These machines have been improved specifically to meet FRESCO's requirements for high precision. Both dressable grinding wheels and CBN grinding wheels are used to grind internal and external tooth profiles.

Specially developed software modules allow the machining of worm gears.

Topological grinding of unusual modifications is also possible.

Grinding of internal profiles of the highest quality requires workpiece-specific mounting fixtures and grinding arms, which makes a consultation with FRESCO's specialists necessary.



<b>Max. workpiece length</b>	external gear/spline	750 mm
	internal gear/spline	upon consultation
<b>Max. profile length</b>	external gear/spline	700 mm
	internal gear/spline	upon consultation
<b>Max. pitch circle diameter</b>	external gear/spline	450 mm
	internal gear/spline	upon consultation
<b>Max. workpiece weight</b>		50 kg
<b>Material</b>		steel, titanium
<b>Tooth profile accuracy</b>	external gear/spline	Q2 (DIN3962)
	internal gear/spline	Q3 (DIN3962)

# High Precision Wire Eroding

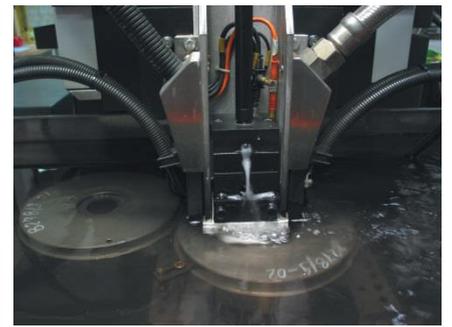
The wire erosion machines are tuned to high precision through sophisticated technology. They are positioned in a fully climatized room. In combination with the

know-how of the operating staff, this results in a fantastic composition, which leads to a brilliant blend of unimagined accuracy.

The extraction hoods provide a constant air humidity

The air temperature is monitored in several places within the room, particularly in the vicinity of the EDM machine.

The temperature of the machine is kept at a constant level via an internal water cooling system.



<b>Max. workpiece size</b>	X=800 mm Y=350 mm
<b>Max. working volume</b>	X=320 mm Y=220 mm
<b>Max. workpiece height / profile width</b>	Z=150 mm
<b>Max. pitch circle diameter</b>	approx. 210 mm
<b>Wire diameter - Standard</b>	0.25 mm
<b>Wire diameter - Special</b>	0.10 mm
<b>Material</b>	Steel, copper, non-ferrous metals
<b>Max. workpiece weight</b>	<b>40 kg</b>
<b>Tooth profile accuracy</b>	Q3 DIN 3962 Q3 DIN 5480

# Pre-Machining

FRENCO has specialised in the manufacture of gears and splines. The pre-fabrication process is carried out by our partner company Munkert GmbH. Munkert is specialised in individual high-precision components and small batches and stands out due to their state-of-the-art production engineering and an experienced and highly qualified team.

The equipment includes NC lathes, 4-axis CNC milling machines, a

5-axis CNC machining centre with high-speed spindle and the necessary Mastercam X2 system as well as highly precise grinding machines for internal, external cylindrical and surface grinding processes.

A Zeiss Prismo Navigator with gearpro Software is, amongst others, available for quality assurance purposes.



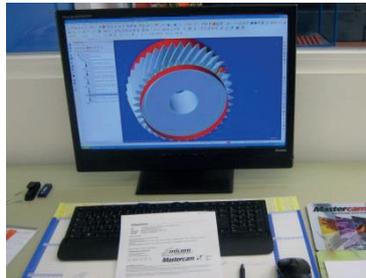
Turning



Cylindrical grinding



Surface grinding



CAM



4- or 5-axis milling

Machining	Dimensional range
Sawing	max. $\varnothing$ 200
Turning, conventional	max. L 1000, max $\varnothing$ 300
Turning, NC	max. L 1500, max $\varnothing$ 250
Milling, conventional	max. 300x200x400
Milling, NC 4-axis	max. 800x500x540
HSC milling, NC 5-axis	max. 600x600x500
CAM Mastercam X2; Interfaces:	ASCII, DXF, DWG, IGES, STEP
Surface grinding	max. L 600 x 300
Cylindrical grinding, conventional	max. L 600, max. A $\varnothing$ 250 I $\varnothing$ 200
Cylindrical grinding, NC	max. L 1000, max. $\varnothing$ 350
Centre grinding	max. L 600
Out-of-round grinding	max. L 1000, max. $\varnothing$ 350

# Inspection

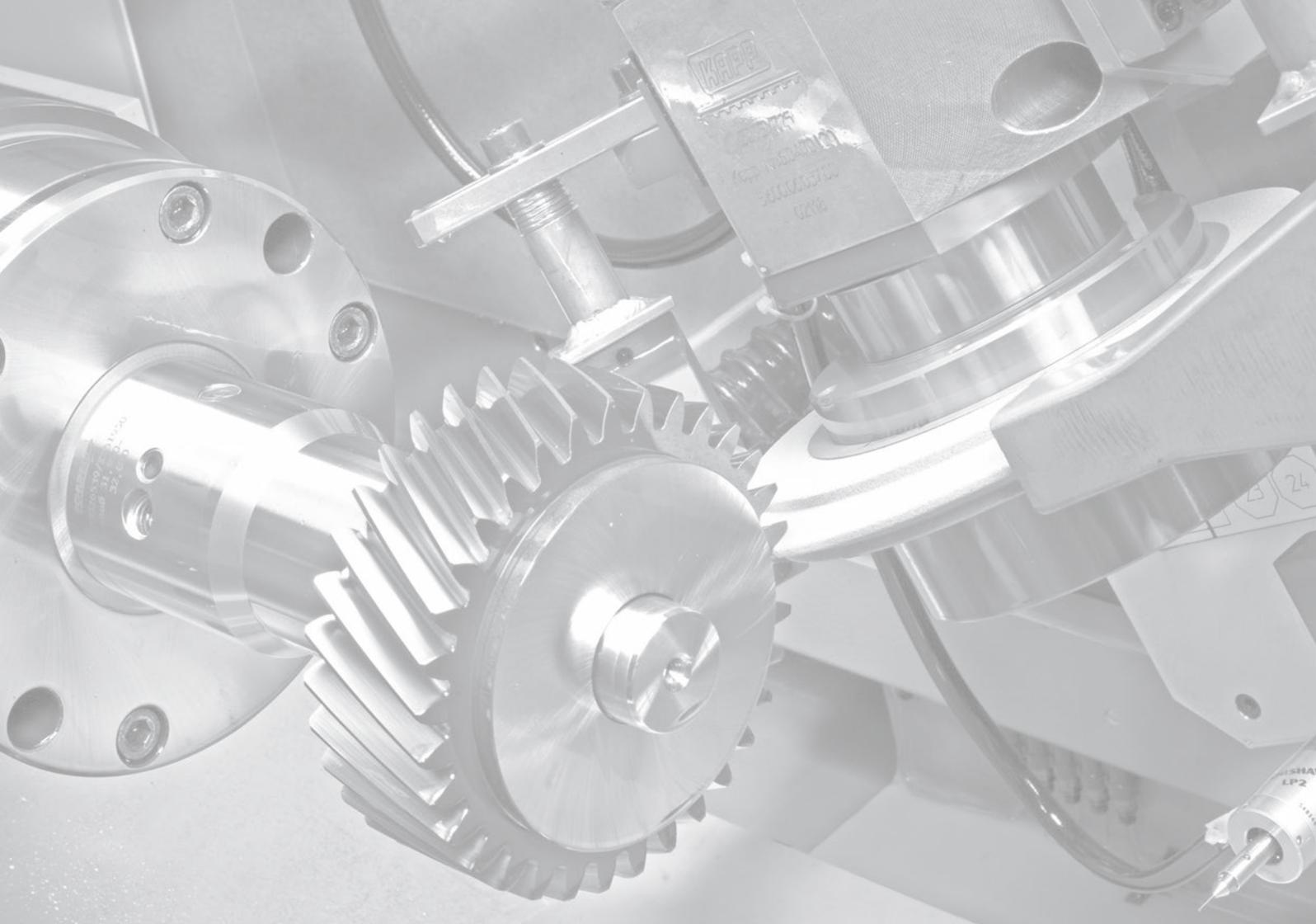
After the manufacturing process, each gearing profile is thoroughly inspected. An inspection certificate guarantees the faultless condition and gives detailed measurement results.

There are three Klingelberg gear measuring centres, one Zeiss CNC co-ordinate measuring machine Prismo Navigator 7 HTG with rotary table, one ULM length measurement machine and a combined roughness and contour measurement device by Mahr.

You can rely on our inspection! After all, FRENCO has the experience of an accredited DAKKS conformity assessment body.



FRENCO GmbH Jülich-Bole-Str.2 D-50818 Hückelhoven Germany Phone +49 (0) 2497 92200 Fax +49 (0) 2497 92200		
<b>Designations</b>		
Symbol	Designation	External
Pa	pitch profile deviation	
Pa1	profile slope deviation	
Pa2	profile form deviation	
Fp	total pitch deviation	
Pa3	total slope deviation	
Ft	total form deviation	
Pa4	total circular deviation	
Fc	total circular profile deviation	
Pa5	total composite pitch deviation	
Fp1	Fp right flanks	
Pa6	total pitch deviation	
Fp2	Fp left flanks	
Pa7	total pitch deviation	
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Pa295	total pitch deviation	



## Pure Perfection. Since 1978.

Experience, competence and innovation in gear metrology.



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### FRENCO GmbH

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Jakob-Baier-Str. 3 • D - 90518 Altdorf

[www.frenco.com](http://www.frenco.com)



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