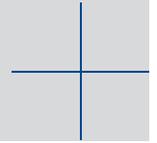




Gear manufacturing tools
roughing / finishing / checking / reconditioning



Our aim is simple: to bring an economic surplus to your daily manufacturing life.



The whole world of gear manufacturing tools in your hands

Since 1949, Samputensili has been supplying a comprehensive range of tools and services for the manufacture of gears, shafts, worms, rotors and other screw-type workpieces. Our tools are manufactured in state-of-the-art production plants, according to the the latest process technology. If the gear cutting tool or measuring device you require is not included in our catalogue, please do not hesitate to contact us for help. Our experienced engineers will readily support you with solutions that ensure you produce efficiently at all times.

Hobs	4
Worm gear hobs	5
Hobs for large gears and rotors	6
Milling cutters / saw blade cutters	7
Shaper cutters	8
Chamfering, deburring and rolling tools	10
Shaving cutters	12
Master gears.....	14
Ring and plug gauges.....	14
Grinding and dressing tools.....	16
Racks resharpening.....	18
X-press delivery programme.....	19
Coating technology.....	20
Service around the world.....	22



HSS and carbide hobs creating quality efficiently



Hob types

- Involute gear hobs
- Bore and shank-type hobs
- Multi-gash and multi-start hobs
- Special profiles/profile modifications
- Hobs for special drives
- Chain sprocket hobs
- Worm gear hobs
- Large module hobs
- Hobs for splines and timing belt gears
- Finishing and pre-finishing hobs

Quality

- A DIN 3968
- AA DIN 3968
- AAA Samputensili standards
- A AGMA Standard 120.01

Modifications

- Tooth tip chamfer
- Protuberance
- Topping / Semitopping
- Full radius
- Tip / root relief
- Other modifications

Designs and dimensions

Depending on your application, we optimise tool geometry in terms of diameter, number of gashes and number of starts in the following ranges:

Module range 0.75 - 22.0 mm
Diameter range 40 - 300 mm
Usable length, max. 400 mm
Larger modules on request

Material

- High-alloy HSS-PM steels
- Carbides

Recommended coatings

- Gold (TiN)
- Futura Nano (TiAlN)
- Alcrona Pro
- Other coatings available on request

Worm gear hobs

A wealth of experience in special gear applications and extensive testing on many different hobbing machine makes means that Samputensili worm gear hobs are tailor-made to your needs.

Due to the nature of this application, our engineering department checks all inquiries for feasibility and optimises tool functionality, taking into account your specific clamping needs and the optimum usable cutting length of the tool.

Module range	1.0 - 6.0	mm
Helix angle, max.	15	deg
Length, max.	610	mm
Shaft diam. min.	18	mm

Other dimensions, and a wide variety of shaft tapers, are available on request.



Hobs for large gears and rotors



Samputensili represents the cutting edge technology for hobs for large gear modules.

Hobs can be supplied in heavy duty design too, with a maximum of 3 cutting blades.

DIN 3972, BP II / with protuberance
Module 6.0 - 22.0 mm
Also available in heavy-duty design with up to 3 cutting blades

We recommend the best tool for your particular gear cutting job by finding the right tradeoff between productivity, lot size, tool cost and cost per piece.



Milling cutters including saw blade cutters



Our saw blade cutters are the number one choice for precision in pitch, runout and tooth height.

Our saw blade cutters produce saw blades of a quality comparable to that of ground saw blades. Saw blade cutters for hacksaw, bandsaw and circular saw blades come in single or variable pitch.

The unique production process provides the maximum usable tooth length. This is especially important on high-hook angle blades where the tooth length is very short on the small diameter cutter end. We also design and build spiral-tapered cutters to suit any customer's sharpening requirement.

We are now also offering ground form-relieved milling cutters for steering racks, straight and crowned forms.

Milling cutters at a glance

Types

- Shell and shank
- Straight and crowned forms, cutters for steering racks
- Interlocked sets
- Single piece circular
- Intermittent continuous feed
- Special tooth forms incl. chip breakers
- Unground and ground forms
- Standard or precision quality

Dimensions

Diameter, max.	250 mm
Length, max.	300 mm
Spiral gash, max.	20 deg

Coatings

- TiN
- TiCN
- TiAlN
- AlCrN

More than 100 years of combined shaper cutter experience



Our wide range of shaper cutter types features the brands Samputensili, Fellows and Star-SU with the combined experience of more than 100 years in shaper cutter design and manufacture.

Shaper cutter types

- Disc-type
- Deep counterbore-type
- Shank-type
- Special cutters for sprockets, cams, splines, timing belts and large modules
- For pre-finishing
- For finishing
- Available also unground

Dimensions

Module min./max. 0.5 - 16.0 mm
Max. diameter 320 mm
Other dimensions on request

Standard bore diameters

- 31.745 mm
- 44.450 mm
- 70.000 mm
- 100.000 mm
- Other bore diameters on request

Taper shanks

- MK K 2
- MK K 3
- MK K 4
- FK 1
- FK 2

Standard profiles

- DIN 3972 - BP I
- DIN 3972 - BP II
- DIN 3972 - BP III
- DIN 3972 - BP IV
- DIN 5480
- BS 2062

Profile modifications

- Semitopping
- Protuberance
- Topping
- Modification of flank for tip and/or root relief on gear
- Modification of pressure angle
- Combination of several of the above modifications

Quality

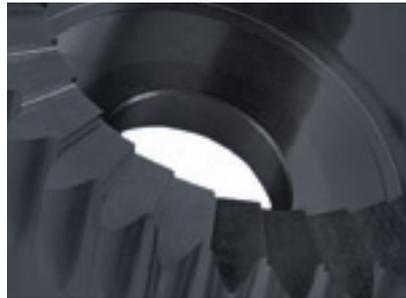
- A DIN 1829
- AA DIN 1829

Material

- High-alloy HSS-PM steels

Coatings

- Gold (TiN)
- Futura Nano (TiAlN)
- Alcrona (AlCrN)
- Other coatings on request



- Disc-type shaper cutter, Gold coated
- Deep-counterbore-type shaper cutter, Futura-Nano coated
- Shank-type shaper cutters, Gold and Alcrona coated
- Internal shaper cutter, Gold coated
- Shaper cutter with block teeth

Keyway types

Type A
without
keyway



Type B
longitudinal
keyway

Type C
clutch
keyway



Type D
keyway, not
aligned

Type E
keyway aligned
on tooth vane
axis



Type F
keyway
aligned on
tooth axis



Patented solutions for chamfering, deburring and rolling



Chamfering tools

- For spur or helical gears
- For straight or inclined gear lateral surfaces

Deburring tools

- P Type (Standard tool for straight gear lateral surfaces)
- P 1000 type (Like P type but grooved)
- PR type (with alternate sections for straight gear lateral surfaces radiused to the root)
- PR 1000 type (grooved tool for straight gear lateral surfaces radiused to the root)
- A 1000 type (grooved tool for inclined gear lateral surfaces)
- AR 1000 type (same as A 1000 type but radiused to the root)
- SPR 1000 type (special tool for chain sprockets)
- T 1000 (grooved tool for chamfering turning chamfers on the tooth tip)

Rolling tools

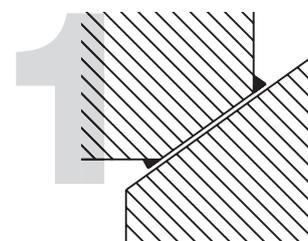
- For spur or helical gears
- As single tool or separate tools
- Rolling tools for burrs and internal toothing

Chain sprocket deburring and rolling tools

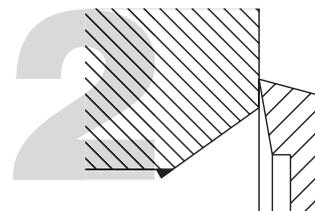
Developed exclusively to deburr chain sprockets, the specially adapted form of the SPR 1000 type has exactly the same profile as the flank radius of the gear tooth and therefore any burrs from the lateral surfaces of the gear teeth.

The chain sprocket roller tool profile also corresponds to the gear tooth profile. The special tapered form of the tool tooth prevents material from building up along the gear tooth profile during the contemporary deburring operation.

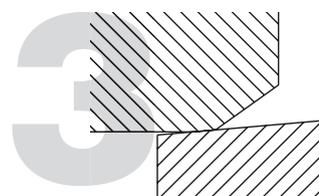
These tools are ideal for Samputensili chamfering machines with motorised tool heads but they can be used on any standard chamfering machine.



Secondary burr during chamfering



Deburring the secondary burr on gear lateral surfaces

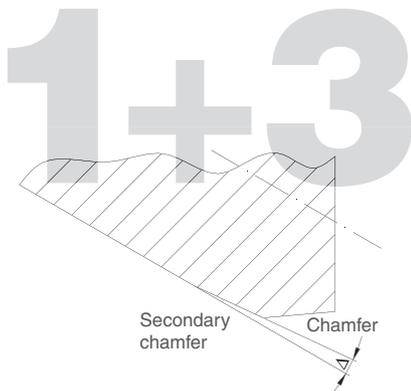


Rolling the secondary burr on gear flanks

Chamfer-roller tools

- For gears with parallel chamfers
- For gears with comma type chamfers

With the patented Samputensili chamfer-roller tool, you can chamfer and roll your gears at the same time. The secondary burr that is generated during chamfering is removed in the very same operation. By combining both processes, the machine utilises just one tool head leaving the second tool head free for another operation.



Rolling is performed by a localised "levelling out" action which may be described as a second chamfer with a chamfering angle Δ of about 1° .

Tool groups



Back: Monoblock chamfering and deburring solution on one tool head
Front: set of rolling tools on one tool head

Why chamfer and deburr?

- A burr which is not removed may break off during use and damage bearings or gears in gearboxes.
- Over-carbonizing may result in too much pressure being exerted on sharp gear lateral surfaces which might then break.
- A hardened burr may lead to premature wear of tools in subsequent finishing operations.
- Removal of very sharp burrs reduces the risk of tool handling injuries.

Why roll?

- The rolling operation serves to remove the material that builds up on the tooth flanks by plastic deformation during chamfering.
- During chamfering/deburring, structural material changes in the form of compression may occur. The rolling process levels out the surface and causes the material to sink.



Workpiece after hobbing



Workpiece after chamfering and deburring



Rolling of a chain sprocket gear

Chamfering / deburring

- Use of two tool heads
- Subsequent operation: shaving or profile grinding

Chamfering / deburring / rolling

- Use of three tool heads, one for each single tool
- Rolling tool used as a third single tool with surface contact between rolling tool and workpiece flank.
- Subsequent operation – Continuous generating grinding, shave grinding, honing

Chamfering & deburring / rolling

- Use of two tool heads, chamfering-deburring tool on one tool head and rolling tool on a second tool head.
- Subsequent operation – Continuous generating grinding, shave grinding
- Requirements: without step, no use of any 1000 type deburring tools

Chamfering & deburring

- Monoblock solution
- Use of one tool head mounted with a combined chamfer-deburring tool
- Requirements: without step, no use of any 1000 type deburring tools
- Subsequent operation: shaving or profile grinding

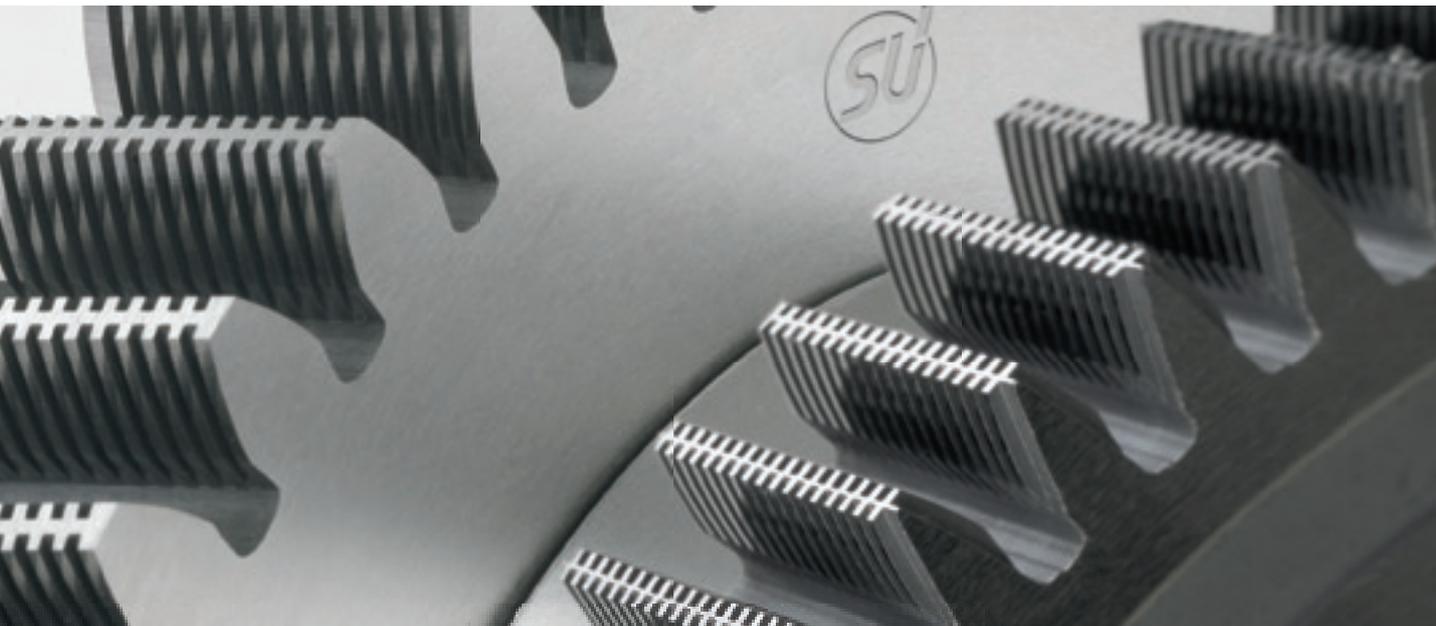
Chamfering & rolling / deburring

- Use of two tool heads, chamfering tool with integrated rolling tool on one tool head and deburring tool on a second tool head.
- Subsequent operation – Continuous generating grinding, shave grinding, honing

Chamfering & deburring & rolling

- Monoblock solution
- Use of one tool head mounted with a chamfer-roller tool with a combined deburring tool.
- Requirements: without step, no use of any 1000 type deburring tools
- Subsequent operation – Continuous generating grinding, shave grinding, honing

Shaving cutters – guaranteeing superior quality after each sharpening process



Shaving cutter types

As one of the largest producers of cutting tools worldwide, and with particular expertise in shaving technology, we offer a wide range of shaving cutter types:

- Transverse
 - Diagonal
 - Diagonal-underpass
 - Underpass
 - Tangential
 - Plunge
-
- Internal/external shaving
 - Unground or finished shaving cutters
 - All tools are supplied with inspection and lead test charts.

Dimensions

Module	0.7 - 10 mm*
Max. width	65 mm
Outside diameter	70 - 330 mm

*All shaving cutter serrations from 0.7 to 0.99 are formed by turning

Material

Choose from different conventional HSS or powder metals.

Design and optimisation

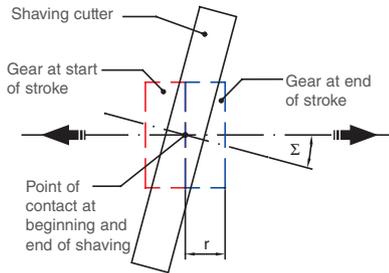
Tool design and optimisation are rooted in the longstanding experience of our shaving cutter design engineers. Unique software developments implemented on our shaving cutter grinding machines and test programmes mean high precision and efficient resharpening of your tools.

Sharpening diagrams for continuous life cycle control

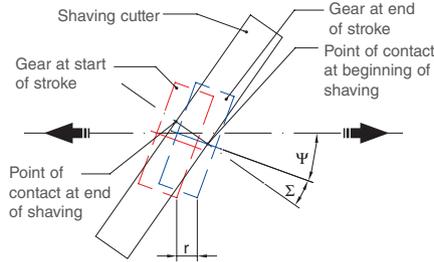
Samputensili delivers each tool with a user-friendly sharpening diagram, enabling you to monitor the life cycle of your tool and directly control the sharpening process, providing you have the right equipment for this high quality process.



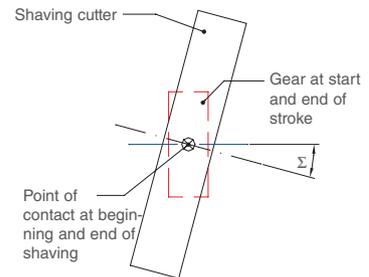
Transverse shaving



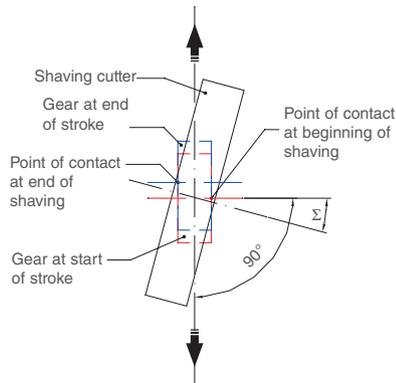
Diagonal shaving



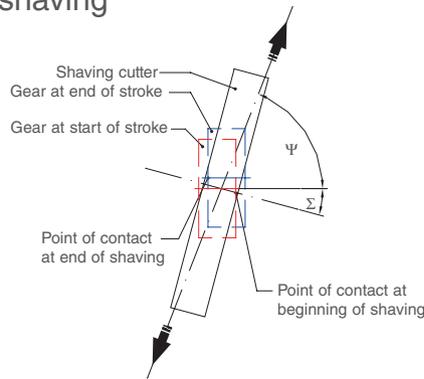
Plunge shaving*



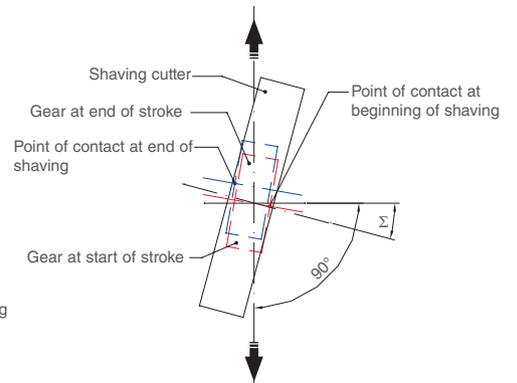
Underpass shaving



Diagonal-Underpass shaving**



Tangential shaving**



* particularly used in the automotive industry.

** these shaving methods are only application variants which are rarely used today.

Twisting profiles made easy

Samputensili software solutions are the cornerstone of our mission to provide good service; tool design and optimisation are based on unique in-house software solutions implemented on our shaving cutter grinding machines.

In any case, Samputensili shaving cutters are profile ground and sharpened on the most modern and productive machine available on the market – made by Samputensili!



Sharpening and in-machine measurement of shaving cutters on the GS 400

Precision tools for measuring, setting, calibration and correction



Types

- Master gears for single and double gear flank and runout measurement
- Setting masters to adjust and calibrate quality control instruments
- Rolling gears to measure noise
- Rolling gears to reduce burrs and nicks
- Plug and ring gauges

Dimensions

Module	0.8 - 6.0	mm
Diameter	40 - 300	mm
Tooth width	4 - 80	mm
Helix angle	0 - 45	deg

Quality: 2-6, DIN 3962
 Geometry: DIN 3970
 or according to drawing

Corrections

- Flank corrections
- Topological corrections

Material

- Gauge steel
- High speed steel
- PM steel

Coatings

PVD coatings for HSS/PM master gears only

- Gold (TiN)
- Futura (TiAlN)

Gauge master gears steel do not withstand temperatures exceeding 450°C and are therefore unsuitable for coating. Protective coatings may only be applied to HSS/PM master gears.

Plug gauges

Module	0.5 – 6.0	mm
Pitch diameter	20 – 150	mm

Ring gauges

Module	0.5 – 7.0*	mm
Ring outside dia.	20 – 200	mm

- Straight and helical teeth
 - Involute and special profile
- (*) depending on outside diameter



Consultancy, analysis, optimisation

Our experienced engineering team is readily available to address any profile analysis or design queries. Existing profiles can be optimised using our internally developed master gear design software.

Regrinding & recoating

Master gears wear with use and need regrinding to ensure continued quality performance. Samputensili is well-equipped for this task.

Marking

All Samputensili checking and setting master gears are engraved according to DIN 3970, or with any requested customer-specific data, and bear an individual tracking number enabling them to be carefully monitored throughout the whole production process.

Certified quality

Master gear design and production processes are all carried out using special Samputensili software and modern manufacturing methods.

All Samputensili checking and setting master gears are fully tested on CNC inspection equipment and are delivered with a certificate of conformity.

We produce master gears on specially designed and optimised machinery in classes from 2 to 6 to DIN 3962, AGMA and BS standards.

We therefore guarantee both the accuracy of our master gears and the quality of the whole manufacturing process.



Packaging

Our precision tools are shipped and transported in a specially developed packaging system.

Drawings, documents and checking protocols are safely stored away in a separate pocket integrated in the tool box lid.



Grinding and dressing tools

Dressable, CBN- and diamond-plated



Grinding wheels for...

- Gears, splines, worm gears
- Extruder screws, recirculating ball spindles and bearings
- Rotors
- Tool sharpening for a wide variety of gear manufacturing tools
- Special forms on request

Combinations

- Single wheels for roughing and finishing
- Single wheels for roughing only
- Single wheels for finishing only
- Wheel sets for roughing (1/2/3/4 ribs)
- Wheel sets for roughing and finishing in one setup (2/3 ribs) as single wheels of fixed tool groups

Grinding worms

- Roughing worms
- Finishing worms
- Special applications on request

CBN tools in the following dimensions:

Outside diameter	40 - 250	mm
Bore diameter	3 - 127	mm
Thickness	4 - 100	mm
Normal module	0.75 - 20	mm
Grit size	25 - 301	B/D

Grinding wheels with specific clamping shafts

- Very small grinding wheel dimensions
- Integrated clamping shaft for high-frequency spindles
- For external gears with modifications (aerospace applications)

Pencil grinding tools

- Very small grinding wheel dimensions available
- Integrated clamping shaft for high-frequency spindles
- For external gears with modifications (aerospace applications)

Clamping solutions

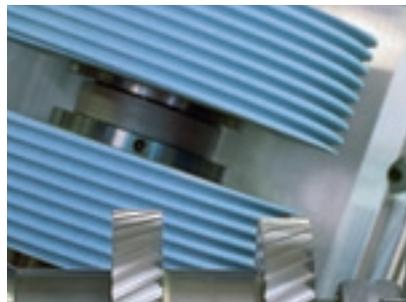
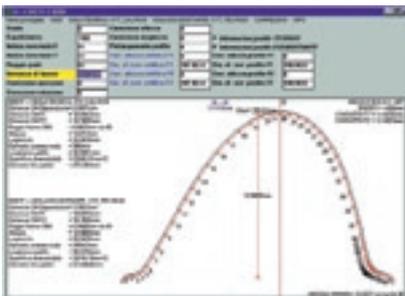
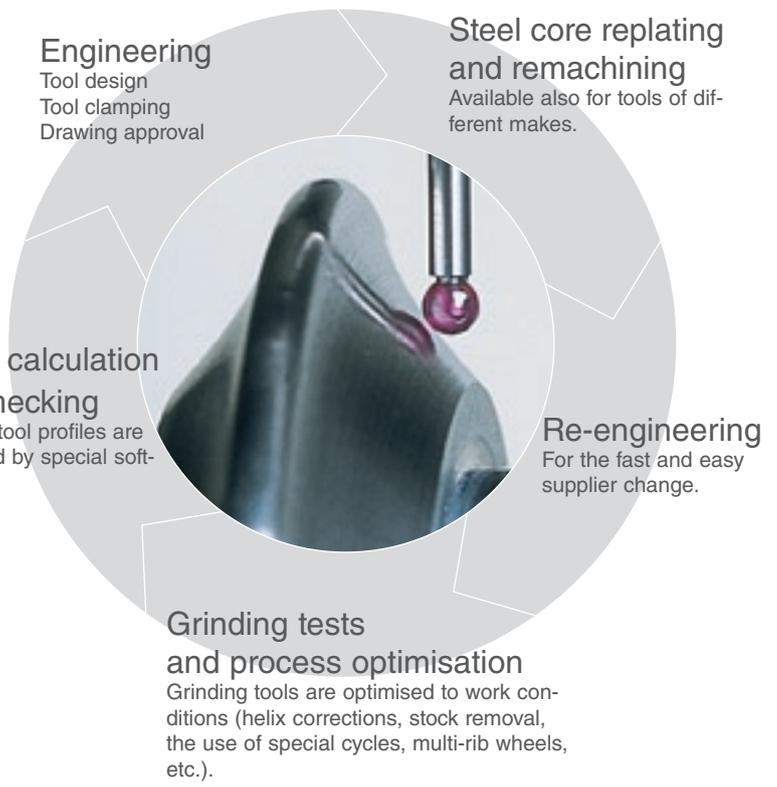
- Clamping options for different machine models and manufacturers
- Special solutions on request



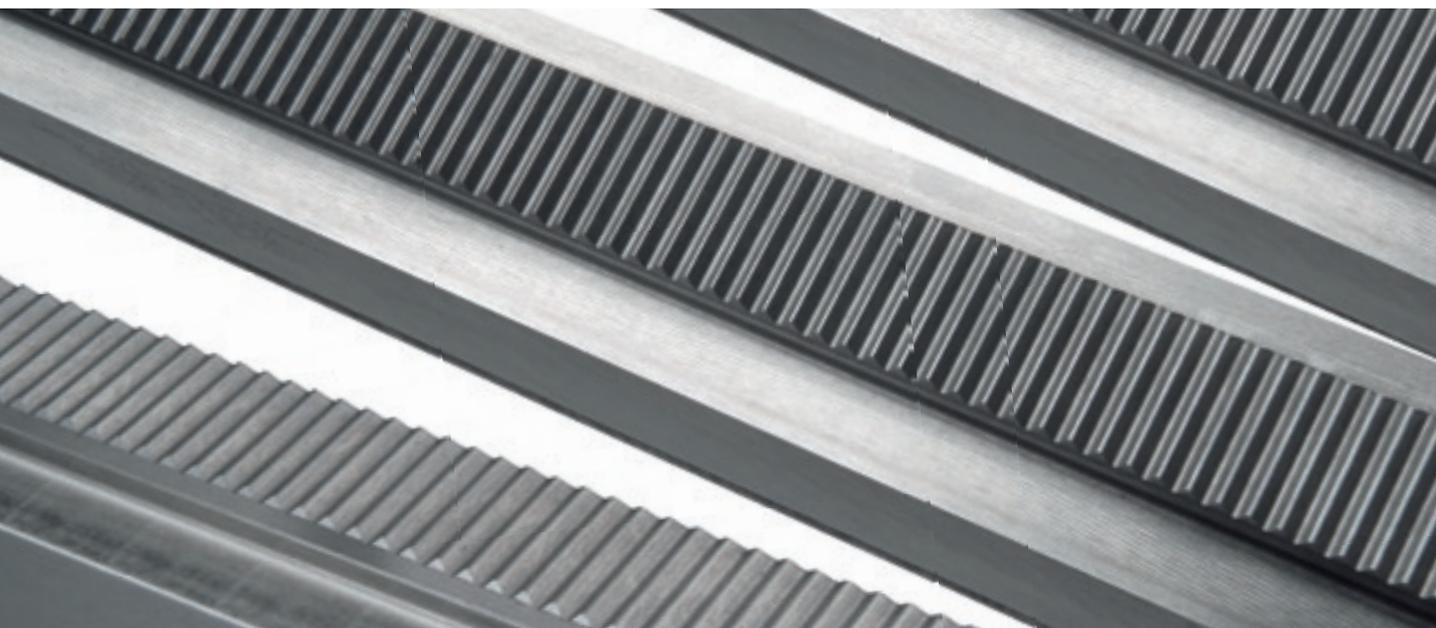
Samputensili develops its own brand of grinding and dressing tools together with leading manufacturers in order to guarantee extraordinary quality results.

Samputensili grinding tools are continuously tested in real manufacturing conditions, optimising the interaction between grinding and dressing tool. Improvements enter directly the production process. Whether ceramics, CBN or diamond, we recommend the best tool for your application, for quality, productivity and lot size.

On request we monitor your application in order to improve results during the life time of your investment.



Rack cutters resharpening



Samputensili supplies its customers with a high efficient resharpening service of cold forming racks.

These high precision tools guarantee highest contact ratios during forming with minimal thermal effects. Grooves are kept free from debris.

Axial tapering enables easy fitting of spline shafts. Simultaneous machining of several profiles is possible.

Types for

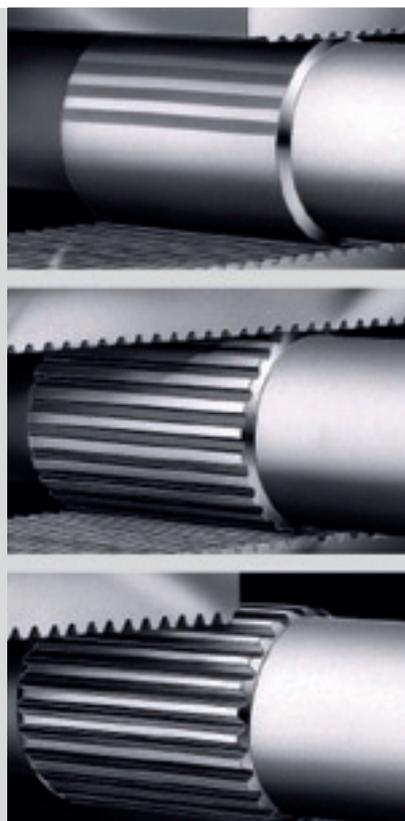
- Gear profiles
- Serrations
- Grooves
- Threads

Quality

- DIN 5480
- ISO 4156
- GOST 6033-51
- ANSI B 92.1-1970
- ANSI B 92.2M-1980

Designs and dimensions

Module range	0.3 - 2.0 mm
Workpiece length, max.	1,000 mm
Profile length, max.	180 mm
Helix angle, max.	< 25 deg
Pressure angle	> 25 mm



X-press delivery



Our X-press delivery programme is designed to deliver tools quickly in the event of emergencies or bottlenecks in production.

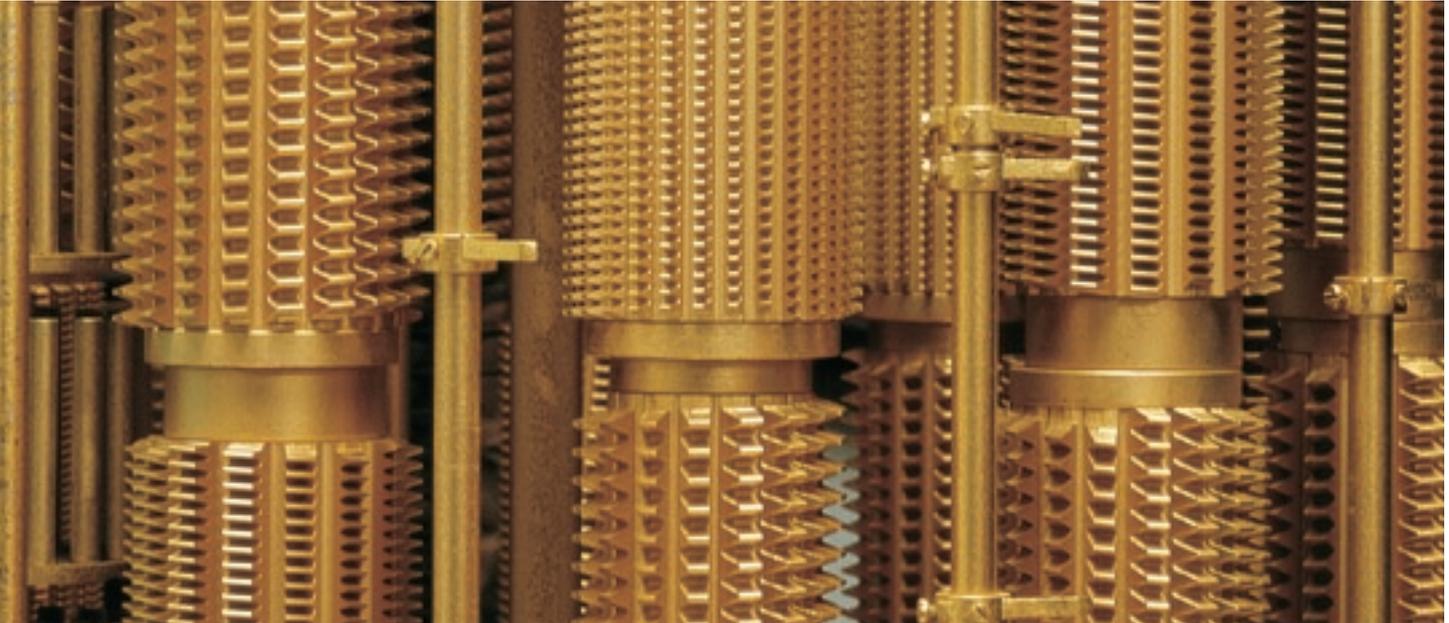
X-press tools help you to bridge gaps in production or meet your prototype production requirements.

Hobs, shaper cutters, shaving cutters, chamfering or deburring tools are now available in just a few weeks: for further information ask your Samputensili contact.

We will be glad to satisfy your request.



Coating technology



Sharpened tools must deliver the same performance as coated new tools.

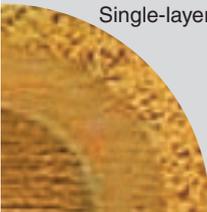
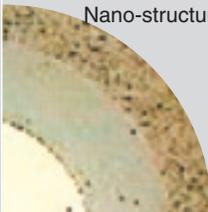
To ensure a manufacturing line performs to plan, sharpened tools must deliver the same results as coated new tools.

In collaboration with the world's leading manufacturers of coating technology, we optimise innovative coatings for gear cutting tools to improve abrasion resistance, wear resistance and consequently tool life. Automated cleaning equipment further optimises the coating process. Substrates are delivered for coating in a thoroughly clean state to help guarantee the ultimate quality of the coated product.

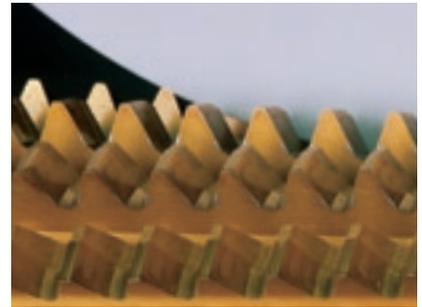
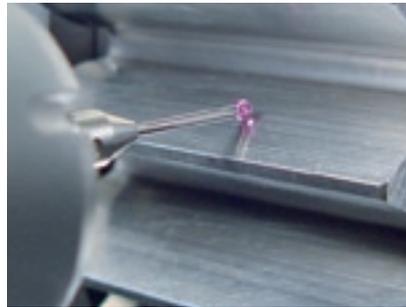
In-house coating units are integrated in Samputensili manufacturing sites all over the world and are frequently updated with the latest process technology. This close co-operation means that any new developments in anti-wear coatings are made available to you immediately.



Standard coatings guide

	Gold	Futura Nano	Alcrona Pro
Composition	Titanium Nitride (TiN)	Titanium Aluminum Nitride (TiAlN)	Aluminum Chromium Nitride (AlCrN)
Microhardness (HV 0.05)	2,500	3,300	3,200
Friction coefficient on steel (dry)	0.4	0.30 - 0.35	0.35
Residual compressive stress (GPa)	- 2.5	-1.3 / -1.5	-3
Layer thickness (um)	1 - 4	1 - 6	2 - 5
Temperature resistance, max. (C / F)	600 / 1,100	900 / 1,650	1,100 / 2,000
Colour	Gold yellow	Violet grey	Bright grey
Characteristics	The proven coating for general metalworking processes. High hardness and a low friction coefficient enhance wear resistance. Remarkably low chemical affinity with most metals.	The nano-structure feature of this coating reduces the stresses associated with TiAlN whilst also enhancing wear resistance.	Tools coated with ALCRONA PRO can be run with much higher cutting speeds and feeds, so the potential of modern machine tools is tapped to a clearly greater degree.
Application	Hobs Shaper cutters Deburring tools Master gears/rolling tools	Hobs Shaper cutters	Hobs Shaper cutters
Process	Wet cutting (HSS) General purpose	Wet cutting (HSS) Dry cutting (carbide) Minimum lubrication	Dry cutting (HSS & carbide) Wet cutting (HSS & carbide)
Structure	Single-layer 	Nano-structured 	Single-layer 
Other coatings available on request			

With you all the way throughout the life of your tool



With Samputensili tool service, you benefit from more than 50 years of experience in tool design, manufacture and testing, as well as comprehensive tool management know how. Today, some of the world's leading gear manufacturers rely on Samputensili to manage special tool cribs or to handle their complete tool supply through commodity management supply systems.

Services

Project consultancy, design and application testing

Sharpening of hobs, shaper cutters and shaving cutters

Regrinding of master gears

Stripping, preparation and recoating of tools at our in-house coating centres

Stripping, preparation and recoating of CBN- and diamondplated tools

Pickup and delivery service, to and from your tool crib

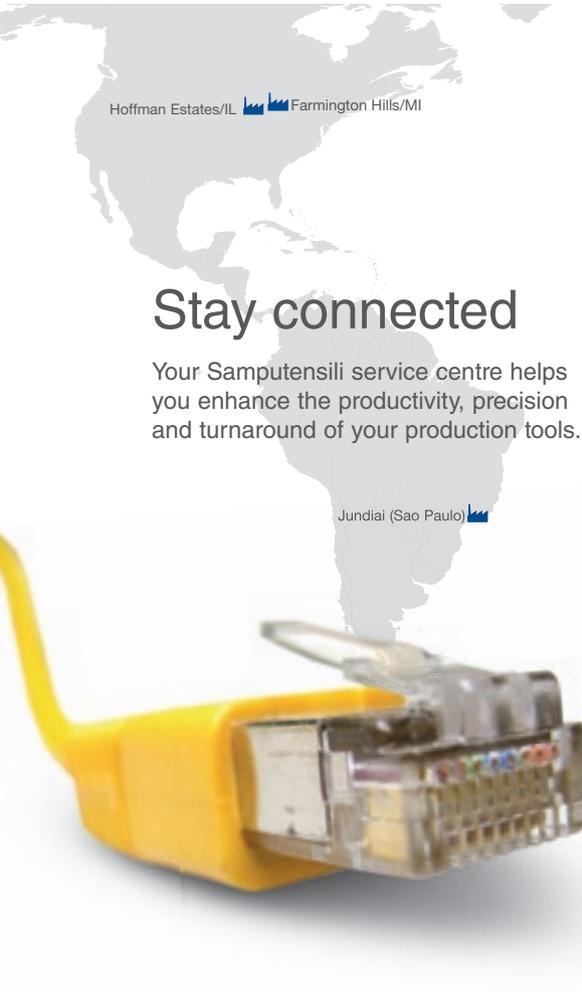
CMS for tool groups and product life cycle management of single tool types.

Samputensili CMS

- + Lower direct and indirect labour costs and lower indirect charges.
- + Reduced tool storage costs.
- + Quality guaranteed by the original manufacturer throughout the complete life cycle of the tool.
- + Longer tool life.
- + Complete range of services for gear tools from a single source.

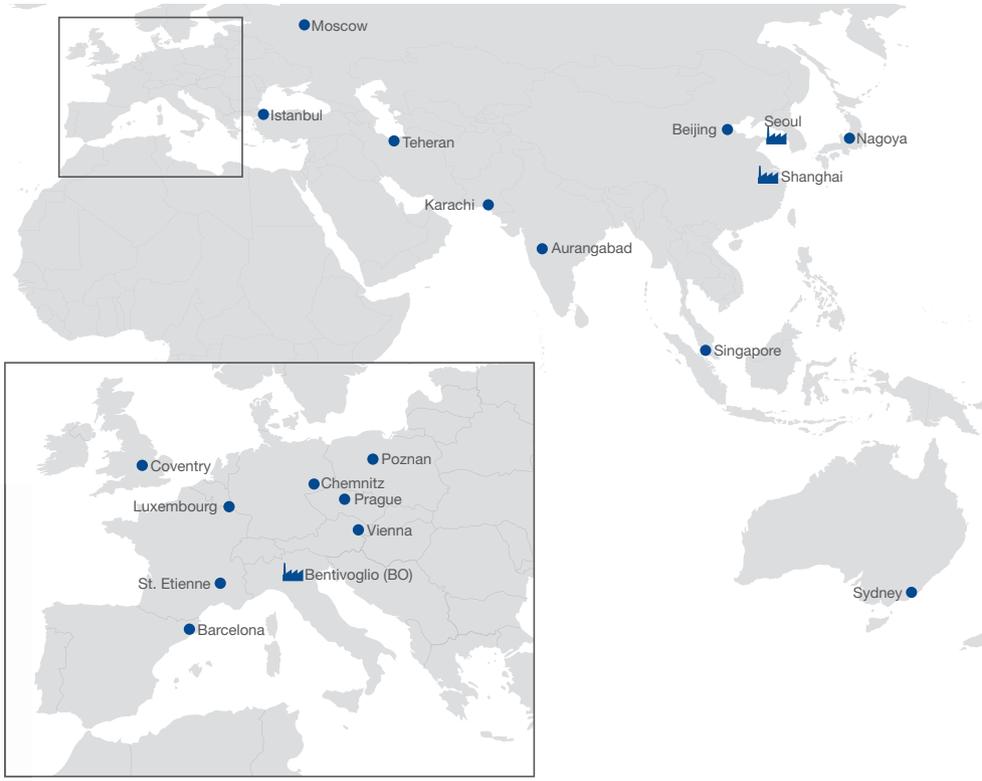
Standard tool coatings

- Gold (TiN)
- Futura Nano (TiAlN)
- Alcrona Pro (AlCrN)



Stay connected

Your Samputensili service centre helps you enhance the productivity, precision and turnaround of your production tools.

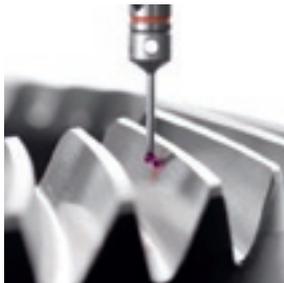
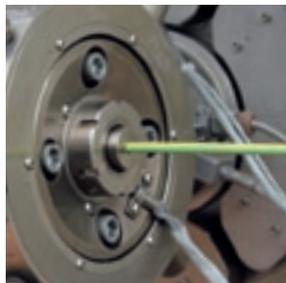
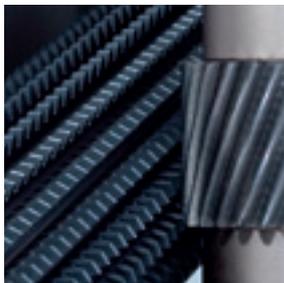


Get in the driver's seat

Samputensili Total Tool Life Cycle Management meets your every production need by optimising each tool life cycle step and enhancing the cost-per-piece performance of your tools. By guaranteeing a certain cost-per-piece, you need no longer worry about actual tool cost, potential tool life or future servicing requirements.

- Take control of the cost-per-piece performance of your tools.
- Consider all tool supply and maintenance costs.
- Optimise all steps in your process chain in-house.
- Keep a check on maintenance costs.





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