Gear cutting tools
roughing / finishing / checking / reconditioning
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. Together with Star Cutter, a well-trusted company based in Michigan, USA, Samputensili formed a joint-venture in 2002 under the name of Star SU, LLC. Initially responsible for the sales and distribution of machines and tools in the North American market, the partnership between the two companies has been extended to South America in 2014 with the creation of Star SU do Brasil and in China in 2015 with the creation of Star SU China. Our tools are manufactured in state-of-the-art production plants, according to 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.

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Our aim is simple: to bring an economic surplus to your daily manufacturing life.
HSS and carbide hobs creating quality efficiently

Hob types
- Involute gear hobs
- Bore and shank-type hobs
- Multi-gash and multi-start hobs
- Special 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
- Double gash hob

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

Material
- High-alloy HSS-PM steels
- Carbides
- MC90

Recommended coatings
- Gold (TiN)
- Futura Nano (TiAlN)
- Alcrona Pro (AlCrN)
- Altensa (AlCrNX)
- Other coatings available on request

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: 0.45 - 22.0 mm
- Diameter range: 40 - 300 mm
- Usable length, max.: 400 mm
- Larger modules 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 per tooth.

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 and rack cutters**

We offer our customers high-precision, form-relieved milling cutters for saw blades and other special forms on request. Regarding the application, we develop custom designs for the milling cutters to ensure a high performance and quality. All our ground milling cutters, saw blade cutters and rack cutters are produced with pitch accuracies of less than 5μm and tool length over 250 mm. With our designing software capabilities, we ensure a constant profile shape after every resharpening process.

Our saw blade cutters are the number one choice for precision in pitch, runout and tooth height. These tools have a single or variable pitch and can produce hacksaw, bandsaw and circular saw blades. 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.

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**Milling cutters at a glance**

<table>
<thead>
<tr>
<th>Types</th>
<th>Dimensions</th>
<th>Coatings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single and duplex milling cutters</td>
<td>Module: up to 16</td>
<td>Gold (TiN)</td>
</tr>
<tr>
<td>Saw blade milling cutters</td>
<td>Diameter, max. 250 mm</td>
<td>Futura Nano (TiAlN)</td>
</tr>
<tr>
<td>Multiple thread milling cutters</td>
<td>Length, max. 300 mm</td>
<td>Alcrona (AlCrN)</td>
</tr>
<tr>
<td>Special form milling cutters</td>
<td>Spinal gash, max. 20 deg</td>
<td>Altena (AlCrN)</td>
</tr>
<tr>
<td>Rack milling tools</td>
<td>Standard or precision quality</td>
<td>Other coatings on request</td>
</tr>
<tr>
<td>Unground and ground forms</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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
- 31.750 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
- Semi-topping
- 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
- MC90

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

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
Strategic alliance for Scudding® tools

Samputensil and Star SU have formed an alliance with Profilator to manufacture Scudding® tools for the global market.

Scudding® is a continual gear cutting process which makes both the production of external and internal gears as well as spur and helical gearing possible. As another great advantage, the Scudding® technology allows the machining of internal or external gears/splines without the need of an undercut or groove. The end of the gear can be a defined/programmed ramp of radius.

Scudding® can compete with shaping, broaching, and other gear cutting processes to produce gear and spline teeth for reduced cycle times and tool costs.

Scudding® is much quicker, more efficient and productive

The high number of cuts per time unit not only leads to a very short cycle time, it produces high quality gears with a low surface roughness.

| Gear quality | DIN 5-7 |
| Surface roughness | Rz 1-5 |
| Modules | 0.7 - 5 |
| Max. diameter - HSS | 200 mm |
| Max. diameter - Carbide | 150 mm |
| Max. shank size | 150 mm |
| Bore size options | 1.75 - 44.45 mm |

Application
- Spur and Helical Involute Gears and Splines

Tool Types
- Wafer
- Disc
- Shank

Material
- PM HSS
- Super Alloy HSS
- Carbide
- MC99

Coating
- Alcrona Pro (AlCrN)
- Altena (AlCrNXX)

Scudding® Wafer Cutters
Scudding® Shank Cutter
Scudding® Disc Cutter
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)
- 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.

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.

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.

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

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Rolling of a chain sprocket gear

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Shaving cutters – guaranteeing superior quality after each sharpening process

Sharpening diagrams for continuous life cycle control

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.

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

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!
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
- 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
- Profile and 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.

Ring gauges
- Module 0.5 – 70° mm
- Ring outside dia. 20 – 200 mm
- Straight and helical teeth
- Involute and special profile (*) depending on outside diameter

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.

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.

Plug gauges
- Module 0.5 – 6.0
- Pitch diameter 20 – 150 mm

Ring gauges
- Module 0.5 – 70° mm
- Ring outside dia. 20 – 200 mm
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Samputensili supplies its customers with a high efficient and precise rolling racks for cold forming of gears.

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 92.1M-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

**High precision rolling racks**

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**Coating technology**

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.
Coating Altensa
Boost your productivity!

The coating ALTENSA by Oerlikon Balzers is the most innovative coating one can currently find in the market. Its characteristics enable to apply high speeds, obtaining huge productivity gains, time savings and cost efficiency.

These are just some of the main advantages in utilizing ALTENSA on our tools:
- Reduced machining cost
- Reduced wear at high speed
- Longer tool life
- Significant improvement for highest cutting speed conditions for all substrate materials (PM-HSS, MC90, carbide)
- Increased productivity

ALTENSA is ideal for markets which need high cutting speed such as automotive. It is recommended in the following processes:
- Hobbing
- Shaping
- Scudding®

Samputensili is always at the state of the art of technology in order to provide the best solution possible!

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Save up to 20% of your production costs by increasing your cutting speed

<table>
<thead>
<tr>
<th>Coating</th>
<th>Speed (m/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcrona Pro</td>
<td>200</td>
</tr>
<tr>
<td>Altensa</td>
<td>300</td>
</tr>
</tbody>
</table>

Standard coatings guide

<table>
<thead>
<tr>
<th>Composition</th>
<th>Gold</th>
<th>Alcrona Pro</th>
<th>Altensa</th>
</tr>
</thead>
<tbody>
<tr>
<td>TiN</td>
<td>2,500</td>
<td>3,200</td>
<td>3,800</td>
</tr>
<tr>
<td>AlCrN</td>
<td>0.4</td>
<td>0.35</td>
<td>0.35</td>
</tr>
<tr>
<td>(AlCrN)</td>
<td>-2.5</td>
<td>-3</td>
<td>-5</td>
</tr>
<tr>
<td>Layer thickness (µm)</td>
<td>1 - 4</td>
<td>2 - 5</td>
<td>2 - 5</td>
</tr>
<tr>
<td>Temperature resistance</td>
<td>600 / 1,100</td>
<td>1,100 / 2,000</td>
<td>1,200 / 2,100</td>
</tr>
<tr>
<td>Colour</td>
<td>Gold yellow</td>
<td>Bright grey</td>
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<table>
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<tr>
<th>Characteristics</th>
<th>Gold</th>
<th>Alcrona Pro</th>
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<tbody>
<tr>
<td>Microhardness (HV 0.05)</td>
<td>2,500</td>
<td>3,200</td>
<td>3,800</td>
</tr>
<tr>
<td>Friction coefficient on steel (dry)</td>
<td>0.4</td>
<td>0.35</td>
<td>0.35</td>
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<tr>
<td>Residual compressive stress (GPa)</td>
<td>-2.5</td>
<td>-3</td>
<td>-5</td>
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The proven coating for general metalworking processes. High hardness and a low friction coefficient enhance wear resistance. Remarkably low chemical affinity with most metals.

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.

Tools coated with ALTENSA can work at higher cutting speed than ALCRONA PRO which caters to latest generation machining centres.

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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)
- Altensa (AlCrNX)

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.

MANAGE...
- Understanding processes
- Monitoring stock & availability
- Analysing cost saving potential
- Cost-per-piece strategy tailored to your needs
- Quality inspection & verification
- Reconditioning, recoating
- On-time delivery

SAVE...
- On-time pickup
- Monitoring of tool wear & servicing rates
- Cleaning, recoating

REDUCE...
- Your tool inventory and flow
- Minimise...
- On-time delivery