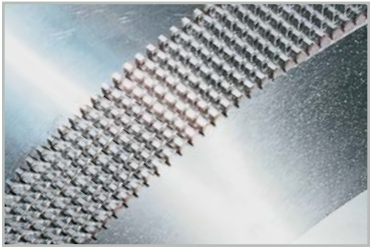
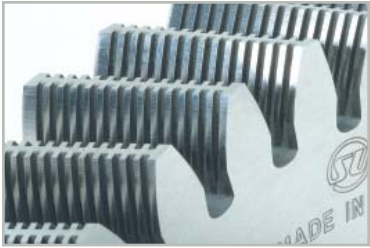
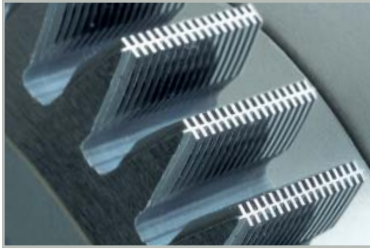


GEAR SHAVING TOOLS





From top to bottom:
Shaving using the plunge method; Shaving using the transverse method; Shaving using the plunge method and a very small module cutter - a diagonal shaving cutter with lightening bores.

TYPES OF SHAVING CUTTERS

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 up to 0.99 are formed by turning.

MATERIAL

It is possible to choose from different conventional HSS or powder steels.

- M2
- ASP 2023
- ASP 2030

SERVICE

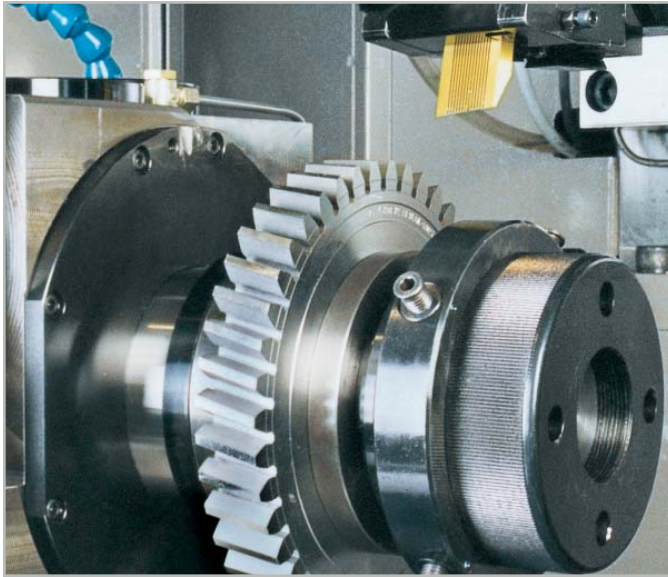
From design to delivery, all processes are carried out in-house and Samputensili shaving cutters are manufactured on our own process machines.

Our service centers in Europe and the United States regrind all types of shaving cutters - regardless of who produces them - on the very latest grinding machines available.

In certain areas collection and delivery services are available. We can even offer complete CMS (Commodity Management System) solutions. We would be delighted to answer any specific questions on tool management or tool application parameters you may have.



PRODUCTION TECHNOLOGY FROM SAMPUTENSILI



In 1949, Samputensili started the production of gear cutting tools. At that time, quality requirements were not satisfied by the production machinery available on the market. It was from this demand that Samputensili began developing its own manufacturing solutions for high precision gear tooling.

These production requirements led to many technological innovations, including our shaving technology which began in the early 1960's.

Today, the most critical operations in terms of quality are performed on Samputensili process machinery, which is now into its fourth generation of development. Samputensili also produces special production tooling in-house to guarantee high quality standards maintaining control of costs.

From top to bottom:

A Samputensili developed serrating machine is used to cut serrations on shaving cutters to the strictest tolerances.

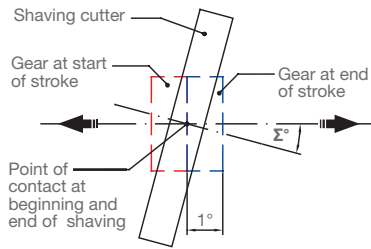
The Samputensili S 400 GS shaving cutter and master gear profile grinding machine used as part of the production process and for tool resharpening.

Customers may purchase this machine to resharpen tools in-house. The machine is equipped with direct drive torque motors and an integrated on-machine measuring system.

Samputensili serrating tools which are used on our serrating machines

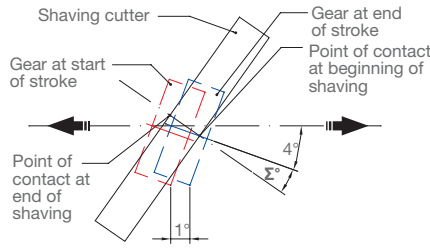


TRANSVERSE SHAVING



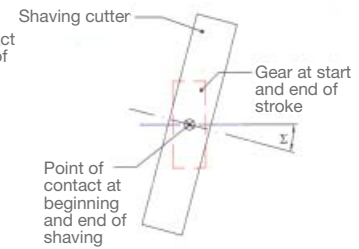
The gear to be shaved reciprocates in the direction of its own axis while the gear and the tool are in mesh. With each reciprocation, a small amount of radial feeding of the shaving cutter occurs. The theoretical table stroke is as long as the face width of the gear to be shaved, and it is recommended to calculate 1 extra stroke per module in order to guarantee clean shaving of the edges. As illustrated in the above figure, this method is unsuitable for shaving shoulder gears.

DIAGONAL SHAVING



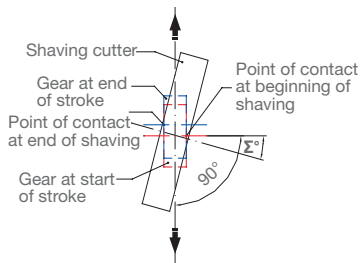
The gear to be shaved reciprocates obliquely in relation to its own axis while the gear and the tool are in mesh. The diagonal angle is achieved either by positioning the workpiece table obliquely or by interpolating two machine axes. With each reciprocation, radial feeding of the shaving cutter occurs. In general the diagonal angle can be between 0 and 40 degrees but should not be above 25 degrees for reasons of wear.

PLUNGE SHAVING



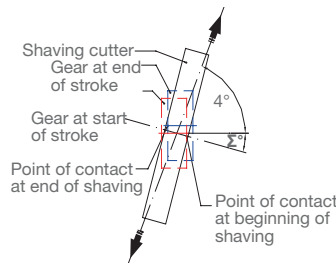
With this method there is no worktable translation but only a radial feed of the workpiece against the shaving cutter. The shaving cutter must be wider than the gear to be shaved, and the serrations of the shaving cutter must be in the form of a helix in order to produce the relative tooth flank feed. Plunge shaving is particularly suited to shaving shoulder gears. In this case, however, all tooth modifications must be made to the shaving cutter, as it will not be possible to realise them through axial movements on the machine.

UNDERPASS SHAVING



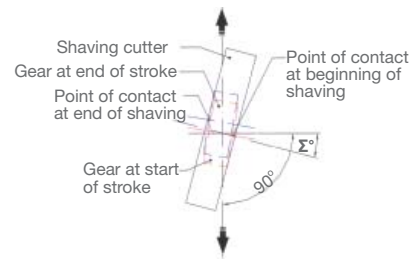
Underpass shaving is basically the same as diagonal shaving but with a diagonal angle of 90 degrees. With underpass shaving there is no axial table reciprocation. Instead, the workpiece reciprocates perpendicularly to its own axis. The shaving cutter must be wider than the gear to be shaved and its serrations must be placed on a helix. All tooth corrections must be made to the shaving cutter, as it will not be possible to realize them through axial movements on the machine.

DIAGONAL-UNDERPASS SHAVING(*)



Diagonal-Underpass shaving is diagonal shaving but with a very large oblique angle. With each reciprocation radial feeding of the shaving cutter occurs. The oblique angle is in general between 40 and 90 degrees. Since the oblique angle may be very large, this method is also suitable for shaving shoulder gears, but it is important to use shaving cutters with similar characteristics to plunge-type shaving cutters.

TANGENTIAL SHAVING (*)



With tangential shaving the oblique angle is between 60 and 90 degrees. The table stroke is in the direction of a tangent. The shaving cutter must be wider than the gear to be shaved and its serrations must be placed on a helix in order to produce the relative tooth flank feed. Furthermore, all tooth modifications must be made to the shaving cutter, as it will not be possible to realize them through axial movements on the machine.

(*) these shaving methods are only application variants but are particularly used in the automotive industry.



FAX QUOTE/ORDER FORM

Customer No: _____
 First/last name: _____
 Company: _____
 Department: _____
 Tel: _____
 Fax: _____
 E-mail: _____

Inquiry Order

SU-ID-No. : _____
 Workpiece drawing no: _____

Tool drawing no: _____

Shaving method: Transverse
 Diagonal
 Diagonal-Underpass
 Tangential
 Plunge

Shaving cutter type: For external gears
 For internal gears

Shaving cutter data
 No. of teeth: _____
 Normal module: _____
 Pressure angle: _____
 Helix angle: _____
 Direction of helix: Right Left

Width _____

Workpiece data
 No. of teeth _____
 Normal module: _____
 Pressure angle: _____
 Helix angle: _____
 Direction of helix: Right Left

Outside diameter: _____
 Width: _____

For shoulder gears
 Shoulder diameter: _____
 Distance from gear: _____

Tool clamping
 Bore Ø 63,50 Ø 100,00
 Other _____
 Longitudinal keyway
 Centering hole

DIN138
 Hole diameter: _____
 Hole centre distance: _____

Orders without drawing
 Outside diameter: _____
 Root diameter: _____
 Tooth depth: _____
 Start of active profile: _____
 End of active profile: _____
 Pre-shaving tool data
 Start of active profile: _____
 End of active profile: _____
 Start of root radius: _____
 Start of undercut: _____

Quality: Unground
 Finished
 Involute unground
 Outside diam. unground

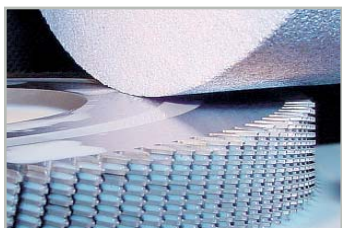
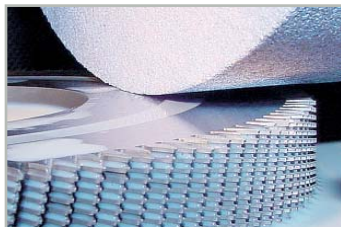
Material (High alloy ASP-Steels): M 2 (HSS-E)
 ASP 23 (PM)
 ASP 30 (PM)
 Other _____

Quantity: 1 piece 2 pieces
 3 pieces 4 pieces
 5 pieces _____ pieces

Remarks: _____

Please send the completed form to:
 Fax: 847-649-0112
 Tel: 847-649-1450 E-mail: sales@star-su.com





CERTIFIED EFFICIENCY

At Star SU, we produce shaving production machinery at above average speeds, with high precision and quality standards. All steps in the production process, from the cutting of the base cylinder to final quality inspection are optimized. The strict compliance with our precise, and well-defined, quality system is guaranteed by UNI EN ISO 9001 quality certification, which we have held since 1996.

Photos to left:

A wide range of materials are available at all times - cutting base cylinder to size

Turning of a shaving cutter body

Engraving shaving cutter data

Pre-milling of teeth

Quality checks after each process - complete shaving cutter geometry inspection

Serration of shaving cutter grooves

Hardening of a shaving cutter in salt baths to minimize distortion

Bore and face grinding

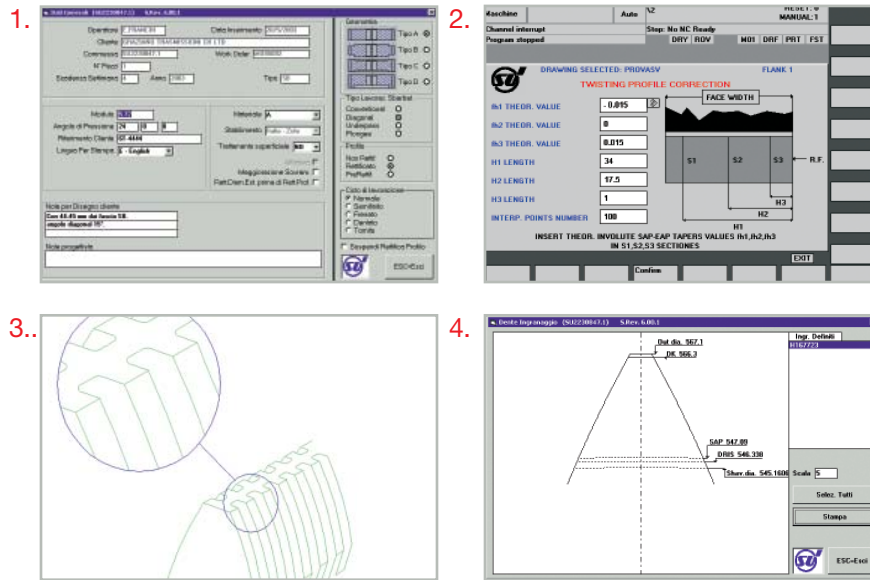
Final quality inspection

Below:

A book about gear shaving



DESIGN AND SERVICE



1. Star SU software for the design and optimization of shaving cutter applications
2. Samputensili software for twisting profile corrections on Samputensili shaving cutter grinding machines
3. Samputensili software for the design and optimization of serration positioning
4. Samputensili post shaving gear simulation software

STAR SU SOFTWARE SOLUTIONS ARE THE CORNERSTONE OF OUR MISSION TO PROVIDE GOOD SERVICE

Tool design and optimization are based on decades of experience of our shaving cutter design engineers. Unique software developments implemented on our shaving

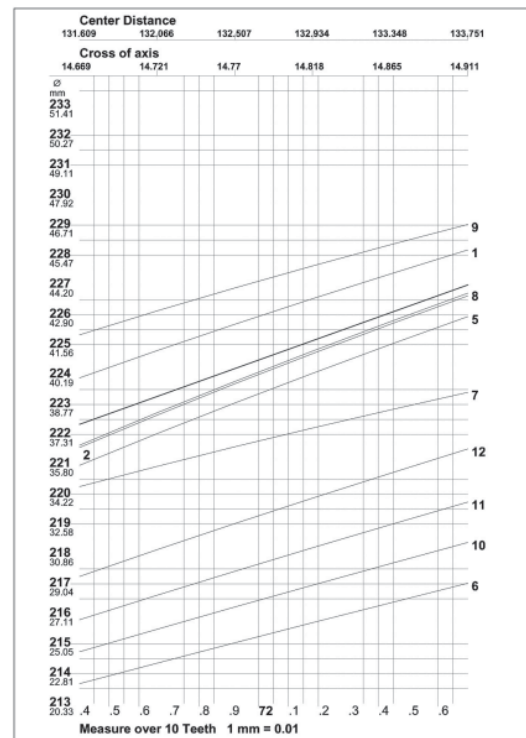
cutter grinding machine, combined with our test programs, means highly precise and efficient re-sharpening of your tools.

WOULD YOU LIKE TO RESHARPEN YOUR OWN TOOLS?

No problem. Samputensili delivers each tool with a user-friendly resharping diagram, enabling you to monitor the life cycle of your tool and directly control the resharping process, provided you have the right equipment for this high quality process.

Our expert engineers are always ready to support you with assistance or advice. For those customers who would rather take advantage of our wide range of tooling services, we can guarantee the highest possible quality standards of resharping using modern Samputensili grinding machines.

1. Points that touch the root diameter of the gear
2. Points that touch the root radius of the gear
3. Points that produce the start of the undercut after shaving
4. Points that produce the start of the undercut after milling
5. Points that generate the start of the active profile (SAP)
6. Points that generate the end of the active profile (EAP)
7. Lines of even contact 4-2-4
8. Lines of even contact 4-4-4-4
9. Lines of even contact 6-4-6-4-6





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Star SU LLC, Hoffman Estates/Illinois



- Tools Service Center
- Tools Manufacturing Site
- Tools Service Center – Planned

