Gear cutting 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

Star SU is the marketing, sales, and service partner for Star Cutter Company in North America, South America, Europe and the Far East. It designs, manufactures and supplies a comprehensive range of tools and services for the production of gears, shafts, worms, rotors and other screw-type workpieces.

The Star Cutter family of companies is a provider of custom-engineered tooling solutions and machine tools for precision applications. Founded in 1927 by Howard B. Lawton and headquartered in Farmington Hills, MI (USA), it has over 700 employees working in 15 manufacturing facilities.

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 catalog, 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.

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
- Heavy duty hobs

Quality

- A DIN 3968
- AA DIN 3968
- AAA Star SU standards
- AGMA 1102-C19
- ISO 4465:2020

Modifications

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

Designs and dimensions

Depending on your application, we optimize 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

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

Worm gear hobs

A wealth of experience in special gear applications and extensive testing on many different hobbing machine makes means that Star SU 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 optimizes 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.	8	mm

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

Hobs for large gears and rotors

Star SU offers cutting edge technology for hobs for large gear modules.

Heavy duty hobs are also available, 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.

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

Milling cutters including saw blade and rack cutters

Milling cutters at a glance

Types

- Bore and shank
- Straight and crowned forms, cutters for steering racks
- Interlocked sets
- Single piece circular
- Intermittent continuous feed
- Special tooth forms incl. chip breakers
- Single and duplex milling cutters
- Saw blade milling cutters
- Multiple thread milling cutters
- Special form milling cutters
- Rack milling tools
- Unground and ground forms
- Standard or precision quality

Dimensions

- Module: up to 16

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

Coatings

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

We offer our customers high-precision, form-relieved milling cutters for saw blades and other special forms on request.
Depending upon 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.
Our 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.

More than 100 years of combined shaper cutter experience

Our wide range of shaper cutter types features the brands 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
- Unground version also available

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
- Carbide

Coatings

- Gold (TiN)
- Futura Nano (TiAlN)
- Alcrona (AlCrN)
- Altensa (AlCrNX)
- 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

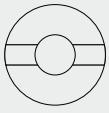
Internal shaper cutter, Gold-coated

Shaper cutter with block teeth

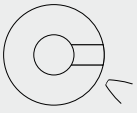
Keyway types

Type A
without
keyway

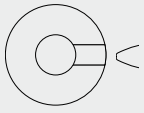
Type B
longitudinal
keyway



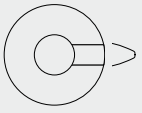
Type C
clutch
keyway



Type D
keyway, not
aligned



Type E
keyway aligned
on tooth vane
axis



Type F
keyway
aligned on
tooth axis

Scudding® / Power Skiving tools

Star SU and Profilator have formed an alliance 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.

Application

- Spur and Helical Involute Gears and Splines

Tool Types

- Wafer
- Disc
- Shank

Material

- PM HSS
- Super Alloy HSS
- Carbide
- MC90

Coating

- Alcrona Pro (AlCrN)
- Altensa (AlCrNX)

Profilator

Power Skiving for quicker, more efficient and productive

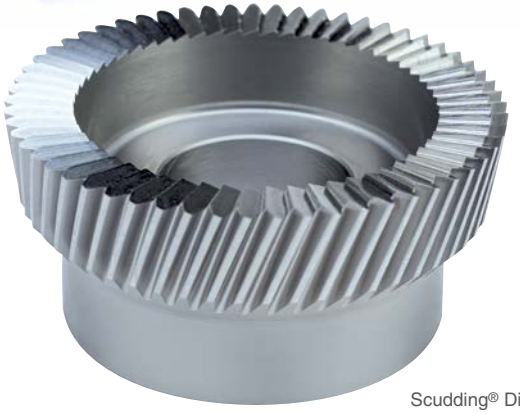
The high number of cuts per time unit not only leads to a very short cycle time, it produces high quality gears with a low surface roughness.

We produce Power Skiving tools for all solutions and machines present on the market.

Gear quality	DIN 5-7
Surface roughness	Rz 1-5
Modules	0.7 - 6
Max. diameter - HSS	250 mm
Max. diameter - Carbide	150 mm
Max. shank size	150 mm
Bore size options	16 - 44.45 mm

Scudding® Wafer Cutters

Scudding® Shank Cutter



Scudding® Disc Cutter

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

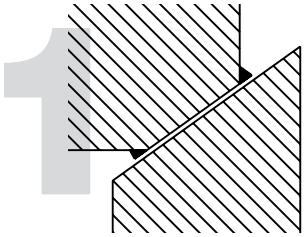
- For spur or helical gears
- As single tool or separate tools
- Rolling tools for burrs and internal toothing

Chain sprocket deburring and rolling tools

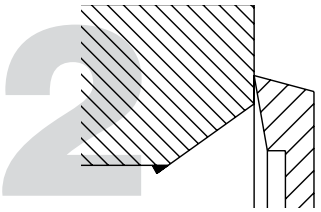
Developed exclusively to deburr chain sprockets, the specially adapted form of the SPR 1000 type has exactly the same profile as the flank radius of the gear tooth and, therefore, any burrs from the lateral surface of the gear teeth.

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.

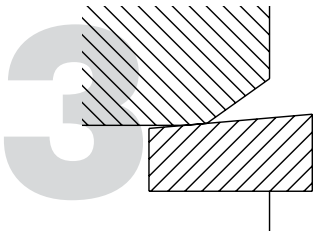
These tools can be used on any standard chamfering machine.



Secondary burr during chamfering



Deburring the secondary burr on gear lateral surfaces

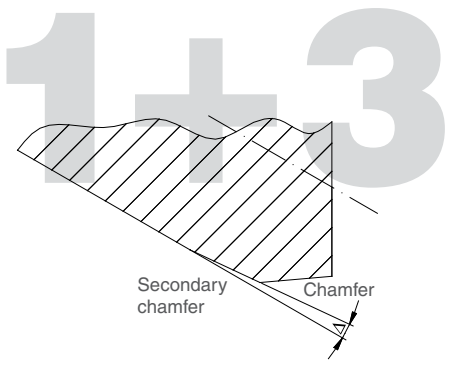


Rolling the secondary burr on gear flanks

Chamfer-roller tools

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

With our 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 utilizes just one tool head, leaving second tool head free for another operation.



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

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

Tool groups

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

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, chamfer-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 gear cutting tools worldwide, and with particular expertise in shaving technology, we offer a wide range of shaving cutter types:

- Transverse
- Diagonal
- Underpass
- Plunge

- Internal/external shaving
- Unground or finished shaving cutters
- All tools are supplied with inspection and lead test charts.

Dimensions

■ Module	1 - 10	mm
■ Max. width	65	mm
■ Outside diameter	170 - 280	mm

Material

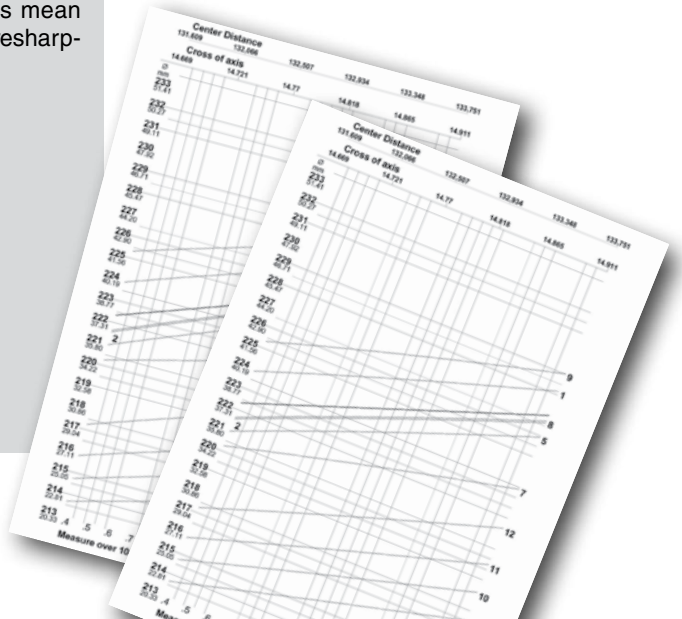
Choose from different conventional HSS or powder metals.

Design and optimization

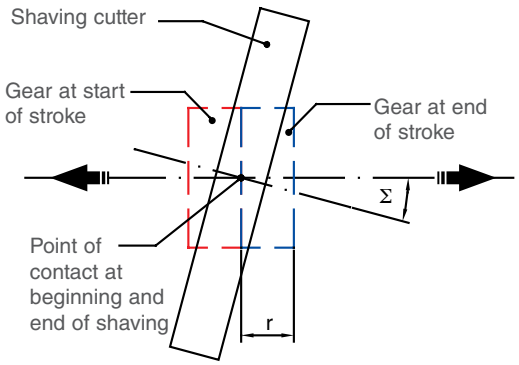
Tool design and optimization are rooted in the longstanding experience of our shaving cutter design engineers. Unique software developments implemented on our shaving cutter grinding machines and test programs mean high precision and efficient resharpening of your tools.

Sharpening diagrams for continuous life cycle control

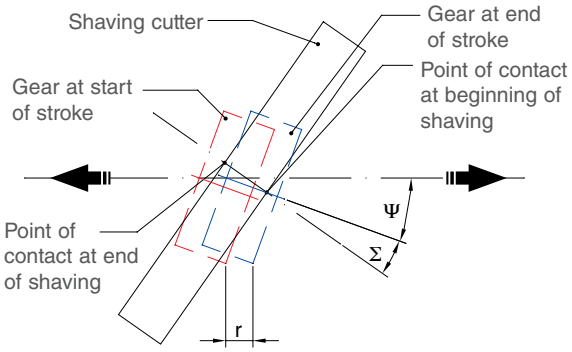
Star SU delivers each tool with a user-friendly sharpening diagram, enabling you to monitor the life cycle of your tool and directly control the sharpening process, ensuring you can optimize this high quality process.



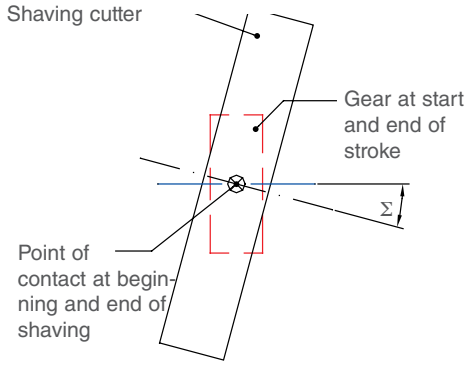
Transverse shaving



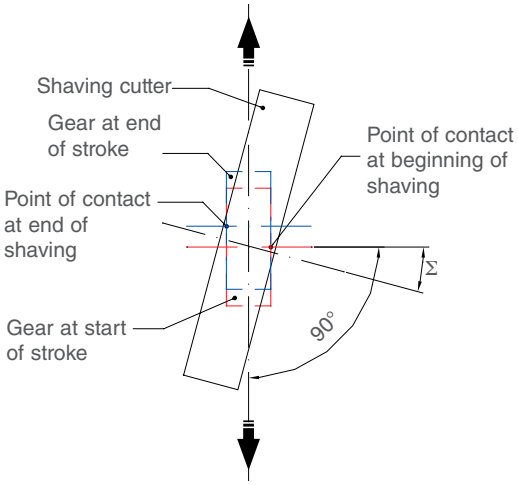
Diagonal shaving



Plunge shaving*



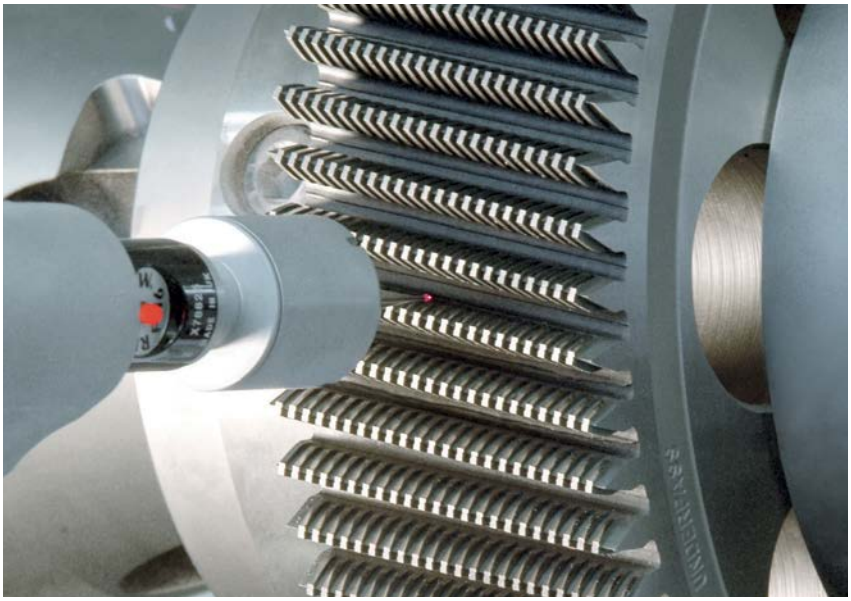
Underpass shaving



* particularly used in the automotive industry.

Twisting profiles made easy

Our software solutions are the cornerstone of our solutions. Tool design and optimization are based on unique in-house software implemented on our shaving cutter grinder machines. Additionally, Star SU shaving cutters are profile ground and sharpened on the most modern and production machines available in the market.



Sharpening and in-machine measurement of shaving cutters

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	
■ 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.

Plug gauges

Module	0.5 – 6.0
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 inquiries. Existing profiles can be optimized using our internally developed master gear design software.

Regrinding & recoating

Master gears will experience wear and need regrinding to ensure continued quality performance.
This service is only availabe in some of our plants. Ask your contact partner for further information.

Marking

All Star SU checking and setting master gears are engraved according to DIN 3970, or can be marked with customer-specific data, bearing an individual tracking number that enables them to be carefully monitored throughout the whole production process.

Certified quality

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

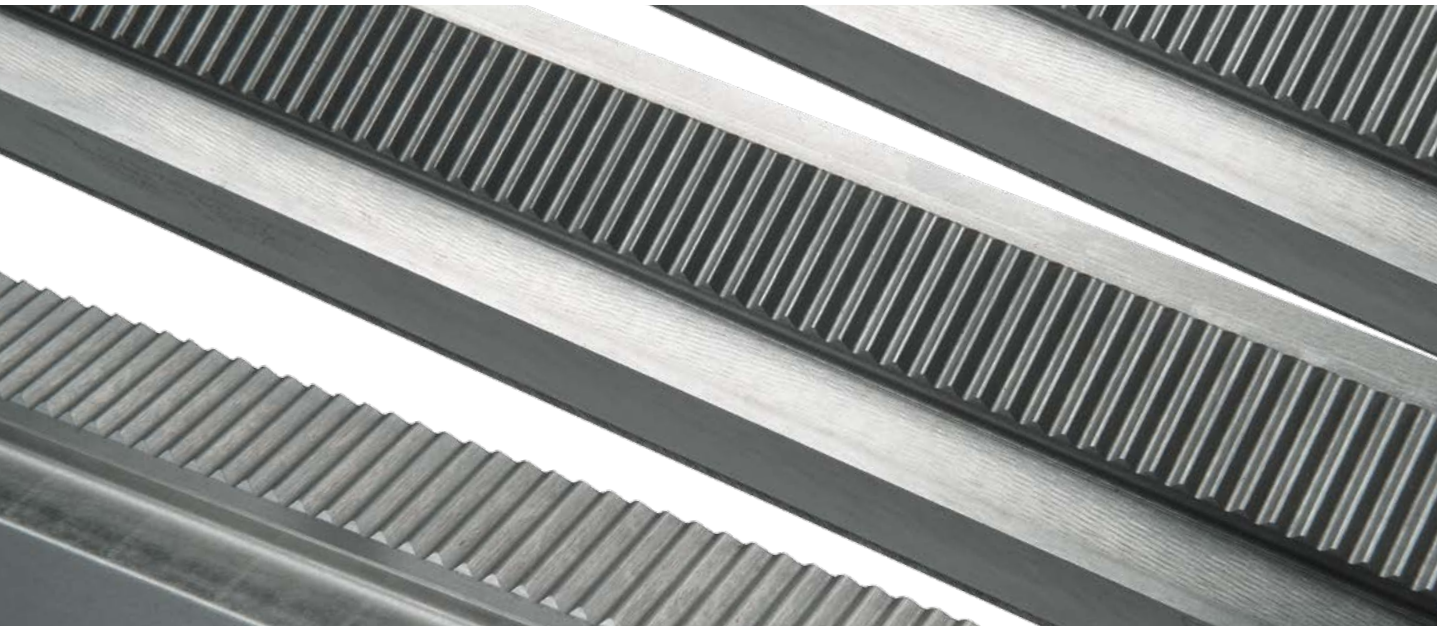
We therefore guarantee both the accuracy of our master gears and the quality of the whole manufacturing process.

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.

High precision rolling racks



Star SU supplies its customers with a highly efficient and precise rolling racks for cold forming of gears.

These high precision tools guarantee the 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.

This service is only available in some of our plants. Ask your contact partner for further information.

Types for

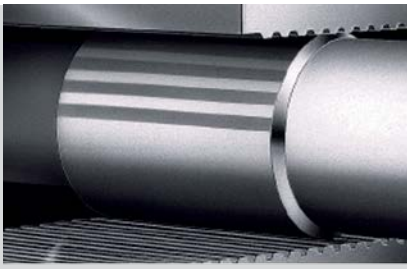
- Gear profiles
- Serrations
- Grooves
- Threads

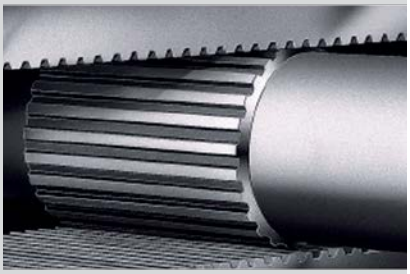
Quality

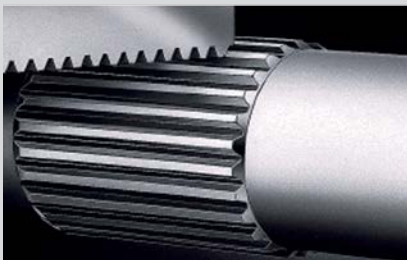
- DIN 5480
- ISO 4156
- GOST 6033-51
- ANSI B 92.1-1970
- ANSI B 92.2M-1980

Designs and dimensions

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







Coating technology

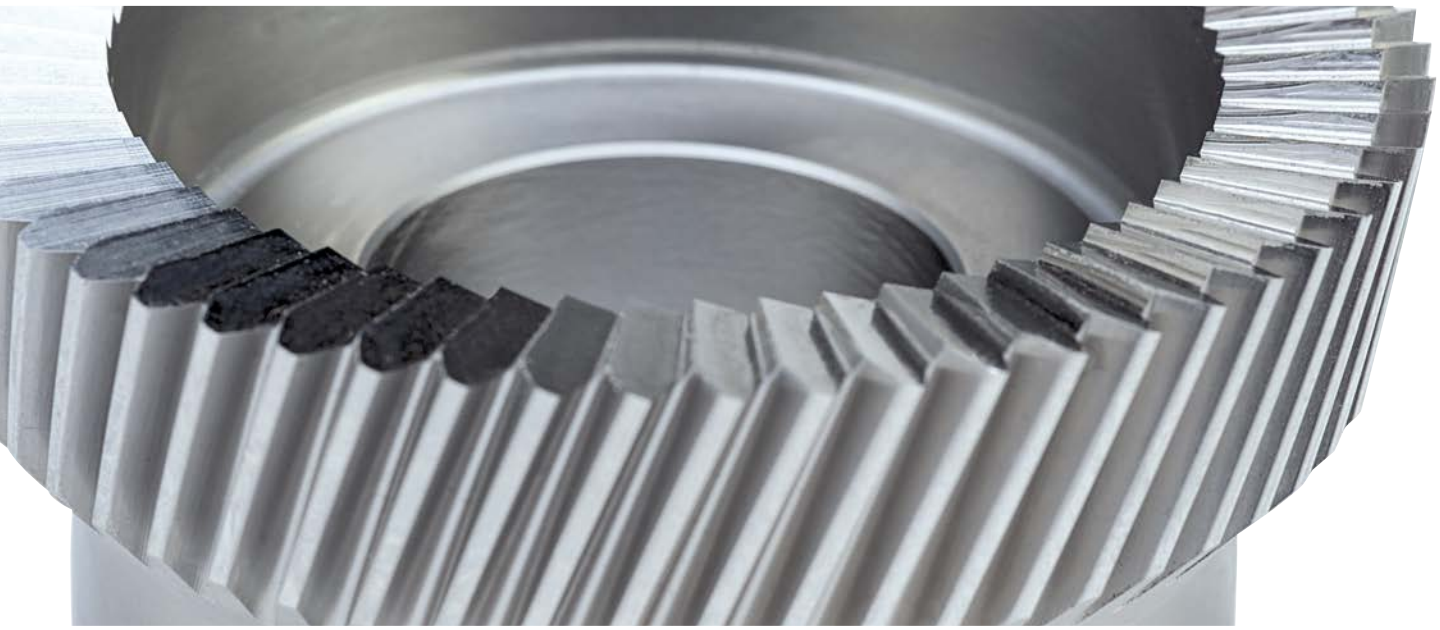
Sharpened tools must deliver the same performance as coated new tools.

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 optimize innovative coatings for gear cutting tools to improve abrasion resistance, wear resistance and, consequently, tool life. Automated cleaning equipment further optimizes 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 Star SU manufacturing sites all over the world and are frequently updated with the latest process technology. This close cooperation 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 currently in the market.

Its characteristics enable the attainment of high speeds, 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 that require high cutting speeds, such as automotive. It is recommended in the following processes:

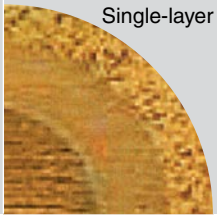
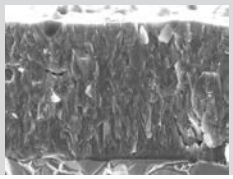
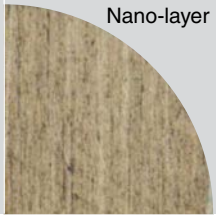
- Hobbing
- Shaping
- Scudding®

Star SU offers state of the art technology that always provides the best solution possible.

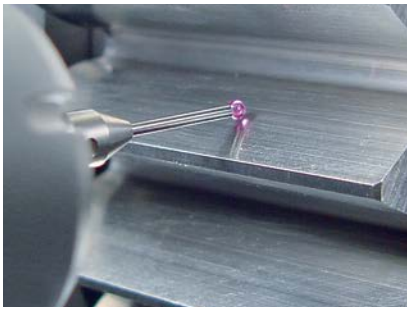
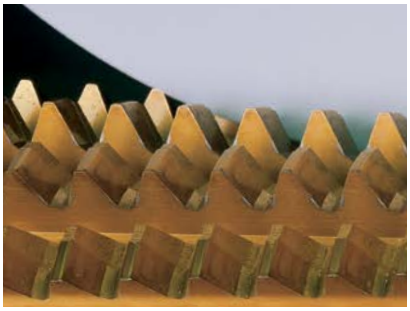
Save up to 20% of your production costs by increasing your cutting speed

Alcrona Pro	200 m/min
Altensa	300 m/min

Standard coatings guide

	Gold	Alcrona Pro	Altensa
Composition	Titanium Nitride (TiN)	Aluminum Chromium Nitride (AlCrN)	Aluminium Chromium Nitride (AlCrNX)
Microhardness (HV 0.05)	2,500	3,200	3,800
Friction coefficient on steel (dry)	0.4	0.35	0.35
Residual compressive stress (GPa)	- 2.5	-3	-5
Layer thickness (um)	1 - 4	2 - 5	2-5
Temperature resistance, max. (C / F)	600 / 1,100	1,100 / 2,000	1,200 /2,100
Color	Gold yellow	Bright gray	Gray
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.	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 centers.
Application	Hobs Shaper cutters Deburring tools Master gears/rolling tools	Hobs Shaper cutters	Hobs Shaper Cutters Scudding® tools
Process	Wet cutting (HSS) General purpose	Dry cutting (HSS, Carbide, MC 90) Wet cutting (HSS, Carbide, MC 90)	Dry cutting (HSS, Carbide, MC 90) Wet cutting (HSS, Carbide, MC 90)
Structure	Single-layer	Single-layer	Nano-layer
Other coatings available on request			

With you throughout the life of your tool


With Star SU 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, many of the world's leading gear manufacturers rely on Star SU 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 centers
- Pickup and delivery service, to and from your tool crib
- CMS for tool groups and product life cycle management of single tool types.

CMS

+ Lower direct and indirect labor 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)

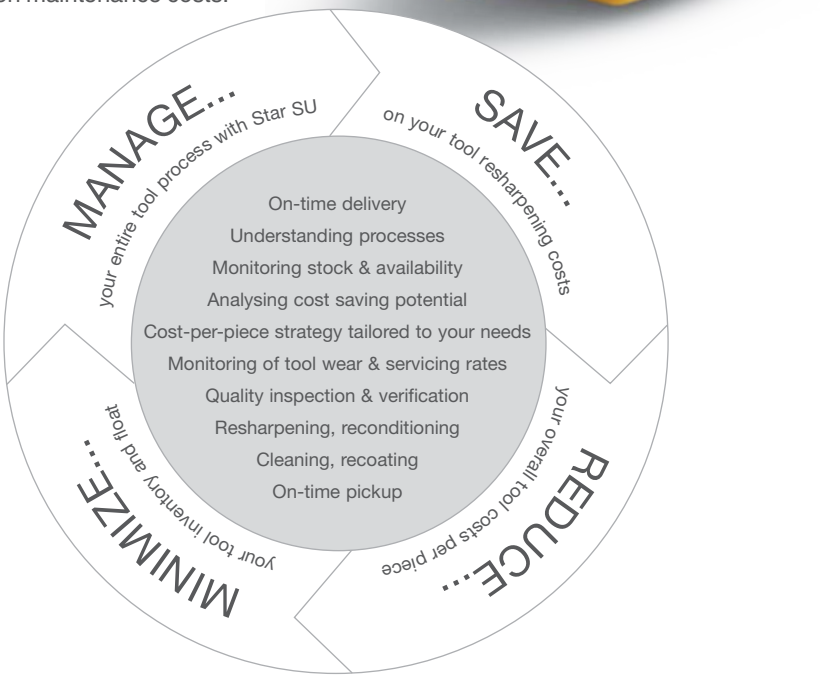
Stay connected

Your Star SU service center helps you enhance the productivity, precision and turnaround of your production tools.

Get in the driver's seat

Star SU Total Tool Life Cycle Management meets your every production need by optimizing each step of the tool life cycle 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.
- Optimize all steps in your process chain in-house.
- Keep a check on maintenance costs.



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