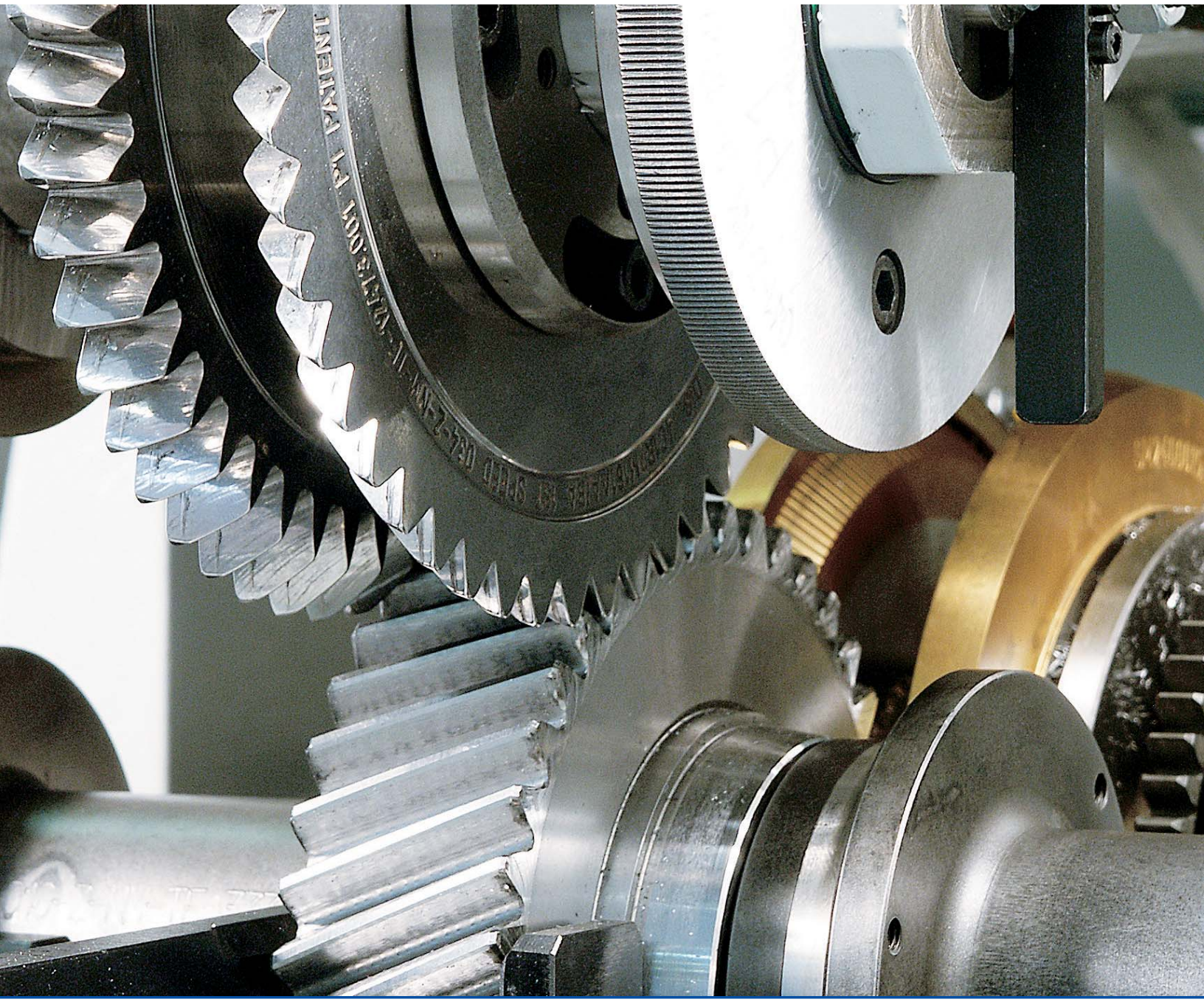
GEAR CHAMFER & DEBURRING TOOLS



Tools for high production gear deburring,
chamfering, and roll chamfering

CALCULATING THE PROFILE AND TECHNICAL ASSISTANCE

Software solutions developed in collaboration with leading technical institutes enable us to design any chamfering and deburring tool quickly and reliably. Your individual production requirements are analyzed thoroughly to provide you with the best manufacturing solutions possible.

CHAMFERING, DEBURRING AND CHAMFER-ROLLER TOOLS

From left to right:
A 1000 type deburring tool
P type deburring tool
PR type deburring tool
PR 1000 type deburring tool
P and T 1000 type deburring tools
SPR 1000 type deburring tool

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 fostraight 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)

CHAMFER-ROLLER TOOLS

- to machine the gear tooth profile
- to remove the secondary burr

Workpiece after hobbing

Workpiece after chamfering and deburring

WHY CHAMFER AND DEBURR?

- a burr which is not removed may break off during machining and lead to damage of bearings or gears in gearboxes.
- over-carbonizing may also result in too much pressure being exerted on the sharp gear lateral surfaces and therefore in potential breakage.
- a hardened burr may, in the event of a subsequent finishing operation, lead to premature wear of the tool. Removing the burr, however, prolongs the life of the finishing tool significantly.
- removal of very sharp burrs reduces the risk of injury when handling tools.

BASIC TYPES OF CHAMFERS

Parallel chamfer of both flanks and of the root radius

Comma type chamfer of both flanks without chamfering of the root radius

Chamfering of one flank without chamfering of the root radius

Comma type chamfering of both flanks and of the root radius

FINISHING OPTIONS	SOLUTIONS
None (finish hobbed or shaped)	Chamferring/ deburring
Shaving	Chamferring/ deburring
Grinding with ceramic form wheels/worm wheels	Chamfer-rolling and deburring (recommended) or just chamfering and deburring
Grinding with CBN form wheels/ worm wheels	Chamfer-rolling and deburring
Honing	Chamfer-rolling and deburring

POSSIBLE COMBINATIONS

CHAMFERING AND DEBURRING

- use of two tool heads
- subsequent operation: shaving or profile grinding

CHAMFERING AND DEBURRING AND 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

CHAMFERING & DEBURRING AND 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

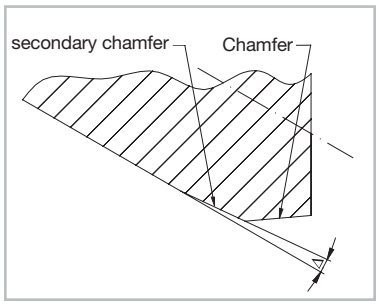
- use of two tool heads, chamfering tool with integrated rolling tool on one tool head and deburring tool on a second tool head.
- subsequent operation – Continuous generating grinding, shave grinding

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

Set of rolling tools on one toll head

COMBINED CHAMFER-ROLLER TOOL



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

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 consequently removed in the very same operation.

By combining both processes, the machine utilizes just one tool head leaving the second tool head free for another operation.

For workpieces
- with parallel chamfers
- with comma type chamfers
- without any step

CHAIN SPROCKET DEBURRING AND ROLLING TOOLS

Machining a chain sprocket

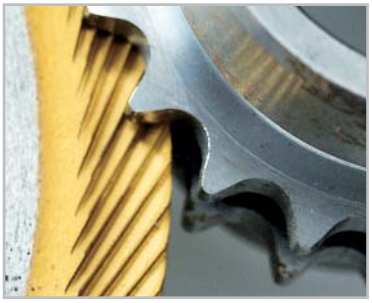
CHAIN SPROCKET DEBURRING TOOLS

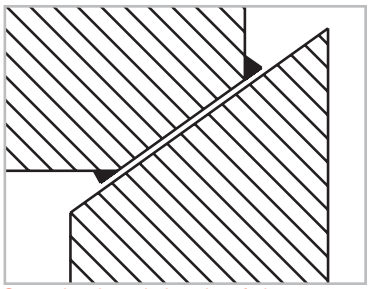
Developed exclusively to deburr chain sprockets, the specially adapted form of the SPR 1000 type has exactly the same profile as the flank radius of the gear tooth, and therefore removes the formation of burrs on the lateral surfaces of the gear teeth.

CHAIN SPROCKET ROLLER TOOLS

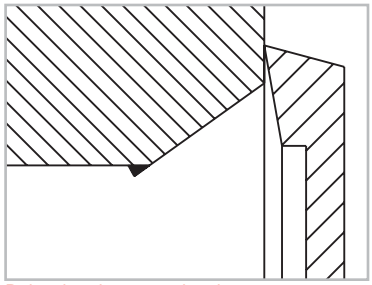
The form of chain sprocket roller tools also has exactly the same profile as the gear tooth profile. The special tapered form of the tool tooth prevents the build-up of material along the gear tooth profile, which can form during the contemporary deburring operation.

These tools are ideal for Samputensili chamfering machines with motorized tool heads but they can be used on any standard chamfering machine without difficulty, as a pair of driving gears is used to vary the rotation speed of the tools compared to that of the workpiece.

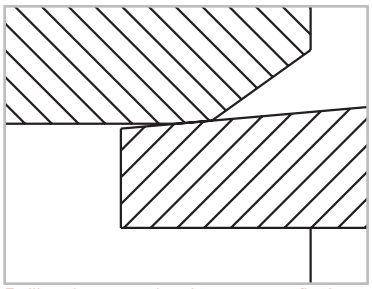




Secondary burr during chamfering



Deburring the secondary burr on gear lateral surfaces



Rolling the secondary burr on gear flanks

WHY ROLL?

The buildup of material during chamfering on the gear lateral surfaces is removed during the deburr operation. The rolling operation, on the other hand, serves to remove the buildup of material on the tooth flanks (secondary burr) which is caused by plastic deformation during chamfering.

PROBLEMS IN SUBSEQUENT OPERATIONS

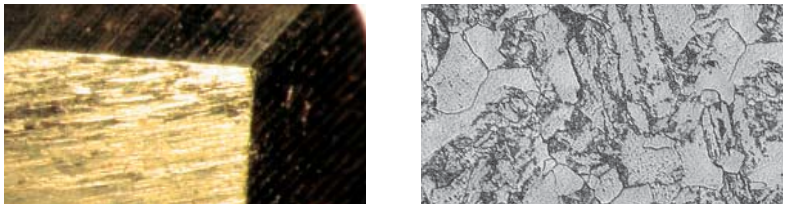
As a rule, burrs which are larger than 0.05 to 0.07 mm can create problems during subsequent phases of production, leading to shorter tool life and often the tool itself may be endangered. In this case, a rolling operation is strongly recommended and is at times crucial.

HEAT DEFORMATION = HARDENING CREVICES?

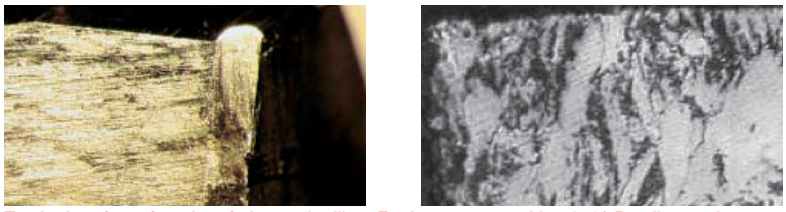
If tools are chamfered and rolled when they are soft, a change in structure, in the form of compression, may occur. The leveling out of the secondary burr during rolling causes the material to sink.

Our research shows that hardening crevices do not appear after heat deformation.

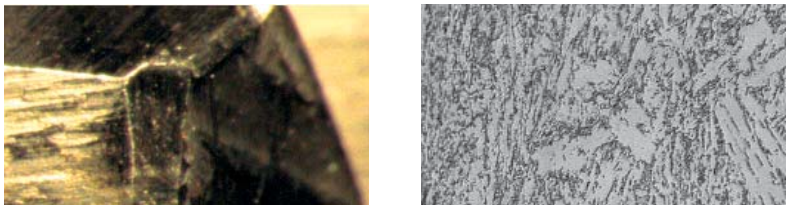
After heat treatment, no crevices form in the rolled zone and the structure of material is normal, according to the properties of the steel itself.



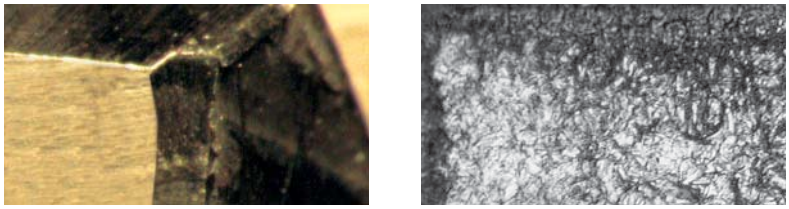
Not heat treated, 2% Nital tested, Ferrite structure with a 25% Pearlite portion



Tooth chamfers after chamfering and rolling, Ferrite structure with a 25% Pearlite portion, compressed due to the pressure exerted by the chamfering tool



Tooth chamfering after chamfer, Nital tested, Ferrite structure with a 25% Pearlite portion, compressed due to the pressure exerted by the chamfering tool



Tooth chamfers after chamfering, rolling and hardening, Nital tested, martensitic structure with a 6-7% austenitic portion

CERTIFIED EFFICIENCY

FROM LEFT TO RIGHT:

1. Designing a tool with CAD systems to customer specifications.

2. Sawing a base cylinder according to the specifications of our engineering team on CNC machinery.

3. Turning of the profile and bore to the strictest tolerances in order to guarantee the best possible quality of subsequent operations.

4. Engraving tool data which is necessary to constantly monitor the tool throughout the production cycle.

5. Milling on CNC machinery.

6. Hardening in salt baths to prevent deformation. P type deburring tools normally have a hardness level from 64-65 HRC.

Higher hardness levels are obtainable for all tools. The hardness level for chamfering tools is usually around 61-62 HRC.

7. and 8. High precision bore and face grinding. The accuracy of the subsequent profile grinding may be strongly influenced by how the tool is clamped.

9. Grinding of each flank of a special profile on Samputensili developed process machinery.

10. “Super-Finishing” of the sharp tooth flank edges. The very fine rounding off of tooth flank edges prolongs the actual life of the tool as the force exerted on the tooth face is more evenly distributed. Also this operation significantly reduces risk of injury when handling tools.

11. Continuous quality inspection throughout the whole manufacturing cycle.

12. All deburring tool types have a standard TiN coating. Chamfer-roller tools do not actually perform any cutting operation and therefore do not require any coating as a rule.

13. Tools ready for dispatch.

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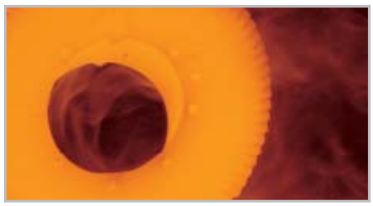

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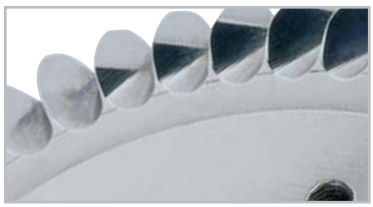

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FAX QUOTE/ORDER FORM

Customer No: _____

First/last name: _____

Company: _____

Department: _____

Tel: _____

Fax: _____

E-mail: _____

☐ Inquiry ☐ Order

SU-ID-No. : _____

Workpiece drawing no: _____

Tool drawing no: _____

Tool Type:
- ☐ Chamfering tool
- ☐ Chamfer-roller tooll
- ☐ Rolling tool
- ☐ Deburring tool
- ☐ Chain sprocket rolling tool
- ☐ Chain sprocket deburring tool

Workpiece data

No. of teeth (z_2): _____

Normal module (mn_2): _____

Pitch*: _____

Roller diameter*: _____

* only for chain sprockets

Pressure angle (a): _____

Helix angle ($ß_2$): _____

Direction of helix: ☐ Right ☐ Left

Outside diameter (da_2): _____

Root Diameter (df_2) _____

Data refers to*:
- ☐ Pre-finishing operation
- ☐ Finishing operation

*Tooth width (W): _____

Measured n° of teeth: _____

*Dim. between rollers: _____

Roller-Ø: _____

*Dim. between balls: _____

Ball-Ø: _____

Usable root -Ø(dnf): _____

Workpiece finishing:
- ☐ None (hobbed only)
- ☐ Shaving
- ☐ Grinding (CBN)
- ☐ Grinding (ceramic)
- ☐ Honing (CBN)
- ☐ Honing (ceramic)

Please also provide the following:

Geometric drawing of the turned workpiece with indication of desired chamfers ☐ Drawing attached

Profile and helix angle corrections to be made during roughing ☐ Drawing attached ☐ Table attached

For Samputensili Chamfering and deburring machines:

Machine type: _____

Machine model: _____

Serial-No. (necessary!):

For chamfering and deburring machines of other manufacturers: workpiece clamping with current too set-up ☐ Drawing attached

Axial position: min. _____

max. _____

Piece or set: ☐ Piece ☐ Set (2 Pieces)

☐ 1 ☐ 2
☐ 3 ☐ 4
☐ 5 ☐ ____

Remarks: _____

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

GEAR CHAMFER & DEBURRING TOOLS

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