

Tool Services and
Total Life Cycle Management

Minimize cost-per-piece by total tool life cycle management



Total tool life cycle management to match your production needs...

...by optimizing each step of the tool life cycle process...to minimize your tool cost-per-piece

Are you really in control of your per piece tool costs?

Are you really considering all costs connected to your tool supply and maintenance efforts inhouse?

Are all of the steps in your process chain inhouse optimized?

Are you paying too much to maintain your tools?

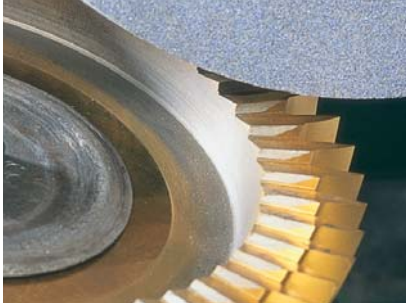
Star-SU offers total tool life cycle management of services and equipment for every step of your manufacturing process, including individualized support services to keep your tools running efficiently.

With our new innovative cost/piece (CPU or PPU) approach you can control your perishable tool costs from a reliable and experienced source. We guarantee a certain cost/piece, taking away your worries about the actual tool cost, its potential life or future servicing processes.

Tools are delivered on time to your appropriate production facility, used tools are automatically picked up, re-sharpened, recoated and delivered according to your particular need.

Finally, you choose our level of involvement: from supplying pure reconditioning services for existing single tools to complete service management with the purchase of the initial product.

Enhancing your tool performance



Design

From the idea to the tool

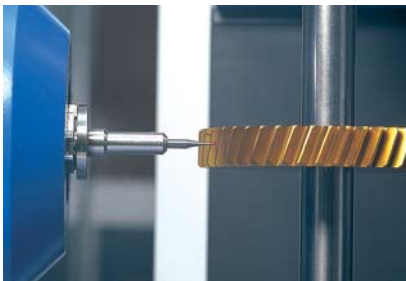
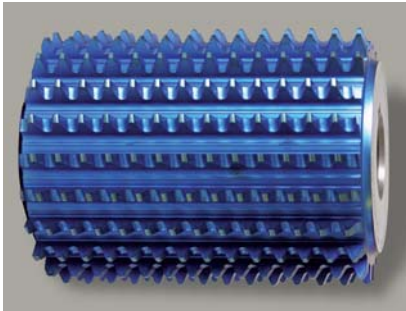
You do not have to worry about the complexity of certain tool types. Specify what you need in a particular gear, spline or tooth form and our team of application and design engineers will do the rest: from quoting the product, designing the tool drawing, creating the roll-out to the final manufacturing of the tool. Our expert staff will work closely with you to make sure you are able to meet your requirements.



Coating

All Gold Star thin film coatings are available to customers through the US, Canada, and Mexico. Coating types are tailored for different operating conditions.

- Titanium Nitride TiN
- StarForce Ti(C,N)
- AdvantaStar SN (Al,Ti)N
- AdvantaStar (Al,Ti)N
- BlueStar Hob™
- BlueStar Shaper Cutters™



Recoating

Bringing coated tools back to optimum life after reshaping by using the latest CemeCon Coating Units, all types of PVD thin film coatings can be reapplied to greatly improve tool performance after reshaping. For the most demanding applications AdvantaStar coatings from the latest CemeCon Coating Units are available.

Resharpener – Achieving original tool performance

Star SU utilizes high precision, modern CNC grinding machines to restore hobs, shaper cutters, shaving cutters, master gears, milling cutters, rack cutters, saw cutters, bevel stick blades, as well as chamfering/deburring tools to their original sharpened quality, condition and performance.

The widest range of types, configurations, and sizes can be accommodated: from the smallest fine pitch hob to shaving cutters as large as 32" in diameter.

Overall, the services are fast, convenient and cost effective – with quality that is unmatched by any other grind service.

Application Services

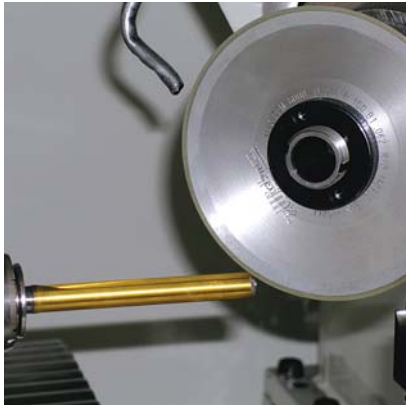
Star SU provides the services to determine strategies to reduce cutting tool cost per piece through lower costs to sharpen and recoat. Recommendations for cutting speeds and feeds from experienced engineers will help you optimize your process through a design of tool review to possibilities to decrease tool change frequency and change over time.

Fast, faster, fastest

Our service centers in Michigan, Indiana and Illinois provide you with fast turnaround of high precision sharpenings.

Pickup and delivery services are available in some areas as well as complete CMS systems to minimize freight and logistics costs by advanced logistics planning.

Services for round tools and gear tools



- Resharpener of gundrills, reamers and solid carbide tools, including high performance points
- Recoating of round tools
- Reworking/retipping of PCD tools - Retip & Resharp Program

$$\text{Production costs per workpiece} = \text{Tool costs per workpiece} + \text{Machining costs per workpiece} + \text{Operator costs per workpiece}$$

Cutting Tool Costs

$$= \text{Total Acquisition Cost} + (\text{Cost of Sharpen} + \text{Re-coat}) \times \text{Number of Regrinds}$$

Total Costs Per Workpiece

$$= \frac{\text{Tool Acquisition Cost} + (\text{Cost of Sharpen} + \text{Re-coat} \times \text{Number of Regrinds})}{\text{Tool Life per Regrind} (\text{Number of Regrinds} + 1)}$$

Tool Costs per Workpiece:

- Tool Acquisition Cost
- Number of Regrinds
- Possible Regrinds
- Costs for Sharpening and Re-coating

Proportion of tool costs on general manufacturing costs ~ 10 %

- Resharpener and recoating of bevel blades
- Gundrills and reamers
- Broach sharpening
- Round tool resharpener
- Retipping of gundrills and brazed reamers
- State of the art inspection



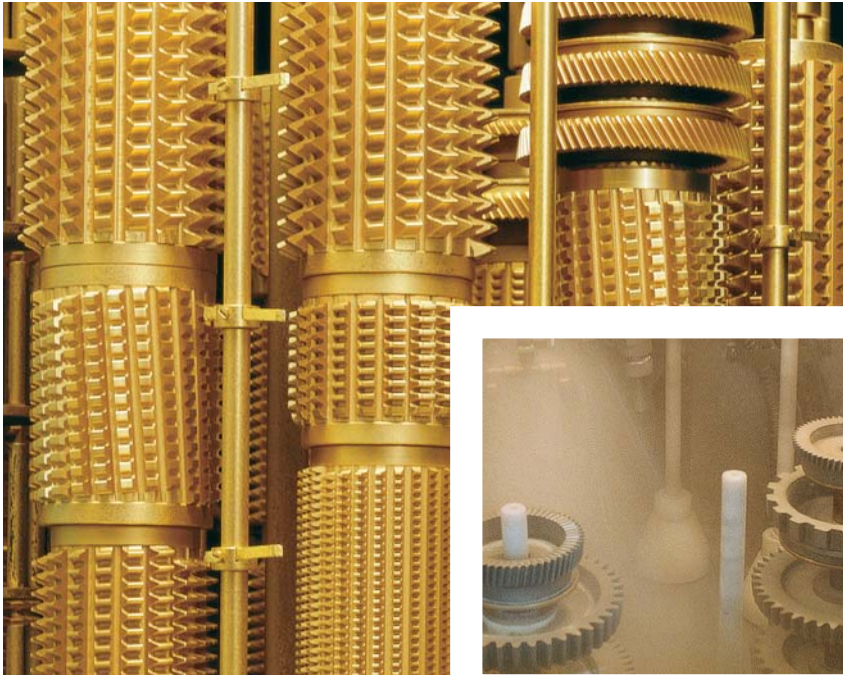
Advantages of tool service

- No capital cost
- No labor or indirect cost
- Reduced inventory
- Better tool life



Round tools are manufactured and resharpener in the same CNC equipment.

Coating and decoating services



Stripping



Resharpener



Recoating



Recoating Stick Blades



CemeCon Coating Unit

Applying advanced coatings

Constant improvement of existing coatings and research of latest coating technology is a result of the collaboration between Star SU and leading manufacturers of coating units.

The coatings process is further optimized by using automated cleaning equipment to remove all oils and residues. Substrates are delivered for coating in a thoroughly clean condition to help guarantee the ultimate quality of the coated product.

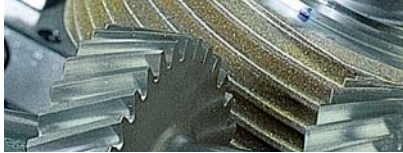
Our Gold Star coatings will improve abrasion, wear resistance and can increase life up to 5-10 times in certain applications.

- HSS and carbide tools
- molds and dies
- special tools
- machined parts and other applications

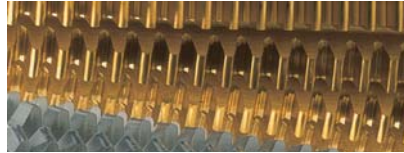
<p>TiN: Titanium Nitride TiN</p> <p>Color: Gold</p>	<p>Applications:</p> <ul style="list-style-type: none"> • Alloy Steel (Rc < 40) • Medium Carbon Steels (Rc < 40) • Low Carbon Steels 	<p>TiN is a good starting point for applications. It is ideal for assisting in eliminating built up edge in steels. It can be re-coated multiple times.</p>
<p>StarForce: Titanium Carbo-Nitride Ti(C, N)</p> <p>Color: Grey-Blue</p>	<p>Applications:</p> <ul style="list-style-type: none"> • Cast Irons • Inconel • Copper • Stainless Steel • Non-metallic materials 	<p>Ti(C, N) is excellent for difficult-to-machine materials. It provides resistance to impact. If application is generating too much heat, look at (Al,Ti)N.</p>
<p>AdvantaStar: Aluminum Titanium Nitride (Al,Ti)N</p> <p>Color: Eggplant Purple</p>	<p>Applications:</p> <ul style="list-style-type: none"> • Steels (Rc > 40) • Non-metallic materials • Cast Irons • Abrasive materials • Dry machining • High-speed STF applications 	<p>(Al,Ti)N should supersede TiN and Ti(C,N) in high-temp applications or when high penetration rates are being applied. The coating is ideal for lack of coolant applications.</p>
<p>AdvantaStar SN: High Aluminum (Al,Ti)N</p> <p>Color: Blue Purple</p>	<p>Applications:</p> <ul style="list-style-type: none"> • Steels (Rc > 55) • Compacted Graphitic Iron • High-speed machining 	<p>ADV SN is for the most demanding applications. Its nanograin structure and high-aluminum composition provide the most wear protective coating in the industry.</p>
<p>AlumaStar: Titanium Diboride TiB₂</p> <p>Color: Silver</p>	<p>Applications:</p> <ul style="list-style-type: none"> • Aluminum (< 12% Silicon) • Magnesium • Copper • Titanium 	<p>TiB₂ is ideal for eliminating build up on the cutting edges. It has a low affinity to aluminum. The coating can be re-coated up to three times.</p>

Note: We will not strip coating from carbide tools. The chemicals used in the process attack the base material.

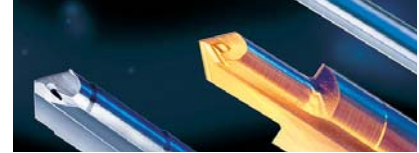
System technology from one source



Cylindrical gear hobbing
 Bevel gear cutting
 Shaping
 Profile grinding
 Continuous generating grinding
 Honing/shave grinding
 Shaving cutter grinding
 Hob grinding
 Universal tool grinding
 Carbide tool grinding
 Chamfering and deburring



HSS and carbide hobs
 Shaper cutters
 Broaches
 Milling cutters
 Rack and saw cutters
 Shaving cutters
 CBN profile grinding wheels
 Master gears
 Chamfering and deburring tools



Single and double flute gundrills
 Solid carbide gundrills
 Two-fluted milled style deep hole drills
 Solid carbide drills and reamers
 Pressure coolant drills and reamers
 "PCD" drills and reamers
 Integrated holder "PCD" tooling

Regrinding of gear cutting tools
 Coating of gear cutting tools
 Decorative coatings
 Replating of grinding wheels
 Grinding of compressor rotors, gears of special design, worms and cams



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