

# High Tensile Strength Steel Stamping Solutions



Providing Solutions to  
Make You More Profitable



[www.daytonlamina.com](http://www.daytonlamina.com)

a MISUMI Group Company

# Dayton Progress Understands that Stamping High Tensile Strength Steel Is Hard—Literally.

1. Low punch performance & cycle life
2. Impact resistance
3. Punch edge chipping, edge wear or breakage
4. Stopping production to service or re-sharpen tooling

Ultimately you have more downtime and increased maintenance costs; robbing your company of profit.

You can rely on solutions from Dayton Progress to increase profits.



## The Dayton Progress Solution

We have developed punches specially designed for stamping today's high tensile strength steels. The combination of the right punch material, design, coating, and finish will improve your day-to-day operations.

**Punch Design:** Features that perforate cleanly and eject slugs efficiently.

**Punch Material:** Durable tool steel, heat treated in-house in our modern vacuum ovens.

**Coatings:** Dayton Progress uses long lasting coatings that reduce friction and increase wear life.

**Finishes:** Precision micro finishes that enhance the performance of our coatings.



**Grind vs. Polish**

*This publication is part of a series of free technical self-study and classroom courses designed to improve your knowledge of the metal stamping process. Other types of Dayton technical assistance include person-to-person consulting, online and printed catalogs, CAD-compatible design software, and other materials and programs.*

## Options That Fit Your Situation and Budget

Production	Good	Better	Best	Callout
<b>Punch Material</b>	M2	PS4	PS4	M2, PS4
<b>Chamfer</b>	—	Yes	Yes	XS20 (round) or XS25 (shape)
<b>Jektole</b>	—	Yes	Yes	BJ_, AJ_F, TJ_F
<b>Back Taper</b>	—	—	Yes	XAR (round)
<b>Coating</b>	Yes	Yes	Yes	XAN



## Order Examples

**Good** VPX 37 1020 P.250 M2 XAN XS20 A7°  
**Better** VJX 37 1020 P.250 PS4 XAN XS20 A5°  
**Best** VJX 37 1020 P.250 PS XAN XS20 A5° XAR

DPO 08 1371 P4.20 W3.5 M2 XAN XS25 A15° Y0.5  
 DJX 08 1371 P4.20 M2 XAN XS20 A5°  
 DJX 08 1371 P4.20 PS XAN XS20 A7° XAR

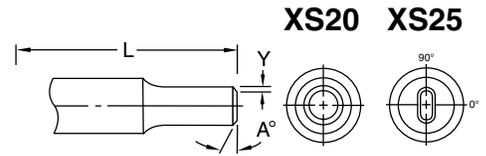
# Optimizing Punch Performance



## Chamfer Shear Angles

**XS20, XS25**—Shear Angles are used primarily to reduce slug pulling. This feature has been proven effective to generate longer cycle life.

Studies show that the XS20 (round) and XS25 (shape) shear angle can improve life cycles by 200-300%.



	XS20	XS25
<b>A</b>	any angle	7.5°, 15°, 30°, 45°
<b>Y</b>	0.04" (1.0mm)	0.020" (0.5mm), 0.040" (1.0mm), 0.060" (1.5mm)

Tolerance on all angles is +/-15 minutes.



## Jektole® Punch

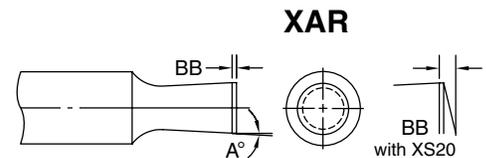
Many high tensile strength material applications require extreme lubrication throughout the die. The increased lubrication magnifies surface tension and increases the possibility of slug bonding.

The benefits of using a Jektole punch are twofold. The spring loaded Jektole pin (extending from the face of the punch) is a method to retain the slug in the die button after perforating. The Jektole punch also has a side vent hole which allows air to get in, breaking the vacuum and lubrication seal between the punch and slug.



## Back Taper

**XAR**—Round punches can be ground with a back taper to reduce stripping pressure, heat and material build up on point. This precise change in the size facilitates stripping material and is much less likely to adhere to the punch. Grind life is not affected. The reduction in diameter is so small that the punch remains within normal tolerances for both hole size and die clearance throughout its life.



<b>A</b>	$\leq 10^\circ$
<b>BB</b>	tolerance $\pm 0.015"$ / $\pm 0.38\text{mm}$



## High-Aluminum Coating

**XAN**—This ultra-hard (harder than carbide), high-aluminum coating provides high temperature resistance. It is well-suited for applications where

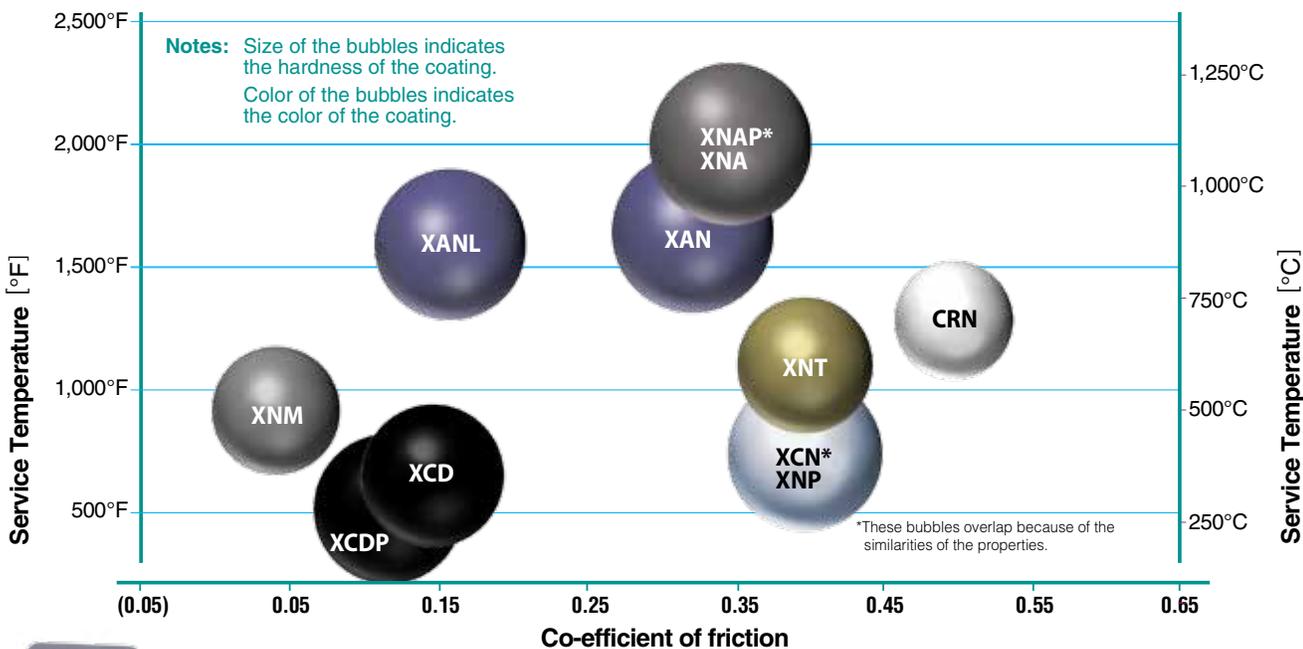
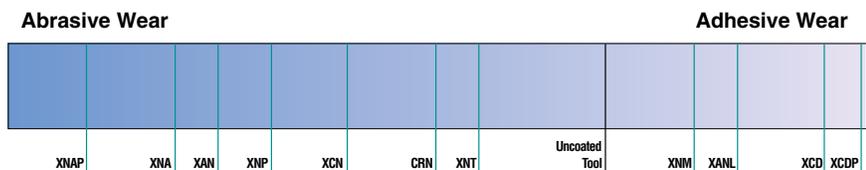
surface heat is generated. High tensile strength, dual phase, TRIP, and newer GIGA steels benefit from this coating. (Approximate hardness: Vickers 3400)

# Select the Coating that Matches Your Specific Needs

Regardless of the end product(s) your company manufactures, you can improve the length of run time, reduce changeover time, improve uptime, and get more for your stamping dollar by selecting the type of coating that matches your individual operational capabilities.

The chart on the right describes the causes, effects, and solutions for abrasive wear and adhesive wear. The slider graph following shows the relative suitability for each type of treatment/coating in both of those categories. The bubble chart shows the relationship between service temperature, coefficient of friction, and hardness of the coating.

	Abrasive Wear	Adhesive Wear
<b>Common Names</b>	Abrasion, pitting, cavitation, striation, etc.	Galling, pick-up, sticking, welding, etc.
<b>Processes</b>	Hard sheet material—jagged edges Piercing, shearing, etc. Perpendicular to direction of forming Process temperature may be too high or low Clearances may be too tight	Soft sheet material Drawing, extruding, etc. Sliding wear—along direction of forming Process temperature may be too high Clearances may be tight
<b>Solutions</b>	Increase surface hardness Increase clearances Choose high thermal resistance coating	Increase lubrication Choose lower coefficient coating Choose high thermal resistance coating Increase clearances



Dayton coated punches are heat treated, precision ground, and made with high performance steel, including, but not limited to, the following:

- **M2**—triple tempered HSS for longer runs. Performs well at higher temperatures; ideal for high-speed applications.
- **PS**—triple tempered with high vanadium and carbon particles. Higher wear and impact performance.
- **PS4**—with 4% vanadium it provides higher wear resistance and improved toughness.

# Dayton Delivers Full In-house Services and World-class Technical Support

## Proprietary Coatings

Dayton is the industry's leader with the largest selection of state-of-the-art coatings—many of them tested in our lab.

In general, surface treatments enhance wear resistance and reduce surface friction above and beyond the capabilities of the substrate material (tool steel). However, surface treatments can be applied to a wide variety of tool steels with varying results.

Dayton's expertise in developing coatings to meet a specific requirement is second to none. We are constantly updating and improving these coatings to meet the ever-changing needs of our customers.

## Heat Treatment

Punch performance depends on the design of the punch, the tool steel used, the finishing process, and other factors. Equally as important, the total performance is directly related to the quality of the heat treatment, i.e., hardening, cryogenics, or tempering.

In order to acquire optimum results for a given application, specific heat treatment guidelines must be followed. Careful monitoring of this process is essential to ensure the toughness of the tool steel—a prerequisite for high-quality stamping tools.

No company pays more attention to heat treating than Dayton Progress. Our in-plant facilities are constantly updated; product performance is regularly monitored; and our Chief Metallurgist oversees all heat treating processes.



## Metallurgy Lab

Dayton's in-house metallurgy lab is designed to develop new products and to test and analyze the quality and viability of materials used in the manufacture of Dayton products. Our metallurgy lab comes fully equipped with top-quality testing and analytical equipment, and boasts best-in-class metallurgy and quality assurance.

Laboratory services include: hardness testing; metallography (e.g., coating thickness); and failure analysis. Routine testing (metallurgical, mechanical, and chemical) is performed on raw materials, semi-processed, and finished parts to determine compliance with quality requirements and design/manufacturing specifications.

## Professional Technical Assistance

Dayton technical experts deliver a wide range of technical assistance and support—on the web, over the phone, or in person.

Services include component design assistance; manufacturing advice (e.g., precision finishing, such as polishing and lapping); heat treatment protocols (e.g., high-volume coating production); product applications and usage; and metallurgical expertise.



**High-resolution scanning electron microscopes (above) and other devices are used to evaluate metal structures—often to determine the cause and prevention of product failure.**



**For additional information or help in selecting the right coating for your operation, contact your nearest Dayton representative.**



Advanced Technologies

## Commitment to Quality & Customer Satisfaction

*Dayton Lamina is a leading manufacturer of tool, die and mold components for the metal-working and plastics industries. As a customer-focused, world-class supplier of choice, we provide the brands, product breadth, distribution network and technical support for all your metal forming needs.*

*Our goal is to give our customers the most innovative and value-added products and services.*



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\*Dayton Lamina's line of Danly products is available only to North America.

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