WILSON TOOL

Volume IV

WILSON TOOL INTERNATIONAL

TABLET TOOLING SOLUTIONS

WILSON TOOL INTERNATIONAL

From humble beginnings in a small manufacturing facility in St. Paul, Minnesota, Wilson Tool International has added innovation, tooling divisions, manufacturing facilities and sales channels around the world to better serve thousands of global customers. Throughout our expansion, our mission has never wavered — we continue to offer products and services that help you, our customers, to be more successful.

In addition to over 50 years of tool and die experience, our tablet tooling division is powered by 59 years of expertise brought by the Tablet Press Tooling division of Thomas Engineering Inc., whom we acquired in 2018. This development brings further strength to our manufacturing, training, and services.

Innovation is key at Wilson Tool International. It's true what they say: no two jobs are the same. In manufacturing, change is the only constant. So working with a tablet tooling supplier that's flexible, nimble and knowledgeable is important.

Wilson Tool International continues to invest in your success. We have worldwide sales engineers available to answer questions and suggest innovative solutions to save you time and money.

And be assured, with every order, you'll always get our quality guarantee: *Your success is our priority. If you're ever unsatisfied with a Wilson Tool International product, we'll do everything we can to make it right and keep you up and running.*

From all of us at Wilson Tool International, thank you for the trust you have placed in us to provide you with the products and services that support your business. We look forward to our partnership in the future.

Sincerely,
Brian Robinson
CEO, Wilson Enterprises

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TABLET DESIGN SERVICES

Our services in tablet design are influenced by a strong belief in the importance of consistent partnership, maintaining checkpoints throughout the production process and providing customized solutions as needed. The services listed below provide the cornerstone of our tablet design process.

Expert Assistance

Your designated tooling technician is available to assist you throughout the process from quoting to ordering, design to delivery, and on any follow-up concerns once your order arrives. Sales engineers answer questions, make in-person visits, and provide solutions to save you time and money. Put their knowledge to work for you.

Finite Element Analysis

Finite element analysis (FEA) is a computerized method for predicting how a product reacts to real-world forces. With first-class FEA software, our designers create a pictorial duplicate of your tablet before it is made. This provides customers with confidence in their product selection.

Tablet Design Samples

To ensure that tablet design is right on target, we supply virtual samples, and offer plastic samples at an additional cost:

- Electronic Samples: Three-dimensional (3D) computer graphic renderings of true-to-scale tablets represent the product's geometric dimensions.
- Plastic Tablet Samples: Plastic replicas of true-to-scale tablets assist customers in design selection.

Data Integrity

Our process is closely managed so that you always receive the most accurate product.

- All drawings must be signed off on prior to release
- Customer signatures are required prior to new tablet design manufacturing
- New drawings are created for any dimensional change

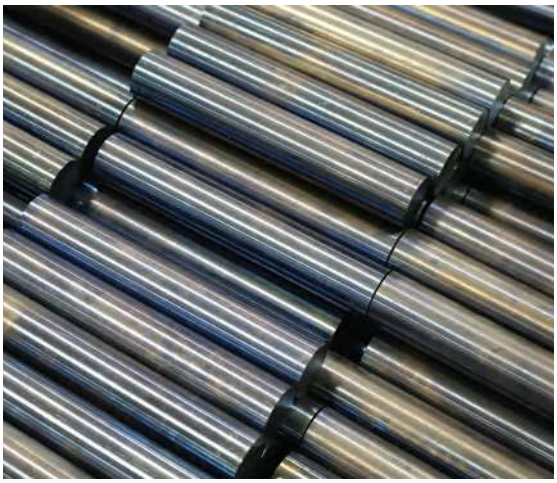
TABLET TOOLING SERVICES

Tool inspection, stocking and maintenance takes time and resources. Wilson Tool International offers the assistance you need to run efficiently and maintain accurate data.

Wilson Tool Stocking Program

When you need a replacement tool you don't always have time to wait. To ensure press up-time, Wilson Tool has two stocking programs available, based on customer needs.

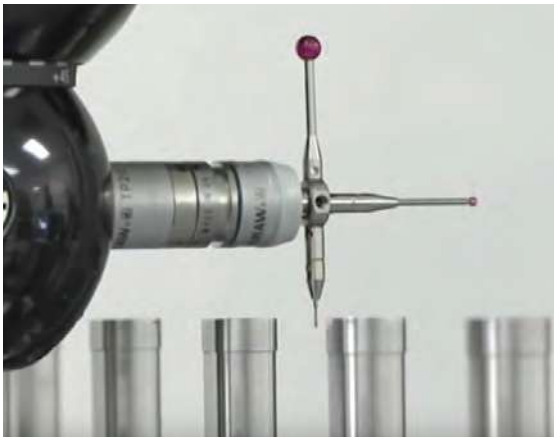
- Standard Stocking Program: High-usage punch blanks and round dies are stocked and ready to be finished to your specification.
- Custom Stocking Program: Unique, proprietary punches and dies can be stocked for individual customers, for use in future orders. Some limitations apply. Contact your Sales Engineer for more detail.



Inspection & Certification

To give you 100% confidence in the accuracy and efficiency of your tooling, we provide inspection and tooling certification data reports.

- Automated Punch and Die Inspection: Manufacturing accuracy is ensured with an automatic coordinate measuring machine (CMM). The CMM is used to measure the geometry of physical objects by using a probe to sense discrete points on the object's surface. The precision-touch probe captures all critical dimensions by direct measurement.



- Tooling Certification: It is important to ensure that critical dimensions of each tool are detailed in order to eliminate time and expenses associated with tooling inspections. Wilson Tool stands behind our tooling and offers free certification reports with every order.

MANUFACTURING ADD-ONS

Wilson Tool International understands that no two jobs are alike. Whether you use a standard sized tool or a custom innovation, the requirements of your application are unique. For this reason, we offer manufacturing add-ons that are available to optimize any tooling order.

Induction Heating for Shock-Absorption

Induction heating is the process of warming a material by inducing in it an electrical current. Induction heating of a punch tip increases its toughness, improving its resistance to breakage. If your punch tips are fracturing prematurely, applying an induction heating process may extend their life. (Note: Induction heating lowers tip hardness which may decrease wear resistance.)

Punch Coatings for Improved Performance

Numerous punch coatings are available to improve tool performance and mitigate challenges. Coatings can help reduce friction, sticking, wear and corrosion, resulting in longer-lasting tooling that performs better.

The following coatings are applied in-house, with minimal impact on lead time.

- Wearbeater™ — an excellent choice for reducing friction while increasing wear and corrosion resistance
- Optima® — a proprietary coating that boosts wear resistance and lubricity, while reducing sticking and picking

We also offer hard chrome and chromium nitride, as well as Slip-Max®, which reduces friction and sticking while strengthening wear resistance.

Advanced Tool Steels for Optimal Production

Choosing the right tool steel lays the foundation for optimal production in any application. Beyond our standard steels, we offer several advanced options when needed.

- Steel options include A2, D2, DC-53, D3, M2, PM-M4, S7 and PM-3V
- Stainless steel and mold steel are also available, including 440C and M340
- Tungsten Carbide

REPLACEABLE TIP TOOLING

Replaceable tip tooling is manufactured so that the tip(s) of the punch can be removed from the punch body. Since the tip is often one of the first parts of the tool to develop wear in tablet compression operations, replaceable tip tooling allows you to just remove and replace the tool tip(s) without replacing the entire tool. This option creates a more efficient and cost-effective solution.

With replaceable tip tooling, you can also reap the benefits of advanced tool steels at a lower cost. Just request the longer lasting steel for the punch tip with standard steel for the remainder of the tool to see increased durability where the punch needs it most.

Replaceable tip tooling provides versatility as well as cost savings, as it's possible to change out the tip shape without replacing the entire punch. With this solution you can make any number of different tablet shapes with one punch body and varying tips.

REPLACEABLE PUNCH BODY

Replacement punch bodies are available for tablet compression tooling utilizing replaceable punch tips. A replaceable punch body allows you to just change out the body as it wears without having to re-purchase and replace the entire tool. Replaceable tooling increases efficiency in tool use and leads to overall cost savings as parts of the punch only require replacement as they wear.

Like replaceable tips, replaceable punch bodies can utilize advanced tool steels without the expense of using premium steel throughout the whole tool.

MULTI-TIP TOOLING

Multi-tip tooling is the ideal solution for increasing your tablet compression production capacity without adding shifts or bringing more machines on line.

Depending on the tablet size and the capacity of the punch body, multi-tips allow you to multiply your production output. (Note: A small reduction in RPMs is typical [20–30%] to allow adequate time under feeder.)

Additional upfront investment for multi-tip tool manufacturing is quickly recovered due to the increase in tablet production. Over the life of the tool, multi-tip tooling can result in a substantial cost savings. Speak with a tooling technician regarding your product for how many tips is best.

TECHNICAL TIP

Are you experiencing delamination problems due to a lack of time-under-compression? By using multiple-tip tablet tooling you can recapture some or all of the lost production — simply slow the machine down and add tips to your punch.

ROTATING PUNCH HEADS

Tablet press tooling manufactured with rotating punch heads can improve the overall life of the tool. Rotating prevents flat or worn spots on the punch head, which can sometimes develop from the constant friction of operating the tool in a single position within the rail.

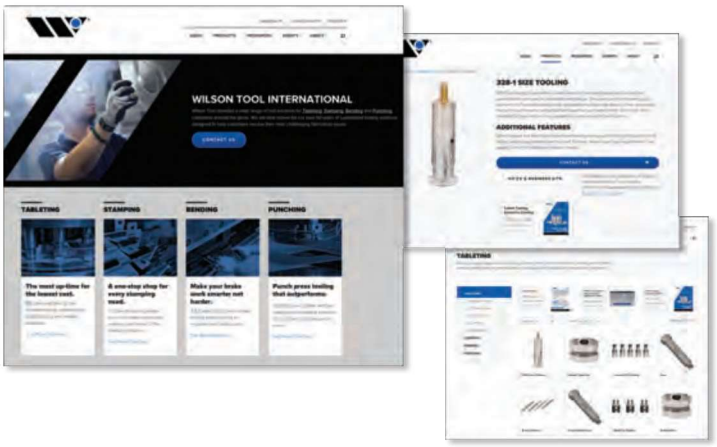
Rotating punch heads rotate slightly so that the head receives impact in a different spot with every compression cycle.

If you notice that your punch heads are wearing or experiencing damage prematurely, consider adding rotating punch heads to your design. As an additional protection, select an advanced tool steel for the punch head to boost tool longevity.

Rotating heads reduce torsional loads applied to punch tips. Micro tip tooling can benefit from reduced applied loads to prevent tip breakage.

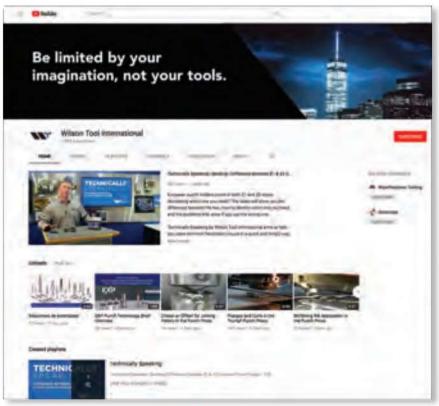
CONNECT WITH US

wilsontool.com is your online source for the latest news and information from Wilson Tool International. Available in seven languages, wilsontool.com is a great resource for all of our customers around the globe. View in Spanish at **wilsontool.com/es-mx**.



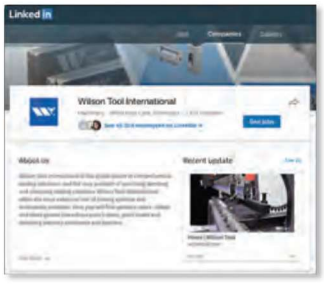
Our **e-newsletters** provide a solutions-based article to improve performance and productivity in your shop. In addition, they keep you up to date on the latest product and industry news along with training and event information. Sign-up at **wilsontool.com** or **wilsontool.com/es-mx**.

Wilson Tool's **YouTube** channel showcases the latest tooling solutions in action and offers problem-solving application tips and tricks in our Technically Speaking video series. Explore application secrets, new products and productivity boosting tips in English and Spanish at **youtube.com/wilsontooltube**.



YouTube

LinkedIn



We post technical articles, helpful solutions, new products, free webinars and more to our **LinkedIn** company pages on a near daily basis. Follow us in English at **linkedin.com/company/wilson-tool-international** or in Spanish at **linkedin.com/showcase/wilson-tool-international-en-espanol**.

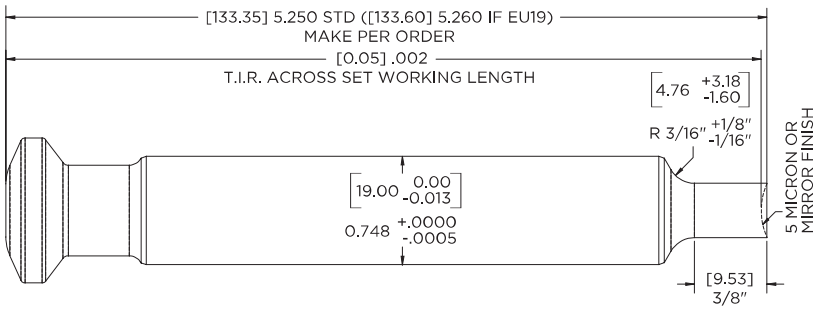
▸ Learn more about our history, core values and five divisions at **wilsontool.com/welcome**.

CONNECT WITH US

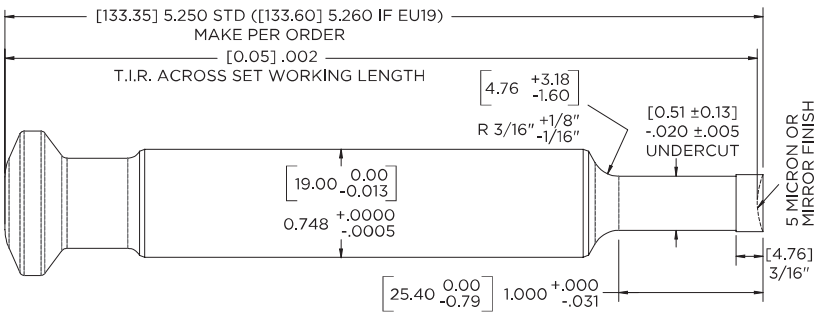
B SIZE TOOLING

B size tooling is available in a wide variety of standard shapes and can also be customized to your specific application and design. The upper punch and lower punch are available in standard or advanced tool steel, to help you ensure the best in performance and production based on your tablet needs. Dies can be manufactured with standard steel, or in a wide variety of high-performance advanced steel options.

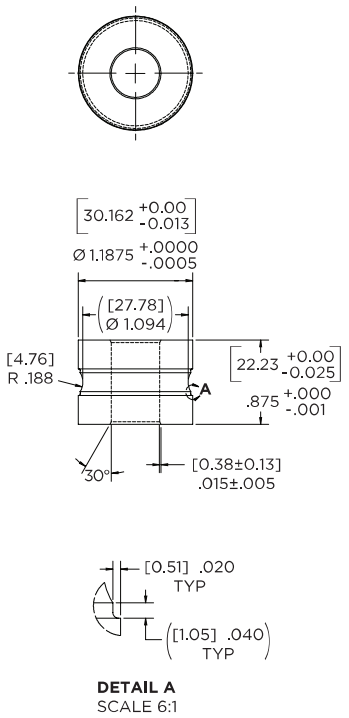
Upper Punch



Lower Punch



Die



Additional Features

Other features that need to be considered when ordering punch tooling include the head design, keying requirements and tip relief. For dies, review taper type requirements. See pages 13 and 17 for additional selection details.

Options

Tool steels and surface treatments help to increase tooling performance. Additionally, a high polish finish can increase tooling life.

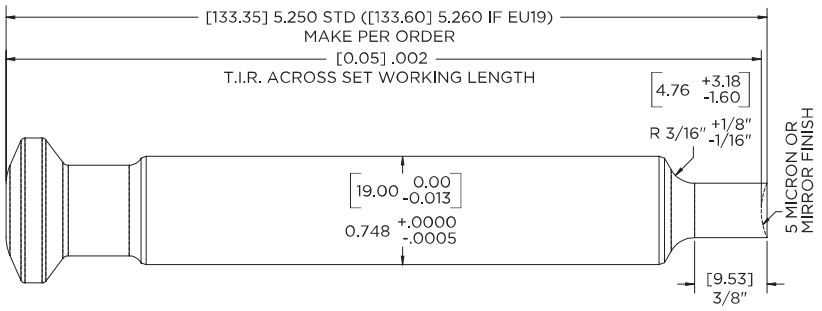
- **Steel Options:** A2, D2, DC-53, D3, M2 PM-M4, S7, PM-3V, Tungsten Carbide, 440C and M340
- **Surface Treatment Options:** Chrome Plating, Chromium Nitride, Wearbeater, Optima® and Slip-Max

*Additional steels and coatings available upon request.

B/BB/B2 SIZE TOOLING

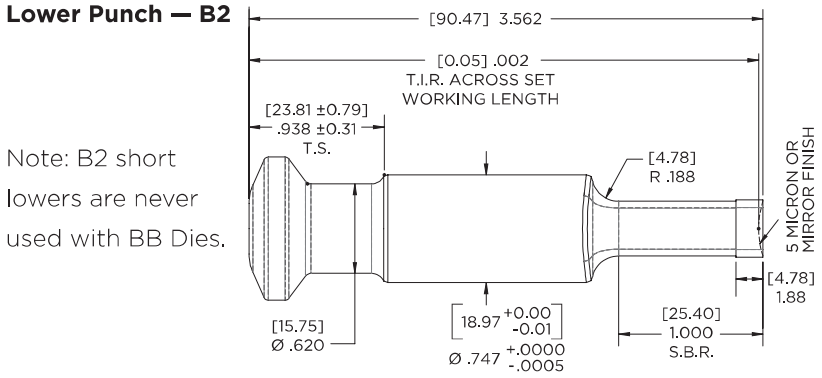
B/BB/B2 size tooling is available in a wide variety of standard shapes and can also be customized to your specific application and design. The upper punch and lower punch are available in standard or advanced tool steel, to help you ensure the best in performance and production based on your tablet needs. Dies can be manufactured with standard steel, or in a wide variety of high-performance advanced steel options.

Upper Punch — B

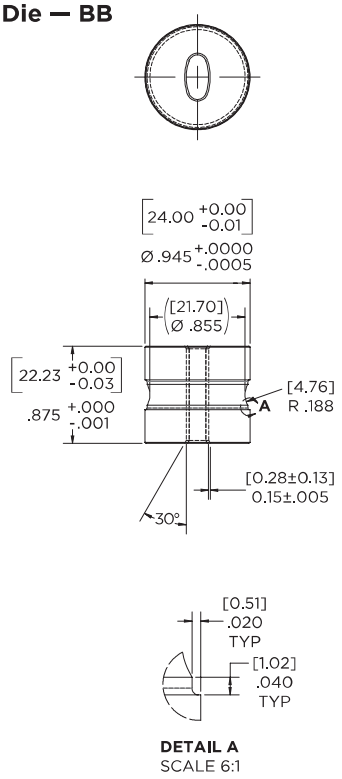


Lower Punch — B2

Note: B2 short lowers are never used with BB Dies.



Die — BB



PUNCHES AND DIES

Additional Features

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Options

Tool steels and surface treatments help to increase tooling performance. Additionally, a high polish finish can increase tooling life.

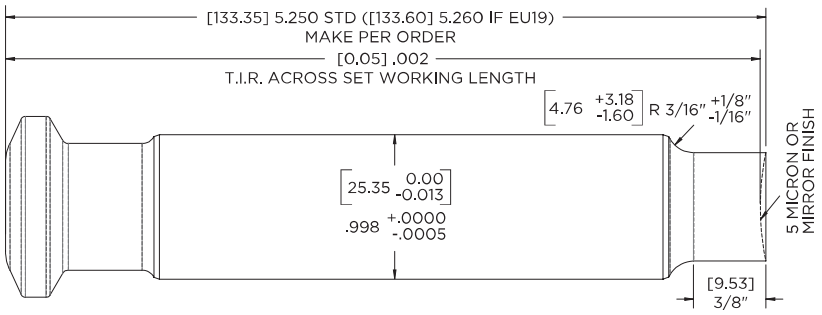
- **Steel Options:** A2, D2, DC-53, D3, M2 PM-M4, S7, PM-3V, Tungsten Carbide, 440C and M340
- **Surface Treatment Options:** Chrome Plating, Chromium Nitride, Wearbeater, Optima® and Slip-Max

*Additional steels and coatings available upon request.

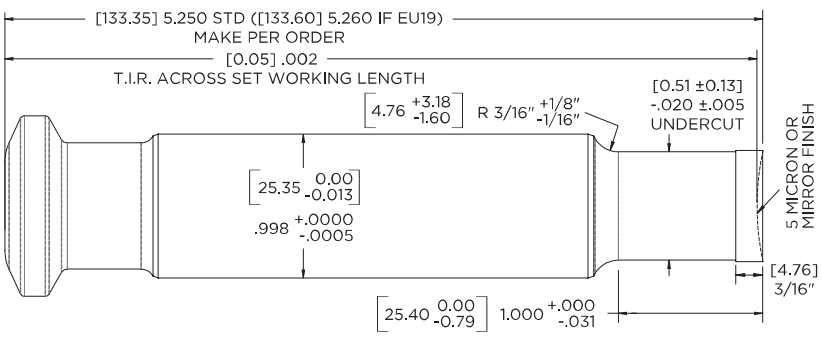
D SIZE TOOLING

D size tooling is available in a wide variety of standard shapes and can also be customized to your specific application and design. The upper punch and lower punch are available in standard or advanced tool steel, to help you ensure the best in performance and production based on your tablet needs. Dies can be manufactured with standard steel, or in a wide variety of high-performance advanced steel options.

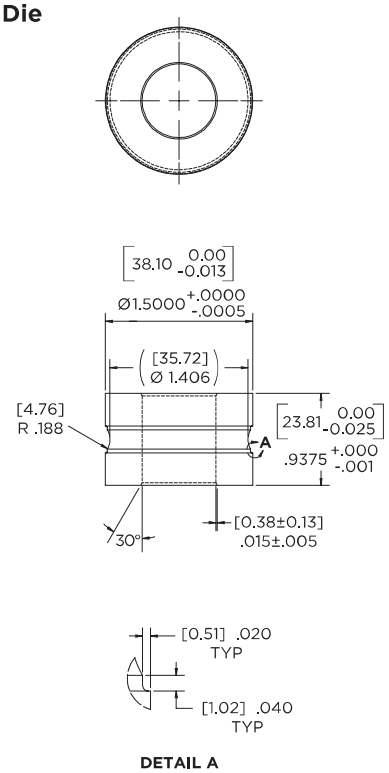
Upper Punch



Lower Punch



Die



Additional Features

Other features that need to be considered when ordering punch tooling include the head design, keying requirements and tip relief. For dies, review taper type requirements. See pages 13 and 17 for additional selection details.

Options

Tool steels and surface treatments help to increase tooling performance. Additionally, a high polish finish can increase tooling life.

- **Steel Options:** A2, D2, DC-53, D3, M2 PM-M4, S7, PM-3V, Tungsten Carbide, 440C and M340
- **Surface Treatment Options:** Chrome Plating, Chromium Nitride, Wearbeater, Optima® and Slip-Max

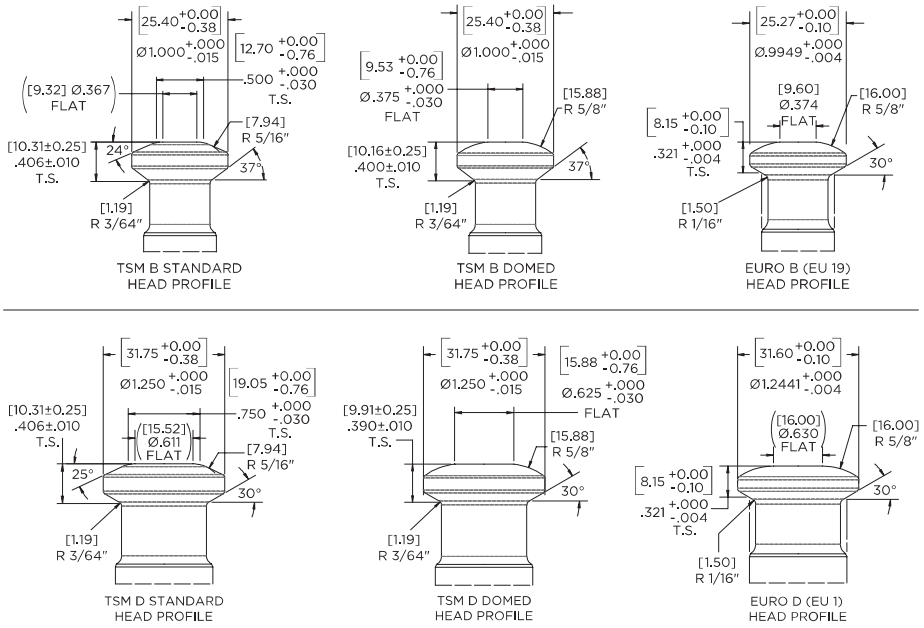
*Additional steels and coatings available upon request.

SELECTING THE RIGHT PUNCH

Each tablet formula, size and application varies, punches need to vary to account for these differences. Use this page to help you select the right punch for your individual applications.

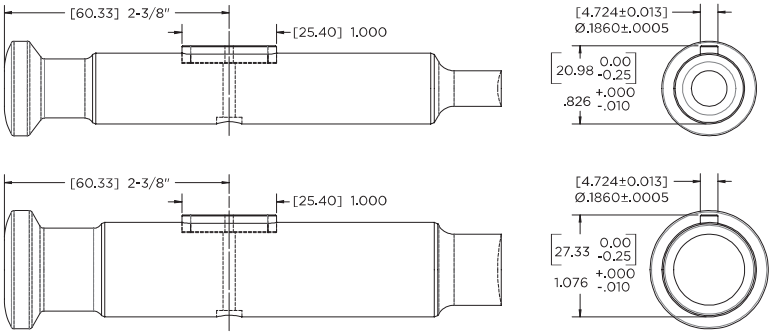
B Size and D Size Head Profiles:

Matching the machine to head type is a critical step in tool development. Differences can consist of having an angle profile versus a domed profile. Or the inside angle difference of the TSM versus the EU. Head thickness and final overall length are also determined by head selection. Extended head flat also available.



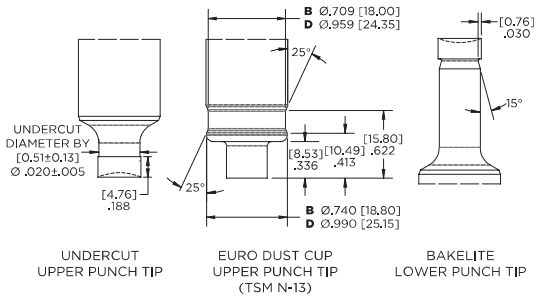
Fixed Parallel Keys:

Fixed parallel keys provide full engagement in the turret. Our keys are designed to provide maximum engagement and come standard with a full radius key end to minimize the opportunity of damage to the bore or burring the key slot. See page 29 for more details.



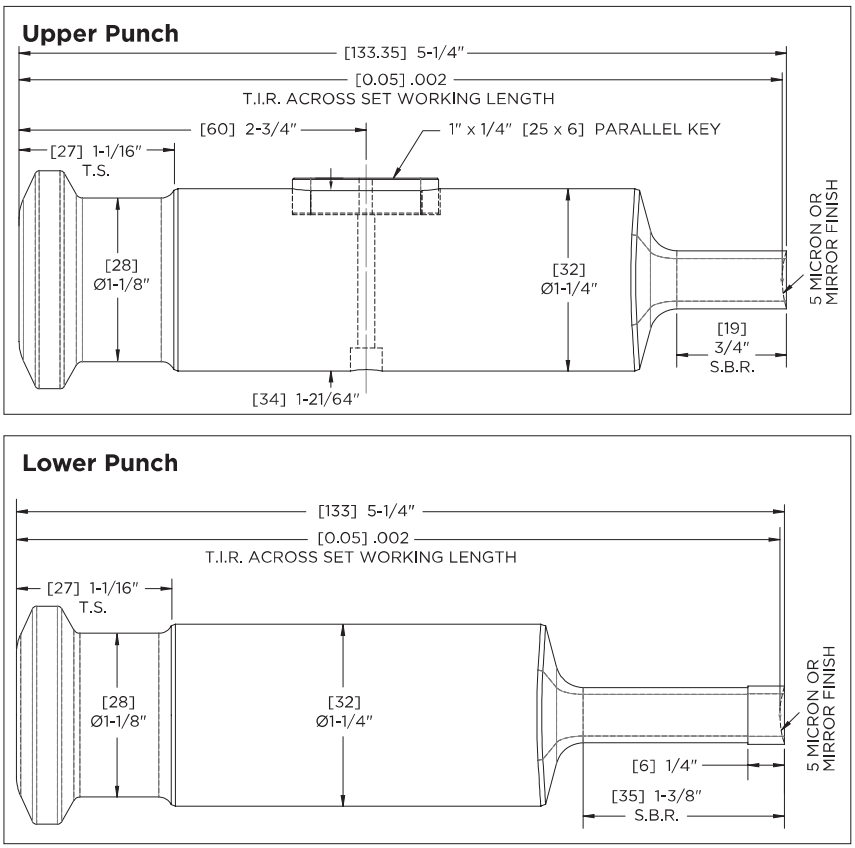
Punch Tip Options:

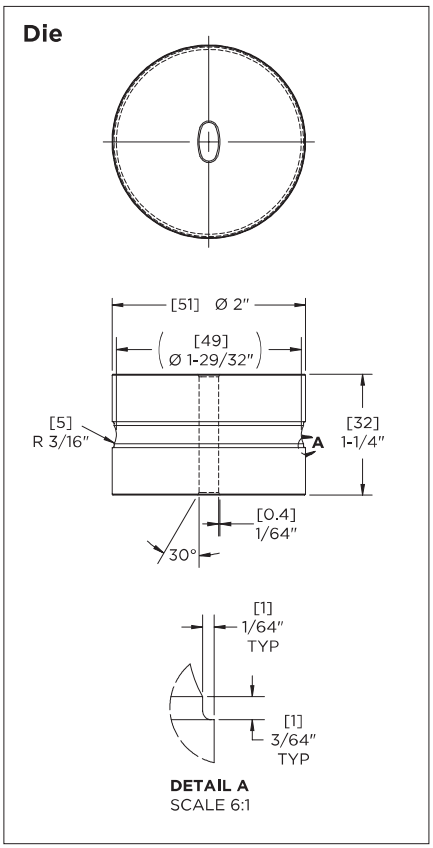
Upper and lower punches have a variety of tip options that create a variety of improvements. An undercut relief on the upper punch can help with retention of dust cups. The Euro dust cup design is another method of dust cup retention that has a tighter seal for better prevention of lubrication leaking out. Bakelite relief is designed with a sharp relief to assist in removal of granulations along the die wall.



DS3 (15) SIZE TOOLING AND 550-1 (15) / 515-1 (15)

DS3 (15) size tooling is available in a wide variety of standard shapes and can also be customized to your specific application and design. The upper punch and lower punch are available in standard or advanced tool steel, to help you ensure the best in performance and production based on your tablet needs. Dies can be manufactured with standard steel, or in a wide variety of high-performance advanced steel options.





Additional Features

Other features that need to be considered when ordering punch tooling include the head design, keying requirements and tip relief. For dies, review taper type requirements. See pages 13 and 17 for additional selection details.

Options

Tool steels and surface treatments help to increase tooling performance. Additionally, a high polish finish can increase tooling life.

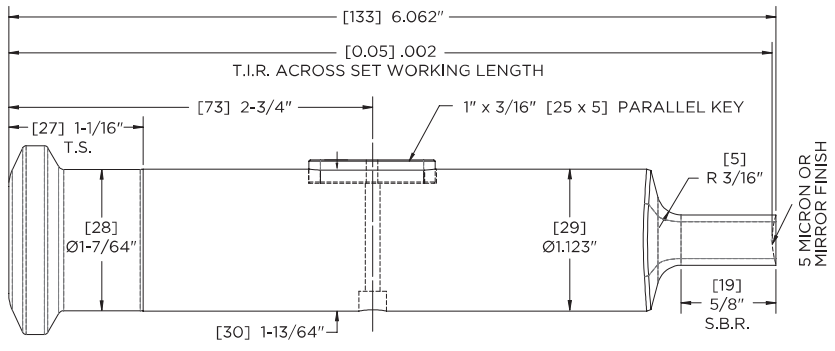
- **Steel Options:** A2, D2, DC-53, D3, M2 PM-M4, S7, PM-3V, Tungsten Carbide, 440C and M340
- **Surface Treatment Options:** Chrome Plating, Chromium Nitride, Wearbeater, Optima® and Slip-Max

*Additional steels and coatings available upon request.

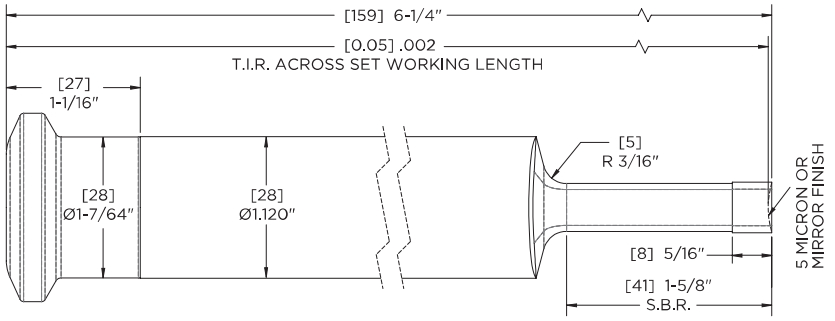
328-1 (45) SIZE TOOLING

328-1 (45) size tooling is available in a wide variety of standard shapes and can also be customized to your specific application and design. The upper punch and lower punch are available in standard or advanced tool steel, to help you ensure the best in performance and production based on your tablet needs. Dies can be manufactured with standard steel, or in a wide variety of high-performance advanced steel options.

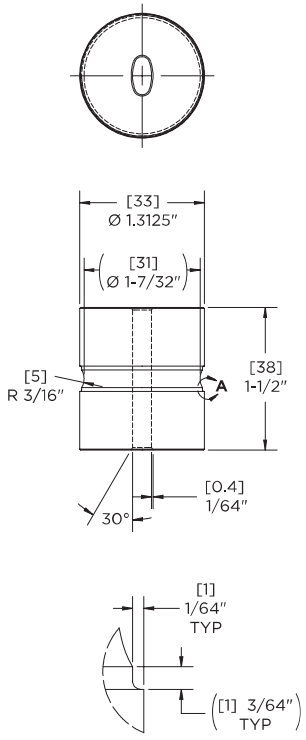
Upper Punch



Lower Punch



Die



PUNCHES AND DIES

Additional Features

Other features that need to be considered when ordering punch tooling include the head design, keying requirements and tip relief. For dies, review taper type requirements. See pages 13 and 17 for additional selection details.

Options

Tool steels and surface treatments help to increase tooling performance. Additionally, a high polish finish can increase tooling life.

- **Steel Options:** A2, D2, DC-53, D3, M2 PM-M4, S7, PM-3V, Tungsten Carbide, 440C and M340
- **Surface Treatment Options:** Chrome Plating, Chromium Nitride, Wearbeater, Optima® and Slip-Max

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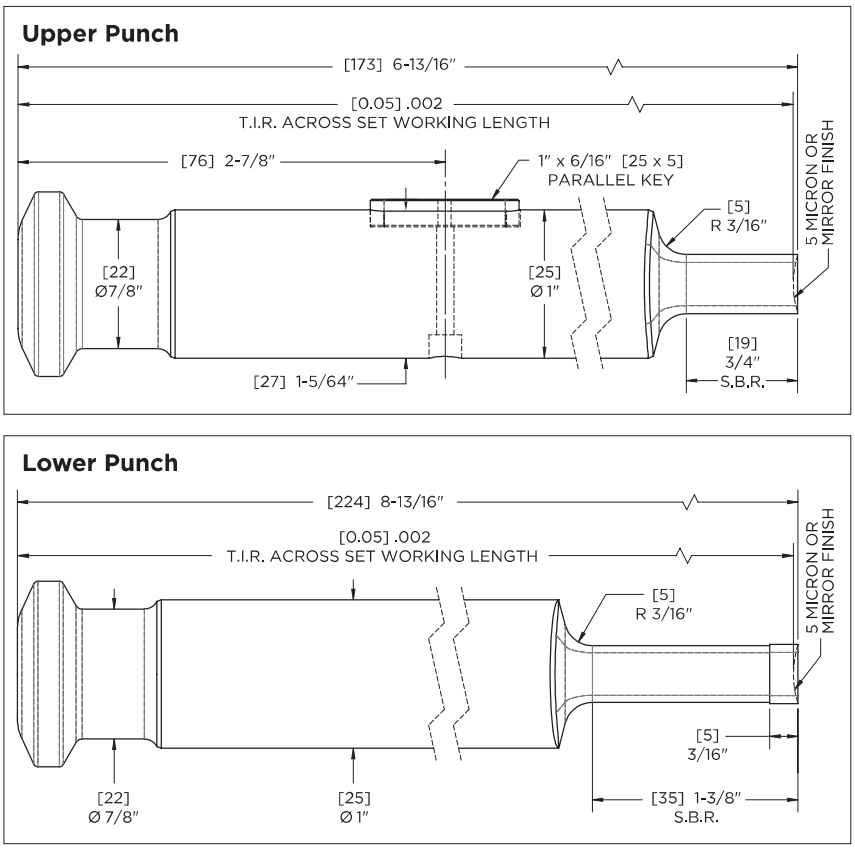
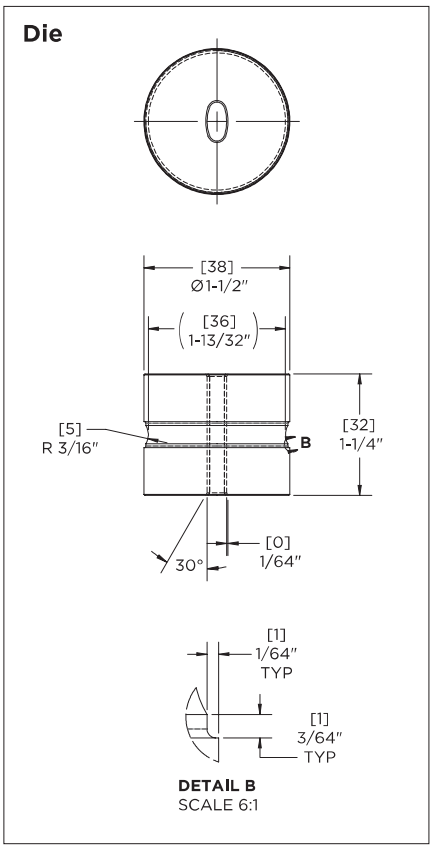
DD2 SIZE TOOLING (31 STATION)

DD2 size tooling (31 station) is available in a wide variety of standard shapes and can also be customized to your specific application and design. The upper punch and lower punch are available in standard or advanced tool steel, to help you ensure the best in performance and production based on your tablet needs. Dies can be manufactured with standard steel, or in a wide variety of high-performance advanced steel options.





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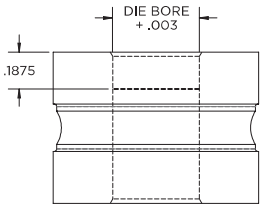
*Additional steels and coatings available upon request.

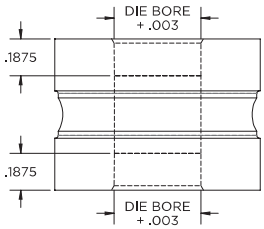
SELECTING THE RIGHT DIE

Just like a punch, dies need to vary to account for differences in formula, size and application varieties. Use this page to help you select the right die for your individual applications.

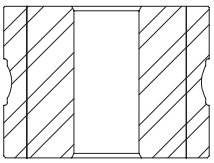
Single Taper:
Adding taper to a die can help minimize capping or delamination of tablets. The increased space at the opening of the die allows air to escape faster and creates a gentler decompression of the tablet during ejection. Single taper is most commonly used in micro tablets or in development of new tablets or low volume production.



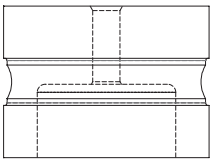
Double Taper:
Double taper dies provide all the same benefits as single taper but with twice the benefit. Adding taper to both ends of the die provides two working ends on one tool. When the first side is no longer usable simply flip the die over and you have a new compression zone in the bore.



Carbide Lined Die:
Manufactured with the same options, single and double taper, lined dies can offer greater wear resistance than steel. Often used when forming abrasive or corrosive materials, carbide lined dies are available in all the same shapes and sizes as standard dies.

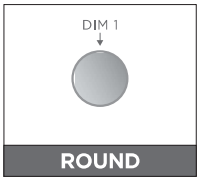


Relieved Die:
A standard die manufactured with relief. This allows for the lower punch to be shortened, adding strength and stability. Most commonly used in micro tablets.

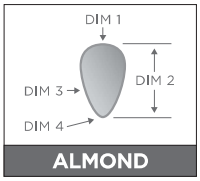


SELECTING THE RIGHT TABLET

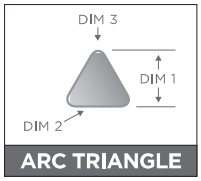
Standards



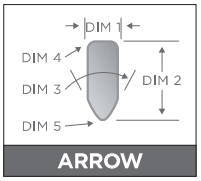
ROUND



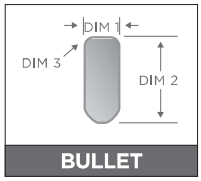
ALMOND



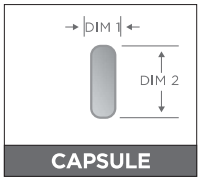
ARC TRIANGLE



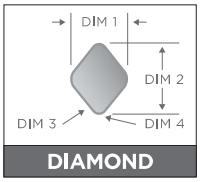
ARROW



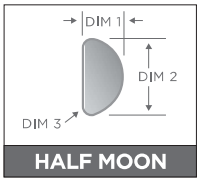
BULLET



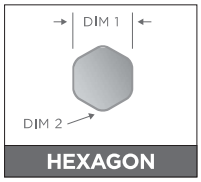
CAPSULE



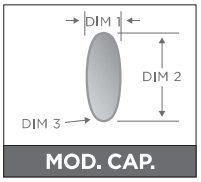
DIAMOND



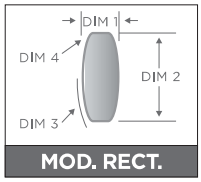
HALF MOON



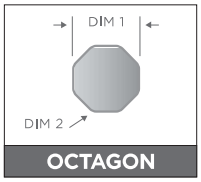
HEXAGON



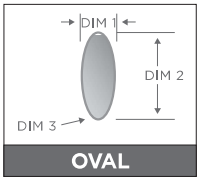
MOD. CAP.



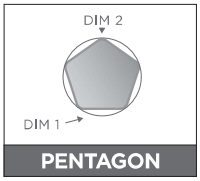
MOD. RECT.



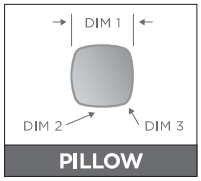
OCTAGON



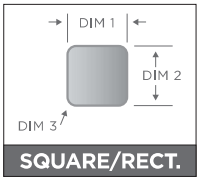
OVAL



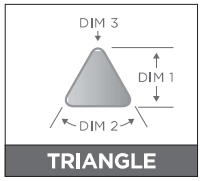
PENTAGON



PILLOW



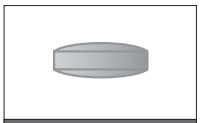
SQUARE/RECT.

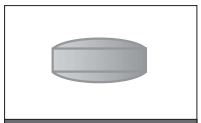


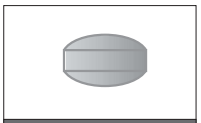
TRIANGLE

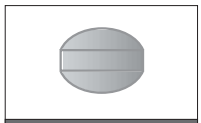
Profiles

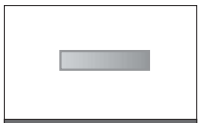

SHALLOW


STANDARD

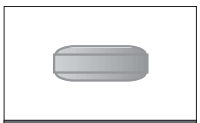

DEEP

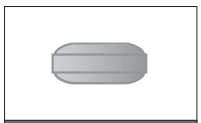

EXTRA DEEP


MODIFIED BALL


FLAT-FACE PLAIN


FLAT-FACE BEVEL


FLAT-FACE RADIUS


COMPOUND CUP


CONVEX w/BEVEL


LOZENGE

Bisects


PRESSURE SENSITIVE

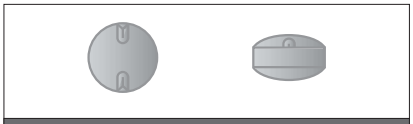

CUT THROUGH

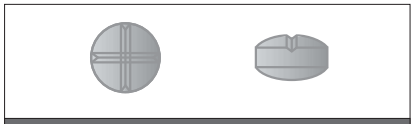

DECREASING


STANDARD PROTRUDING

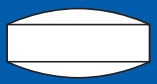
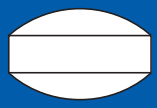
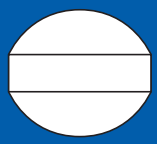
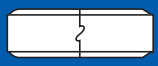

STANDARD


SHORT


PARTIAL

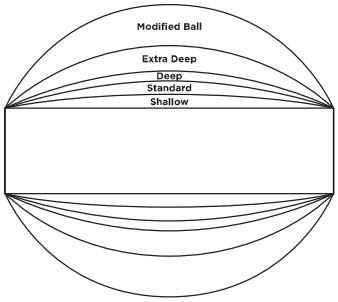

QUADRISECT

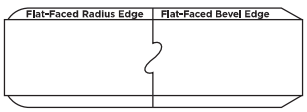
SELECTING THE RIGHT TABLET

CUP DEPTHS						
						
Ø OR MINOR	SHALLOW	STANDARD	DEEP	EXTRA DEEP	MOD. BALL	FFRE/FFBE
0.1250 [3.175]	0.005 [0.127]	0.017 [0.432]	0.024 [0.610]	0.030 [0.762]	0.040 [1.016]	0.007 [0.178]
0.1563 [3.969]	0.007 [0.178]	0.021 [0.533]	0.030 [0.762]	0.036 [0.914]	0.049 [1.245]	0.008 [0.203]
0.1875 [4.763]	0.008 [0.203]	0.026 [0.660]	0.036 [0.914]	0.042 [1.067]	0.059 [1.499]	0.009 [0.229]
0.2188 [5.556]	0.009 [0.229]	0.029 [0.737]	0.042 [1.067]	0.048 [1.219]	0.069 [1.753]	0.010 [0.254]
0.2500 [6.350]	0.010 [0.254]	0.031 [0.787]	0.045 [1.143]	0.050 [1.270]	0.079 [2.007]	0.011 [0.279]
0.2813 [7.144]	0.012 [0.305]	0.033 [0.838]	0.046 [1.168]	0.054 [1.372]	0.089 [2.261]	0.012 [0.305]
0.3125 [7.938]	0.013 [0.330]	0.034 [0.864]	0.047 [1.194]	0.060 [1.524]	0.099 [2.515]	0.013 [0.330]
0.3438 [8.731]	0.014 [0.356]	0.035 [0.889]	0.049 [1.245]	0.066 [1.676]	0.109 [2.769]	0.014 [0.356]
0.3750 [9.525]	0.016 [0.406]	0.036 [0.914]	0.050 [1.270]	0.072 [1.829]	0.119 [3.023]	0.015 [0.381]
0.4063 [10.319]	0.017 [0.432]	0.038 [0.965]	0.052 [1.321]	0.078 [1.981]	0.128 [3.251]	0.016 [0.406]
0.4375 [11.113]	0.018 [0.457]	0.040 [1.016]	0.054 [1.372]	0.084 [2.134]	0.133 [3.378]	0.016 [0.406]
0.4688 [11.906]	0.020 [0.508]	0.041 [1.041]	0.056 [1.422]	0.090 [2.286]	0.148 [3.759]	0.016 [0.406]
0.5000 [12.700]	0.021 [0.533]	0.043 [1.092]	0.059 [1.499]	0.095 [2.413]	0.158 [4.013]	0.016 [0.406]
0.5313 [13.494]	0.022 [0.559]	0.045 [1.143]	0.061 [1.549]	0.101 [2.565]	0.168 [4.267]	0.016 [0.406]
0.5625 [14.288]	0.024 [0.610]	0.046 [1.168]	0.063 [1.600]	0.107 [2.718]	0.178 [4.521]	0.016 [0.406]
0.5938 [15.081]	0.025 [0.635]	0.048 [1.219]	0.066 [1.676]	0.113 [2.870]	0.188 [4.775]	0.016 [0.406]
0.6250 [15.875]	0.026 [0.660]	0.050 [1.270]	0.068 [1.727]	0.119 [3.023]	0.198 [5.029]	0.016 [0.406]
0.6875 [17.463]	0.029 [0.737]	0.054 [1.372]	0.073 [1.854]	0.131 [3.327]	0.217 [5.512]	0.020 [0.508]
0.7500 [19.050]	0.031 [0.787]	0.058 [1.473]	0.078 [1.981]	0.143 [3.632]	0.237 [6.020]	0.020 [0.508]
0.8125 [20.638]	0.034 [0.864]	0.061 [1.549]	0.083 [2.108]	0.155 [3.937]	0.257 [6.528]	0.020 [0.508]
0.8750 [22.225]	0.037 [0.940]	0.065 [1.651]	0.089 [2.261]	0.167 [4.242]	0.277 [7.036]	0.020 [0.508]
0.9375 [23.813]	0.039 [0.991]	0.069 [1.753]	0.094 [2.388]	0.179 [4.547]	0.296 [7.518]	0.020 [0.508]
1.0000 [25.400]	0.042 [1.067]	0.073 [1.854]	0.099 [2.515]	0.191 [4.851]	0.316 [8.026]	0.025 [0.635]

MINIMUM LAND WIDTHS*		
CUP DEPTH	SHAPES	ROUNDS
Shallow	Remove Sharp Tip Edge	
Standard	0.004 [0.102]	0.003 [0.076]
Deep	0.005 [0.127]	0.004 [0.102]
Extra Deep	0.006 [0.152]	0.005 [0.127]
Mod. Ball	0.008 [0.203]	0.007 [0.178]
FFRE/FFBE	0.004 [0.102]	0.003 [0.076]

*Values pertain to minimum land widths before blending.





Note: Information based on the 7th Edition of the *Tableting Specification Manual* by American Pharmacists Association.

TABLET PROFILES AND BISECTS

SOLVING COMMON TABLET DEFECTS

PROBLEM		SOLUTION
BLACK SPOTS		
	Dark, visual defects that occur on the tablet when they come into contact with lubricants, unclean surfaces or heat. Often comes from oils that have fallen into powder path.	Control dust by optimizing aspiration and contain lubricants by using dust cups, seals or baffles. Use good quality cleaning brushes when cleaning. A frequently missed spot is the upper punch keyway.
FLASHING		
	When material extrudes in the gap between the punch tip and the die wall forming wing-like structures on the tablet.	Check for excess clearance between punch and die. Make sure the tablet is formed in the straight wall portion of the die and not the relief area. (TSM standard taper is 3/16" [4.76mm], often caused by worn punches leading to increased clearance.)
PUNCH INNER ANGLE WEAR		
	Shows as a single wear mark (or two opposing wear marks when keyed 0° and 180°) or radical wear on round tools. Likely caused by binding between the die and punch tip or tightness between the punch body and machine bore.	Check punch and die clearances and concentricity. Check lower punch barrel lubrication. Clean cams of any metal deposits. Check for powder adhering to upper or lower tip perimeter and die cavity.
TWINNING		
	When cup or tablet perimeter edges stick together during the coating process.	Avoid flat-faced and flat-sided tablets. Radius the cup design of the punch. Radius the sides of the capsule at least 0.003" [0.08mm]. Contact Wilson Tool for design recommendations.
DELAMINATION		
	When the granulation separates within the band caused by improper pressure, formulation or air entrapment.	Increase or decrease the compaction pressure. Your formulation may not be cohesive due to particle shape or too much lubrication. Add a taper to the die and/or change the clearance of the upper punch tip.

SOLVING COMMON TABLET DEFECTS

PROBLEM		SOLUTION
CAPPING		
	Capping occurs when a tablet fractures along the seam between the face and the band of the tablet.	Increase dwell (time-under-compression) by slowing the machine down, adding pre-compression or increasing the punch head flat size. Also, avoid punch tips with a deep concave shape, add a taper to the die and/or change the clearance between the die and upper punch tip. Reduce fines or change particle shapes.
SPAULDING ON PUNCH HEAD		
	Metal fatigue on the punch head from high pressure or tonnage during tablet pressing.	Ensure the punches are not running tight by ensuring the machine and tools are operating freely at all times. Reduce the pressure or tonnage. Switch to domed heads to increase the surface area at point of contact between the punch head and pressure roller. Flush and replace the lubrication in the press, clean the press thoroughly removing any embedded metal on the pressure rollers.
SYMMETRIC PUNCH TIP WEAR		
	Shows as upper punch tip perimeter wear marks perpendicular to the punch edge and located at opposing corners on a shaped punch tip. Often caused by set-up.	Pre-load the punch during installation of the die by rotating the punch in the same direction as press rotation. Ensure that the die is not rotating in the die socket. Check the punch keyways on the machine for wear. Ensure adequate clearance between tips and die aperture.
STICKING & PICKING		
	When powders stick to the cup face or inside the emboss of the tablet. The face of the tool may be too deep or the emboss too sharp.	Try a special surface treatment on punch tips, such as coatings, or keep surfaces highly polished. If possible reduce moisture content of formulation, or increase the lubrication content. Increase tablet weight/reduce thckness within allowable tolerance range.

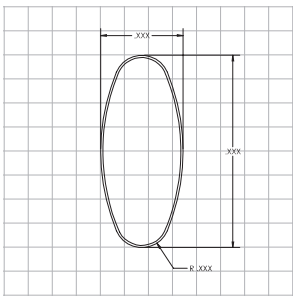
EASY ORDERING

From design and development to manufacturing, our tooling technicians will work with you to customize your product and determine the right production process. Together, we can turn your vision into reality.

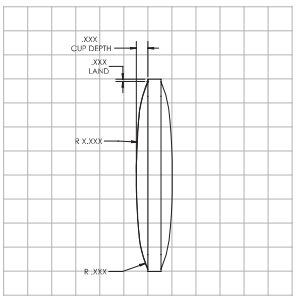
Preparing for Your Order

Graph your tablet design like the two drawings below or select from standard shapes, profiles and bisects on page 18.

Front View:



Side View:



Ready to Order?

We are here to help and to partner with you through the ordering process. Placing a tooling order is easy; simply follow one of the options listed below. Need us to come to you? Ask your local sales engineer to stop in to consult.

Option 1: Email – Attach your print and completed ordering guide and email to tableting@wilsontool.com.

Option 2: Fax – Scan your print and completed ordering guide and fax to 800-222-0002.

Option 3: Phone – Give us a call at 800-467-8444 and we'll take your order over the phone based on the information on your print and ordering guide.

Option 4: Mail – Contact our tooling technicians to receive a tablet development authorization number at 800-467-8444. Then mail your tablet or tooling to be reverse engineered.

EASY ORDERING — IMPERIAL

COMPANY INFORMATION					
COMPANY NAME					
ACCOUNT NUMBER		PHONE NUMBER			
CUSTOMER INFORMATION					
CUSTOMER NAME		SO NUMBER			
MACHINE INFORMATION					
MAKE		MODEL		NO. OF STATIONS	QTY. WANTED

TSM TOOL SIZES
B2 Lower Punch 0.748″ or 0.745″ OD x 3.562″
B Lower Punch 0.748″ or 0.745″ OD x 5.250″ or 5.260″ (for Euro)
B Upper Punch 0.748″ OD x 5.250″ or 5.260″ (for Euro)
BB Die 0.945″ OD x 0.875″ Max Tablet: 1/2″ Round / 9/16″ Shape
B Die 1.1875″ OD x 0.875″ Max Tablet: 5/8″ Round / 3/4″ Shape
D Lower Punch 0.998″ or 0.995″ OD x 5.250″ or 5.260″ (for Euro)
D Upper Punch 0.998″ OD x 5.250″ or 5.260″ (for Euro)
D Die 1.500″ OD x 0.9375″ Max Tablet: 7/8″ Round / 1″ Shape
OTHER TOOL SIZES
DS3 Lower Punch 1.245″ OD x 5.250″
DS3 Upper Punch 1.248″ OD x 5.250″
DS3 Die 2.000″ OD x 1.250″ Max Tablet: 1.1875″ Round / 1.245″ Shape
DD-2 Lower Punch 0.995″ OD x 8.812″
DD-2 Upper Punch 0.998″ OD x 6.812″
DD-2 Die 1.500″ OD x 1.250″) Max Tablet: 0.875″ Round / 0.998″ Shape
328-1 Lower Punch 1.120″ OD x 6.250″
328-1 Upper Punch 1.123″ OD x 6.062″
328-1 Die 1.312″ OD x 1.500″ Max Tablet: 0.750″ Round / 1.120″ Shape
328-2 Lower Punch 1.245″ OD x 6.250″
328-2 Upper Punch 1.248″ OD x 6.062″
328-2 Die 1.625″ OD x 1.500″ Max Tablet: 1.187″ Round / 1.245″ Shape

TABLET INFO		
COATED	YES or NO	
SHAPE		
PROFILE		
DIM 1		
DIM 2		
DIM 3		
DIM 4		
DIM 5		
DIM 6		
LAND		
CUP DEPTH		
PUNCH OPTIONS	**UPPER**	**LOWER**
HEAD STYLE		
TIP RELIEF	YES or NO	STD or DBL or BAKELITE
BARREL DUST CUP	YES or NO	—
KEY ANGLE		
NO. OF KEYWAYS	1 or 2	
STEEL TYPE (IF NOT STD.)		
DIE OPTIONS		
TAPER	SINGLE or DOUBLE	
CARBIDE LINED	YES or NO	
STEEL TYPE (IF NOT STD.)		
UPPER TURRET		
MACHINE SEALS	YES or NO	
SPECIAL TOOL CONSIDERATIONS (I.E. CHANGES TO O.D.'S)		

EASY ORDERING — METRIC

COMPANY INFORMATION			
COMPANY NAME			
ACCOUNT NUMBER		PHONE NUMBER	
CUSTOMER INFORMATION			
CUSTOMER NAME		SO NUMBER	
MACHINE INFORMATION			
MAKE		MODEL	
NO. OF STATIONS		QTY. WANTED	

TSM TOOL SIZES
B2 Lower Punch 19mm or 18.92mm OD x 90.5mm
B Lower Punch 19mm or 18.92mm OD x 133.35mm or 133.60mm (for Euro)
B Upper Punch 19mm OD x 133.35mm or 133.60mm (for Euro)
BB Die 24mm OD x 22.23mm Max Tablet: 12.7mm Round/14.3mm Shape
B Die 30.16mm OD x 22.23mm Max Tablet: 15.88mm Round/18.75mm Shape
D Lower Punch 25.35mm or 25.27mm OD x 133.35mm or 133.60mm (for Euro)
D Upper Punch 25.35mm OD x 133.35mm or 133.60mm (for Euro)
D Die 38.1mm OD x 23.81mm Max Tablet: 22.22mm Round/5.4mm Shape
OTHER TOOL SIZES
DS3 Lower Punch 31.6mm OD x 133.35mm
DS3 Upper Punch 31.7mm OD x 133.35mm
DS3 Die 50.8mm OD x 31.75mm Max Tablet: 30.16mm Round/31.6mm Shape
DD-2 Lower Punch 25.27mm OD x 223mm
DD-2 Upper Punch 25.35mm OD x 173mm
DD-2 Die 38.1mm OD x 31.75mm Max Tablet: 22.22mm Round/25mm Shape
328-1 Lower Punch 28.45mm OD x 158.75mm
328-1 Upper Punch 28.52mm OD x 153.97mm
328-1 Die 33.32mm OD x 38.1mm Max Tablet: 18.75mm Round/28.45mm Shape
328-2 Lower Punch 31.6mm OD x 158.75mm)
328-2 Upper Punch 31.7mm OD x 153.97mm)
328-2 Die 41.28mm OD x 38.1mm Max Tablet: 30.15mm Round/31.6mm Shape

TABLET INFO		
COATED	YES or NO	
SHAPE		
PROFILE		
DIM 1		
DIM 2		
DIM 3		
DIM 4		
DIM 5		
DIM 6		
LAND		
CUP DEPTH		
PUNCH OPTIONS	**UPPER**	**LOWER**
HEAD STYLE		
TIP RELIEF	YES or NO	STD or DBL or BAKELITE
BARREL DUST CUP	YES or NO	—
KEY ANGLE		
NO. OF KEYWAYS	1 or 2	
STEEL TYPE (IF NOT STD.)		
DIE OPTIONS		
TAPER	SINGLE or DOUBLE	
CARBIDE LINED	YES or NO	
STEEL TYPE (IF NOT STD.)		
UPPER TURRET		
MACHINE SEALS	YES or NO	
SPECIAL TOOL CONSIDERATIONS (I.E. CHANGES TO O.D.'S)		

PRODUCTION ACCESSORIES

Tool Storage: Storage and transit solutions are available to keep tablet punches and dies safe, clean and organized. Wilson Tool top-quality tool storage boxes are available in configurations made specifically to accommodate your tool size. Made of durable, FDA-approved materials and designed to meet OSHA lifting guidelines, the boxes provide a first-class method for protecting your tooling and keeping you organized.

	PRODUCT NUMBER	DESCRIPTION
TOOL STORAGE		
	16508	Tooling Box — Large (DS3) 8-inch plus length DD2
	16552	Tooling Box Short
	16553	Tooling Lid
	16554	Tooling Box with Lid Short
	16555	"B" Tooling Insert 3/4" Tray (Holds 72)
	16556	"D" Tooling Insert 1" Tray (Holds 48)
	16557	"DS3" Tooling Insert 1-1/4" Tray (Holds 33 Punches and 20 Dies)
	16558	"B" Handle & Leg Kit for 3/4"
	16559	"D" Handle & Leg Kit for 1"
	16560	"B" Tool Box with 3/4" Tray
	16561	"D" Tool Box with 1" Tray
	16562	"DS3" Tool Box with 1-1/4" Tray

Blank Dies: Blank dies can be used to fill unused stations when you don't have enough tools to fill all stations in the tablet press. Available in sizes BB, B & D.

	PRODUCT NUMBER	DESCRIPTION
BLANK DIES		
	16533	0.945" Dia (BB)
	16534	1.1875" Dia (B)
	16535	1.500" Dia (D)

Setting Tools: Designed to reduce setup time and achieve more consistent alignment, setting tools can reduce tooling wear and help prevent misalignment by providing a more accurate centering of the upper punch to the die.

	DESCRIPTION
SETTING TOOL	
	"B" Setting Tool
	"D" Setting Tool

PRODUCTION ACCESSORIES

Alignment Rings: Alignment rings make inserting dies a snap. Drop the ring over the die and place both on the tablet press. When you slide them over the die pocket the die will be properly aligned. Gently tap to release die into the pocket. Available in sizes B2, B, D & DS3.

	PRODUCT NUMBER	DESCRIPTION
ALIGNMENT RINGS		
	16536	B2 Station
	16537	B Station
	16538	D Station
	16539	DS3 Station

Deburring Tools: Deburring stones remove burrs in machine keyways. To detect burs that need removal, it is recommended that operators inspect keyways in the machine prior to loading.

	PRODUCT NUMBER	DESCRIPTION
DEBURRING TOOLS		
	6060	Norton Oil Stone 4 x 1/2 Triangle (Medium)
	6059	Diamond File

Polishing Block: Polishing blocks help return tooling to its original shine for improved performance.

	PRODUCT NUMBER	DESCRIPTION
POLISHING BLOCK		
	983401	Rouge Polishing Block

PRODUCTION ACCESSORIES

Cleaning Brushes: To maintain tooling in superior condition and to ensure optimal performance, regular tool cleaning is recommended. Wilson Tool International provides a full complement of cleaning brushes ranging from 1/8" to 2" diameter. Brush bristles come in two different hardnesses of nylon as well as stainless steel.

	PRODUCT NUMBER	DESCRIPTION
STEEL CLEANING BRUSHES		
	983370	3/8" Dia
	983371	3/4" Dia
	983372	1" Dia
	983373	1-1/8" Dia
	983374	1-1/4" Dia
	983375	1-1/2" Dia
	983376	1-5/8" Dia
	983377	2" Dia
NYLON 940 CLEANING BRUSHES		
	983378	1/4" Dia
	983379	3/8" Dia
	983380	1/2" Dia
	983381	3/4" Dia
	983382	7/8" Dia
	983383	1" Dia
NYLON CLEANING BRUSHES		
	983384	1/8" Dia
	983385	1/4" Dia
	983386	3/8" Dia
	983387	1/2" Dia
	983388	3/4" Dia
	983389	7/8" Dia
	983390	1" Dia

PRODUCTION ACCESSORIES

Die Pocket Cleaner: Die pocket cleaners work to loosen and remove product buildup before inserting dies into the die pocket.

	PRODUCT NUMBER	DESCRIPTION
DIE POCKET CLEANER		
	16540	BB Station
	16541	B Station
	16542	D Station
	16543	DS3 Station

Dust and Grease Cups: Keep your station clean with tablet press dust and grease cups, used to prevent grease or lubricant from falling into the media being compressed.

Wilson Tool International offers a full line of tip-style dust and grease cups. A complimentary set is provided with every new tablet tooling order.

	PRODUCT NUMBER	DESCRIPTION
DUST AND GREASE CUPS		
	983356	Barrel Type B Style
	983357	Barrel Type D Style
	983351	Size 0 (Goes with BB Die)
	983352	Size 1 (Goes with B Die)
	983354	Size 2 (D)
	983355	Size 3 (DS3)

PRODUCTION ACCESSORIES

Keys: The Fixed Parallel key is Wilson Tool International's exclusive keying option. Its rounded ends eliminate the broaching effect of other styles like the woodruff key. It provides the greatest contact length and is held in place with a machine screw. A second key added to the opposite side of the punch can be an effective way to mitigate rapid tool wear. This addition can be made for a nominal charge.

	PRODUCT NUMBER	DESCRIPTION
KEYS		
	983358	Fixed Parallel Key 3/16 x 1 - #4-40 (B & D)
	983402	Fixed Parallel Key 1/4 x 1 - #4-40 (DS3)
	983364	4-40 x .625 long SHCS (3/4" Barrel, B Style)
	983369	4-40 x .875 long SHCS (1" Barrel, D Style)
	986129	4-40 x 1.000 long SHCS (1-1/8" Barrel, 328-1, etc.)
	985925	4-40 x 1.125 long SHCS (1-1/4" Barrel, DS3, etc.)

Lubricants: Proper tooling lubrication is critical to keeping your tablet presses running smoothly and maintaining your compression tooling. Lubricating barrels and punch heads keeps cams running well, punch guides clean, and tooling in good condition. Both lubricants offered by Wilson Tool are H1 food-grade lubricants.

	PRODUCT NUMBER	DESCRIPTION
LUBRICANTS		
	987555	H1 Barrel Lube; 14 fl. oz. spray
	987557	H1 Synthetic Grade 2 Grease; 454g tube

TABLET TECHNOLOGY TRAINING

Wilson Tool International provides training and continuing education on a wide variety of topics related to tablet design, tooling maintenance and compression theory. Our trainers offer best practices and time-tested techniques that will produce tangible results for your organization.

Onsite Hands-on Training

Customized training, tailored to your specific needs, onsite at your facility.

- Tooling training
- Tablet press operator training
- Tool room training
- Pricing based on customized needs

White Bear Lake Training Events

Training sessions at our global headquarters in White Bear Lake, MN.

- Hands-on education
- Small group environment
- Approximately 1.5-day duration
- Free to Wilson Tool customers

The following in-depth topics are available for training. To see full agendas, visit wilsontool.com/training.

The Art and Science of Tablet Compression

Exploring the history of tablet compression, compression terminology and the "Seven Steps in the Tableting Cycle", this course is an excellent introduction to tableting science.

Tablet Tooling Design

Learn about the different tablet shapes and the advantages/disadvantages of each. Explore common tablet defects and failure issues and how to solve them.

Tooling Options

Take a look at different tablet tooling options, and what custom modifications are useful for certain applications.

Multi-Tip Tooling

Become familiar with the advantages and drawbacks of multi-tip tooling for the tablet press. Consider variations to the design and press.

TABLET TECHNOLOGY TRAINING

Tablet Press and Tooling Performance

Investigate concerns related to the performance of the tablet press and tooling. For example, natural vs. assignable variation, weight controllers and limitations, and optimization for the press and tooling for weight control.

Tooling Measurement

Consider the numerous tools and techniques used for various aspects of tool measurement concerning inspection, safety, setup and calibration, working length and overall length, and more.

Tooling Maintenance

Discuss the ins and outs of tooling maintenance. Cleaning techniques, visual inspection, punch head and tip edge repair, storage and more will be explored.

Tablet Quality Troubleshooting

Learn how to manage various challenges that can arise with tablet quality. Look at weight and thickness variation, black specs, capping and lamination, chipping and splitting, embossing clarity and many more problems and their solutions.

Film Coatings

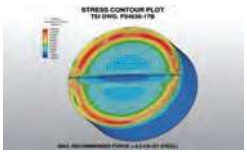
Coating a tablet is a common practice to improve appearance, stability, swallowability and modified drug release. Discuss the finer elements of film coatings, from material considerations and mixing, to the different types of systems available.

Micro-Tip Tooling

Considerations for use of micro-tip tooling include press evaluation, tablet and tool design. Learn how to control weight and how to prevent tip buckling or bending.

Advanced Tablet Design

In this advanced course, further explore the details of the tablet, from engraving and font optimization to scaling up. Dive deeper in to cup profile, surface and edge performance, as well as how to measure the effects of distortion in the process.



Tablet Tooling Force Ratings

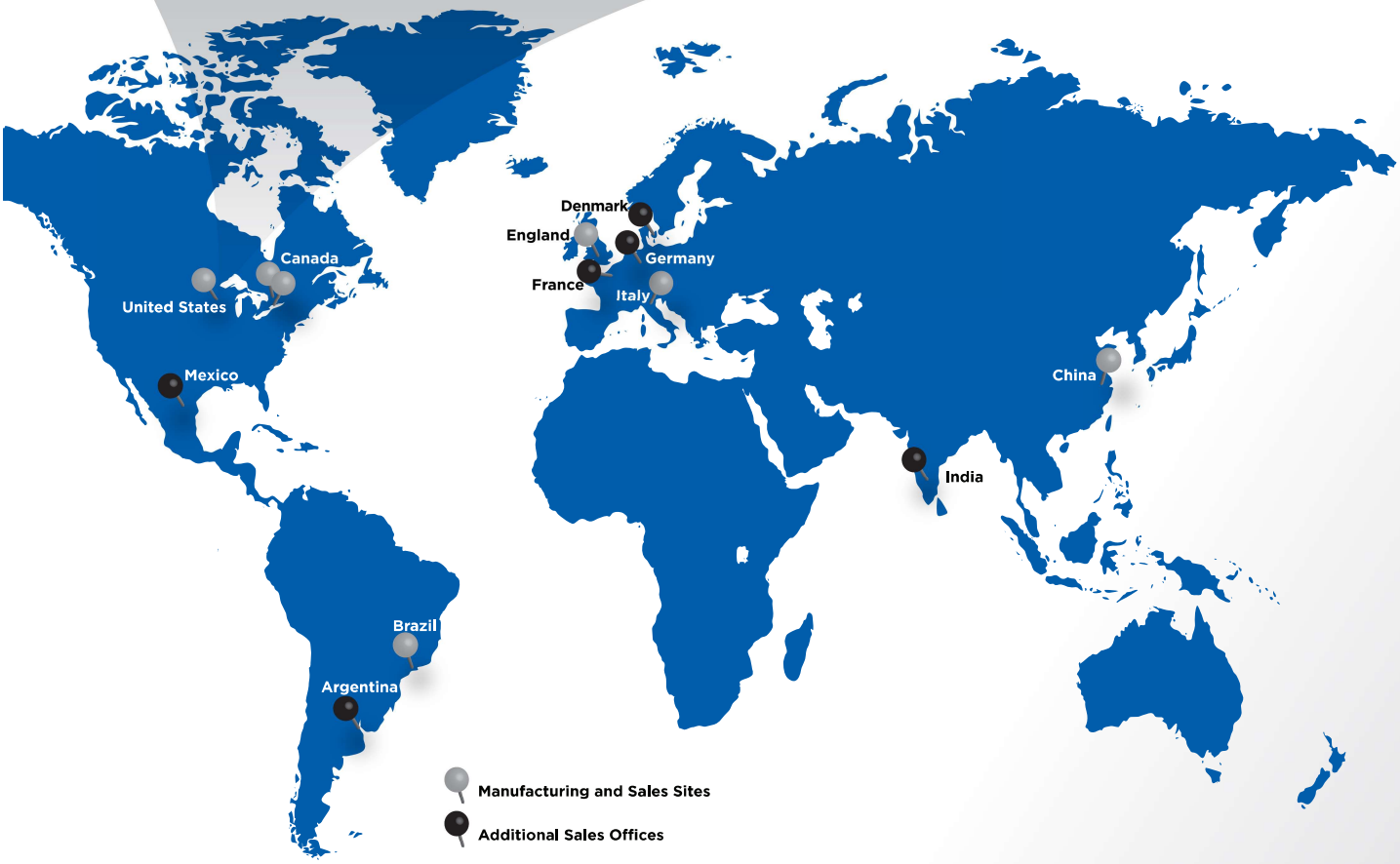
A "What's what" of terminology and formulas. TSM ratings, overload settings and Finite Element Analysis are all reviewed to provide design optimization.

Looking for training on a different topic? Let us know!

TECHNOLOGY TRAINING

WILSON TOOL INTERNATIONAL HEADQUARTERS

12912 Farnham Avenue N, White Bear Lake, MN 55110, USA
800-467-8444 | **tableting@wilsontool.com**



OUR QUALITY GUARANTEE

Your success is our priority. If you're ever unsatisfied with a Wilson Tool International product, we'll do everything we can to make it right and keep you up and running.

WILSON TOOL

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