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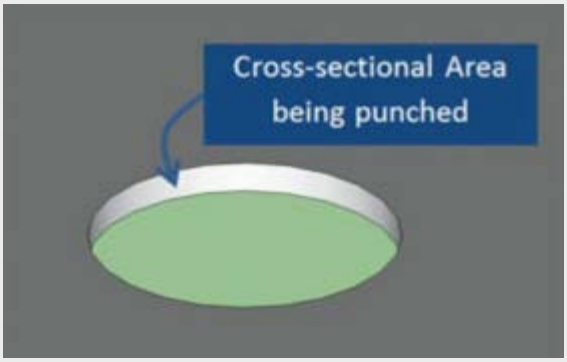
TOOLING AROUND THE WORLD

February 2013

A Closer Look at Punching Force

Punching Force (PF) is the force required to punch a hole. Calculating this force is an important step for fabricators – failure to do so can be costly, bringing production to a halt. Finding out that a punch you are using on a project causes an alarm is not the time to do the calculation, it should be done during the planning stage.

The formula is short and relatively simple; Punching Force (PF) = Area x Shear Strength, where Area is the cross-sectional area of the material being punched away and Shear Strength is the shear strength of the particular material being punched.



Breaking the formula down further results in the root formula:

PF = Perimeter x Thickness x Shear Strength

However, to ensure we align our force with that of the punching machine we must yet again adjust the formula so that the punching force is displayed in either US tons (tons) or Metric tons (tonne).

PF (US tons) = Perimeter (inches) x Thickness (inches) x Shear Strength (lbs/in^2) / 2000 (lbs/ton)

PF (tonne) = Perimeter (mm) x Thickness (mm) x Shear Strength (N/mm^2) / 9806.65 (N/tonne)

Below is a vertical breakdown of the calculations to determine the Punching Force required to punch a 1” (25.4mm) round hole in .125”

Wilson Tool Introduces NEW Fabrication Forum

In response to your feedback, Wilson Tool will be holding our first Fabrication Forum in April. At the Fabrication Forum, you will meet with our team of application experts to help you better understand and overcome today’s toughest fabrication challenges. Our goal is to hold these on a regular basis, so stay tuned for a schedule of future events.

The interactive format of the Fabrication Forum allows for plenty of time for questions and answers to your specific questions or challenges. The forum is free, but space is limited so sign up today!

Thursday, April 11, 2013
9:30 a.m. – 4:30 p.m.
Wilson Tool International – White Bear Lake, Minnesota

Click here for more information on the April 11th forum.

Download registration form.

(3.2mm) thick mild steel (Result: 9.8 US tons or 9.0 metric tons).

Process Steps	US units	Metric units
Calculate the perimeter of the round hole (Per=πD)	π x 1” = 3.14”	π x 25.4 mm = 79.8 mm
Multiply by thickness to get the area	3.14” x .125” = 0.3925 in^2	79.8 mm x 3.2 mm = 255.4 mm^2
Multiply area x strength	0.3925 in^2 x 50,000 lbs/in^2	255.4 mm^2 x 345 N/mm^2 = 88,113 N
Convert to US tons	19,625 lbs ÷ 2,000 lbs/ton = 9.8 tons	88,113 N ÷ 9806.65 N/tonne = 9.0 tonne

Even though the calculations are relatively simple, the more commonly used formulas for calculating tonnage are:

> Punching Force (US tons) = Perimeter (inches) x Thickness (inches) x 25 x Material Multiplication Factor
> *OR*
> Punching Force (metric tons) = Perimeter (mm) x Thickness (mm) x 0.0352 x Material Multiplication Factor

A chart that lists the “Material Multiplication Factor” for various common materials normally accompanies these formulas. However, in some cases the material being fabricated is not listed on the chart. When that happens you may find yourself asking:

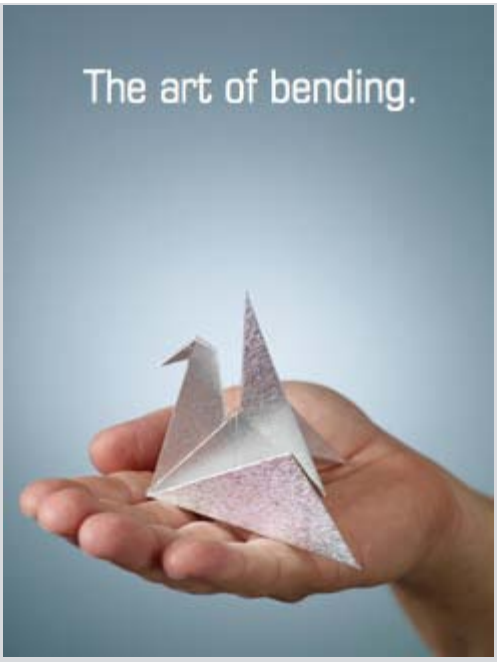
> Where does the constant value (25 or 0.0352) come from?
> How is the “Material Multiplication Factor” determined?

First let’s address the constant values; 25 or 0.0352. Mild steel was once the most commonly used material and as a result the formula would read:

> PF (US Tons) = Perimeter x Thickness x 50,000 lbs/in^2 ÷ 2,000 lbs/ton = Perimeter x Thickness x **25**
> *OR*

- PF (tonne) = Perimeter x Thickness x 345 N/mm^2 ÷
- 9806.65 N/tonne = Perimeter x Thickness x **0.0352**

Because mild steel was once the most commonly used material it became the material all others were compared to. So let’s compare stainless to mild steel. The Shear Strength of stainless is about



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75,000 lbs/in^2 [518 N/mm^2] and when compared to mild steel you will see how it takes 1.5 times more force to shear, 1.5 being the Material Multiplication Factor for Stainless.

50,000 lbs/in^2 x **1.5** = 75,000 lbs/in^2

345 N/mm^2 x **1.5** = 518 N/mm^2

As you can tell, the more commonly used formulas do not equate to a more simple calculation nor do they make it easier to understand. No matter which formula you choose though, be sure to do your calculations beforehand to avoid mistakes and inefficiency.

Although the Shear Strength of many materials can be found online, the best source would be your supplier. If the Shear Strength is not available, “Ultimate Tensile Strength” is often substituted. To assist you further we have provided a link to the Punching Force calculator, which also contains a perimeter calculator for some of the most common standard shapes.

Download the Punching Force Calculator:

- **Excel 97-2003 version**
- **Excel 2010 version**

For more information on punching force, please call Glen Shuldes at **651-286-6144** or Scott Tacheny at **651-286-6171**.

The Faces of Wilson Tool

JC Danielson
BUL General Accounting

Years at Wilson Tool: 20

What is your favorite aspect of your job?
Creating a win-win situation with our customers.

What do you enjoy doing in your free time?
Fishing, scrapbooking, and going to our cabin and four-wheeling.

What is something that people would be surprised to learn about you? I own a restored 1979 El Camino – ‘The Black Knight.’

Wilson Tool Introduces Tooling for Salvagnini Punching Systems

As the provider of the most comprehensive tooling solutions in the industry, Wilson Tool now offers Salvagnini standard and custom shape tooling. Our Salvagnini tooling is made with Wilson Tool’s high quality tool steel to give you better punch performance and longer lasting tooling. And of course you can expect the same fast delivery and superior customer service you have always received from Wilson Tool.

Click here to view the product page and download the Salvagnini tooling catalog.

If you had to eat only one food item for the rest of your life, what would it be? My mom's oven baked chicken!

Where is the most interesting place you have been? Why? Sweden, because my grandfather grew up there. It was nice to visit his family, see the home he grew up in and experience some of their culture.

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