Last month, we featured an article on the designation system for aluminum alloys. This is an important first step to be knowledgeable about if you are working with or just beginning to work with aluminum. With that foundation laid, now we can discuss some of the issues you might find when working with this material, and how to be most successful in your applications. We have provided tips and advice for both working in a punch press and a press brake.

**Tips for Forming Aluminum:**
- Annealed, or softer material, as well as non heat-treatable material perform better when making forms.
- From our experience, those creating forms are most successful when running either the 1xxx, 3xxx or 5xxx Series materials from the non heat-treatable groups or the 6xxx Series that is fully heat treatable.

**Tips for Piercing Aluminum:**
- Hardened material performs better when punching holes.
- Piercing any of the aluminums can be done successfully with proper clearance, lubrication and coatings.
- Clearances that are too small will create a greater burnish land and are likely to result in galling.
annealed. A 6xxx Series that is not fully annealed is more likely to fracture when forming.

- When forming, tool radii which enable the flow or stretching of material often need to be larger when working with aluminum as compared to steel even though you can generally form greater distances, as in the case of an emboss offset form.

Below is the Wilson Die Clearance Selection chart. However, clearances range from 1% when fine blanking thin aluminum to 25% when punching thick aluminum.

### Die Clearance Selection

<table>
<thead>
<tr>
<th>Material</th>
<th>Minimum</th>
<th>Best</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper (1/2 Hard)</td>
<td>8</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Brass (1/2 Hard)</td>
<td>6</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>Mild Steel</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Steel (0.5 C)</td>
<td>12</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>Aluminum (Soft)</td>
<td>5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Stainless Steel</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

% x Material Thickness = Total Clearance

![Figure 17: Table of die clearances](image)

### Common Issue of Galling in Aluminum:
Aluminum can often be described as sticky and if you have worked with aluminum, you know that this results in galling or stripping problems. Some believe that a highly polished finish can combat the problem. However, we have found just the opposite, a highly polished tool can actually promote sticking and galling.

The appropriate lubricant can help reduce galling though, and the best lubricants for aluminum are not the same ones you would use for steel. We suggest Xcel lube for use with aluminum. Aside from specialized lubricants, you can also use kerosene, mineral oil or petroleum jelly when forming aluminum to help reduce galling.

### Coatings for Aluminum:
Although generally thought of as soft, aluminum can be very abrasive due to oxidation. This is where high quality tool steels and coatings can be beneficial. Coatings are generally separated by the operation - piercing or forming. But here at Wilson Tool we like to break them down as they are shown in the chart below.

![COATING RECOMMENDATION BY APPLICATION](image)

Click here to learn more about coatings.
Press Brake

Forming Soft & ½ Hard Aluminum
Example 5052-H32*

- Tends to conform to the punch tip
- May crack with a small (material thickness) inside radius
- Depending on the grade, it may require an inside radius of 2-3 times the material thickness
- Typically not much spring back
- About 50% of the tonnage required for comparable thickness of mild steel
- Form results can vary with or against the material grain

Forming Hardened Aluminum
Example 6061-T6*

- Cracks more easily than softer materials
- Larger tip radii required to prevent cracking
- Typically an IR of at least 2-3 times the material thickness is required
- More over-bend required due to greater springback
- Tonnage can be as much as a comparable mild steel
- Form results can vary with or against the material grain

*Material can vary from different suppliers or vendors. Examples given above are generalities.

Part Marking Considerations

- V-series works well with aluminum tread plate to minimize tread distortion.
- Urethane drape over the die helps to protect the sheet being formed.
- Large shoulder radii on dies. A more generous shoulder radius on the v-opening allows the material to slide into the v-opening with less marking to the part.
- Use material with protective coating.

Faces of Wilson Tool

Dennis Wasieleski
Punching Sales Desk / Technical Support

Years at Wilson Tool: 15+

What is your favorite aspect of your job?

NEW Fabrication Forums Met With Positive Reviews

Wilson Tool has held three Fabrication Forums at our plant in White Bear Lake, Minn. this year and we have received very positive reviews from the attendees so far! At our Fabrication Forums, you will meet
I enjoy working with and helping our customers with their applications, and also working with the people here at Wilson Tool.

What do you enjoy doing in your free time?
Road trips, fishing, classic cars, antiques and cooking.

What is something that people would be surprised to learn about you?
I was a chef for a few years (long hours).

If you had to eat only one food item for the rest of your life, what would it be?
A good steak.

Where is the most interesting place you have been?
Hawaii (The Islands). The Islands are beautiful, the people are friendly, and the view is spectacular and very relaxing.

Wilson Tool’s Three-Tier System for Thick and Thin Turret Tooling

To simplify your decision and ordering process, Wilson Tool has created a brand new three-tier system for both of our thick and thin turret tooling lines. These three new levels of performance help to meet a variety of needs and budgets. No matter which level of performance you choose, you can rest assured that you are receiving only the highest quality product and industry leading customer service.

with Wilson Tool’s team of application experts to help you better understand today’s toughest fabrication challenges and how to overcome them. The forums are free to you, but space is limited so sign up today!

Upcoming Fabrication Forum
Wednesday, August 21st
9 a.m. - 4 p.m.
Wilson Tool International
White Bear Lake, Minn.
Click here to learn more.
Click here to download registration form.

Here are some comments from previous Fabrication Forum attendees:

The one thing I noticed about Wilson Tool was not only the company, but its employees are very honest and realistic. Not just out to make a buck, they consider what capabilities you may already have instead of asking you to replenish your entire inventory. THAT is good business!! Can’t say there are many left like that. Very impressed.

I thought the seminar was very informative and I liked the real world problems and solutions for those problems. I also thought the variety of different applications was very helpful in learning new ways to do things.

As a new comer to the turret press world, everything covered in the forum will be used.

It’s also good to know that the guys who are quoting and designing the tools know what they are talking about.

Everything was put together very well! I really enjoyed the experience! A lot of helpful information on different topics. Thank you!
With the new system comes the availability of EXP™ punch technology for Fab/thin turret tooling. As a thin turret customer, you can now experience the same benefits of EXP that our thick turret customers have been experiencing over the last year and a half, such as lower punch cost, faster setups and punches made standard with Ultima® tool steel.

To learn more about our tooling products and which one is right for you, download one of our brochures:

- **Metric Thick Turret Tooling Brochure**
- **Wilson Fab Thin Turret Tooling Brochure**

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**Wilson Tool on YouTube**

Less is more.

A fraction of the size of standard punches, **EXP™ punch technology** from Wilson Tool International® is more productive, more durable and more affordable than any other punch press tooling. 4x faster setups result in less downtime. Ultima® tool steel makes EXP punches last 2x longer. Standard holders with universal punches make it practical to replace only the punch. Smaller punches mean you can stock more shapes in less space. EXP punches also require significantly less material to produce, resulting in less waste.

Expect more for less. EXP punch technology is simply better tooling for less money.