

SCAFCO TECH-NOTE: Field Drilling with a Step Drill Bit

SUMMARY: This Technical Note discusses the advantages of a step drill bit, and proper step drill usage on galvanized sheet metal. It is important to note that safety glasses must be worn at all times during step drilling operations, as with all other drilling operations.



INTRODUCTION:

A step drill bit is a versatile, multi-diameter drill bit that cuts holes in material using successively increasing "steps." The further the bit goes into the material, the larger the hole gets. This incremental drilling process provides a wide range of hole diameters, and is commonly used to enlarge existing holes.

A step bit is an invaluable tool with a multitude of applications in the field. One step bit can replace numerous twist bits, reamers, and deburrers. Its many advantages make it ideal for sheet metal.

ADVANTAGES:

- *Straight flute design:* Allows the step bit to pass smoothly through material without grabbing. This feature also prevents waste material from clogging the bit, which is a frequent problem with the spiral flutes of twist bits.
- *Self-tapping tip:* Eliminates the need for a pilot hole on thin material (although, a center punch is still recommended to counteract bit walking.)
- *Variety of diameters:* Saves time that would be wasted on constantly switching between twist bit sizes.
- *Reaming ability:* Smooth hole sides are instantly achieved by the step bit.
- *Deburring ability:* Lightly contacting each side of the hole surface with the bevel of the next bit step leaves a perfect, smooth hole.
- *Can be used on plastics:* Drills through plastics, such as Lexan and Plexiglass, without cracking the material.

MAINTENANCE:

Step bits should only be used on sheet metal thinner than the step height, which is generally 1/8". Step bits with steps larger than 1/8" do exist and are capable of penetrating thicker sheet



metal. However, larger step bits are more expensive and can more easily lead to tapered holes. A twist bit is recommended over a step bit for thick gauge sheet metal, especially if starting a hole. Step bits are most effective on thin, galvanized sheet metal.

Over time, the step bit tip may wear and become dull. Do not attempt to sharpen the tip. Improper sharpening can severely damage the point geometry and hinder drilling performance. Instead, use a pilot hole to overcome a dull tip. The steps of the bit can be sharpened, but it is ill-advised to sharpen them more than once. Removing too much material from the steps can ruin the accuracy of the bit.

Be sure to clean the step bit after using it. Waste metal can act as an abrasive and wear the cutting edges.

PROCEDURE:

Drill gradually to avoid over-stepping past a desired hole diameter. Additionally, a marker or masking tape may be used to mark a desired diameter on the bit before drilling.

It is important to keep the step bit normal to the work surface for evenly stepped holes. Angled approaches can result in oblong holes and uneven bit wear. Let the bit do the work as much as possible. Some operations take time and excessive force should not be applied.

Step drills should run at a low to moderate spindle speed (unless the bit is designated as High Speed Steel [HSS]) or chatter will occur. Pilot holes are especially necessary for more control when drilling larger diameter holes.

Binding of the bit to the material can become an issue when drilling large diameters, so it's important to always maintain a firm grip on the drill to dampen occasional jerks.

Use cutting fluid/lubricant while step drilling whenever possible. Heat dissipation becomes particularly important to tool life and hole quality when drilling large diameter holes or drilling on thicker material. Remove the bit from the material more often to prevent overheating when large holes or thick gauges are in play.

CLOSING REMARKS:

Step drilling is the best suited option for drilling on thin, galvanized sheet metal in the field. This is a general technical note discussing step drill bits. For more information on a specific step drill bit, consult the manufacturer's data.

REFERENCES:

- [Practical Electronics: Components and Techniques](#)
- [Popular Mechanics, May 1974](#)
- [HSS Step Drill Tech Tips](#)

