

SPOTTING THE RIGHT ANGLE

In high precision machining applications, drilling a hole exactly where it is needed can be a challenge. Material behavior, surface irregularities, and drill point geometry can all be factors leading to inaccurate holes. Spot drilling is a common method of eliminating the chance of drill walking, and leads to properly located holes and a better product.

How should I choose a spot drill?

The challenge with spotting comes with choosing the right spot drill to suit your job. Ideally, the center of a carbide drill should always be the first point to contact and begin drilling a workpiece, which allows for gradual loading of the drill and proper cutting action. Therefore, a spotting drill should have a slightly larger point angle than that of your drill. If a spotting drill with a smaller point angle than your drill is used, your drill may be damaged due to shock loading when the outer portion of its cutting surface contacts the workpiece before the center. Using a spot drill angle equal to the drill angle is also an acceptable situation.

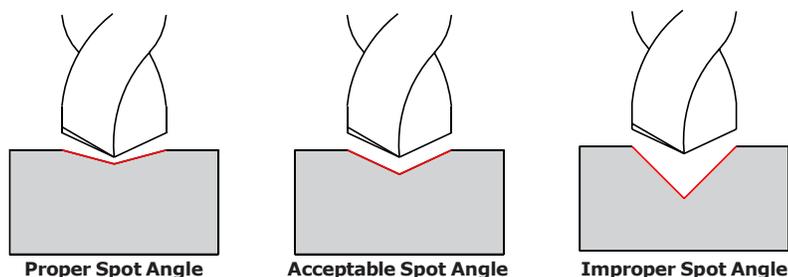


Figure 1

Figure 1 illustrates the desired effect. On the left, a drill is entering a previously drilled spot with a slightly larger angle than its point. On the right, a drill is approaching a spot with an angle that is far too small for its point.

Contrary to every other drilling operation, spot drilling does not carry as much importance on the diameter. Typically, a spot is made with approximately the same diameter as the final hole. To save time, some machinists choose to create a larger spot, leaving a chamfer at the top of the hole after drilling is complete, illustrated in **Figure 2**. However, all that is truly needed is a small divot to correctly locate the center of a drill when initiating a plunge.

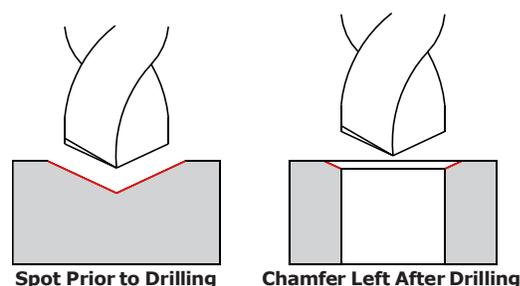


Figure 2

What happens if I use a spot drill with an improper angle?

Using a larger angle spot drill will allow the drill to find the correct location by guiding the tip of the drill to the center. Most drill styles are differentiated by the tip geometry, where the cutting action begins, and which often has a large impact on the performance of the drill as a whole. If the outer diameter of a carbide drill were to contact the workpiece first, the tool could chip. This would damage the workpiece and result in a defective tool. If the two flutes of the drill were slightly different from one another, one could come into contact before the other. This could lead to an inaccurate hole, and even counteract the purpose of spot drilling in the first place.

When will a spot drill not work for my application?

When drilling into an extremely irregular surface, such as the side of a cylinder or an inclined plane, a spot drill may not be sufficient to keep holes in the correct position. For these applications, flat-bottom drills or flat-bottom counterbores may be needed for creating accurate features.