Deburring Cross-Drilled Holes

Drilling cross-drilled holes always creates burrs where the holes intersect, which makes removing them efficiently a real challenge. A variety of methods are commonly tried first: abrasive blasting, honing, flash deburring, electrochemical deburring, and manual deburring with knives, scrapers, various abrasives, and brushes. Such methods can be costly in terms of labor or capital expenditures. And many manual methods fail to provide the desired edge condition, meaning one large burr is often replaced by two smaller ones.

Achieving consistent results can be difficult. Most deburring methods are offline processes, meaning parts need to be transferred from machining to a deburring station. Extra handling, set-up, queue, packaging, transport, and unpacking all affect throughput time and represent substantial non-value added operations.

In response, J.W. Done Co. (Foster City, CA) has developed the Next Tool After drill. The tool is used just like any cutting tool found on a lathe turret or tool magazine of a milling machine. It removes burrs specifically from the intersection of cross-drilled holes. The operation can be tailored to leave a minimally broken edge or a blended radius.

The tool consists of a shaped cutter and disk fixed on the end of a shaft, with the disk slightly larger then the cutter. Its shaft is mounted in a flexible coupling, which in turn is mounted into a driven spindle. Standard tools employ hemispherical carbide cutters.

After partial insertion into one of the bores, the tool is moved laterally until the disk contacts the wall of the bore and the flexible coupling is lightly deflected. Next, the tool spins and advances toward the intersection while sweeping the wall of the bore. Since the disk is slightly larger than the cutter, this prevents any cutting until the tool reaches the intersection. The periphery of the disk is smooth and radiused to prevent marring of the bore wall. Burr removal begins when the disk is able to enter the other bore.

Tool design is very scalable, allowing cutters to be tailored for specific applications. Tool shafts are supplied extra length to allow for deep intersections. Shafts can he trimmed to optimal lengths with nippers, or by scoring and breaking. Coupling stiffness can be varied by changing coupling size.

Additional features and benefits of the drill are that it:

- Works in manual machines or CNC lathes and mills with or without automatic tool changers.
- Uses standard lathe/mill spindle speeds.
- Has simple setup and programming.
- Requires no special tooling.
- Works on hard and soft materials.
- Covers a range of hole sizes.
- Provides for in-process deburring, eliminating any batches and queues.
- Significantly reduces deburring costs and increases throughput.
- Can deburr non-circular features.