Cutting Tool Information for Plastics

There are two exciting topics for this month's column. First is the introduction into the market place of several new styles of tooling that are designed to solve problems that used to require customized tooling and/or specialized programming options. Operations such as drilling, pocketing, and lettering have new tool lines capable of producing better finishes with faster cycle times without the need for multiple tool changes or difficult programming. The second topic covers a new resource available on the Internet for detailed selection of cutting tools based upon specific materials and the required finishes, spindle speeds, and feed rates.

Figure 1

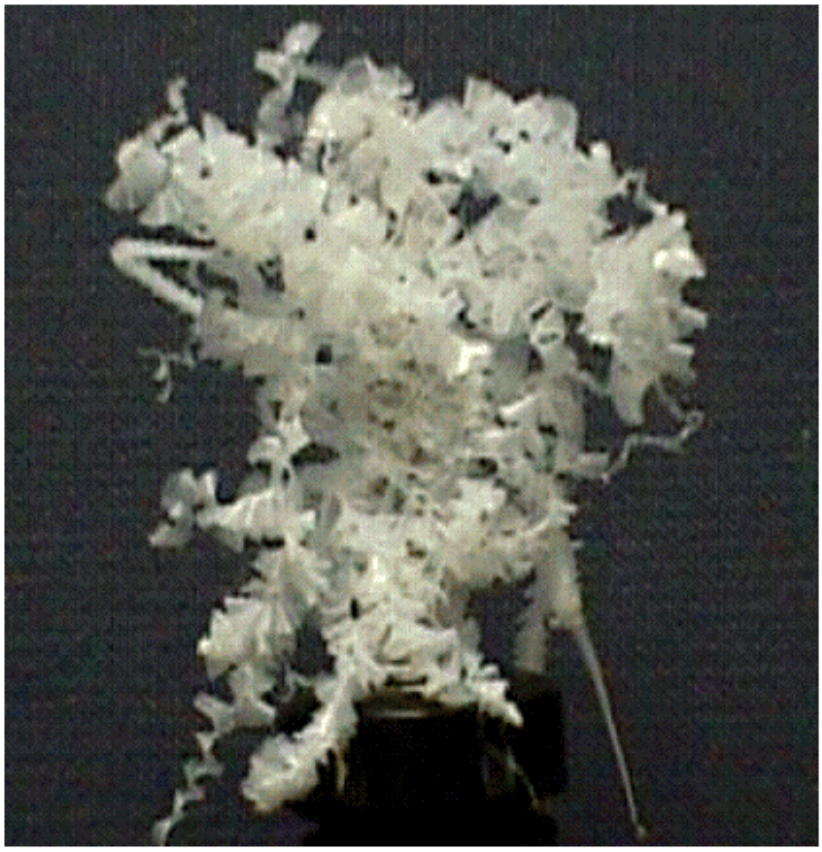

Figure 2

A new style of drill (Figure 1) is commercially available for the first time that allows faster plunge speeds and can reduce the occurrence of chip wrap in soft plastics and crazing in hard materials such as acrylic. An additional benefit is the ability to plunge into blow molded or other thermoformed parts without ejecting a plug into the interior of a part.

Figure 3

A 60° point and a flat rake face provide the best plunge point to date for use in a wide variety of plastics being machined today. This point style creates a chip in soft plastics that is easily ejected and allows the use of normal drilling routines during programming. In the past, many softer materials such as polyethylene or polypropylene required peck drilling cycles to prevent the formation of long chips that would wrap around the drill once the material or tool began to warm up from use. (Figure 2) The elimination of these special drilling cycles in a program can lead to a reduction in cycle times in excess of 50% and can increase cutter life by preventing multiple impacts of the cutting edge with the material.

The new drill point also reduces the stresses introduced into hole walls and will provide a clean hole surface without the clouding or crazing typical of standard drills in many acrylics. (Figure 3) The narrow point angle allows the cutting forces to be distributed over a larger cutting surface and will create a long chip as opposed to a plug when the drill exits the bottom of the material. This chip is typically carried along the drill flutes and ejected from the top surface as opposed to being pushed underneath the workpiece or into a hollow cavity area on a blow molded part.

Pocketing & Lettering

With the increased use of UV and weather resistant plastics, more and more signage and outdoor displays are being routed complete from a single plastic blank. This is especially true on the multi-layer materials that allow the top colored surface to be routed away to expose an inner, contrasting color for outdoor and indoor signs.

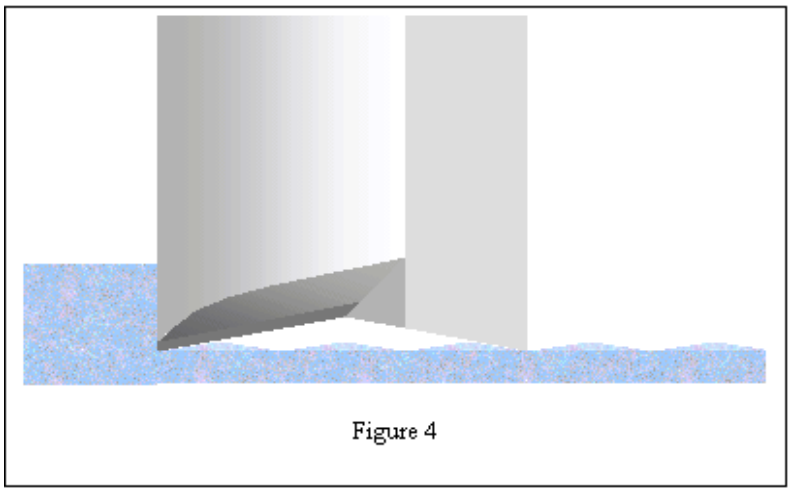

Figure 4

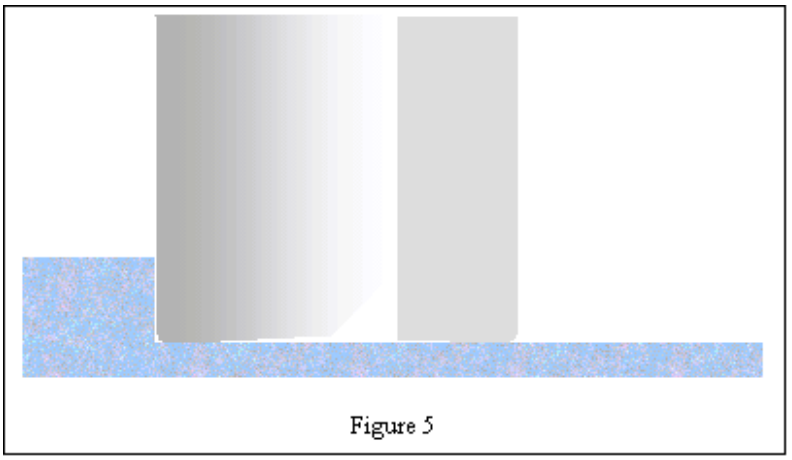

Figure 5

A problem with this operation in the past has been the difficulty in obtaining a smooth bottom surface after the routing operation was performed. Even with a relatively flat pointed cutting tool, a series of swirl marks would be evident on the exposed inner material. (Figure 4) These swirl marks were the result of raised ridges left by the router bit point and were sometimes severe enough to require secondary finishing operations to remove.These swirl marks were the result of raised ridges left by the router bitpoint and were sometimes severe enough to require secondary finishing operations to remove.

A new style of cutter (Figure 6) is now available that utilizes a nearly flat point with radiused corners to create a smooth bottom (Figure 5) for this type of application and any other application that requires a high degree of aesthetic appeal in pocketing or recessed lettering applications.

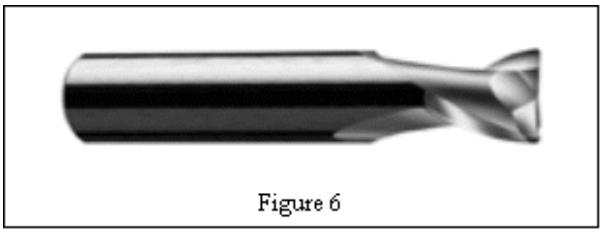

Figure 6

Another recently available tool is a combination rout and chamfer bit. (Figure 7) While these tools have been commercially available for wood based applications for some time, this is the first series of tools designed specifically for plastic sheets. By combining both a straight flute optimized for cutting plastics with a cutting edge sized for specific sheet sizes and a 45° chamfer edge, these tools can rout out plastic parts and apply a variable depth edge chamfer in a single pass. By combining these features into a single tool, tool changes within the machining cycle are eliminated and CNC routers without a tool changing spindle have new capabilities for parts production.

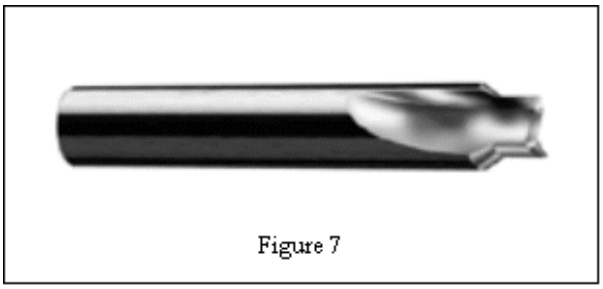

Figure 7

Cutting Tool Selection Resource

A new resource (www.PlasticRouting.com) co-sponsored by the International Association of Plastic Distributors (IAPD) and Onsrud Cutter has recently gone online with the purpose of increasing the information available to fabricators who rout plastic products. In conjunction with many of the major manufacturers of plastic products in the U.S., a database has been compiled that lists the best cutting parameters for specific materials and tools. Information contained within the database includes:

- Material Manufacturer
- Material Manufacturer Contact Information
- Material Brand Name
- Material Type
- Material Color and/or Color Code
- Material Thickness
- Cutting Tool Feeds & Speeds
- Cutting Tool Diameters
- Cutting Tool Helix
- Recommended Depth of Cut
- Recommended Roughing and Finishing Passes (if applicable)
- Recommend Cutting Direction (Climb vs. Conventional)
- Actual resultant Surface Finish of the cut material

This information is searchable by the material manufacturer, the brand name of the plastic, or the type of plastic. All search results are sortable and the results are ranked according to the surface finishes that were obtained under the recommended cutting parameters.

Additional resources available at the site include a searchable FAQ section and a message board that allows users to post and reply to questions, thoughts, or comments listed by other users. This site will be continually updated as new materials are introduced into the market place and new tools are developed to increase the feed rates and/or surface finishes of routed plastics.