Routing And Trimming Abs

ABS is one of the most popular plastics used by thermoformers and rotational molders. It is also one of the most versatile from low-density foam to high-density material. ABS combines toughness, stability, wide temperature range and chemical resistance with relative ease of fabrication. No wonder it most often is the plastic formula of choice given these advantages even before considering ABS's low water absorption and hi to low gloss range in a variety of colors. These substantive properties often dictate restrictive machining practices in other formulations. This is not the case with ABS. There are just a few (but important) considerations when routing or trimming ABS. It is also a reasonably priced material and happily can be machined in a most cost-effective manner.

ABS has been used in consumer products for years. It is becoming the material of choice in many auto/truck components. Instrument panels, headliners, grilles, wheelcovers, decorative trim, mirror housings, truck bed liners and bumper farings are some of the ABS applications. Small and large appliances, refrigerator door liners, business machine and electronic housings, luggage, toys, storage bins and flower pots are ABS parts often trimmed by air or CNC routers. Pipe and fence materials of ABS are used in several products requiring unique routing methods. All of the products here mentioned can be effectively machined only if properly fixtured, clamped or held firm before the spindle is turned on.

In many instances, CNC routers are setup with the right tools and an elaborate vacuum system. The spoilboard however, is overlooked and becomes the problem area. The one thing that can make or break an ABS setup is the ability to hold a part on the table "rock solid". ABS parts are normally quite flexible and will tend to vibrate if not fixtured properly. There are many elaborate pod systems employed by both point to point machines and routers. These systems can be very effective. There are also many machines utilizing dedicated spoilboards to hold parts. This is most often the case with ABS parts. The proper way to build a dedicated spoilboard is often misunderstood or cut short, in the interest of time. Taking the time to do it right will pay dividends in the form of productivity and piece part finish.

Many consider a spoilboard a piece of MDF or particleboard with self-stick weather-stripping and a few holes drilled inside the perimeter. While this type of fixture may work in a few instances, it does not often satisfy the demands made in high performance routing. If a router is going to run at production speed, the parts must not move. The preferred spoilboard technique employs grooving the interior area of the gasket perimeter to allow a vacuum to reach the outermost portion of the part. The holes are then drilled at the intersection of the vacuum grids. This method provides a greater vacuum surface area. It is preferred to just drilling holes in the spoilboard because it provides a "bead" of vacuum to the outermost edge of the part, giving the best chance for a "rock solid" hold. (See figure 1).

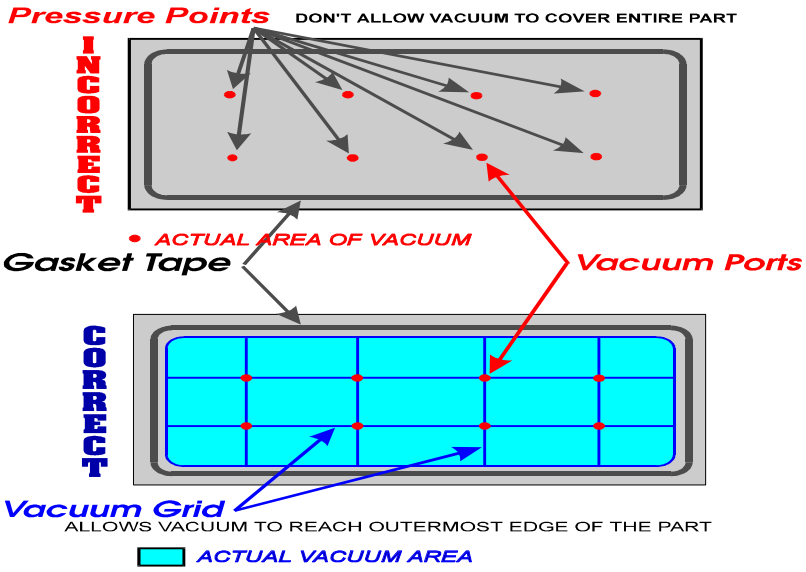

FIGURE 1


FIGURE 2

Once the ABS part has been properly fixtured, tool selection is really quite straightforward. The router bit of choice for most thermoformed sheet, 6mm or less, is the 0 flute tool, either single or double edge. In

many instances, the part can be machined while cooling and high-speed steel tools work very well. (See figure 2). In all instances, ABS can be trimmed and routed effectively with solid carbide 0 flute tools. (See figure 3). A new product in solid carbide router bits for plastic applications is the 0 flute spiral tool. (See figure 4). While available for many years in straight or shear geometry, recent developments in CNC grinding technology has enabled the design and manufacture of the 0 flute spiral, which provides better chip flow control in certain applications.

FIGURE 3

FIGURE 4

FIGURE 5

One of the few problems in machining ABS can be chip reweldment. This occurs when the chip is not removed properly or quick enough. It can also occur when the feed rate is too slow. These problems can be easily resolved in a CNC environment with proper fixturing and tool selection. They can be more difficult to solve in hand held or air routing applications. Depending on the difficulty of the set up, one may wish to consider carbide tipped straight flute tools (See figure 5) if high-speed steel does not provide satisfactory tool life. In these situations, carbide tip tools may be preferable to solid carbide because of the strength of the tool steel body. Whether the router is CNC or hand held, ramp entry into the ABS work piece (rather than a straight plunge) will also prevent rewelding.

In any plastic routing application, one should experiment with both single and double edge bits, as well as both spiral and straight flutes, before choosing the best tool for the specific job.