The Importance of Spoilboards in the Machining Process

The emphasis today in the fabricating and machining of plastics is CNC - or computer numerical controlled machines. These high spindle speed, high feed rate machines accomplish a tremendous amount of work in cycle times, which enhance productivity and profitability. A great deal of time is devoted to the selection of such machines and the appropriate tooling and accessories, but the area of spoilboard methodology is given less consideration. Without proper investment of time in this critical area, the holding of parts to accomplish maximum productivity becomes challenging at best.

Types of Spoilboards

The dedicated or discreet spoilboard system has traditionally been utilized over the years to machine individual parts that are held by a gasketed vacuum system. Unfortunately, many times the process of adequately constructing these spoilboards has been ignored in the interest of time. The use of a piece of MDF or particleboard with holes drilled inside an area encapsulated by self-stick weather stripping does not meet the demands placed on the parts in a high-speed application. Consequently, it is imperative to follow certain criteria when building spoilboards to maximize the part hold-down procedure.

First, the selection of gasketing material is foremost in the process of building substantial dedicated spoilboards. This material should be quality closed cell foam, which has the ability to return to its original configuration repeatedly under rigorous machining conditions. Self-stick weather stripping, which is open cell construction, does not possess such memory characteristics and should never be utilized. The gasketing material represents the perimeter of the part configuration and must have the resiliency and durability to maximize part rigidity and reduce vibration. A good technical source for gasket material and usage is at www.allstaradhesives.com.

After the proper gasketing material is selected, a channel should be routed into the spoilboard to establish the outside perimeter of the part and as a recessed area for application of the gasketing tape. This process allows the part to be solidly held to the table surface, and prolongs the life of tape. The source of vacuum is port holes drilled in the interior of the gasket perimeter. In order to generate a larger vacuum surface area the holes should be connected to a groove routed just inside the gasket perimeter. This provides an arterial flow to the outermost edge of the part and substantially increases rigidity **(Figure 1)**. Furthermore, the actual spoilboard is often significantly impacted when constructed of double-sided melamine board to reduce the leakage of vacuum associated with raw board materials.

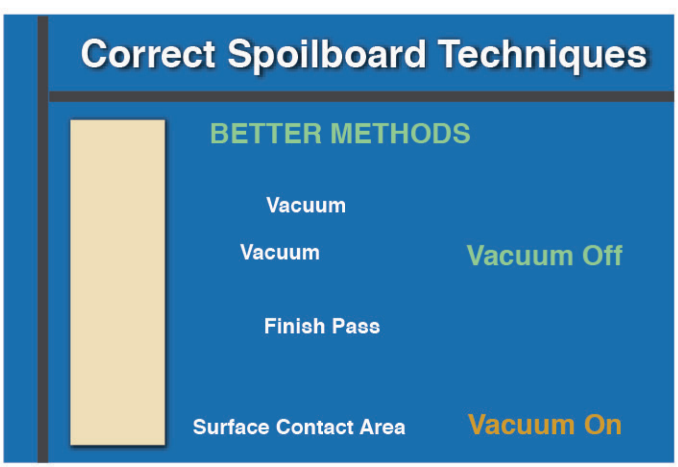

FIGURE 1: ***Correct spoilboard techniques.***

The second type of spoilboard is universal vacuum, which is also referred to as high volume, flow through or suck through vacuum.

This method distributes volume of vacuum throughout the entire surface of low or medium density spoilboard, and has gained popularity because of minimal setup time. The process is utilized to cut parts from whole sheets of raw materials, and is particularly effective on larger parts where part movement is not a major concern. However, smaller parts can become problematic with this spoilboard approach and other techniques should be employed to avoid part movement. Tab cutting and skin cutting techniques are especially effective in dealing with small parts. This involves leaving a tab or a thin layer of material on the bottom of the part to hold them together. The tab or skin portion is then removed in a secondary operation. This process is slightly more time consuming, but the final results are quality edges and less scrapped parts caused by movement during the machining process.

Since the universal vacuum approach involves high flow without the inherent benefits of dedicated spoilboards, the opportunity for leaks and subsequent part movement is always present. In order to minimize those kinds of problems, additional techniques can be applied. Rubberized paint can be applied to seal spoilboard edges. Smaller diameter tools will minimize cutting pressure and reduce larger open spaces on the cutting area. Scrap parts or plastic sheet can be used to cover open unused areas of the spoilboard when smaller than whole sheet raw material is utilized. Furthermore, the spoilboard should be surfaced with a large diameter spoilboard surfacing cutter. This process should be done initially to both sides of the spoilboardbefore actual machining of parts to increase porosity and ensure the surface of the board is flat. The cutter is continually used to maintain those two parameters and eliminate rout lines caused by the cutting tool during the machining process **(Figure 2)**.

FIGURE 2: ***These spoilboard surfacing cutters are used for surfacing MDF, particleboard and balsa core where "flow through" or "high flow" cutting is employed using large capacity vacuum pumps.***

Does the Pump Have Enough Suction?

In addition to actual spoilboard, the vacuum system should be constantly evaluated to guarantee optimum performance. Rating this system should include the following criteria:

- 400 cfm w/15in HG for flow-through systems.
- 80 cfm w/25in Hg for dedicated systems. Are supply lines large enough?
- 3 inch diameter minimum for flow-through systems, 4 to 5 inches recommended.
- 3/8 inch diameter for dedicated systems, 1/2 inch recommended.
- Are there enough vacuum sources?
- How many bends are in the supply lines?
- Are potential vacuum leak areas and unused areas sealed?

Conclusion

Regardless of which spoilboard application is utilized, it is imperative to follow good construction and enhancement techniques to ensure parts are held solidly. In the world of high-speed machining in plastics, it is the only method to produce quality parts on a consistent basis.

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