From the Centre With Steve Bader

How safe is your table saw?

The table saw is without a doubt the most common woodworking machine in the industry. Unfortunately, it is also one of the most dangerous.

A study in the U.K. in 1999 showed that 35 per cent of all accidents at woodworking machines occurred at the table saw[1]. Although proper training is first and foremost the best defence against an accident, advancements in the design and construction of the saw have also helped to prevent accidents. One such advancement, not necessarily a new one, is the riving knife.

I would hazard a guess that every table saw on every shop floor has a splitter mounted to it directly behind the blade. If not, it should. While a splitter is better than nothing, a riving knife is even better. They have been used in other countries for many years now and from far away resemble a splitter. There are, however, some notable differences between the two.

One difference has to do with the way the knife is mounted to the saw itself. It is attached to the trunnion system of the saw. This feature allows the riving knife to ride up and down with the saw blade whereas a splitter tends to remain stationary. The benefit of this is that once the riving knife is installed, it should never have to be removed.

All too often, the splitter needs to be taken off to perform a grooving or dadoing operation because the cut is not a through cut and the splitter gets in the way. If that splitter doesn't get re-installed once that operation is complete, there is potential for an accident. When the tip of the knife is set to about 1/8" below the highest saw blade tooth, it won't ever get in the way regardless of depth of cut.

The other major difference between the riving knife and splitter is that the riving knife is curved to more closely conform to the saw blade's shape. Most splitters are simply rectangular. When installed correctly, the gap between blade and knife is very small. In fact, in some parts of the world, such as the United Kingdom, this gap is regulated to no more than eight millimetres when measured at table level. Depending on the configuration of the saw, that same distance between blade and splitter can be many times greater.

Why is this blade-to-splitter/knife distance important? Well, a thin off-cut could become inadvertently rotated after the cut is made and fall into this gap. We had this exact situation occur here at the centre a few weeks ago. A 5/8" wide soft maple off-cut came in contact with the spinning blade between the upward running part of the saw blade and the splitter. The piece was then thrown violently upward into the saw guard and shattered with splinters flying everywhere. One person was slightly injured as a result.

Would a riving knife have prevented this injury? Probably, but no one knows for sure. I say probably because with a riving knife the chance of that 5/8" piece of maple coming in contact with the upward cutting teeth on the blade would be almost nil. Needless to say we are re-evaluating all of our table saws and performing retrofits where necessary. I encourage you to do the same. ww

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[1] Accidents at woodworking machines WIS7(rev1) HSE Books 1999

The CNC Shop With Tom Morin

Turn mass production into mass cutomization

Setup time is the problem. It's the reason that a 1,000-foot run of crown moulding costs about the same as a 10-foot run. It's the reason Henry Ford invented the moving assembly line. It's also the reason why he only offered the model T in black. In fact, mass production was born as a way to spread out setup time over as many units as possible. This, in turn, kept prices down.

Conventional wisdom states that batches should be as big as possible to minimize each product's setup time. This is the legacy of mass production thinking. But big batches create their own problems.

In a cabinet shop, big batches are great for material yield (thanks to optimizers), but here are the downsides:

- Lots of material handling and sorting time. The parts for a given cabinet get spread out through a batch and must ultimately get sorted back together for assembly. Few shops realize how much time is wasted searching for parts.
- Slow job progress as the whole batch must clear one department before moving on to the next.
- Lots of half finished jobs on the shop floor (work in progress) as batches queue up for processing at the next station.
- Small mistakes can get replicated on every part of the batch, causing big problems in subsequent procedures. Often the mistake is not caught until final assembly, resulting in difficult rework and missed delivery dates.
- The shop culture comes to frown upon small jobs.
- Quality is lower as employees are encouraged to focus on processing their batch, instead of the final product. Things that happen downstream are someone else's problem.
- Little flexibility to react to change once a batch is started.

"The key to eliminating setup is to use the capabilities of CNC machinery creatively."

The new problem is how to keep setup cost down, while minimizing the negative effects of mass production and large batch size. Is it possible to combine the low unit costs of mass production with the flexibility and customization of small batches?

The quest for quick and efficient product customization has been dubbed mass customization. In a nutshell, mass customization is about squeezing all the setup time out of your process so that it is just as quick to build a custom size as a standard size, and just as quick to build based on a batch of one or one thousand.

The key to eliminating setup is to use the capabilities of CNC machinery creatively. Unlike a manual tool, CNC's can set themselves up. If they have been given information ahead of time, they can work all day without wasting any time adjusting heights, moving fences, changing blades or making test pieces. Often you'll have to rethink how you build in order to take advantage of this strength.

I have often seen manufacturers using a CNC in ways that actually increase setup time. In many applications, manual machines outperform CNC's in speed and are certainly much less expensive. Remember the goal is to minimize setup and maximize flexibility.

Here are some mass customization tenets:

- use a flexible order entry system that will allow for many product options (sometimes called a configurator);
- automatically generate manufacturing information for CNC machines, with minimal or no human intervention;
- move from batch to flow manufacturing;
- eliminate all hand fitting of parts and manual customization;
- make work instructions for shop personnel easy to read and find. Customize the information to present the most important instructions for that workstation;
- think about nesting;
- reduce the number of different materials in your products; and
- standardize part configurations to work in many different products.

Mass customization is an extension of lean manufacturing that applies well to cabinet and millwork shops. Even if you don't convert your shop over to flow manufacturing, there are some valuable ideas to speed your operation and keep you out of the mass production pitfalls. ww

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