Best Practices for ripping random width lumber and creating a good glue joint

Ripping of random width lumber to create part blanks and stave material for wood products has for many years been accomplished using straight-line (single blade) ripsaws. The straight-line ripsaw provides great versatility in choosing what parts can be ripped from a random width board, but it is labor intensive and has limited production capabilities.

When production demands outgrow the capabilities of a single straight-line ripsaw, manufacturers have two options: they can add more straight-line ripsaws, with additional labor required, or upgrade to a gang ripsaw. The latter is usually recommended, and manufacturers typically start off with a 12-inch width capacity gang rip with fixed blades on the arbor.

A fixed blade gang ripsaw has some advantages and some disadvantages. Some of the disadvantages are that the gang ripsaw might not have the width capacity to have all the required sizes on the arbor and the set-up time required to change the arbor rip width configurations takes time away from producing parts. Also, the rip width combinations on the arbor may not provide good yield from random width lumber, but presorting the lumber by width prior to ripping to best utilize the different arbor set-ups will help in attaining better yields.

On the other hand, some advantages for using a gang ripsaw include the fact that the rip width accuracy and parallelism is better than a straight-line ripsaw and can allow ripping narrower moulding blanks having less moulder allowance. The primary advantage, however, is its higher production capability over a straight-line ripsaw.

One or More Moving Blades

Using a gang rip with one moving blade will provide more rip widths from which to choose. Many boards will be ripped into two or more rip widths. The moving blade pocket allows many different widths to be ripped, but the fixed pocket next to the moving blade pocket will provide a high volume of that size part. This scenario has been good for the cabinet shop that requires a high volume of stile and rail parts of the same width. Also the cabinet shop can use the moving blade pocket to rip random width parts for panel glue up staves. Ripping random width parts will increase overall yield from the lumber.

A gang ripsaw with two moving blades and one fixed blade (two variable pockets) provides solutions of great flexibility when a board provides only two net rips. Adding a second fixed blade provides a fixed pocket that can generate a third net rip. If many of the boards provide a three-rip solution, there will be a high volume of the fixed pocket rip width.

Gang ripsaws with all-moving blades provide the versatility advantages of the straight-line ripsaw and the production capability of the gang ripsaw. The ability to select the many pocket size combinations available from an all-moving blade saw can overwhelm or slow down an operator. Gang ripsaws with all-moving blades will be best utilized when integrated to a rip optimizing system. Part widths and required quantities can be input into the optimizer, allowing the gang ripsaw to rip those parts until the required

quantities are met and the part is disabled. New parts can be added to the cutlist, or parts can be removed from the cutlist in a matter of just a few seconds. The all-moving blade gang ripsaw will respond to the changes, without any set-up downtime.

Some optimizers will provide an initial solution, but allow the operator to change the solution based on wane or defects in the board if desired. The all-moving blade saw allows keeping the same combination of rips provided in the initial solution, but change the rip width positions on the board by flipping or rotating the solution. This may allow segregating a defect in a specific rip width.

Glue Joint Ripping on the Saw

With the right equipment and properly prepared material, it is possible to achieve a joint suitable for edge gluing directly off the gang ripsaw, saving time, yield, material handling, and boosting productivity. Material to be ripped must be properly kiln dried and stress relieved to industry standards and within a moisture content range of 6 to 8 percent. Material must also be surfaced on both faces to assure that ripped edges will be perpendicular to the top/bottom surfaces. The industry standard practice of "Hit/Miss" or "Skip" planing is acceptable.

A glue joint finish can be defined as follows: Ripped strips must hold a width tolerance of ±0.005 inch throughout the length of the piece. Width tolerance is best measured with a digital caliper on nominal 12-inch intervals. The ripped strips should hold straightness tolerance of ±0.015 inch in 8 feet of length. This tolerance does not include stress relieved in the material as a result of the ripping process. In addition, the ripped edge finish must not have any variance exceeding ±0.0025 inch, i.e., saw hatch marks, and must be perpendicular to the planed surface within a tolerance of ±0.0025 inch. This tolerance explains why thicker material is more difficult to maintain glue joint quality.

If there is a problem with the glue line production, correcting problems typically can be achieved by making subtle changes to variables, such as feed speeds, tooling design and gluing practices. The industry standard for the successful edge gluing is to glue material within 24 hours of the ripping process.

Typical feed speeds for glue joint production will vary between 80 to 200 feet per minute based on the machine's capability, saw blade design, type of material being processed, and other factors. A general rule of thumb is to increase feed speed when blade burnishing is present and decrease feed speed when the saw hatch is too coarse.

The method of gluing plays a role in successful edge gluing. Clamp carriers, for example, are more forgiving than RF gluing. This is because mechanical carriers clamp panels individually and clamps center themselves on each panel, applying equal pressure from both sides. RF batch presses typically have cylinders on one side and push all boards against each other so there is more potential for an accumulation of error.

Proper Adjustment Critical

It is critical that the gang ripsaw be in good condition and adjusted properly for successful glue joint production. Feed works must have a flat and true surface and the means for captivation - friction, spikes and knurling - must be suitable for proper material containment.

Other machine components such as hold-downs, dip cams and chain way also can influence feed system accuracy, and therefore glue joint production success. Hold-downs rollers must be set to rotate on a

parallel elevation to the feed bed and perpendicular to the feed direction, or the potential for "banana" cuts will occur. The means for providing the hold-down roller pressure and actuation (typically spring or air) must be smooth and consistent. Feed rolls set with excess yield, i.e., the rolls are set too far below the top of material, or excess force, can influence cut quality.

In addition, arbors must be set to be perpendicular to the feed direction with minimal runout and end play. When set at acceptable perpendicular position, an arbor will deliver a trace crosshatching on ripped strips.

Crosshatching marks result from equal "toe" and "heel" saw blade contact with the strip. When an arbor is not running in true perpendicular position, single directional hatching will appear on the ripped strip.

Arbor runout can be measured with a dial indicator on the outboard horizontal surface of the arbor. It is recommended that runout not exceed 0.002 inch. End play can be measured with a dial indicator positioned on the outboard vertical surface of the arbor shaft. It is recommended that end play not exceed 0.001 inch.

Other Factors

There are additional factors that can affect gluing success. Yearly seasonal changes can contribute to increased glue line failure rates, particularly in the spring and fall, a result of moisture and material stress issues.

Equipment such as feeding devices, infeed systems, and outfeed conveyors also can impact the glue line preparation success. Feed rolls or other feeding devices should be set to deactivate once the ripsaw feed mechanism contains the material. Any time two mechanical devices compete for containment, it can potentially have a negative affect on the joint quality and also create unnecessary machine wear.

Feed rolls can be set to deactivate via timing devices or can be equipped with a slip clutch or other mechanism, allowing the ripsaw feed works to override the feeding device. This principal also applies to any outfeed roll assemblies. It also is important that the elevation of the infeed and outfeed systems match that of the ripsaw feed works. Material should not change elevation within a distance equal to the maximum length of material to be processed. A common sign of improper feed system set-up is to have consistent flaws in the sawn edge at a similar area along the length of boards. Measuring the position of these flaws can facilitate troubleshooting by indicating where the feed system interference may be occurring.