SOFTWARE SOLUTIONS

BY PHIL ARAMAN

Future Automated Rough Mills Hinge on Vision Systems

The backbone behind major changes to present and future rough mills in dimension, furniture cabinet or millwork facilities will be computer vision systems. Because of the wide variety of products and the quality of parts produced, the scanning systems and rough mills will vary greatly. The scanners will vary in type. For many complicated applications, multiple scanner types will be used.

The scanning systems (one or multiple types of sensors) will improve the effectiveness of current processing equipment and be very consistent performers. They will also spur the development of new equipment.

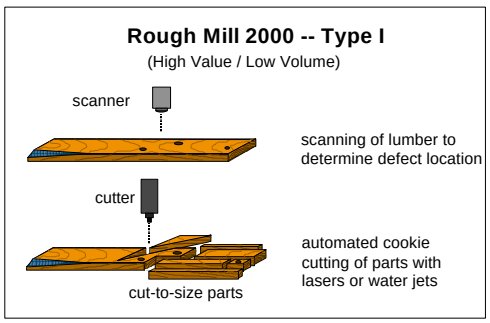
A new generation of rough mills with scanning systems tied to master computers will be developed. They will provide total production control and impressive yield improvements in the rough mill area. Cutting decisions will be coordinated. Choice will be the name of the game.

The "Eyes" have it. Computer vision systems will control rough mills, increase raw material yields, and improve product quality.

Scanning systems will allow lumber to be automatically graded, described and sorted prior to the rough mill. The systems will cull poor-quality boards, sort boards into color classes, and even sort boards into grain pattern classes if needed.

Lumber may even be purchased from sawmills with scanning systems. The lumber would be graded with NHLA rules. Each piece could be bar-coded with data on each board sent on a computer disk. The purchaser also could obtain the board data over the Internet. The seller also could offer lumber better suited to crosscut-first or rip-first processing.

Mill operations will change with master computers controlling rough mill production and providing instant information to supervisors. Scanners will provide the information to the master computer and process-control computers. They will identify defects and other objectionable board or strip characteristics that should or should not be included in cuttings. Computers will make the decisions and control rip saw and crosscut saw processing.



SOME FUTURE ROUGH MILLS

Laser/Water Jet Mill: The first mill, called Rough Mill 2000 — Type I (see this page), is designed to use laser or water-jet cutting with very small kerfs. The mill would be used to process high-valued lumber and would operate at lower-than-usual speeds. The scan data is essential input to computer programs determining cookie-cutting-type paths to obtain maximum yields. Non-rectangular parts can be made.

Box Design: The Box Design or Rough Mill 2000 - Type II (see page 36, top), a moderate-to-high volume mill, is designed to either crosscut or rip first.

While traveling around the box design, the boards are scanned, analyzed, and programmed for crosscuts or rips or multiple cuts. The remaining pieces pass to the next saw. Color and/or grain separation can be included in the processing decisions.

This mill would have tremendous flexibility to maximize yield and value in cuttings from lumber. It would be suited for processing moderate- to high-value species.

Rip First: The Rip First Design or Rough Mill 2000 – Type IIIR (see page 36, bottom), a high volume mill, will incorporate the flexibility of gang rip saws with floating or moveable blades followed by automatic chop saws.

The boards will be scanned prior to ripping and prior to chopping. Ripping decisions will consider multiple part grades and color classes while maximizing yield and value of cuttings produced. Information will be passed to the chops saws so that the

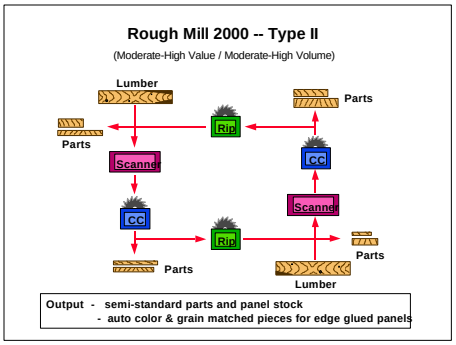
proper cuttings are produced. The strips will be rescanned prior to chopping to confirm that all defects were found. The chop saws will also produce shorts for a fingerjointing line.

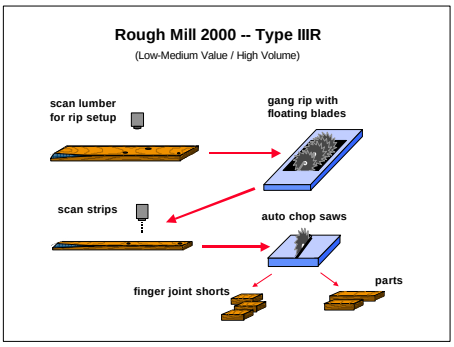
Crosscut First: Two Crosscut First Designs or Rough Mill 2000 — Type IIIC1 and Type IIIC2 are high-volome facilities like the rip first mill. They both have the traditional crosscut-first flexibility.

In mill Type IIIC1, the lumber is scanned and then cross cut based upon maximizing yield and value of potential cuttings. The controlling computer determines multiple cutting patterns prior to crosscutting the lumber into boards, The computer will consider the value of potential cuttings for different grades and even consider color. The boards will be rescanned to confirm previous scan data.

Board ripping will be done on a series of straight-line rip saws with computer controlled, moveable fences. Fingerjointing material will be produced at a salvage crosscut or at the rip saws.

The second Crosscut First Design (Type IIIC2) is similar to the Type IIIC1 mill except that the series of rip saws are replaced by a gang rip with moveable blades.





SCANNING REQUIREMENTS

Locating defects to make proper cutting decisions is very difficult. Scanning systems must be able to find, properly size and, in many cases, label the defect or characteristic by type. Determining defect type is needed when cutting multiple part grades, customizing part grades, and grading hardwood lumber. Many situations are possible and maximum flexibility is desired in the scanning system. Therefore, the ultimate scanning system should be able to find and label the following:

- Basic defects such as knots, bark, splits, checks, and holes
- Small characteristics such as bird pecks and bud traces
- Color
- Stain
- Internal defects such as honeycomb, imbedded knots , or worm holes
- Moisture content
- Texture
- Grain orientation
- Surface and edge quality

ROUGH MILL OPERATIONS WILL CHANGE

Rough mill operations will change drastically in future rough mills. Here is a quick list of future activities. The master operator is the rough-mill-area supervisor.

- Lumber is scanned, graded, bar-coded, sorted and stored for the rough mill
- The master operator deals with large cutting orders and not cutting bills
- Cutting bills are determined by computer programs based on inventory of dry lumber and projected optimum yields
- The master operator is given options on what lumber grade mixes or packages of lumber to process into the needed parts in a cutting bill
- Probable needs are periodically sent to dry or green ends for drying scheduling
- Lumber fetching information from dry area warehouse is transmitted to monitors mounted on forklifts
- Bar codes for each board are read for board data, prediction of parts yield, and checking of final results
- Scans are made between machines to control processing for maximum yields
- A master computer predicts parts production and tracks the production of parts
- New cuttings are added automatically to replace completed cuttings
- The systems will process at least 10 lengths at a time and more than one quality of part
- The system will remove crooked and cupped boards for preprocessing
- Fingerjointing of small salvage pieces will be based on value and yield

IN CONCLUSION

You haven't seen anything yet. And you won't unless you are the type willing to invest money in the future to help fully develop some of the scanning technologies or invest in technologies coming on the market today. Several commercial scanning systems are available now and the new rough mill configurations are starting to be possible. This is your chance to be a leader and secure a competitive advantage.

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