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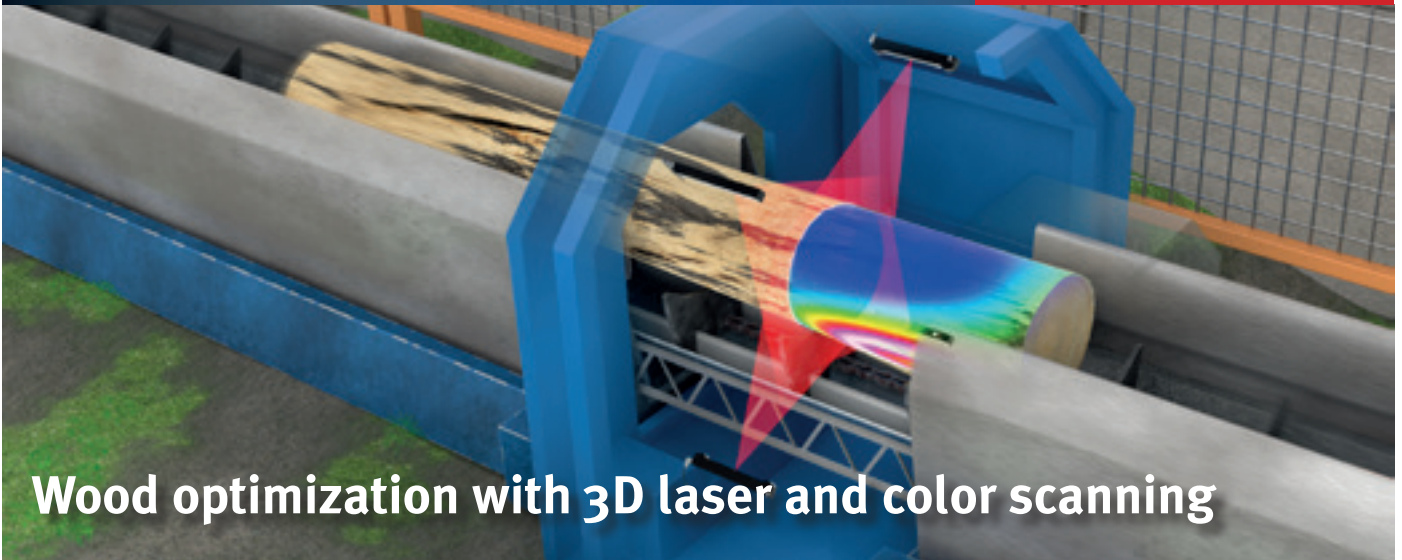
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Wood optimization with 3D laser and color scanning

Ring layout of Gocator® 2880 laser line scanners scanning a log travelling along a lineal transport system

Margins for sawyers across the world are getting tighter, making it more imperative than ever to get every cent of value out of each log processed at the mill

Increasing pressure on pricing and processing costs requires that lumber manufacturing extract maximum volume and value from every log. As a solution, 3D laser and colour scanning are able to deliver dramatic improvements in yield and value recovery.

Log optimization

Logs are cut into semi-finished boards (flitches) at up to 30 logs per minute, requiring a large amount of data to be collected and analyzed in a short time. When logs travel on a sharp chain into the mill, the typical scanner configuration mounts three, four, or more laser-line scanner heads in a ring layout spaced to provide full coverage.

As the log moves through the scan plane, a full 3D map of the log surface is generated using 3D

laser scanners. Cutting patterns are then computed and sent to a downstream gang saw that strips away the outer flitches and produces a center cant.

In headrig carriage systems (a moving platform that positions, rotates, and transports the log through a single bandsaw), multi-line laser scanner heads are mounted on one or two sides of the carriage along the entire log length, such that a single capture produces profile data every 6 in. The snapshot data is used to make decisions on the next cut for the current opening face. Moving the platform just 6 in produces even greater shape detail.

Cutting decisions are an accumulation of multiple scans and back and forth passes through the bandsaw until the final cant

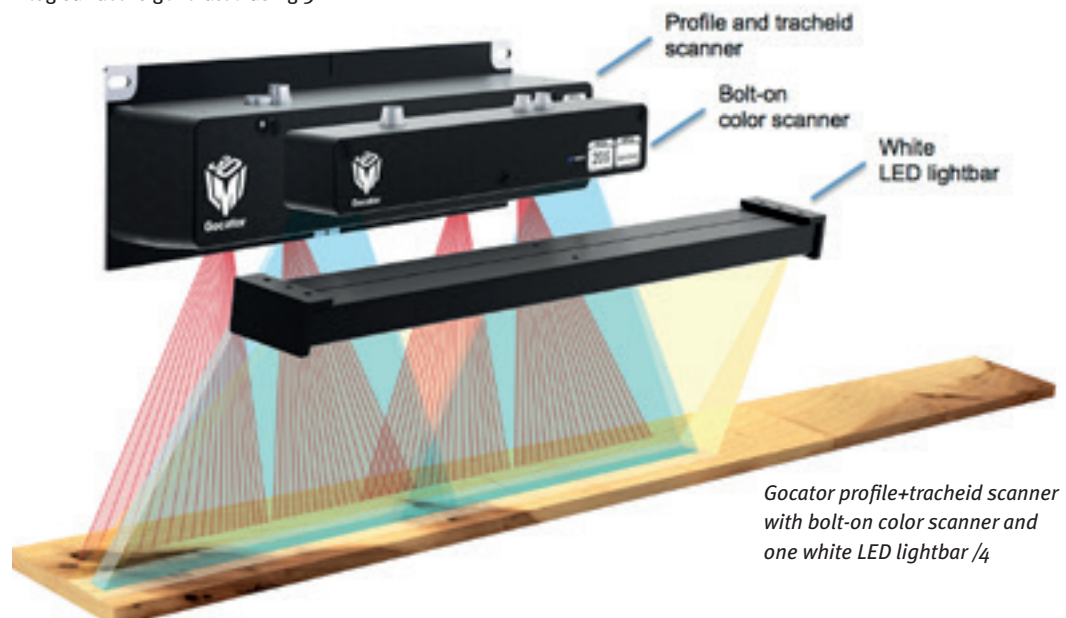
is dumped for downstream processing.

Once logs are reduced to flitches and cants, secondary operations are required to edge pieces for width then trim to length at two different machine centers—an edger and a trimmer optimizer.

Board optimization

In both edger and trimmer machine centers, transverse 3D scanning is used to digitize each wood piece and generate 3D shape, 2D surface colour, and tracheid (i.e. laser scatter effect in wood) data. This information is used to determine optimal cutting patterns to yield maximum value recovery for varying dimensions and grades.

Transverse conveyor systems use multi-point laser scanners



Gocator profile+tracheid scanner with bolt-on color scanner and one white LED lightbar /4



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mounted above and below the wood flow to build fully stitched 3D models based on the principles of laser triangulation and colour imaging running at 3 kHz. Speed of data acquisition is critical in handling typical unit rates between 70 to 300 boards per minute.

Modular board scanning systems for finished grading

With Gocator® 200 series multi-point scanners, a modular board scanning system can be easily configured to mix 3D profiles, tracheid, and color data. Color is used only on the wane-up surface, while profile and tracheid is used on both top and bottom board surfaces.

Multi-point scanning for tracheid

Not only do multi-point scanners minimize scanner frame space and capture both edges of a board, they also achieve another critical capability: Measurement of tracheid effect.

When a laser spot is projected onto healthy tracheid wood cells, laser light scatters into the cells in the direction of cell growth. If the wood fibre is dead (as in a knot), then the laser light does not scatter. This effect can be measured to identify quality wood from defective wood and even determine grain angle.



Bank of Gocator® 200 series multi-point scanners in a transverse board scanning application

Adding colour vision for defect detection

Colour scanning identifies surface defects such as knots, splits, rot, speck, beetle damage, and more, resulting in powerful grade-based recovery optimization (i.e. where lumber is cut into boards to obtain the highest grade as opposed to extracting the highest volume). Higher grade output leads to

higher dollar returns from the input wood fibre.

Colour scanning requires the addition of white light to illuminate the board surface and megapixel colour cameras to build high resolution colour images. Resolutions down to 0.25 mm are typical in today's high-performance colour scanners.

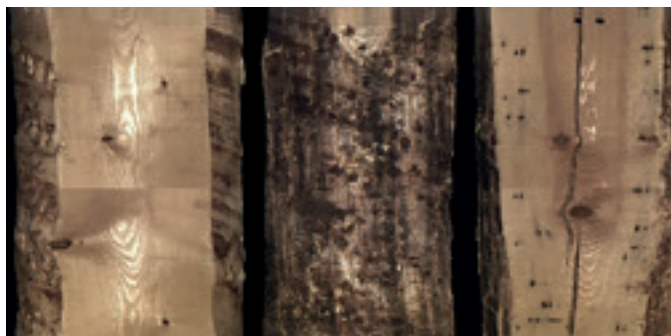
The bolt-on Gocator 205

vision module (along with a white LED light bar that is strobed to maximize efficiency and lifetime) provides Gocator® 200 scanners with color vision for detection and measurement of surface defects including knots, splits, and rot.

The future of lumber optimization with Gocator

The Gocator smart sensor feature set offers onboard processing to configure triggering, exposure, resolution, board detection, filtering, stitching, measurement, built-in communication protocols to other factory equipment using PLC protocols.

With an open source SDK, customers can build sophisticated, modular scanning solutions and deliver unique capabilities that are specific to mill requirements.



Stitched Color Images of Top and Bottom Board Surfaces

Optimise your production plan...

Optimise your operations

Material	Quantity	Material	4.5m	5.4m	6.3m	Total
AbfHslgr1	205.270	010-00001_0402		888	205	1,093
AbfHslgr1	205.270	010-00001_0402-030	1,740	888	205	2,833
AbfHslgr1	205.270	Total	1,740	1,093	205	3,038
AbfHslgr1	205.220	010-00001_0402-030	1,740	888	205	2,833
AbfHslgr1	205.220	010-00001_0402	1,740	888	205	2,833
AbfHslgr1	205.220	010-00001_0402-030-040	1,740	888	205	2,833
AbfHslgr1	205.220	Total	1,740	1,093	400	3,233
AbfHslgr1	205.230	010-00001_0402	888	1,740	888	3,516
AbfHslgr1	205.230	010-00001_0402-030	1,740	888	205	2,833
AbfHslgr1	205.230	010-00001_0402-030-040	1,740	888	205	2,833
AbfHslgr1	205.230	Total	2,868	1,740	400	5,008
AbfHslgr1	205.240	010-00001_0402-030	1,740	888	205	2,833
AbfHslgr1	205.240	010-00001_0402	1,740	888	205	2,833
AbfHslgr1	205.240	010-00001_0402-030-040	1,740	888	205	2,833
AbfHslgr1	205.240	Total	3,220	1,676	400	5,296
AbfHslgr1	205.250	010-00001_0402	1,740	888	205	2,833
AbfHslgr1	205.250	Total	1,740	1,676	205	3,621
AbfHslgr1	205.260	010-00001_0402	1,740	888	205	2,833
AbfHslgr1	205.260	010-00001_0402-030-040	1,740	888	205	2,833
AbfHslgr1	205.260	Total	3,480	1,676	400	5,556
AbfHslgr1	205.270	010-00001_0402-030-040	1,740	888	205	2,833
AbfHslgr1	205.270	010-00001_0402	1,740	888	205	2,833
AbfHslgr1	205.270	Total	3,480	1,676	400	5,556

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