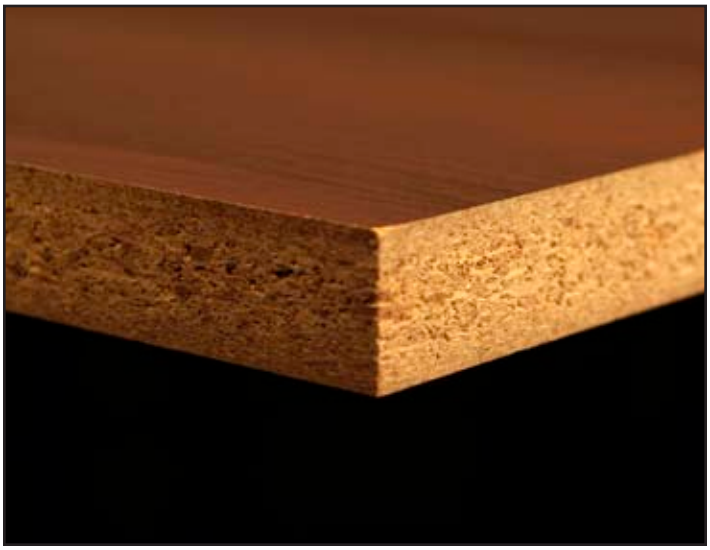
Glue Area Percent in Engineered Wood

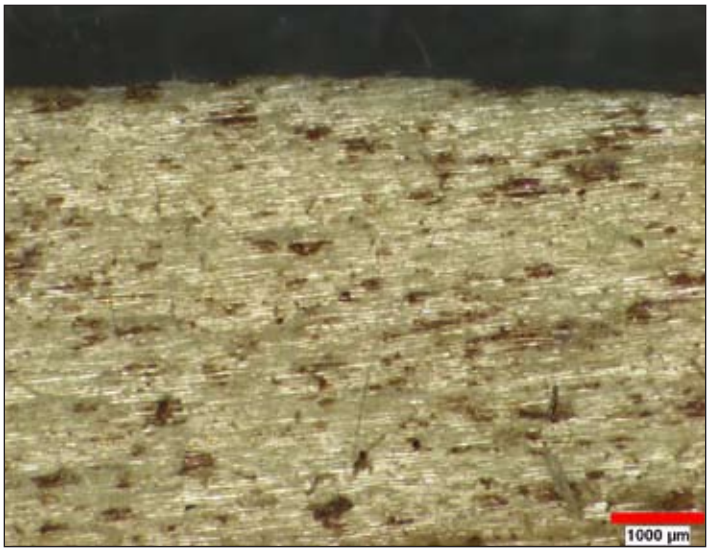
Image Analysis by microscopy

Meeting performance requirements and standards in the composite wood industry requires solutions that are precise and easy to replicate. Strength and stress tests are only one part of the process. When it comes to analyzing the boards' glue to wood ratio, Clemex's Vision PE image analysis system is the preferred solution.

Wood is one of the mainstays of the world's economy. One of its primary uses is as fuel, but for millennia wood has been used as a construction material. From the paper we write on to the houses we live in, wood is the number one recyclable resource in the world. Not only is wood the single major renewable building material, it also requires less energy to manufacture than any other building material. Wood is strong, lightweight and easy to manufacture into new products such as engineered wood.



Piece of engineered wood



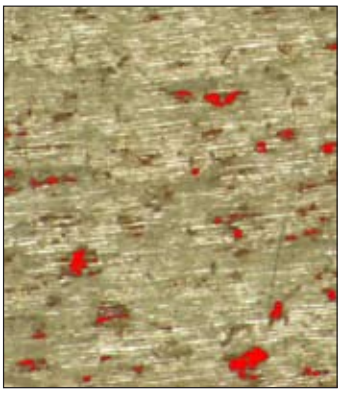
A typical field of view.

Typically, engineered wood products are made from hardwoods and softwoods: whole logs are usually used for veneers, like plywood, while sawmill scraps and other wood waste are used for particle boards or Oriented Strand Boards (OSB), like aspenite.

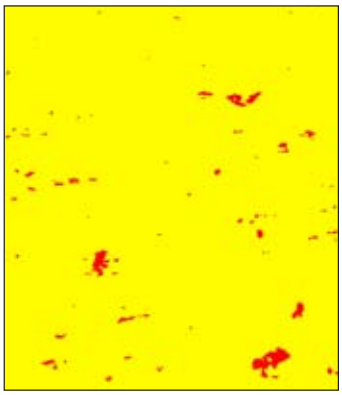
As its name implies, aspenite is an OSB made out of the wood strands of the aspen poplar; a fast growing softwood. The strands are compressed and bonded together with wax and resin adhesives. The layers are then placed in a thermal press and compressed to a standard 15 mm panel thickness. This process sets and hardens the glue. All aspects of this entire process must be carefully controlled to ensure the correct size, density and consistency of the board (95% wood and 5% wax, resin and/or glue). The finished product has similar properties as plywood, but is uniform and cheaper. It is primarily used as sheathing in walls, floors, and roofs.

OSB and waferboards are manufactured to meet performance requirements and standards such as CSA 0325 for Construction Sheathing, or PS 2, Performance Standard for Wood-Based Structural-Use Panels in the US. For our report, Clemex was given a sample of aspenite to determine if the wood to glue ratio complied with industry standards.

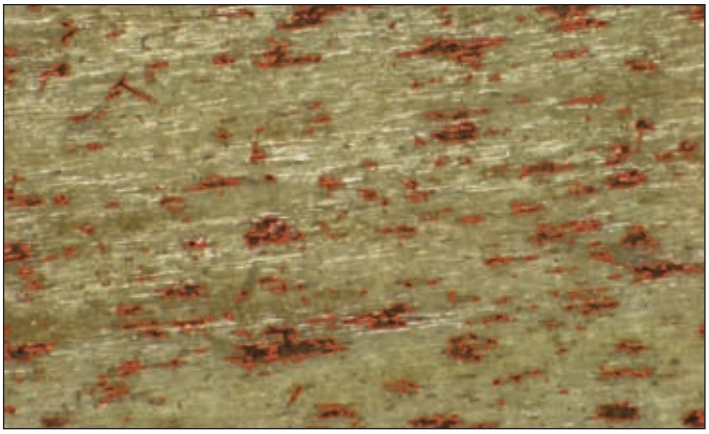
A sample of aspenite showing glue spots was submitted for analysis. Clemex Vision PE image analysis system can isolate and measure the glue (dark phase) and compare it to the aspenite.



Dark features detected in red using Color Threshold. Artifacts were eliminated.



Aspenite detected in yellow (fuzzy edges were eliminated), as measured.



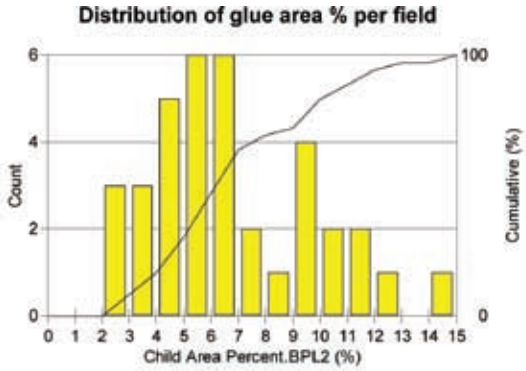
Typical field of view of glue detection.

The glue was binarized into the red bitplane. Some small artifacts were eliminated and some small holes were filled in. In a second step, the aspenite was binarized into the yellow bitplane, filled and cleaned from artifacts that could have been detected from the background (outside of the sample).

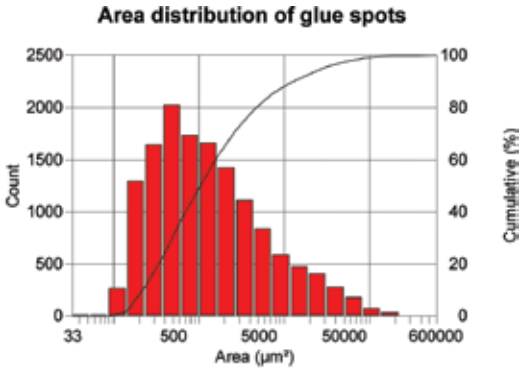
Area measurements of the glue spots and the area percentage of these same spots over the aspenite were performed. Automated statistics and graph were generated and were cumulated for the whole sample. Final results could be printed directly from Clemex Vision and were saved for further use. A customized report was built using the Report Generator module. Raw data is linked to their respective objects for validation purposes. Raw data could also be exported in Excel format.

The main concern in this analysis was to compare the glue area to the aspenite area only, even when the sample was not covering the whole field area. The problem was easily overcome by calculating the ratio of the glue over the wood instead of over the field.

Results



Count:	36	wood portions
Min:	2.43	%
Max.:	14.11	%
Mean:	6.84	%
Std. Dev.:	3.00	%
Whole analysis:	6.68	%



14099	glue spots
32.71	micron 2
527881.88	micron 2
6006.06	micron 2
20104.51	micron 2
84679382.69	micron 2