

Cameron

A U T O M A T I O N

***OPTI-MATCH:
COLOR MATCHING,
PANEL SIZING,
OPTIMIZATION SYSTEM***



Smarter Machines for Higher Yield with Less Labor

Introduction

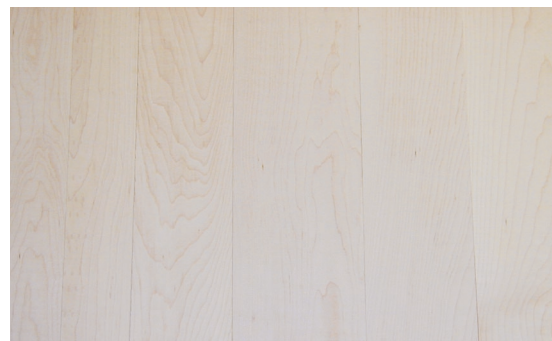


Cameron Automation introduces the Opti-Match, the only machine to completely automate the color matching process for high quality solid wood panels. The Opti-Match combines innovative scanning and sorting technology with complex computer programs to build and stack sized, color matched, and color blended panels, automatically. It completely eliminates the labor intensive and subjective job of manual color matching.

Before

Until 1988, all panels produced were sized and matched by hand. That changed when we created the Opti-Sizer. The Opti-Sizer revolutionized panel building by measuring the widths of boards and then combining the boards into panels of predetermined widths. The Opti-Sizer replaced human trial and error with computer optimization to build panels faster and with increased yield.

The Opti-Sizer produced accurately sized panels, but high quality panel producers often matched their panels for color as well as size, something that couldn't be duplicated by machine. Until now!



Color Matched Panel



Unmatched Panel

Now

Like the Opti-Sizer, the Opti-Match measures the width of each board, but the Opti-Match scans the color of the board as well. It then combines these boards into panels that are sized, color matched and color blended, and then automatically stacks the panels, ready for gluing.

Advantages

Increase Yield:

Experience has shown that manual sizing produces panels, on average, that are 1/2" or more too wide. Operators are impressed not to make under sized panels. To balance color and size, it is easier to produce a panel much wider than needed.

The Opti-Match can consistently produce panels within 1/4" of the desired size. This is a small advantage per panel but many board feet of savings per week, month, or year.

Reduce Labor:

A typical operator is capable of sizing and matching 20 panels per hour manually. With an Opti-Match, that same operator can size up to 4 panels per minute. The owners of the first Opti-Match are currently producing with one operator what used to take four operators.

Save Space:

The Opti-Match centralizes the sizing and matching into one location, replacing multiple layup tables.

Consistency:

The Opti-Match sizes and matches consistently all day long. Manual matchers vary in skill level from one to the next and may grow tired toward the end of the day. Additionally, manufacturers can now color match panels that were previously unmatched due to cost.

Some of the companies that can benefit from the advantages of the Opti-Match are:

Furniture Manufacturers
Musical Instrument Makers

Kitchen Cabinet Manufacturers
Wood Component Manufacturers
Moulding & Millwork Shops

Payback

Production:

The Opti-Match will produce on average 1260 panels per day.*

Yield Savings :

3/8" per panel. Using an average panel length of 20", yield savings will be 7.5 square inches per panel or 65.6 board feet per shift (7.5 sq. In. x 1260 panels=9450 sq. In. ÷ 144=65.6 board feet). Assuming that material cost for boards planed, ripped and chopped is 3.00/bd.. ft., Total savings in yield will be \$196.80 per day or \$47,232.00 per year based on a 240 working day year.

Labor Savings:

3 people. By replacing 3 operators whose salary, including benefits, would equal \$20,000.00 total yearly savings will be \$60,000.00

Total Savings:

\$107,232.00

Payback:

10.8 months

* Based on panels with 5 to 7 boards per panel.

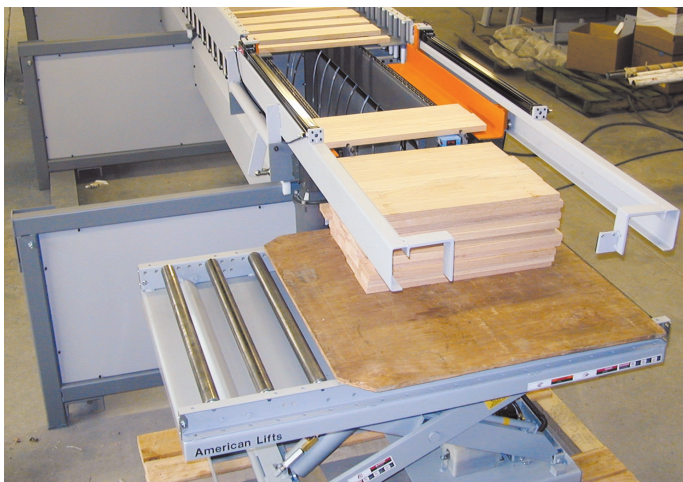
Opti-Match

The Opti-Match is the *first and only* Color Matching and Panel Sizing Machine available anywhere.

Operation

Operation of the Opti-Match is simple. The operator enters the desired panel width into the computer. The machine is quickly adjusted by a hand crank to accommodate the board length. Boards are then placed on the infeed of the machine. The Opti-Match singulates the boards and feeds them under color and width sensors. The computer uses this information to select the optimal combination of boards to build an accurately sized, color matched and color blended panel. To build the panel the Opti-Match uses a series of lifters to re-arrange the order of the boards on the conveyor. The newly arranged boards continue to travel down the conveyor to the stacker. The stacker piles the created panels into a neat stack using a self-leveling scissors lift. When the lift is full, the machine stops itself. The operator rolls the stack off the lift and raises it for the next stack.

determining which boards to use to build a panel, all while trying to keep the panel size close to the desired width and also attempting to maintain uniform color. Because of the large amount of information the operator has to process, panel building is a painfully slow operation and usually, either size or color suffers.



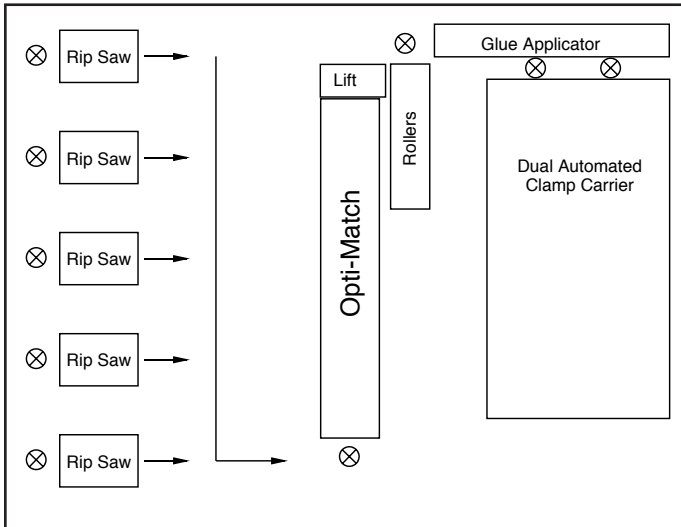
Opti-Match in Operation



Opti-Match showing two sensor heads.

Color matching is a difficult job. Since every human sees color differently, matchers are difficult to train and consistency is hard to maintain. A human matcher might consider as many as ten boards when

The Opti-Match considers twenty-two boards at a time. It uses its computer power to analyze hundreds of thousands of possible combinations, all in a fraction of a second, to determine the best combination of boards to match both size and color. The computer then uses complicated color algorithms to arrange the boards in the order that best blends the colors. All of this is done very quickly. The Opti-Match allows one untrained operator to match and size panels at the rate of four trained matchers... consistently all day long.



Typical Chop First Factory Layout. Material is fed to the Opti-Match from the Straight Line Rip Saws.

Chop First

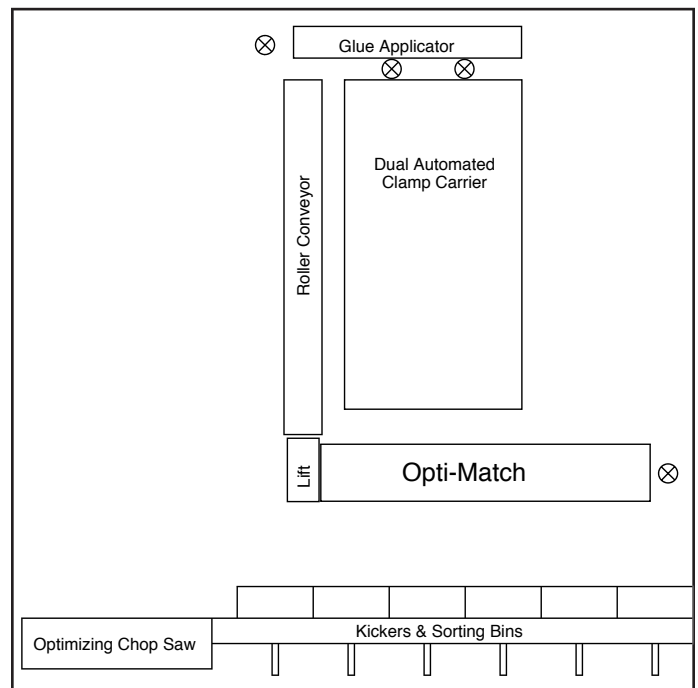
Many operations plane kiln dried lumber and then proceed to the chop saw for defecting. Once the material is chopped, it is brought to a number of straight line rip saws to further defect and rip the boards into correct widths for parts as well as for gluing into panels. Material from the Straight Line Rip Saws is placed on carts or conveyors. From there, it is brought to a sorting area where parts are separated by job and/or length. Several operators are then needed to size/color match panels and place them onto carts or a conveyor. The panels are then brought to the gluing area for gluing.

By placing the Opti-Match between the rip saws and the gluing area, labor and floor space can be reduced. Material flow is more linear and efficient. Panel sizing is optimized for higher yields and color matching is more consistent.

Rip First

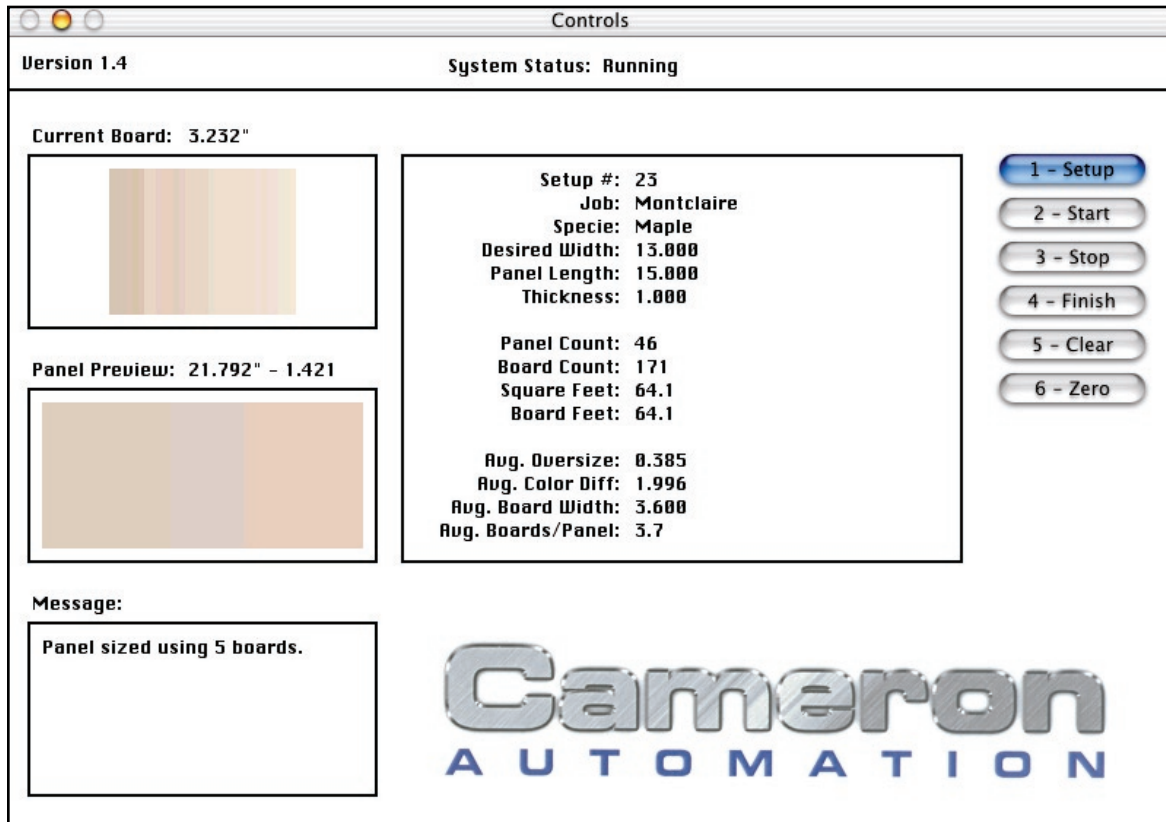
A high number of woodworking plants will rip material before cutting to length. In these instances, kiln dried lumber is planed and then fed to a Gang Rip Saw by either an operator or a rip optimization system to rip material for size as well as to rip out defects. It will then proceed on to several operators who will mark material for further defecting and the material will proceed to one or more optimizing chop saws to cut material to length. The kickers on the out feed of the saw will kick the different length boards into a number of bins based on size. Operators will then place material on carts or roller conveyors to be sent to a sizing/color matching area where several operators arrange the boards into panels.

The Opti-Match can be placed near the out feed of the optimizing chop line reducing the buffer area of material. The Opti-Match will reduce labor and floor space required for such an operation. Yields will be higher and panel color will be consistent.



Typical Rip First Factory Layout. Material is fed to the Opti-Match from the Optimizing Chop line.

Opti-Match Software



Screen Shot of Opti-Match in Operation

The software is designed to have high technology features to complete complicated tasks and keep the user interface simple so that any operator can use it without formal training. A simple menu system that can be accessed by either a click of the mouse or pressing a key on a the keyboard enables the operator to quickly set up and run the Opti-Match. The software includes a complete set of features such as production reports, production tallies (including: panel/board count, board/square footage), yield, scalable color importance, edge matching, end matching, entering multiple panel widths, and stacking multiple panel sizes.

Network capabilities enable personnel to monitor operations, download and print production reports, change setups, and even operate the Opti-Match from anywhere Ethernet access is provided.

Software Includes:

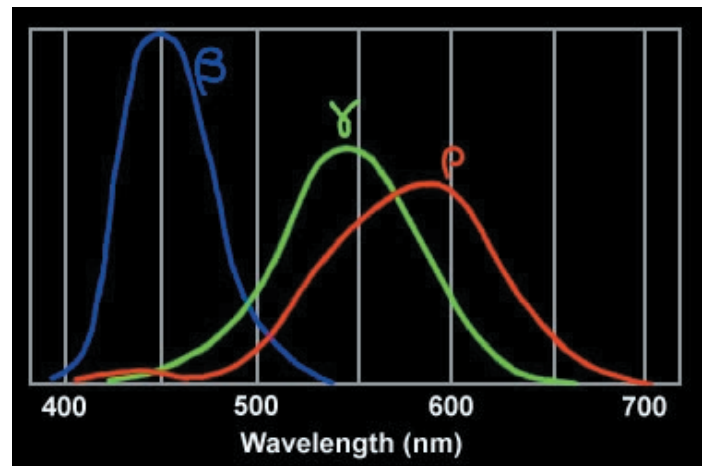
- **Intuitive Operator Interface**
- **Production Tallies with:**
 - **Panel/Board Count**
 - **Board/Square Footage**
 - **Yield**
- **Scalable Color Importance**
- **Edge Matching**
- **Multiple Panel Widths**
- **Smart Stacking of Multiple Width**
- **Networking**

Color Fundamentals

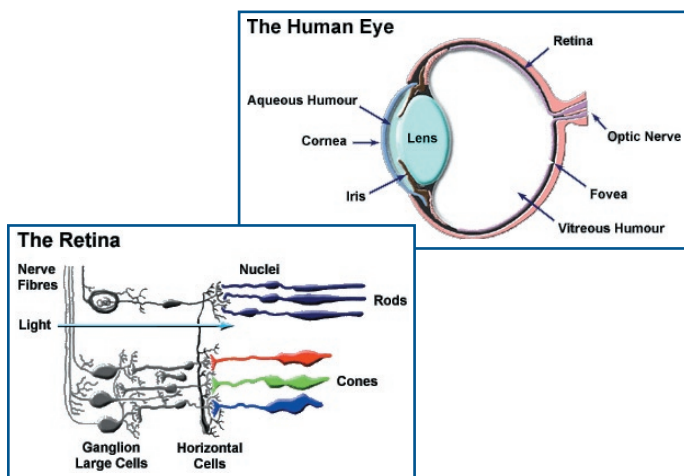
Color is most often thought of as a rainbow containing all of the colors of the visual spectrum. It is perceived as the order of colors being ROYGBIV (red, orange, yellow, green, blue, indigo, violet). These colors correspond to the various wavelengths of light produced.

The human eye detects these various wavelengths using color receptors called “cones.” Our eyes have three types of cones. Each type of cone is sensitive to a particular range of wavelength of light. One type has peak sensitivity to the red area of the spectrum, one to the green area, and one to the blue area. The light entering the eye may be composed of multiple wavelengths which means that more than one type of cone is excited at a time. The human brain receives signals from these cones and perceives a particular color depending on the combination of signal levels from these different types of cones.

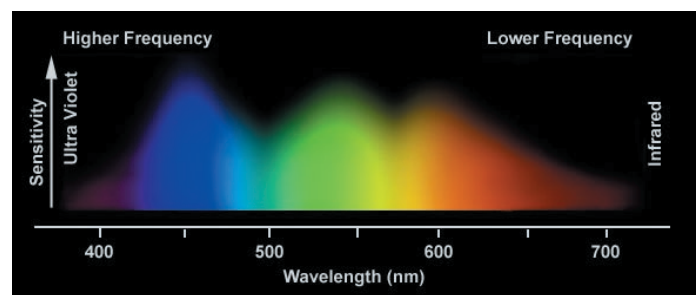
three types of cones, we need three values to describe how the eye is stimulated by a particular color. This means that color is basically three dimensional.



This three dimensional nature of color makes color matching a difficult task. We can't simply think in terms of blending from light to dark. Instead, we need to think of each color in a three dimensional color space and then calculate the optimal arrangement of boards to minimize the color variation between each board and it's neighbor. Add this to the fact that every person perceives color slightly differently and we can see why this is a process best left to a computer.



The colors in the rainbow are “monochromatic”, meaning that they each contain only one wavelength of light. When multiple wavelengths of light are combined, more than one type of cone is stimulated and the human brain interprets the color. Most of the colors we see aren't in the rainbow because they are actually combinations of wavelengths (like brown or gray). When all wavelengths are received at the same time, we perceive “white”. Since the eye has



Specifications

Dimensions:

Overall Height: 54" (1372 mm)
Overall Width: 72-1/2" (1842 mm)
Overall Length: 27' 2" (8.28 Meters)

Specifications:

Minimum Board Length: 10" (254 mm)
Maximum Board Length: 66" (1676 mm)
Maximum Board Width: 6" (152 mm)
Minimum Board Width: 1" (25.4 mm)
Maximum Thickness: 8/4" (51 mm)
Maximum Panel Width: 36" (914 mm)
(Optional 42" (1067 mm))

Power Requirements: 3 phase power
Productivity: 3-8 Panels/Minute

