

Cut Optimization Viewer

User Manual

Version 1.0

Complete Guide to Viewing and Editing Cut Optimization Results

Table of Contents

1. Overview
2. Interface Layout
3. Navigation Controls
4. Viewing Modes
5. Edit Mode Features
6. Keyboard Shortcuts
7. Mouse Operations
8. Visual Indicators
9. Information Panel
10. Menu Reference
11. Workflow Examples
12. Tips and Best Practices
13. Troubleshooting
14. Technical Notes
15. Glossary

1. Overview

The Cut Optimization Viewer is a specialized tool for viewing and editing cutting optimization results. It provides visual representation of panel layouts, cutting patterns, and material utilization, with advanced features for modifying and optimizing cutting layouts interactively.

2. Interface Layout

Main Window Components

The viewer is divided into several key areas:

- 1. Left Panel** - Material and item lists
- 2. Center Panel** - Visual preview of cutting layouts
- 3. Right Panel** - Information display
- 4. Top Toolbar** - Navigation and mode controls
- 5. Menu Bar** - File, Tools, and Edit menus

3. Navigation Controls

Material Navigation

Located at the top-left of the window:

▣ (First) - Jump to first material

▣ (Previous) - Go to previous material

▣ (Next) - Go to next material

▣ (Last) - Jump to last material

Material Info Label - Shows current material (e.g., "Material 1 of 5")

Panel Navigation

Located at the top-center of the window:

▣ (First) - Jump to first panel

▣ (Previous) - Go to previous panel

▣ (Next) - Go to next panel

▣ (Last) - Jump to last panel

Panel Info Label - Shows current panel (e.g., "Panel 3 of 12")

4. Viewing Modes

Normal Mode (Default)

Display:

- Shows one panel at a time centered in the preview area
- Auto-scales to fit the window
- Displays items with their board numbers (#1, #2, etc.)
- Shows merged cuts with labels (M#1, M#2, etc.)

Features:

- Click on items to view details in the Info panel
- Navigate between panels using panel navigation buttons
- Navigate between materials using material navigation buttons

Edit Mode

Activation: Click the **EDIT** button in the top toolbar to enter Edit Mode.

Display:

- Shows THREE panels side-by-side:
 - **Left:** Previous panel (if available)
 - **Center:** Current panel (highlighted)
 - **Right:** Next panel (if available)
- Each panel has a 5-pixel margin and 10-pixel spacing between panels
- Panels are rendered with borders and labels

5. Edit Mode Features

5.1 Selection Tools

Single Item Selection:

- Click on any item, merged cut, or remnant to select it
- Selected items are highlighted with a red rectangle
- Click anywhere else to deselect

Area Selection:

- Menu: Edit → Area select (or use toolbar button)
- Action: Click and drag to create a selection rectangle
- Result: All items FULLY inside the rectangle are selected
- Validation: Selection is only allowed if selected items can be moved as a clean unit
- Cancel: Press ESC key to cancel area selection

5.2 Moving Items

Single Item/Merged Cut Move:

1. Click and hold on an item or merged cut
2. Drag it to a new position (within current panel or to adjacent panels)
3. A blue rectangle appears showing where the item will be placed
4. Release mouse button on a valid remnant (unused space) to place
5. If no valid remnant, the move is cancelled

Cross-Panel Moves:

- Items can be moved between the three visible panels
- The system automatically transfers items and manages remnants

5.3 Rotation During Move

How to Use:

1. Start moving an item (single or merged cut)
2. Press SPACE BAR while moving to toggle rotation
3. The blue preview rectangle rotates 90° to show the new orientation
4. Release to place the item in the rotated position

Behavior:

- Single items: Width and height are swapped, rotation property is toggled
- Merged cuts: Entire structure rotates around the parent's origin point

5.4 Flip Operations

Menu: Edit → Flip X or Edit → Flip Y

Flip X (Horizontal Flip):

- Mirrors selected items/cuts across vertical axis
- X positions are recalculated

Flip Y (Vertical Flip):

- Mirrors selected items/cuts across horizontal axis

- Y positions are recalculated

5.5 Remnant Management

Automatic Remnant Handling:

- When an item is moved FROM a position → Remnant created at source
- When an item is placed ON a remnant → Remnant is split into two smaller remnants
- System maintains minimum blade thickness clearance

Remnant Drag-to-Merge:

1. Click and hold on a remnant
2. Drag toward another remnant
3. If remnants touch and share an edge → they merge
4. Green highlight appears on target remnant during drag
5. Release to complete the merge

6. Keyboard Shortcuts

Key	Action	Context
SPACE	Toggle rotation	During item move
ESC	Cancel operation	During move or area selection

7. Mouse Operations

Normal Mode:

- Left Click on item → Select and show info

Edit Mode:

- Left Click on item/cut/remnant → Select (red highlight)
- Click + Drag on item → Move to new position
- Click + Drag on remnant → Drag to merge with another remnant
- Click + Drag in empty space (with Area Select active) → Create selection rectangle

8. Visual Indicators

Colors and Highlights:

Normal Mode:

- Items: White fill with black border
- Merged cuts: White fill with black border
- Labels: Black text showing board numbers (#N) or merged labels (M#N)

Edit Mode:

- Red Rectangle - Selected item/cut/remnant
- Blue Rectangle - Preview of item being moved
- Green Highlight - Target remnant during drag-to-merge
- Black Dotted Rectangle - Area selection box (during drag)

9. Information Panel

Located on the right side, displays details about selected items:

Item Information:

```
=== ITEM (BOARD) ===  
Board #5  
Dimensions: 1200.0 x 800.0 mm  
Position: (150.0, 200.0)  
Area: 0.96 m2  
Rotated: Yes
```

Merged Cut Information:

```
=== MERGED CUT ===  
Position: (0.0, 0.0)  
Dimensions: 2400.0 x 1200.0 mm  
Area: 2.88 m2  
Contains Board: #3
```

Remnant Information:

```
=== REMNANT ===  
Position: (1500.0, 800.0)  
Dimensions: 900.0 x 400.0 mm  
Area: 0.36 m2  
Status: Unused material
```

10. Menu Reference

File Menu:

- Exit - Close the viewer

Tools Menu:

- Edit Cut - (Feature for external cutting editor)
- Flat Test - (Testing feature)

Edit Menu:

- Area select - Activate area selection mode
- Flip X - Flip selected items horizontally
- Flip Y - Flip selected items vertically

11. Workflow Examples

Example 1: Moving a Single Item to Another Panel

1. Click EDIT button to enter Edit Mode
2. Click on the item you want to move (it highlights in red)
3. Click and drag the item
4. Drag it to the left or right panel
5. A blue rectangle shows where it will be placed
6. Release on a valid remnant (unused space)
7. The item moves to the new panel

Example 2: Rotating an Item While Moving

1. Click EDIT button
2. Click and drag an item to start moving
3. While dragging, press SPACE BAR
4. Blue rectangle rotates 90° showing the new orientation
5. Release to place the item rotated

Example 3: Moving Multiple Items Together

1. Click EDIT button
2. Click Edit → Area select
3. Click and drag a rectangle around the items you want to select
4. All items FULLY inside the rectangle are selected (red highlights)
5. Click and drag any selected item
6. All selected items move together as a unit
7. Release on a valid remnant to place them all

Example 4: Merging Remnants

1. Click EDIT button
2. Click and hold on a remnant
3. Drag it toward another remnant
4. When they touch, the target remnant highlights in green
5. Release to merge them into one larger remnant

12. Tips and Best Practices

Selection Tips:

- For small remnants or items near edges, click precisely
- Use Area Select for moving multiple related items
- Check the Info panel to verify you selected the right item

Moving Tips:

- Watch the blue preview rectangle to see exactly where the item will land
- If the move is invalid, the blue rectangle won't appear
- Cross-panel moves work seamlessly - just drag to adjacent panels
- For rotated items, the system checks if the ROTATED dimensions fit

Remnant Tips:

- Merge adjacent remnants to create larger usable spaces
- The system prevents merges that would violate blade thickness clearance
- Drag-to-merge is faster than manual remnant editing

Performance Tips:

- Edit Mode renders three panels - use Normal Mode for faster navigation
- Use panel navigation to jump through many panels quickly
- Material navigation lets you switch between different materials

13. Troubleshooting

Problem: Can't select item near the edge

Cause: Clicking outside the item bounds

Solution: Click more toward the center of the item

Problem: Move cancelled when I release

Cause: No valid remnant at the drop location

Solution: Target position must have enough empty space

Problem: Area selection doesn't work

Cause: Selected items can't move as a clean unit

Solution: Adjust selection rectangle to include only items that form a complete block

Problem: Rotation doesn't work

Cause: Trying to rotate after releasing the mouse

Solution: Press SPACE BEFORE releasing the mouse button

Problem: Remnant won't merge

Cause: No shared edge or insufficient clearance

Solution: Remnants must touch on an edge and have clearance from items/cuts

14. Technical Notes

Coordinate System:

- Origin (0,0) is at top-left of each panel
- X increases to the right
- Y increases downward
- All measurements in millimeters (mm)
- Positions and dimensions are floating-point values

Blade Thickness (Pila):

- Minimum clearance required between items
- Used in remnant merge validation
- Smart alignment allows gap up to 3x Pila

Panel Structure:

- Each panel can contain:
 - Items (individual boards)
 - Merged cuts (hierarchical cutting structures)
 - Remnants (unused material areas)
- Items and cuts are rendered with board numbers
- Remnants are rendered as empty white space

15. Glossary

Item (Board) - Individual piece to be cut from the panel. Has properties: position (x,y), dimensions (w,h), rotation flag (rot), board number (rb).

Merged Cut - Hierarchical structure representing nested cutting operations. Can contain child items, bottom cuts, and right cuts.

Remnant - Unused material area on a panel after items are placed. Can be merged with adjacent remnants to create larger usable spaces.

Panel - A sheet of material (board, plywood, etc.) on which items are arranged for cutting.

Pila - Blade thickness; minimum clearance required between cuts.

SpojenoLIPovecano - Boolean flag indicating if an item is part of a merged cutting structure (true) or standalone (false).

Area Selection - Rectangular selection tool for selecting multiple items simultaneously.

Cross-Panel Move - Moving items from one panel to another (previous/current/next).