

Get started with



Creator's Field Guide

Spring 2022 Edition

Welcome to [CLO](#)!

Use this guide as a reference as you learn the program.

All of the information here can be referenced in more detail online;

[CLO Online Manual](#)

[CLO You Tube Channel](#)

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1 | Foundations

Interface Overview

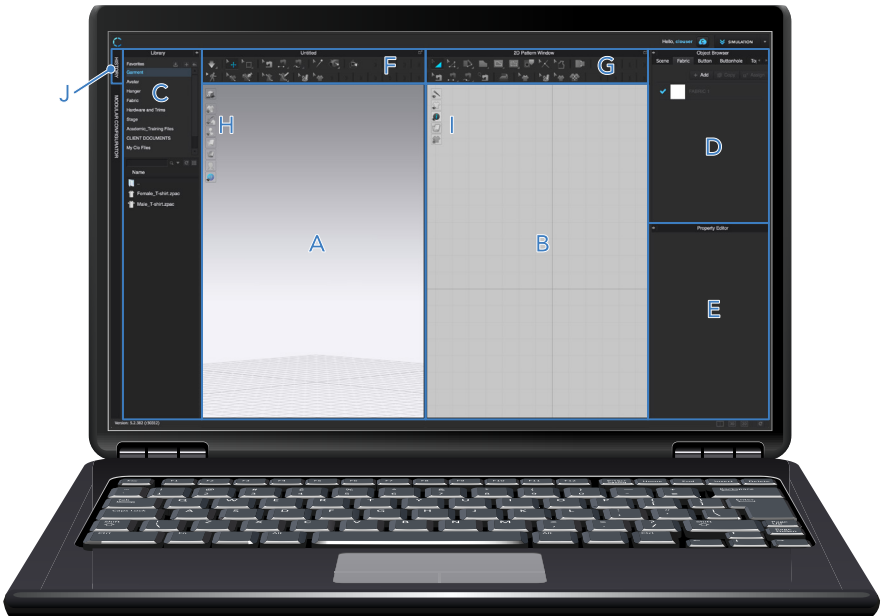
Navigation & Selection

Arrangement & Avatar

Simulation

Sewing

1 | INTERFACE OVERVIEW



Customize the workspace as needed. Use the icons located in the bottom right of the screen environment to change the view between the 3D and 2D windows, or return to the default layout.

1 | INTERFACE OVERVIEW

SCREEN ENVIRONMENT

- A** 3D Garment Window
Arrange, drape & visualize 3D garment
- B** 2D Pattern Window
Create and edit patterns, sewing, topstitching & puckering
- C** Library (Show/Hide Y)
Access default Avatars & link commonly used folders to CLO Library for quick access
- D** Object Browser
Access fabrics, buttons, buttonholes, topstitches, puckering & point of measure
- E** Property Editor
Edit properties of all objects, options will change based on selection
- F** 3D Toolbar
Access and control main 3D tools
- G** 2D Toolbar
Access and control main 2D tools
- H** 3D Vertical View Toggle Toolbar
Toggle components, views, rendering styles, fit maps for the 3D garment & avatar
- I** 2D Vertical View Toggle Toolbar
Toggle sewing, pattern, information and fabric displays, and pattern locks
- J** History
Access 3D State or return to an earlier point of the 3D design process

Tools are grouped by function. A selected tool will highlight blue and the background to dark gray. Not sure which tool to use? Refer to the Tool Index or hover over a Tool and refer to the tooltip.



1| INTERFACE OVERVIEW

LIBRARY



The Add button will link a folder to the Library. Navigate to the desired folder, click on it, and then click on Select Folder. The folder will always be linked to the Library unless it is deleted or the Library is reset. To remove a folder, right-click on the folder and click on Delete.



The Refresh button will update a linked folder. Any added files will appear.



Use the Reset function to return to default settings. This will remove any custom linked folders.



Download button: receive additional default assets to the Library (poses, shoes, etc.)



List View will organize the Library menu in list format.



Icon View will organize the Library with icons of each folder.

OPEN FILES

Double-click, or drag & drop files directly into the workspace from the Library to open. right-click on files in the Library to add them to the existing file.

To open files manually, go to File > Open or use the CTRL+O shortcut.

SAVE FILES

There are two main file types:

Project file (ZPRJ)-this is the default saving file type and includes the garment, avatar info, and all other modes. ZPRJ is a larger file type.

Garment file (ZPAC)-this will only save the garment info-the avatar or other mode info will not be included. ZPAC is a smaller file type.

CTRL+S-Save current format

CTRL+SHIFT+S-Save-As a new format

1 | INTERFACE OVERVIEW

UNDO (CTRL+Z) & REDO (CTRL+Y)

UNDO will go back to the previous action, while REDO will restore the undone action in the program.

IMPORT / EXPORT

CLO can import or export in a variety of different file formats. Go to File > Export, Import or Import (Add) in the Main Menu to select a variety of formats:

- **PATTERN OUTLINES** | DXF-AAMA or ASTM
- **BILL OF MATERIALS** | XML
- **3D OBJECT FILES** | OBJ, FBX, LKO, Alembic
- **ANIMATION FILES** | Maya Cache, Point Cache 2, MDD Cache, OBJ Sequence
- **FABRIC & TEXTURE** | XTex, Normal & Secular Maps, Adobe Substance SBSAR, JPEG, PNG, PSD, AI, TIFF

To retain transparency of a print: save & import as a PNG

- **ARTWORK / GRAPHICS** | JPEG, PNG, AI, PDF, PSD

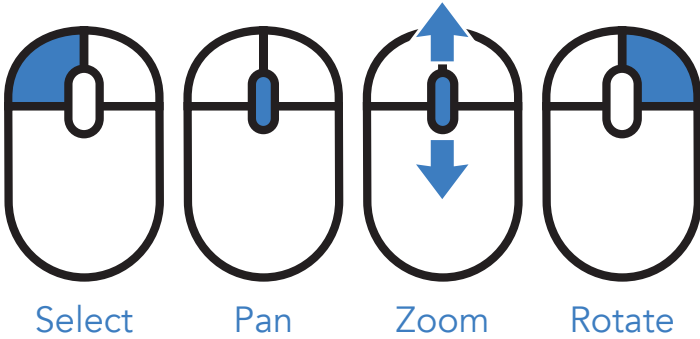
To retain transparency of a graphic: save & import as an AI or PNG

- **COLOR PALETTES** | ACO & ASE-Color Consistency Standard: RGB
- **TRIMS / HARDWARE** | OBJ

CLO auto-saves in the background just in case of program crash or unexpected error! When re-launching the program, a pop-up will allow the auto-saved file to be opened.



1 | NAVIGATION & SELECTION



3D WINDOW

Pan

Hold down scroll wheel, then move mouse in any direction

Zoom

Scroll toward the screen to zoom out, scroll away from the screen to zoom in

Rotate

Hold right-click and move mouse in any direction to rotate

2D WINDOW

Pan

Hold down scroll wheel, then move mouse in any direction

Zoom

Scroll toward the screen to zoom out, scroll away from the screen to zoom in



There is a right-click menu for just about everything! Right-click on patterns, toolbars, avatars, and window backgrounds for additional functions and options.

SELECT/MOVE (Q)

Select and move patterns in the 3D window.

- Patterns will be highlighted in yellow when selected
- Hold to select and deselect multiple patterns
- Use the Gizmo to precisely control movement of one or more pieces
- Use CTRL+A to select all patterns in the 3D window
- Click anywhere in the 3D window background to deselect all pieces

TRANSFORM PATTERN (A)

Select, transform, and move patterns in the 2D window.

- Scale and rotate individual or multiple pattern pieces
- Use CTRL+A to select all patterns within the 2D window
- Hold to select/deselect multiple pattern pieces
- Click & drag to use marquee to select multiple pieces at once

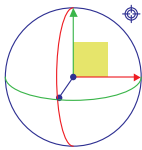
Functions are tool specific; make sure to use the correct tool. For example, the **Transform Pattern Tool** will not select pattern segments or points. This selection is possible with the **Edit Pattern Tool**.



THE GIZMO

The Gizmo allows very specific control of pieces within the 3D window.

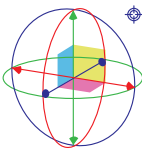
- Utilize the Gizmo when Arrangement Points do not offer enough precision
- The Gizmo only appears when Simulation is off
- Lines move the object along the x, y, z axes
- Circles rotate the object along the x, y, z axes
- The yellow square moves the object
- The location of a pattern or object when it is selected becomes the axis of rotation



Screen Coordinate Gizmo:

Based on the camera axis. Change the camera view in order to change the gizmo axis.

Selected object moves along with the camera axis.

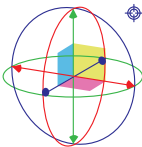


Local Coordinate Gizmo:

Based on following the native direction

of an object. Mainly usable when designing poses from the avatar's X-ray joint points. Selected object

moves to native direction of an object.

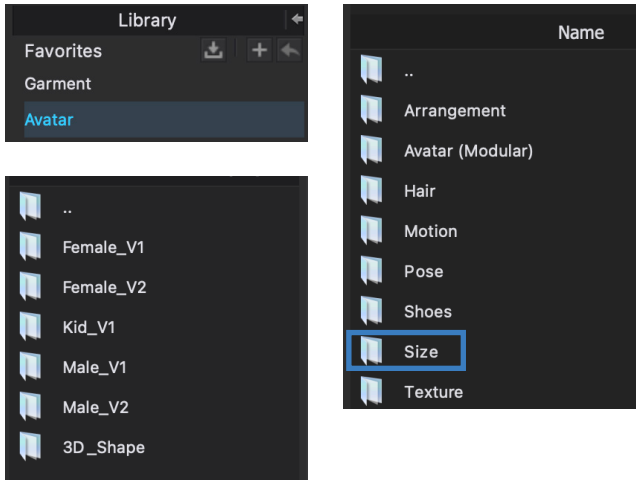


World Coordinate Gizmo:

Based on 3D space regardless of screens or objects.

Selected object moves along the grid axes.

1 | ARRANGEMENT AND AVATAR



ADDING AN AVATAR

Menu

File > Add > Avatar

Library

Select an avatar from the CLO Library Avatar folder.

CHANGING AVATAR SIZE

Library of ASTM Sizes

Locate the Size folder within the corresponding folder of the Avatar that is in the workspace.

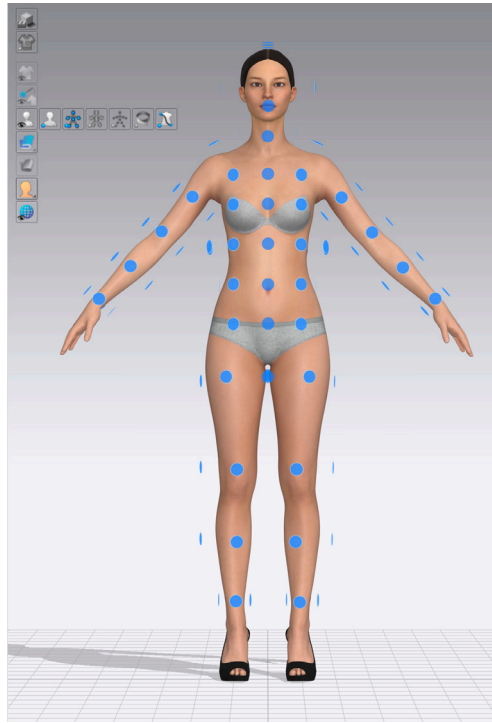
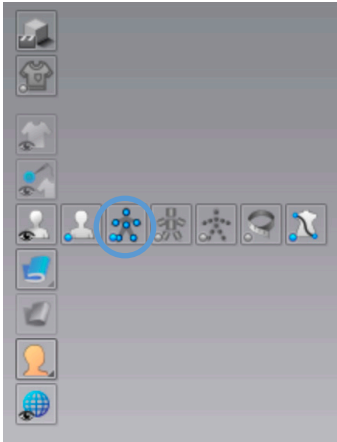
Double click on the size and it will apply to the avatar.

Menu

Avatar > Avatar Editor

Create and save out custom avatar sizes. For more information about the Avatar Editor, [please check out our Avatar Editor guide!](#)

1 | ARRANGEMENT AND AVATAR



ARRANGEMENT POINTS (SHIFT+F)

Arrangement points appear as blue points around the Avatar that help quickly place pattern pieces around the body.

- Turn Arrangement Points on/off using the Vertical View Toggle menu
- Use the **Select/Move Tool (Q)** to select the pattern piece you want to arrange
- Hover over the arrangement points to see a preview shadow of the pattern arrangement
- Click on arrangement point to place the pattern piece
- Move pattern pieces out of the way of arrangement points to help easily access Arrangement Points

1 | ARRANGEMENT AND AVATAR



RESET 3D ARRANGEMENT

Resets how the patterns were arranged in the 3D Garment window with either Arrangement Points or the Gizmo tool.



RESET 2D ARRANGEMENT

Reset patterns in the 3D window to match how they are placed in the 2D window.



RE-DRAPE 3D ARRANGEMENT

Patterns are auto draped on the avatar based on its size.

- Re-drape 3D Arrangement is supported only with CLO avatars
- Adjust the avatar size after draping the 3D garment on the avatar, use this tool to reset your garment in 3D

CTRL+F Reset 2D and 3D Arrangement (Selected) Reset only selected pieces to match position placed in 3D or match location in 2D. Access this option by right-clicking pattern pieces in the 3D window.

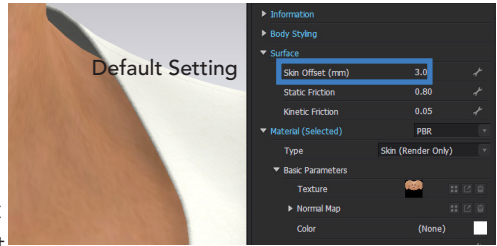


AVATAR SURFACE

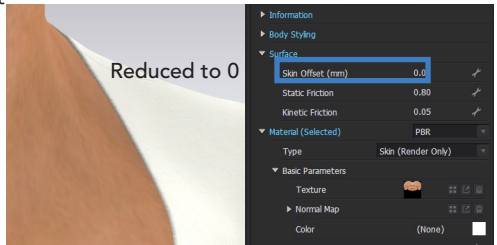
SKIN OFFSET

INVISIBLE buffer layer between the Avatar and Garment (similar to collision thickness but for Avatars/OBJs).

- Form of protection to stabilize Simulation when fabric is at a higher particle distance
- Default is set to 3 mm-can be REDUCED to 0 or 1 mm after the garment particle distance has been reduced



- Lowering the Skin Offset will allow the fabric to sit closer to the avatar



- This setting affects the entire surface of an avatar; all fabric touching the avatar skin will sit closer/farther away from the avatar

STATIC FRICTION COEFFICIENT

The force of static friction keeps a stationary object at rest. The HIGHER the value, the more stationary the garment will stay on the body.

KINETIC FRICTION COEFFICIENT

The force of kinetic friction slows down the moving object. Works in conjunction with Static Friction Coefficient. The HIGHER the value, the slower the garment will move on the avatar.

SIMULATION (SPACEBAR)

Apply gravity in the 3D Garment Window to visualize the creation in 3D.

OFF | ON



- To change the Simulation type, click and hold on the Simulation button

- The Normal (Default) Simulation icon is gray when Simulation is off, blue when on/active. You can work on the garment efficiently with fast Simulation speed

- The Fitting (Accurate Fabric) Simulation icon is gray when Simulation is off, red when on/active. Garment Simulation is more defined and fabric stretch is expressed more realistically

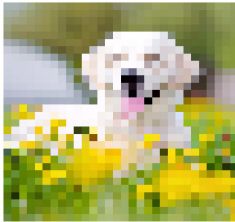
- When Simulation is off, use the **Select/Move Tool** access the Gizmo tool and move pattern pieces. When Simulation is on, use the **Select/Move Tool (hand)** to interact and adjust the garment

* Speed and efficiency of working while Simulating will also depend on the Particle Distance/Resolution of your garments; Low Particle Distance = Hi Resolution = Slower Simulation

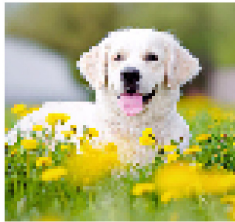
2D VS 3D RESOLUTION

In 2D applications dealing with imagery, files are made up of pixels. The higher the number of pixels, the higher the resolution of the images.

2D RESOLUTION



LOW RESOLUTION
72 DPI

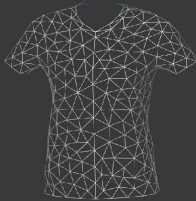


MIDDLE RESOLUTION
150 DPI



HIGH RESOLUTION
300 DPI

3D RESOLUTION (PARTICLE DISTANCE)



LOW RESOLUTION
50 PD



MIDDLE RESOLUTION
20 PD



HIGH RESOLUTION
5 PD

In 3D applications, files are made of mesh, and in CLO the mesh is triangular by default. Resolution in CLO is measured as Particle Distance. In CLO, the higher the Particle Distance the LOWER the resolution. The lower the Particle Distance, the HIGHER the Resolution, more draping details come into focus.

PARTICLE DISTANCE

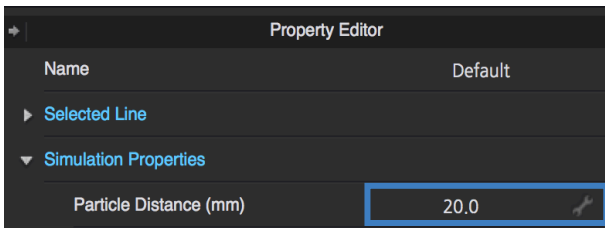
Particle Distance refers to the average distance between the points that make up the mesh of the garment.

The garment quality and Simulation speed is affected by the Particle Distance. Set the value at 20mm when making a garment and dressing it on an avatar for faster working process, and set it 5mm or under to enhance the garment quality once it is completed.

- Controls the size of each triangle that makes up the fabric mesh
- The number (mm) represents the average length of one leg of the triangle, this size is multiplied to make up the total mesh
- The HIGHER the number, the larger the mesh
- Recommended Working (Low Resolution) PD = 20, Final (High Resolution)
- For childrenswear or smaller garments, working in 10mm might also be a good option.

CHANGING THE PARTICLE DISTANCE

- Manually change Particle Distance of pattern pieces in the Property Editor under Simulation Properties
- This can be changed by selecting one or multiple pieces in the 2D or 3D windows



PARTICLE DISTANCE PRESETS

Automatically toggle between Particle Distance, Offset, and Simulation Presets quickly to ensure the 3D sample is accurate down to the wrinkle.



HIGH-RES GARMENT

Decreases the Particle Distance and Collision Thickness of the garment, decreases the Skin Offset of the avatar, changes Simulation to Fitting (Accurate Fabric).



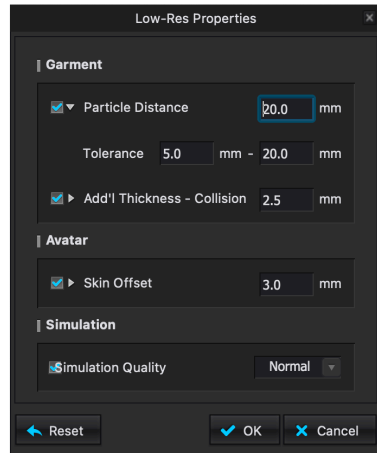
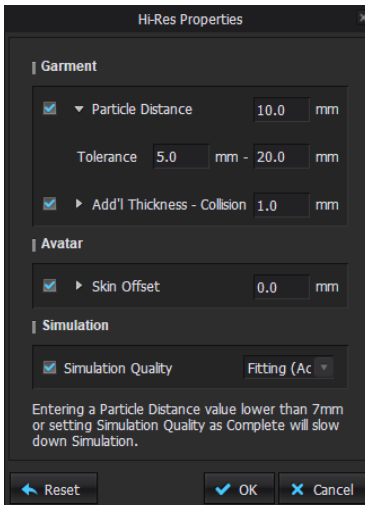
LOW-RES GARMENT

Increases the Particle Distance and Collision Thickness of the garment, increases the Skin Offset of the avatar, changes Simulation to Normal.



CUSTOM

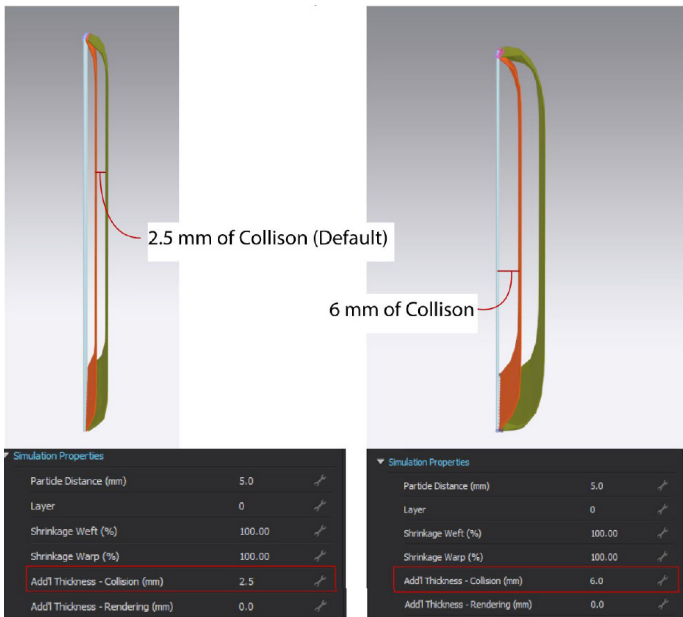
Set your own presets for Garment Resolution.



ADDITIONAL THICKNESS COLLISION

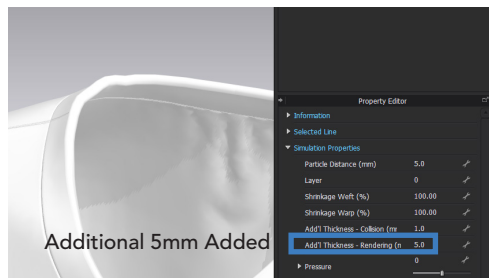
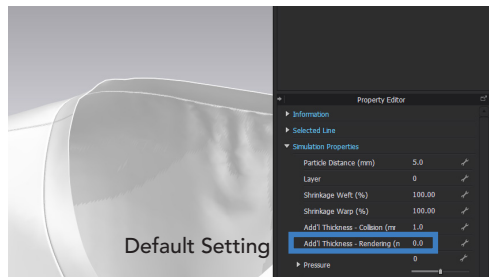
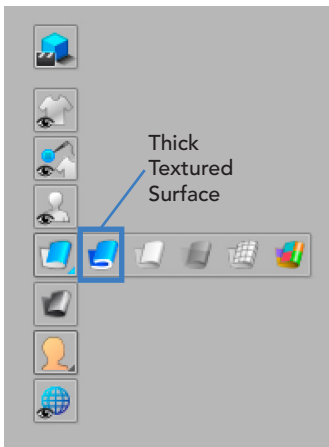
Collision or Simulation thickness is invisible property that represents the collision limit for Garments to result in smooth Simulation.

- CLO has a default of 2.5mm on all pieces-this is adjustable
- Distance (mm) between the fabric pieces, or distance from an avatar
- Collision Thickness is INVISIBLE-this will only be seen as space between pieces
- Form of protection to stabilize Simulation when fabric is at a higher particle distance
- The HIGHER the number (mm), the larger the space will be between fabric that is layered
- AFTER the garment is complete and particle distance is reduced (so mesh is very tight), the Collision Thickness can be reduced



ADDITIONAL THICKNESS RENDERING

- Adds visual Thickness to the fabric without affecting the Physical Properties of the fabric
- This can be added on an as needed basis. The default is set to 0.
- Will only see Additional Rendering thickness when on **Thick Textured Surface** view



SINGLE PIN (W)

- This function will affix patterns in the 3D space
- When Simulation is on, this area will not be pulled down by gravity
- Use the **Select/Move Tool**, hold W, and click on a part of the garment in the 3D window
- A visual marker of the pin will appear in the 3D and 2D window in red
- Pins can be moved around using the **Select/Move Tool**
- Pinning can be applied with Simulation on or off
- Single Pinning can only be applied in the 3D window
- While using the Select/Move tool, right-click on a pin to delete just one or multiple pins



PIN (BOX)

Pin large areas at once & create rectangular areas filled with pins.

- To use, click the tool and click and drag over an area to apply pins
- The **Pin (Box) Tool** can be applied in the 2D or 3D window
- A visual marker of the pinned area will appear in the 3D and 2D window in red
- Pinned areas created with the pin box will always function as a group and move together
- Click and hold to change from Box selection to Lasso selection
- Right-Click on pin to remove selected pin or all pins



1 | SEWING

Sewing tools connect the pattern pieces together. You can sew in both the 2D window and the 3D window. Dotted lines and notches will indicate the sewing direction.



EDIT SEWING (B)

Controls all sewing lines and will also show all the sewing lines on all patterns.

- Select and edit sewing line lengths and positions
- Left click and drag on either end of the sewing line (light blue dot) to adjust the length or direction
- Delete and reverse sewing lines by right-clicking the sewing line and using the Delete/Reverse option



CHECK SEWING LENGTH

Easily check sewing mistakes using this tool by highlighting seam lines that have a noticeable difference in sewing lengths. The values can be adjusted as desired.



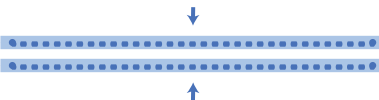
SEGMENT SEWING (N)

Connects two segment sections together.

- Hover over the desired segment line, a preview sewing line will appear with a sewing notch to show you the direction of sewing. Left click once to lock this line into place
- Hover over the matching segment, the preview sewing line will appear, Make sure the sewing notches line up. Left click once and the sewing relationship will be established

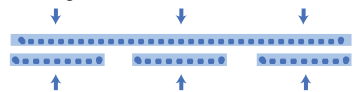
Segment Sewing: "2 clicks"

Click on segments to create seams



Segment Sewing (1:M)

Start on the longer segment, shift+click the shorter segments, release Shift to create seam

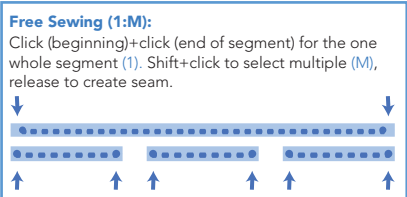
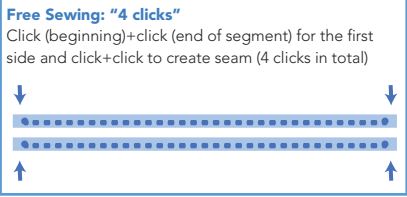




FREE SEWING (M)

Create sewing lines bypassing points and establishing the start and end freely.

- Click at the beginning point of the sewing line, hover the mouse over the "seam" to the desired length, then left click to finish one side of the seam. (A sewing notch will appear while sewing, to show the direction of the line)
- Click on the start of the matching second sewing line and follow the same procedure. A blue dot will appear towards the end of the second sewing line as a guide showing the previous sewing length. Left click on this dot to finish the sewing

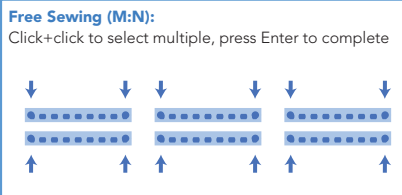
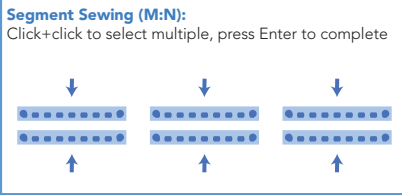




M:N SEGMENT & FREE SEWING

Sew one or multiple pieces to one or more connecting pieces. This tool is especially helpful for sewing two-piece sleeves to an entire armhole or garments with multiple seamlines.

- Click and hold on the **Segment or Free Sewing Tool**, a drop down menu will appear and you can select M:N Sewing
- Left click to begin sewing, follow the segment with the cursor, then click to end sewing. Repeat these steps on all segments that will make the first (or M sewing) line. Press enter to complete the first sewing group
- Repeat the steps above for the second (or N sewing) group, press enter once all of the N sewing is completed. This will complete the sewing
- Use the Edit Sewing Tool to unlink M:N sewing





AUTOSEW

CLO will read patterns and place sewing relationships.

- Arrange patterns on Arrangement Points, the Autosewing is calculated by reading their placement
- Click the Autosew icon, choose the Garment Type, and click OK
- If Top is selected, choose the Front Type and collar seam option that closest matches the style
- If patterns are not arranged, only darts and pleats will be sewn together
- To exclude patterns from the Autosew, do not Arrange them

2 | Pattern Editing & Creation

Pattern Anatomy

Creating Patterns &
Internal Markings

Pattern Markings & Notations

Transforming Patterns

Editing Patterns

Modifying Curves & Segments

Walk Patterns & Seam Allowance

3D Editing

SYMMETRY

Symmetry allows the user to create a mirrored copy of the pattern piece and pattern edits. Choose whether sewing edits and arrangement are also linked.

CLONING PATTERNS WITH LINKED EDITING

- Select the **Transform or Edit Pattern Tool**
- Select one or multiple pattern pieces, right-click and select the desired cloning option underneath the Clone Pattern with Linked Editing header

APPLYING LINKED EDITING

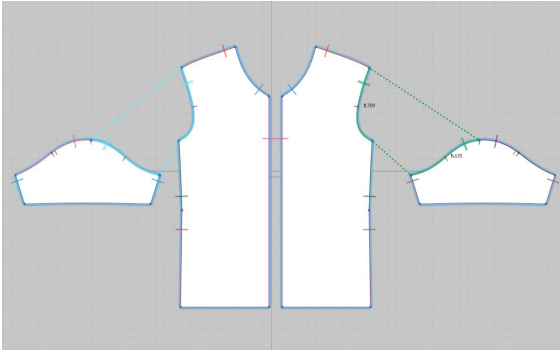
- Select the **Transform or Edit Pattern Tool**
- Select the 2 pattern pieces to link and right-click over one
- Select the desired option under the Apply Linked Editing header
- Patterns may only be linked if they are identical and do not contain asymmetrical segment points or internal lines
- To remove, select the desired patterns and select Remove Linked Editing from the right-click menu

2| PATTERN ANATOMY

SYMMETRIC PATTERN (with Sewing) (CTRL+D)

Patterns are copied, pattern edits, arrangement, and sewing edits are symmetrical.

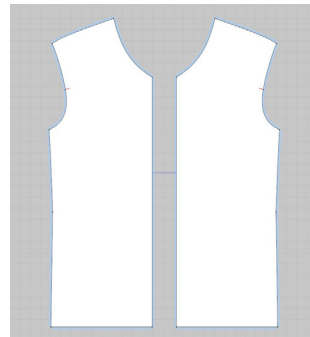
- Patterns appear with a thick blue halo and linking line between the pieces
- If a sewing line is selected on one side of the garment, the other side will select with a blue highlight



SYMMETRIC PATTERN

Patterns are copied, pattern edits and arrangement are symmetrical.

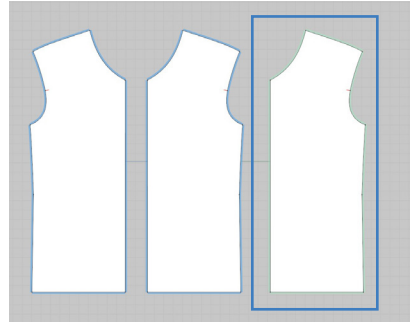
- Patterns appear with a light blue halo and a linking line between the pieces



INSTANCE PATTERN

Patterns are copied, only pattern edits are symmetrical.

- Patterns appear with a mint halo and a linking line between the pieces
- Sewing and arrangement information will not be linked



SEGMENT LINES

Segment lines connect anchor points on a pattern piece.

- Thin black lines on pattern piece outline
- Segment lines are created when pattern drafting tools are used
- Segment lines can be curved or straight
- Segment lines turn blue when you hover over them with the **Transform or Edit Pattern Tool**
- Segment lines turn yellow when selected by the **Transform or Edit Pattern Tool**

INTERNAL LINES

Drawn inside pattern pieces using the Internal Tools. Can be cut, folded, or sewn to pattern edges or other internal lines.

- Show as red lines



The colors of pattern outlines, internal lines, baselines, selection highlight, and hovering are able to be changed from their defaults in **Settings > User Settings > User Interface**.

BASE LINES

*Drawn inside pattern pieces using the Base Tools. Used for reference. Use the **Trace Tool** to convert to Internal Line.*

- Show as dotted purple lines

SEGMENT POINTS

Segment points are anchor points on a pattern piece.

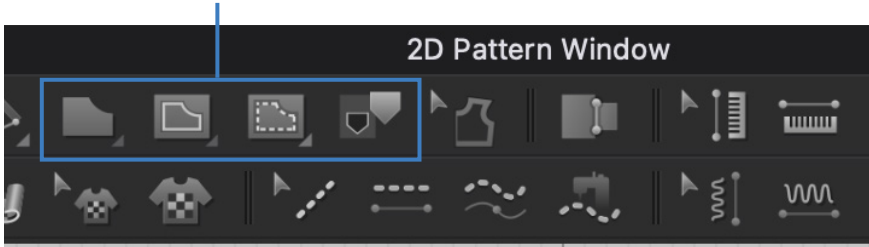
- Marked by a black point on a pattern piece outline
- Segment points are created when pattern drafting tools are used
- Segment points are always visible and can have Bezier handles, and serve as corners or curves
- Segment points can be moved and edited with the **Edit Pattern Tool**
- To change a segment point to a curve point, right-click on one or multiple points with the **Edit Pattern Tool** and select 'Convert to Curve Point' from the menu
- Segment points with a thin green outline have grading applied

CURVE POINTS

Curve points are anchor points on pattern piece curves only.

- Marked by a red point on a pattern piece outline
- Curve points can only be seen when using the **Edit Curve Point Tool**
- To change a curve point to a segment point, right-click on one or multiple points with the **Edit Curve Point Tool** and select "Convert to Segment Point" from the right-click menu

2D Pattern Tools



POLYGON (H)

Draw free-form pattern shapes.

- Click in the 2D window to start creating
- To close/finish creating a pattern, click on the starting point
- Hold **trl** & click to make the line curved or a curve point
- To stop creating curve points simply let go of **ctrl**
- Hold **shift** while clicking to activate smart guides
- Press **delete** or **backspace** to go back a step
- Press the **esc** key to start over
- Click & drag to draw **bézier** curves



RECTANGLE (S)

Create a rectangular pattern shape.

- Click in 2D window to input specific height and width info
- Click & drag to freehand draw a rectangle in the 2D window
- Hold **shift** while drawing to constrain rectangle to square proportions



ELLIPSE (E)

Create an elliptical pattern shape.

- Click once in 2D window to input diameter, radius, & circumference
- Click & drag to freehand draw an ellipse in the 2D window
- Hold shift while drawing to constrain ellipse to circular proportions



SPIRAL

Create a spiral or flared pattern shape.

- Click to bring up the Create Spiral window
- When a field is selected, the corresponding segment will highlight
- Direction: Choose Clockwise or Counterclockwise
- Offset: Static measurement. Distance from the middle of the inner ring to the middle of the second ring. Set Offset at 0 to create a flared skirt pattern
- Side (Inner and Outer): Static measurement. Length of the side segments of the inside or outside of the spiral
- Length (Inner and Outer): Measurement adjusts relative to other measurements. Set inside and outside segment length
- Radius (Inner): Static measurement. Distance from spiral center to the middle of the first ring

INTERNAL LINE/SHAPE TOOLS

Lines and shapes within pattern pieces that can be used as a sewing seam, copied and pasted to other pattern pieces and used to cut pattern pieces. All tools can be used by click-&-drag or single click for Precision Measurements.



INTERNAL POLYGON/LINE (G)

Draw single lines or polygon shapes within patterns.

- Single-click to start a line, double-click to end
- Hold Shift to lock axis to 90 or 45 degrees
- Create a shape by connecting end points
- Start to create a shape and right-click, the Create Internal Polygon window will appear



INTERNAL RECTANGLE

Create squares and rectangles. To maintain square proportions, hold shift.



INTERNAL ELLIPSE (R)

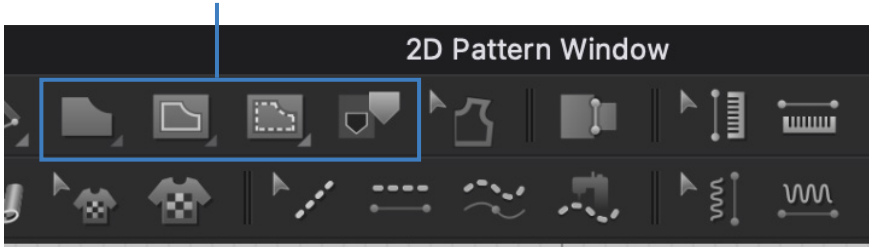
Create ellipses within patterns. To maintain circle proportions, hold shift.



DART

- Create darts quickly
- Click & drag to create the dart shape freehand
- Click once to input specific measurements
- Then sew closed using the **Segment** or **Free Sewing Tools**

2D Pattern Tools



BASELINE/SHAPE TOOLS

Lines and shapes within pattern pieces that are for reference only. Can be converted to an Internal Line or Shape by using the **Trace Tool**. All tools can be used by click-&-drag or single click for Precision Measurements. (Show in 2D window as purple dotted lines.)



BASE POLYGON/LINE

Draw single lines or polygon shapes within patterns.



BASE RECTANGLE

Create squares and rectangles. To maintain square proportions, hold shift.



BASE ELLIPSE

Create ellipses within patterns. To maintain circle proportions, hold shift.



BASE DART

- Create Dart shape quickly
- Click & drag to create the dart shape freehand
- Click once to input specific measurements

2| PATTERN MARKINGS & NOTATIONS



TRACE (I)

Trace baselines as internal lines, create patterns from internal shapes, and create Points of Measure.

- Trace baselines into internal lines and shapes by selecting lines and pressing Enter, or right-click and select Trace as an Internal Shape
- Extract pattern shapes from internal lines by selecting a closed shape, right-clicking, and selecting Trace as a pattern
- Trace from negative space too!



A

EDIT ANNOTATION

Edit Text Annotations for patterns.

- Click & drag to move Annotation
- Right-click to delete

A

PATTERN ANNOTATION

Create text annotations for patterns.

- Click inside the pattern shape and type



PATTERN SYMBOL

Create center front fold or gathering markings.

- Select the **Pattern Symbol Tool** then click on the segment
- Control the symbol in the Property Editor
- Right-click on the segment to delete the symbol

2 | TRANSFORMING PATTERNS



TRANSFORM PATTERN (A)

Select, transform, rotate and move patterns in the 2D window.

TRANSFORM PATTERN ESSENTIAL FUNCTIONS

CLONE AS PATTERN

Create a copy of an internal shape as a pattern piece.
Helpful for creation of patches and pockets.

CLONE AS INTERNAL SHAPE

Create a copy of a pattern piece as an internal shape on another pattern piece.

CLONE AS REFERENCE LINE

Create an outline of a pattern piece as a Baseline. Helpful for creating a reference while making pattern edits.



SELECT/MOVE TOOL (Q)

Select, transform, rotate and move patterns in the 3D window.

SUPERIMPOSE (Over, Under, Side)

Use Superimpose to arrange patterns directly over, under, or next to another pattern

- Complete sewing first, sewing lines determine where the piece is placed
- Multiple pattern pieces can be Superimposed at once
- Shortcuts: Over (Ctrl+[), Under (Ctrl+])

LAYER CLONE (Under and Over)

Duplicate pattern pieces or internal shapes with sewing attached
— great for creating a lining or adding quilting!

- Pressure in 3 Garment Details covers how to create filled garments



EDIT PATTERN TOOL (Z)

Edit points/anchors and lines/segments.

- Pattern elements will turn blue when the cursor hovers over. Once selected, they will be highlighted in yellow
- Hold shift to select/deselect multiple points and segments from the same, or different patterns
- Select all: Ctrl+A, or marquee (click & drag) over all patterns in the 2D window
- Deselect all: click in the 2D window background
- Ctrl+Z to bring back previous selection
- Check the next page for essential functions



TRANSFORM POINT/SEGMENT

Move, rotate and scale points and segments.

- Select the **Transform Point/Segment Tool** from the 2D toolbar
- Click on the segment to be rotated
- The selected segment will be highlighted in yellow as a marquee box appears
- Hover the mouse over the scale point on top of the marquee box. The mouse cursor will appear as a rotating wheel
- Click and drag the scale point towards the desired direction
- The segment will rotate around its center



Right-click while moving a point or line to get a Precision Move dialogue box. This applies to most of the editing functions.

EDIT PATTERN ESSENTIAL FUNCTIONS

UNFOLDING PATTERNS

Draft and unfold a half pattern to convert and use it as a full pattern with no center line or seam.

- With the **Edit Pattern Tool**, right-click on a pattern edge and click unfold
- If the pattern outlines will overlap or intersect when unfolded, an error message will appear
- Internal Shapes can also be unfolded

MERGE

Combine two pattern pieces to become one.

- With the **Edit Pattern Tool**: select two segments —> right-click on one of them —> Merge

CONVERT TO CURVE/SEGMENT POINT

Change point from segment to curve or curve to segment.

CONVERT TO HOLE

- With the **Edit Pattern Tool**, right-click on a closed internal shape and select Convert to Hole
- Delete or edit the hole by using the **Edit Pattern Tool**

2| EDITING PATTERNS

CUT

Using an Internal line that intersects at least one external line, you can add a seam or split a pattern piece in two.

CUT & SEW

Same option as Cut, but immediately adding sewing

SYMMETRY

For information on creating patterns with symmetry or applying linked editing, refer to the beginning of this chapter.



EDIT CURVATURE TOOL (C)

Create curves by selecting a line and dragging to desired shape.

- Adjust segments with no curve points using Bézier handles, simply click & drag with the **Edit Pattern tool**
- Selection is only possible one segment at a time



EDIT CURVE POINT TOOL (V)

Edit existing or add curve points by clicking on point or selecting where to place on line.

- Hold shift to access smart guidelines while moving points
- Delete curve points by selecting with **Edit Pattern** or **Edit Curve Point tool**, right-click, Delete
- Right-click on a segment point to convert it to a curve point with this tool, and vice versa



ADD POINT/SPLIT LINE (X)

Adds single points and splits a line into multiple segments.

- Click on a segment to freely add points and split lines
- Right-click on a segment to add points using specific distances and quantities



NOTCH TOOL

Create notches on a pattern outline.

- Create notches by hovering over desired place along pattern outline, a red dot will mark the notch placement
- Click on the mark and a yellow notch will appear
- Select and change the notch shape in the Property Editor

Create with Specific Values:

- Right-click on the pattern outline in the area where the notch will be added. Precision Dialogue Box will open and input desired value. (Similar to **Add Point/Split Line Tool**)



SMOOTH CURVE

Create curved corners on patterns or internal shapes.

- Click & drag corner point to create a curve point
- Right-click to input specific curvature percentage and curve line length

Another way to add a notch is by right-clicking on a segment point > Add Notch.



SLASH & SPREAD



FULLNESS POINT

Add fullness to one side of the pattern piece.

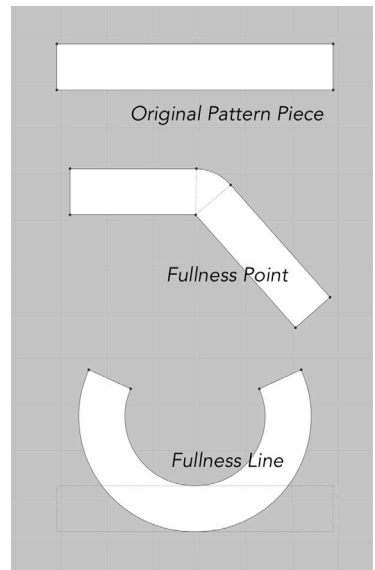
- To start the slash, click on a pattern segment then the opposite segment of the pattern
- Click either side, then move the cursor to begin spreading. A preview will appear, click to place the pattern into position
- Right-click while spreading the pattern to input a precise distance or angle to spread
- To spread on both sides, click on a pattern segment, then double-click the opposite segment of the pattern



FULLNESS LINE

Add fullness along a segment by choosing the Fullness and Slash lines.

- On the segment where the fullness is being added, select the line the same way as the **Free Sewing tool**
- Do the same on the opposite segment (Slash line)
- The Fullness Option Box will open to change the line length and where the fullness is added
- See the changes they are made



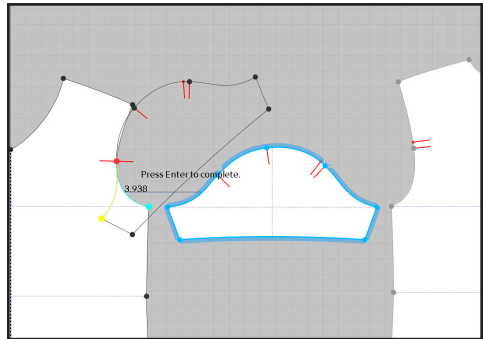
2 | WALK PATTERNS & SEAM ALLOWANCE



WALK PATTERNS

Compare the length of two segments of different patterns in real-time by temporarily aligning them.

- Click on a segment point of a pattern outline. The point is selected and an arrow appears in between the selected point and the mouse cursor
- Click on a segment point of a pattern outline of the pattern to be compared. The preview of the first pattern moves next to the clicked position
- Move the mouse cursor along the pattern outline of the second pattern
- The preview moves along the pattern outline
- The length of the segment appears at the center of the yellow guideline
- Hit the Enter key to complete Walk Pattern
- Right-click while walking patterns to add a notch to either or both patterns (Stationary or/and Walked), or place it to the intersection



2 | WALK PATTERNS & SEAM ALLOWANCE



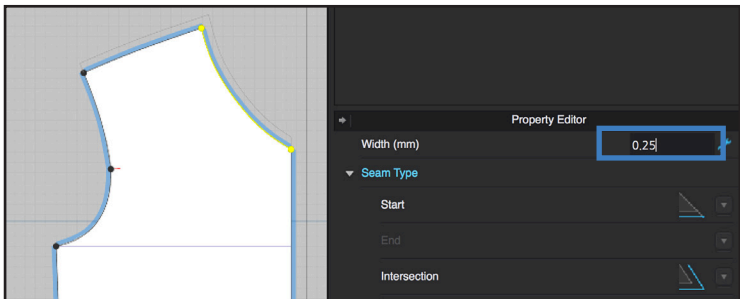
SEAM ALLOWANCE

Add CLO seam allowance to the patterns. It will not affect sewing and will affect placement of patterns in Print Layout Mode.

- To add seam allowance to a pattern piece or groups of segments, marquee over the entire area
- Select individual segments to add seam allowance to one segment at a time
- To adjust the amount of allowance, click on the segment with the **Seam Allowance** tool and change the width in the Property Editor
- Customize how the corner intersection of two segments with seam allowance is finished

Ex; Slant Corner, Mitered Corner, Mirrored Corner, etc.

- To change the corner intersection, select the point or segment with the **Seam Allowance** tool and change the Seam Type in the Property Editor





EDIT 3D PEN (GARMENT)

Edit lines on the garment in the 3D window.

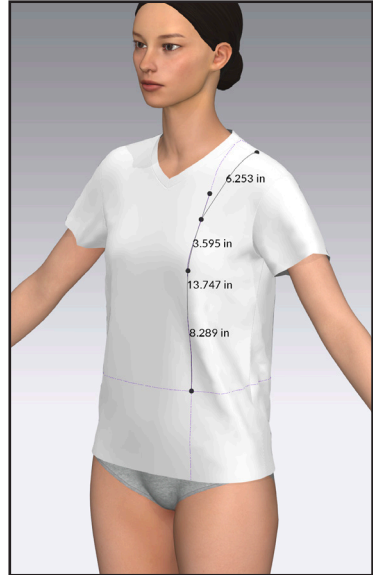
- Click & drag point to move the point on the garment
- Right-click for editing options
- See the pattern change in the 2D window



3D PEN (GARMENT)

Draw lines on the 3D garment.

- Click to start the line and double-click to end
- Click to add points, or hold ctrl to create curve points
- Hold shift to create a straight line
- A guide of the line will appear on the 2D pattern, use the **Edit 3D Pen (Garment) Tool** to activate the lines on the pattern



Use **3D Pen (Garment) Tool** to quickly shift a side seam or shoulder. Trace the new seam directly onto the garment, then Cut & Sew the line. Merge the cut away edge back to the other side.





EDIT 3D PEN (AVATAR)

Edit 3D lines on the avatar in the 3D window.

- Click & drag points to move points on the avatar
- Right-click to delete
- Right-click to assign “Flattening as a Straight Line”



3D PEN (AVATAR)

Draw lines on the avatar in the 3D window.

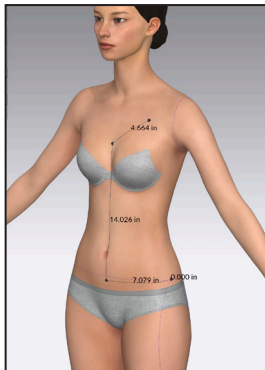
- Click to add points, or hold ctrl to create curve points
- Hold shift to create a straight line
- Click on first point to close the shape



FLATTEN

Create patterns from closed shapes drawn onto the avatar with the 3D Pen (Avatar).

- Click on an enclosed shape(s) to select, press enter to extract one or more pattern pieces from the avatar into the 2D window
- Intersecting flattened pattern pieces will be automatically sewn together





3D BASE PEN

Draft baselines in the 3D window.

- Click & hold the mouse button down to draw freely on the 3D garment
- When the mouse button is released, a baseline will be generated
- Use the **Trace Tool (I)** to convert baselines to Internal lines
- **Note:** Baseline curve points are not optimized. right-click in the background of the 2D window and select **Optimize All Curve Points** to throw out extra curve points

STYLELINE TOOLS

Edit patterns directly in the 3D window.

- Click on the garment to isolate and edit it
- Click on a pattern piece to highlight the edges
- Simulate after each adjustment to better see results



EDIT STYLELINE

Edit the curvature of seamlines or pattern edges in 3D.

- Click & drag on a line to edit the curve, this will adjust patterns in both 2D and 3D
- Click & drag on a segment point to adjust the placement



SCALE STYLELINE

Edit the fullness of seamlines or pattern edges in 3D.

- Click & drag on a line and move along the axis to adjust fullness
- Hover near a seamline end, an arrow will appear that will adjust fullness on a specific edge



MOVE STYLELINE

Edit seamline placement or length in 3D.

- Click & drag on a line to move along the axis and adjust placement (internal seam) or length (pattern edge)
- Hover near a seamline end, an arrow will appear that will move the pattern on a specific edge
- Click on an internal seam to select and adjust one side



DRAW STYLELINE

Cut & Sew new seamlines into patterns.

- Click to start a line on the pattern
- Single click in the middle of patterns to drop anchor points
- Double click in the middle of patterns to cut a slit
- Single click on pattern edges to cut a new seam line
- Seams are cut Symmetrically
- Lines cannot cross pattern edges

3 | Garment Details

Temporary Pattern Settings

Pleats & Folding

Pressure

Layer Clone

3D Morphing Tools

Hardware & Notions

3| TEMPORARY PATTERN SETTINGS

STRENGTHEN (CTRL + H)

Apply a starching/hardening effect to a pattern piece.

- Temporarily makes the pattern more rigid and inflexible
- This tool is especially useful for folding or pleating pattern pieces
- Right-click on the pattern piece(s) in either window and select Strengthen (Unstrengthen to remove)
- Pattern piece(s) will turn bright orange in the 3D Window

FREEZE (CTRL + K)

Freeze a pattern piece in space.

- Right-click on the pattern piece(s) in either window and select Freeze (Unfreeze to remove)
- Pattern piece(s) will turn ice blue in the 3D Window

SOLIDIFY

Prevent pattern pieces from redraping with Simulation on.


- Adds stiffness to the pattern piece, shaping won't change in Simulation
- This tool is especially useful for bags
- Right-click on the pattern piece(s) in either window and select Solidify (Unsolidify to remove)
- Pattern piece(s) will not have any color indicator when this setting is applied

To keep the effects of Strengthen and Freeze, but hide the color indicators: right-click on the 3D window background —> Show/Hide Color. Choose all or specific colors.




DEACTIVATE

Pattern piece(s) will not be recognized with Simulation on.

- Right-click on the pattern piece(s) in either window and select Deactivate (pattern only) or Deactivate (Pattern and Sewing)
- Deactivate (Pattern only) (Ctrl + J): During Simulation the pieces will react as if they are not there, but sewing relationships stay active
- Deactivate (Pattern and Sewing): During Simulation the pieces and sewing will react as if they were not there
-  Pattern piece(s) will appear transparent purple in the 3D Window
- To activate, right-click on the pattern piece again and select Activate (Ctrl + J)

HIDE 3D PATTERN (SHIFT + Q)

Hide pattern pieces in the 3D Window.

- Right-click on the pattern piece(s) in either window and select Hide 3D Pattern
- Patterns will disappear, but still drape when Simulation is on
- To Show 3D Pattern, right-click on the pattern piece in the 2D Window and select Show 3D Pattern
-  To show all hidden pieces at once, click on the Show Garment icon in the 3D Window vertical toggle menu, shortcut Shift + W



To fix pattern placement without deleting sewing, the sewing can be deactivated too! Right-click on sewing relationships with the **Edit Sewing Tool** in either window and select Deactivate Sewing (Selected). To activate, right-click and select Activate Sewing (Selected).

FOLD ANGLES

Apply a degree value to an internal line or seam to fold. Direction is dependent of the face of the fabric

- Click on any internal line or seam line with the **Edit Pattern Tool** and adjust the Fold Angle in the Property Editor
- Fold Angles will cause the pattern to fold along the chosen line
- Fold Angle 0°: pattern will fold forward, away from viewer
- Fold Angle 360°: The cloth will fold backward, towards viewer
- Type in a specific degree, or use slider
- Fold Strength refers to how dramatic the fold is
- Turn on Fold Rendering to allow a fold line to appear more sharp in the 3D Window



FOLD ARRANGEMENT

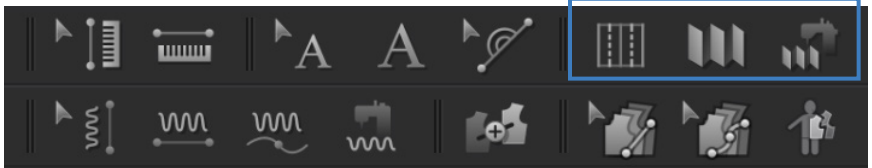
Fold Arrangement allows garments to be easily manipulated and styled in the 3D Window. This tool is particularly useful for folding collars and cuffs.

- Use on internal lines and seam lines, the selected line will function as the folding axis
- Simulation should be off while using this tool
- Click on a line, the Fold Arrangement Gizmo will appear
- Fold pattern piece(s) along the line by adjusting the view and rotating with either the green or red arrow
- Straight or curved lines can be folded

Sometimes when folding upwards, it can be hard to counteract gravity! Try Strengthening the pattern piece before Simulating. (see previous page)



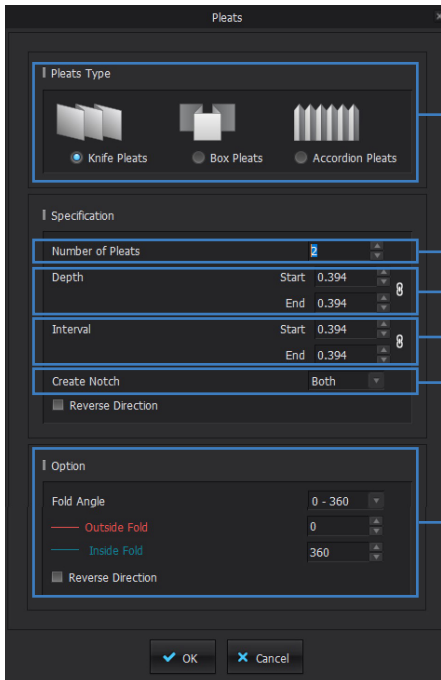
Pleating Tools



PLEATS

Create and add pleats to patterns with fold angles and sewing applied.

- Place a slash line by drawing manually, or select an internal line
- Select which side of the pattern to add pleats to
- In the Pleats window, select the desired settings, and click OK
- Patterns will adjust, Simulate to allow the garment to redrape



Choose from knife, box, or accordion pleats.

Number of pleats to add. If the pattern piece outline turns red and returns to its original shape, there is not enough space to add more pleats.

Depth of the pleat at Start and End of the pleat line. These measurements can be unlinked and adjusted separately.

Spacing at the Start and End of the pleat.

Place sewing notches on patterns at the Start, End, or both ends of the pleats.

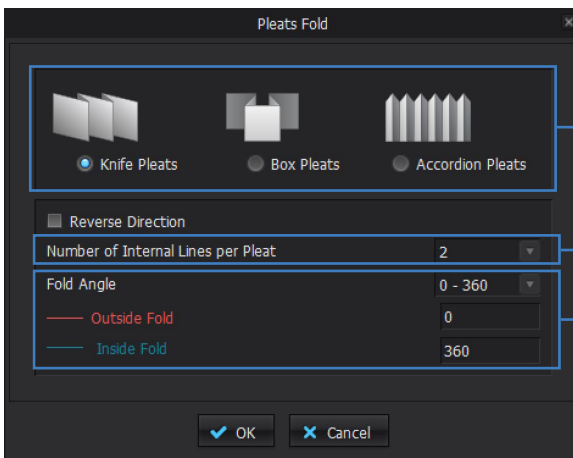
Set fold angles using the presets, or manually. Reverse the fold angle placement by checking the Reverse Direction box.



PLEATS FOLD

Create and assign fold angles to internal lines automatically.

- Start by establishing the number of pleats, their depth and the fold direction:
- Step 1: Add segment points to opposite segments of the pattern piece
- Step 2: Place internal lines connecting segment points added in Step 1. This can be done using the **Internal Polygon/Line tool** to draw internal lines, or **Edit Pattern tool** to Offset internal line or Distribute internal line Between Two Segments
- Step 3: With the **Pleats Fold Tool** click across the internal (red) lines, ending with a double click
- Step 4: The Pleats Fold Window appears. Choose settings and click OK when complete. The internal lines will change color according to their fold angle value
- View the fold angle of each internal line in the Property Editor



Choose from knife, box, or accordion pleats

Set the number of internal lines that make up each pleat

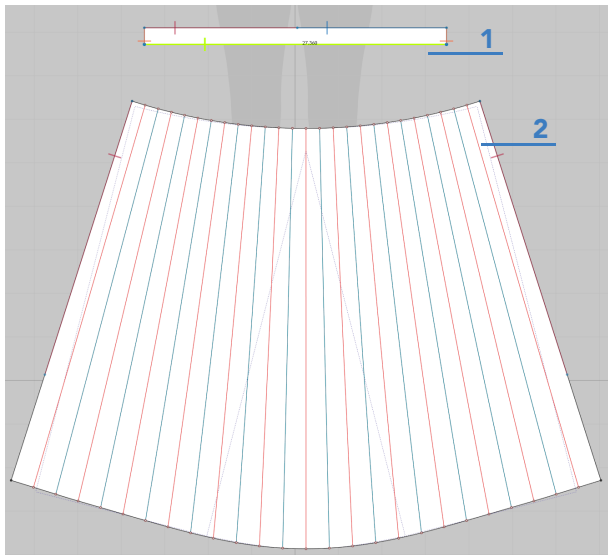
Set fold angles using the presets, or manually. Reverse the fold angle placement by checking the Reverse Direction box



PLEATS SEWING

Sew together one pleat, or continuous pleating automatically.

- Any attached sections (i.e. flat fronts, facings, panels) should be sewn with regular Segment or Free Sewing
- **If attaching a non-pleated pattern (1) to the pleated pattern (2):** With the **Pleats Sewing** tool selected, start by sewing the non-pleated pattern (i.e. the waistband or top that will be attached to the bottom pleated skirt). Then, sew the pattern with the pleats. After sewing the pleated pattern, view the automatically distributed sewing.
- **If sewing pleated pattern (2) individually:** With the **Pleats Sewing** tool selected, press Enter, then click one side of the pattern edge. Hover mouse along the pleated edge, then click to finish. The pleated pattern edge is automatically sewn together.



LAYER CLONE (Under and Over)

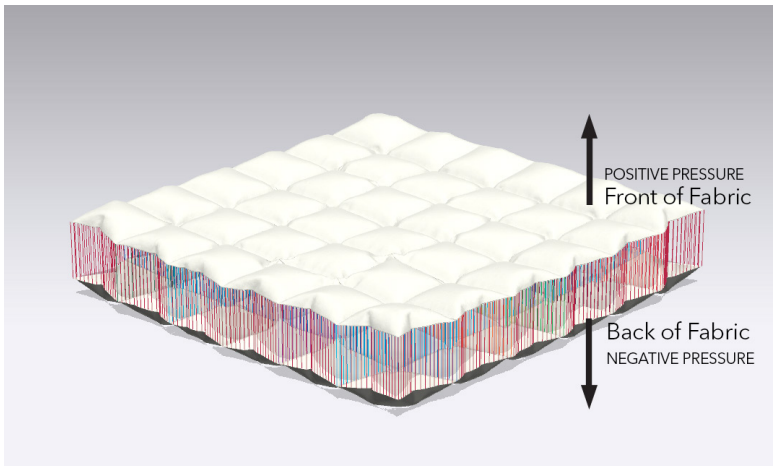
Duplicate pattern pieces with sewing attached—great for creating a lining or adding quilting!

- Layers will automatically be Superimposed Over or Under the main pattern piece
- Any existing internal shapes or lines will copy and automatically sew together when the layer is cloned
- Follow these steps:
- Step 1: With the **Transform Pattern Tool** selected, right-click on the pattern piece(s) and select Layer Clone (Over) or Layer Clone (Under)
- Step 2: Click in the 2D window to paste

PRESSURE

Use pressure to inflate pattern pieces to create quilted/wadded/padded effects.

- Select patterns with the **Transform Pattern Tool** and adjust the pressure value in the Property Editor under Simulation Properties
 - Positive: Pressure is applied into the back face of the fabric
 - Negative: Pressure is applied into the front face of the fabric
- To achieve a filled effect, apply equal and opposite Pressure values to the outer and inner pattern pieces. If values are not equal, patterns will fly away when simulation is turned on



Make sure the garment is sewn and constructed before applying Pressure, or the pattern pieces will float away. Pressure should only be applied to pattern pieces that have a Layer Clone.



SELECT MESH (BOX/LASSO)

Grab and move a selective portion of the mesh grid.



- Can be used with simulation on or off in the 2D & 3D Window
- Selected portion highlights green
- To deselect, click anywhere in the 2D or 3D window background
- Click & hold the tool icon in the 3D toolbar to change from Box selection to Lasso selection
- Box: Select a square/rectangle of mesh
- Lasso: Select a circle/oval of mesh



SELECT MESH (BRUSH)

Select portions of the mesh grid to selectively change properties.

- Change the size and strength in the Brush window
- Right-click on selected area to apply temporary pattern settings



PIN (BOX/LASSO)

Pin large areas and create rectangular areas filled with pins.



- Click & drag over an area to apply pins
- The **Pin Tools** can be applied in the 2D or 3D Windows
- Pins are red, and will appear in both the 3D and 2D Windows
- Pinned areas created with Pin Box will function as a group and will move together while Simulating
- Click & hold the tool icon in the 3D toolbar to change from Box selection to Lasso selection
- Shift + marquee over additional areas to expand pin selection
- CTRL + marquee over areas to remove pins from the selection

SINGLE PIN (W + Click)

This function will affix patterns in the 3D Window.

- When simulation is on, this area will not be pulled down by gravity
- Use the **Select/Move Tool**, hold W and click on a part of the garment in the 3D Window, pinned area will turn red
- A visual marker of the Pin will appear in the 3D and 2D Windows
- Pins can be moved around using the **Select/Move Tool**
- Pinning can be applied with simulation on or off
- Single Pinning can only be applied in the 3D Window
- While using the **Select/Move Tool**, right-click on a Pin to delete one or multiple pins
- Only move areas with pins while Simulation is on



To add pins along the segment of a pattern piece, use a **Pin Tool** in the 2D window. Hover over the segment to pin; when you see the blue picking point, double-click; just that segment will be pinned.

TACKS

Secure pattern pieces to other pattern pieces or the avatar. Can be used in the 2D or 3D window.



EDIT TACK

Edit, move, and delete tacks.



TACK

Attach two places of a pattern, or 2 patterns together.



TACK ON AVATAR

Attach a pattern piece to an avatar.



SET SUBLAYER

Set layering relationships between two overlapping pattern pieces in 2D to achieve more stable simulation in 3D. Multilayered jackets and garments with lining pieces are good examples of when this tool may be helpful.

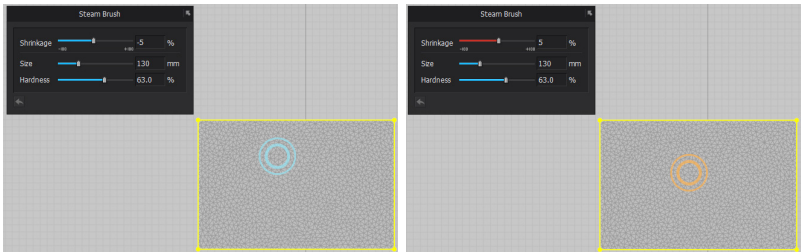
- When the **Set Sublayer Tool** is selected, only pattern outlines will be visible
- Click the top layer first, then select the bottom layer to set the relationship
- A plus sign appears in the center of the arrow to indicate the pattern order
- Click the plus sign to change the pattern order
- Simulate after applying
- To delete the relationship, click on the arrow so it highlights yellow, and press Backspace
- Pattern pieces may have multiple sublayer relationships



STEAM TOOL

Shrink or stretch out areas of the 3D garment.

- Can be used with simulation on or off.
- Shrinkage: Shrinkage level expressed in %
- Size: Brush size in millimeters
- Hardness: Sets steam concentration. A smaller Hardness value will decrease the brush inner circle size.
- When amount is positive, brush will appear in orange color which stretches the fabric. When amount is negative, brush will appear in blue color which shrinks the fabric
- To delete > right-click on the steam on the pattern > Remove Steam from Selected Pattern or Remove All Steam.
- Steam can also be deleted with the **Edit Pattern Tool** by right-clicking anywhere and selecting Remove All Steam



Use the **Steam Tool** when you have added diamond darts to your garment. This will help smooth the top & bottom of the dart.



ZIPPER TOOL

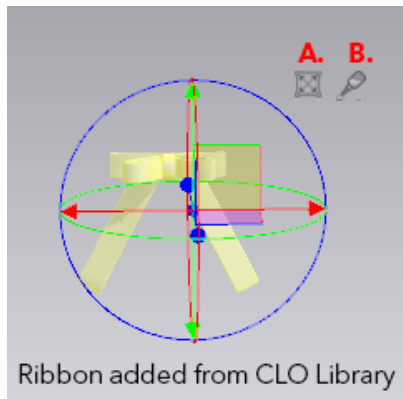
Apply a functional zipper in 2D or 3D

- Click to start, hover along the desired seam in either window, and double-click to end- The direction the **Zipper Tool** is applied in is the direction the zipper will zip.
- Clicking once while hovering will drop anchor points if necessary.
- Use the **Select/Move Tool** to unzip (Simulation must be off to move the Zipper Pull)
- Edit properties of the Zipper Tape and Zipper Slider, Pull and Stoppers in the Property Editor
- Other Zipper Tapes, Sliders, Pullers and Stoppers are available in the Library —> Hardware and Trims —> Zippers

TRIM (.TRM)

Glueable trim can be found in the Hardware and Trims folder within the CLO library.

- A. Toggles the Gizmo to the Scale Tool
- B. Glue; click to then attach to Pattern Piece



IMPORTING OBJECTS AS TRIM

- File types include: ZIP, .OBJ
- To add the trim, right-click on the file icon and select Add to Workspace
- If the trim is from the CLO library, add the trim located in the OBJ folder
- Object Type: Add as Trim
- Scale: Select the unit the trim was created in. Selecting the wrong unit will cause the trim to come in at the wrong size.
- Translation: Specify where the trim loads in the 3D space
- Click OK to load the trim, it will appear on the floor of the 3D space
- Click on the glue bottle icon on the Gizmo, hover over the desired location, and click to place
- Use the Gizmo to move, or click on the glue bottle again to replace the trim in another location
- Edit properties of the glued trim in the Property Editor
- Edit trim size in the Property Editor, or by clicking the Gizmo icon. Adjust along the axes, or click & drag from the gray center cube to scale all proportions

BUTTON TOOLS



SELECT/MOVE BUTTON

Select, move, and edit buttons in the 2D or 3D Windows.



BUTTON

- Add buttons in the 2D or 3D Windows
- A red dot (3D) or blue cross (2D) will appear to show the placement, click to place



BUTTONHOLE

- Add buttonholes in the 2D or 3D Windows
- A red dot (3D) or blue cross (2D) will appear to show the placement, click to place



FASTEN BUTTON

- Click on the button and corresponding buttonhole, they will highlight yellow when selected
- Once fastened, a purple dotted line will mark their relationship and a lock will appear to the top right of the button, then Simulate

Sew garments closed before adding/fastening buttons for easier and more stable simulation. Remove the sewing once the buttons are in place and fastened.



BUCKLES AND RINGS

Buckles can be found in the Hardware and Trims folder within the CLO library.

- File types include: .zip, obj
- To add a buckle, right-click on the file icon and select Add to Workspace
- Object Type: Add as Avatar
- Scale: Select the unit the buckle was created in. Selecting the wrong unit will cause it to come in at the wrong size.
- Translation: Specify where the buckle loads in the 3D space
- Click OK to load

THREADING BUCKLES

**Note: Any trim loaded as an Avatar will not move if the human Avatar's pose is changed. Make sure the human avatar is in the final pose before threading.*

- Use the Gizmo to move the buckle close to the garment where it is being threaded
 - Use the **Select Mesh Tool** to thread the fabric through the buckle, making sure the fabric is not touching the buckle
 - Adjust the Skin Offset of the buckle to .5-1 mm
 - Adjust the Collision Thickness of the fabric to .5-1 mm
 - Simulate to allow the fabric to drape on the buckle
- * Note: This may require testing depending on the mesh and shape of the trim to achieve stable simulation

ELASTIC

- Use the **Edit Pattern Tool**: click on the segments to apply Elastic
- In the Property Editor, check the box next to the Elastic option
- Pattern segments with elastic applied will highlight green in the 2D Window

SETTINGS

- Strength: increase/decrease the elastic intensity. Even if elastic has the same ratio, it may be affected differently depending on their intensity
- Ratio: shows the percentage that a segment is being reduced or increased
- The default is 80% (20% reduction), a ratio of 1: 0.8



PIPING

Add piping to pattern edges and seam lines.

- Can be used in the 2D and 3D Window
- Functions the same way as the **Zipper Tool**
- Click to start, hover along the desired seam in either window, and double click to end
- Clicking once while hovering will drop anchor points if necessary
- Delete and edit properties by selecting piping with the **Edit Piping Tool**, and adjusting in the Property Editor

When using elastic on a segment, if you use the Ratio of 100% the line will function as mobilon tape. It will neither stretch nor contract.





EDIT PIPING

Edit and delete piping lines

- Select piping in the 3D Window, and adjust settings in the Property Editor
- Additional settings are available by right-clicking over the piping in the 3D Window



BINDING

Add binding to pattern edges and seam lines

- Can be used in the 2D and 3D Window
- Functions the same way as the **Zipper Tool**
- Click to start, hover along the desired seam in either window, and double click to end
- Clicking once while hovering will drop anchor points if necessary
- Delete and edit properties by selecting binding with the **Edit Binding Tool**, and adjusting in the Property Editor



EDIT BINDING

Edit and delete binding lines

- Select binding in the 3D Window, and adjust settings in the Property Editor
- Additional settings are available by right clicking over the binding in the 3D Window



PRESS

Use this function to create pressing effect especially for the edges of two layers sewn together.

- Select **Press Tool** from 3D Toolbar
- Click on one of the pattern layers to press. The selected pattern will turn transparent
- Click on the other layer. All Sewing Lines on the selected pattern switched to Turned Sewing Line Type, the pattern selected first appears again
- Turn on Simulation, the bulging edges will be flattened



SEAM TAPING

Reinforce pattern edges to withstand gravity and retain their shape in Simulation.

- Select the **Seam Taping Tool**, then click on the seam to apply Seam Taping, or marquee over selection to apply tape to multiple segments
- Use the Presets to control the type of Fusible used for the taping
- Seams with taping applied will have an orange highlight
- To delete > right-click on the seam > Delete Seam Tape
- Show/Hide seam taping in the 3D Window using the Vertical toggle menu

3| HARDWARE & NOTIONS

BOND

Apply bonding to pattern pieces to emulate interfacing.

- To apply bonding, select patterns or internal shapes with the **Transform Pattern or Edit Pattern Tools** and check on Bond in the Property Editor under the Bond/Skive header
- The bonded piece will display as a beige color in both windows, but can be toggled off in the 3D vertical toggle menu “3D Trims Display”
- Bonding fabric quality options are available in the Preset dropdown menu. Simulate to apply changes in drape
- The Detail section displays the fabric physical property sliders, which can be changed if needed

SKIVE

Apply skiving to pattern pieces and internal shapes to display them softer, as if they have been shaved down.

- To apply skiving, select patterns or internal shapes with the **Transform Pattern or Edit Pattern Tools** and check on Skive in the Property Editor under the Bond/Skive header
- Percent is able to be set in the dropdown

4 | Fitting

Fit Maps

Point of Measure

3D Tape & Measure

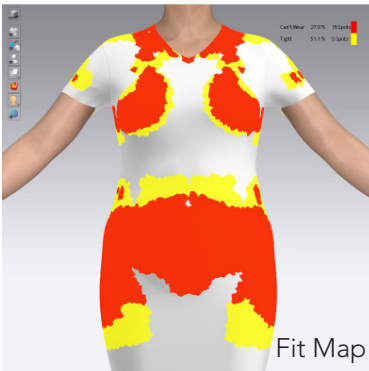
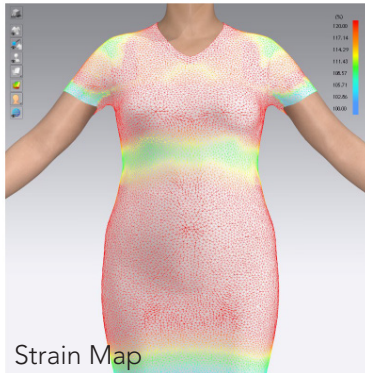
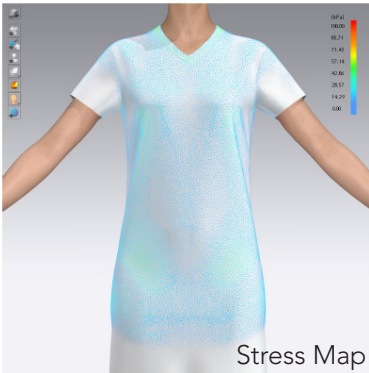
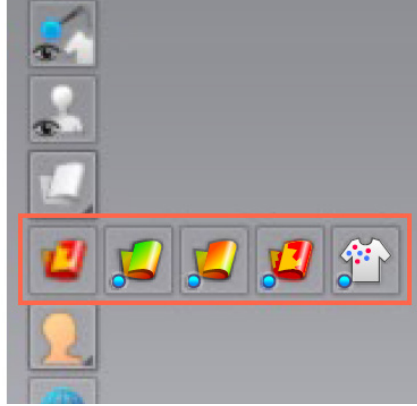
Grading & Autograding

4 | FIT MAPS

FIT MAPS

Use Garment Fit Maps to check a garment's fit.

- In the 3D window vertical toggle bar, hover over the Garment Fit Maps icon to expand fit map options.
- Click to activate / deactivate a map.



**NOTE: Only one fit map (Stress, Strain, or Fit) can be active at a time. However, Show Pressure Points can be active with another fit map.*



STRESS MAP (ALT + 6)

Displays the force per unit area in kPa applied to a garment by external stress.

- External Stress causes a garment to distort. As a result of this distortion, the garment's fabric will receive pressure (stress)
- Pascal (Pa) / Kilopascal (kPa) is a pressure unit that correlates to the fabric's tear resistance. The maximum stress a fabric can withstand before ripping is represented in Pa or kPa. Areas stressed above the fabric's stress limit will tear
- The Stress Map shows how much pressure is applied to the fabric per section from the avatar



STRAIN MAP (ALT + 7)

Displays the stretch percentage applied to a garment against its non-stretched state.

- External Stressors cause a garment to distort. As a result of this distortion, the garment's fabric can stretch around the Avatar
- The Strain Map measures the fabric's percentage of stretch when worn against its non-stretched state (100%)

NOTE: The default max stretch capacity is 120% (red color) for the upper limit of the scale. Many fabrics can be stretched above this percentage. To ensure accuracy, the scale can be adjusted for each unique fabric.



When clicking on an area of the garment with the Fit Maps toggled on, the unit of measure will be displayed at the picking point in the 3D window.



FIT MAP (ALT + 8)

Displays how many sections of the garment have reached the fabric's limit strain.

- Each fabric has a maximum distortion. This value is determined by the Stretch, Shear, and Stiffness properties in the Physical Properties of the fabric
- Fit Map is a percentage of how much the fabric has stretched relative to this maximum distortion
- The Fit Key in the upper right corner displays the percentage of distortion and amount of spots on the garment where the garment is Tight or Can't Wear
- Fit Map is calculated for the areas in which fabric and Avatar are in contact



SHOW PRESSURE POINTS

Displays contact points between the fabric and the avatar.

To update the Range, Unit of Measure, and Appearance of each Garment Fit Map, select Main Menu → Preferences → Garment Fit Properties.





POINT OF MEASURE (POM)

Create rulers to check measurements of particular parts of 2D patterns/ internal shapes/ graphics.

- To Start: Click on a pattern or in the background of the 2D window
 - Click while drafting to add segment points, hold the Control key and click to create curve points
- To End: Double-click on the endpoint, or hit Enter to complete the POM ruler
- Across Multiple patterns: At a pattern's edge, click across the pattern to create a line, then click across the next pattern to create a line. Double-click on the endpoint, or hit Enter to complete the POM ruler. The grey dashed line linking the patterns is not included in the POM length
- When a POM is created, it will appear in the POM tab of the Object Browser. If the 2D POM is selected in the POM tab, then the 3D length will be provided in the Property Editor. The POM Ruler will be highlighted in the 2D and 3D windows
- If the pattern has grading, then the POM rulers will show graded lengths in the POM tab
- Double-click on POM description in the Object Browser POM tab to rename it



EDIT POINT OF MEASURE

Move or delete Points of Measure.

- Click to move a POM ruler, segment points, or delete a POM ruler



Hold Shift or Ctrl to display cardinal or slope guides. Use the **Trace Tool (I)** to right-click on pattern outlines and/or internal lines to Trace as POM.



EDIT MEASURE (Avatar)

Select and edit properties of existing Measures and Tapes. Right-click on applied Measures and Tapes to display menu options.



BASIC CIRCUMFERENCE MEASURE (Avatar)

Apply a tape measure around the Avatar. (waist, arm, leg, neck, etc).



SURFACE CIRCUMFERENCE MEASURE (Avatar)

Apply a tape measure around the exact contours of the Avatar.



BASIC TAPE MEASURE (Avatar)

Apply a tape measure along a linear length of the Avatar (arm length, back length, inseam length, etc).



SURFACE TAPE MEASURE (Avatar)

Apply a tape measure along a linear length over and around the exact contours of the avatar.



LINEAR TAPE MEASURE (Avatar)

Create a straight line through an avatar with two end points. Tape does not conform to the avatar's surface.



HEIGHT MEASURE (Avatar)

Apply a tape measure from the floor to a point on the avatar (floor to HPS/HPS to waist).



EDIT GARMENT MEASURE

Select and delete the measurements created with the Linear and Circumference Garment Measure tools.



LINEAR GARMENT MEASURE

Create a straight line through a garment with two end points. Tape does not conform to the fabric surface.



CIRCUMFERENCE GARMENT MEASURE

Apply a tape measure around a 3D garment parallel to the floor.

ATTACH TO MEASURE (Avatar)

Attach an Avatar Tape to an internal line, pattern edge, or seam.

Attach to Avatar Tape:

- Step 1: Use any Avatar Tape Tool to place a tape on the avatar
- Step 2: Select the Attach to Measure (Avatar) tool in the 3D Toolbar
- Step 3: Click to select the seam or edge of the garment to be attached to the tape; the selected edge will be highlighted in blue
- Step 4: The 3D garment will turn transparent, and the selected segment will appear with a red highlight
- Step 5: Click on an Avatar Tape to attach the selected segment to the tape. The garment will no longer be opaque with the selected edge and Avatar Tape highlighted in red
- When attaching a edge with multiple segment lines to a tape, each segment line must be paired to the tape. The circumference will be evenly distributed

Example: To attach the top edge of a pant without a waistband to an Avatar Tape, 4 segments must be attached (left and right front, left and right back). A waistband pattern could be paired in one click if it doesn't have segment points.

- Step 6: Simulate to attach the garment to the Avatar Tape

Detach from Avatar Tape:

- Right-click on an attached segment, and select Detach from Avatar Measure. To detach all segments in the file, select Detach All From Avatar Measure
- Simulate to allow the 3D garment to re-drape

GRADING

Edit existing grading to a DXF/RUL pattern or add grading to an ungraded pattern using Size Groups.

Grading in CLO is applied and edited using the same methods as most 2D pattern CAD programs. Grading is applied using CLO's X & Y Axis'. Positive grading values will move points up and to the right. Negative grading values will move points down and to the left.



EDIT GRADING

Create and edit grading on segments and segment points.



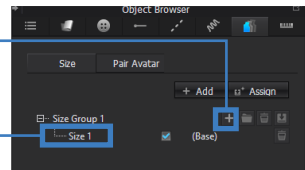
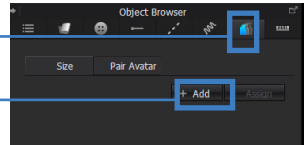
EDIT CURVE GRADING

Crete and edit grading on curve points.

BUILDING A SIZE GROUP

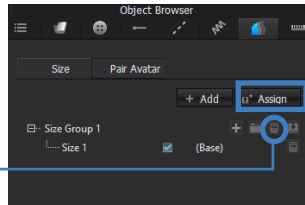
A Size Group must be created and assigned before grading can be applied to an ungraded pattern.

- Click on the Grading tab in the Object Browser
- Click on the +Add icon to add a Size Group
- To add more sizes to the group, click on the + icon
- Rename a size or Size Group by double-clicking on the name



ASSIGNING THE SIZE GROUP

- Select all pieces in the 2D pattern to apply grading, click Apply to Selected Pattern on the right side of the Size Group. The Size Group is applied to the selected pattern
- Click Assign with all patterns selected to create a new group and assign all patterns



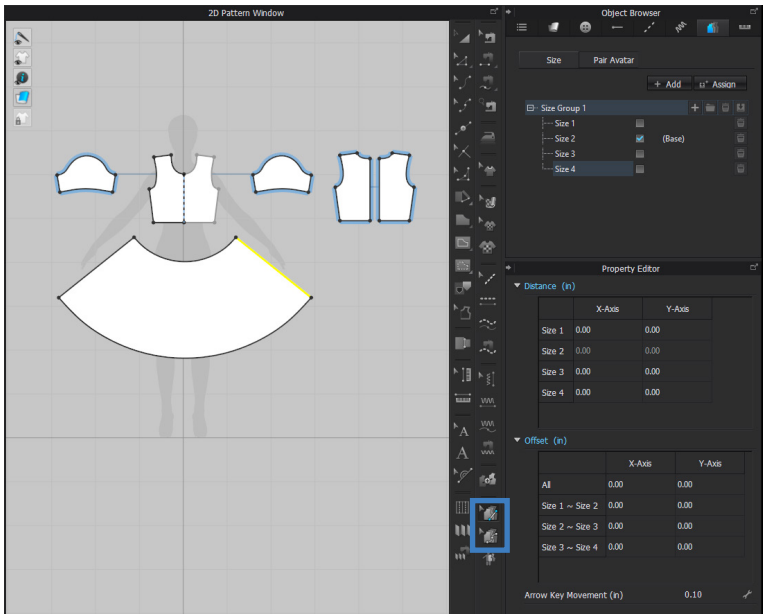
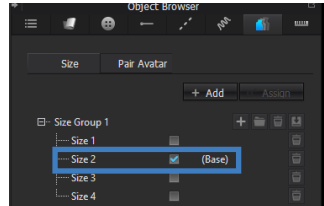
4 | GRADING & AUTOGRADING

SETTING THE BASE SIZE

- Once all patterns are assigned to a Size Group, use the check mark to choose the pattern's Base Size

APPLYING GRADING

- Select either the **Edit Grading** or **Edit Curve Grading Tool** and choose a segment or point to grade. Once selected, the grade rule tables will appear in the Property Editor
- Edit grading for one segment/ point individually, or by holding Shift and selecting multiple segments or points
- Update grading using the arrow keys, or manually typing the distances between sizes using the Distance or Offset Grading Tables using the X & Y Columns

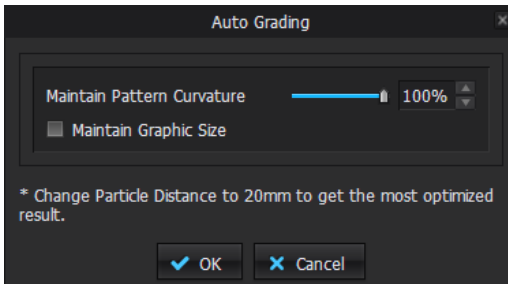




AUTO GRADING

Automatically fit a simulated garment to a updated/new CLO Avatar.

- NOTE: The garment **MUST BE SAVED** before using Auto Grading. Reopen the Project File or Garment after saving to ensure the Auto Grade applies correctly
- NOTE: Auto Grading only works with CLO Avatars
- NOTE: Change patterns to 20 Particle Distance for best results
- After saving the garment, reopen the file and delete the CLO Avatar. Import a new CLO Avatar in a different size, gender, or body type
- Select Auto Grading to open a dialoge box



MAINTAIN PATTERN CURVATURE;

- Configure the extent of modification of pattern curvature
- Higher the value is, less affected curvature while resizing the patterns

MAINTAIN GRAPHIC SIZE

- Toggle ON for Graphics maintain their size
- Toggle OFF to edit graphic size in proportion to the changes of the pattern.

5| Materials

Introduction

Applying Fabrics

Fabric Properties

Color Palette

Texture Application
& Editing

The Texture Editor

Graphic Application
& Editing

Topstitch & Puckering

Colorway Mode

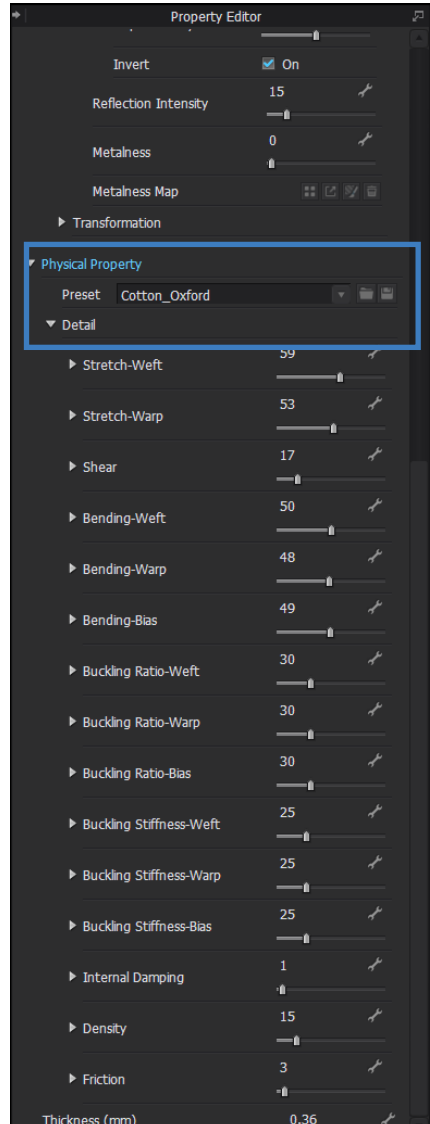
FABRIC INTRODUCTION

The fabric file type in CLO is called a ZFAB. There are 2 main components of a ZFAB: Physical Properties and Visual Properties/Texture. Both are required to express fabrics in CLO.

PHYSICAL PROPERTIES

The fabric physics; how it bends, stretches, and drapes when Simulation is on.

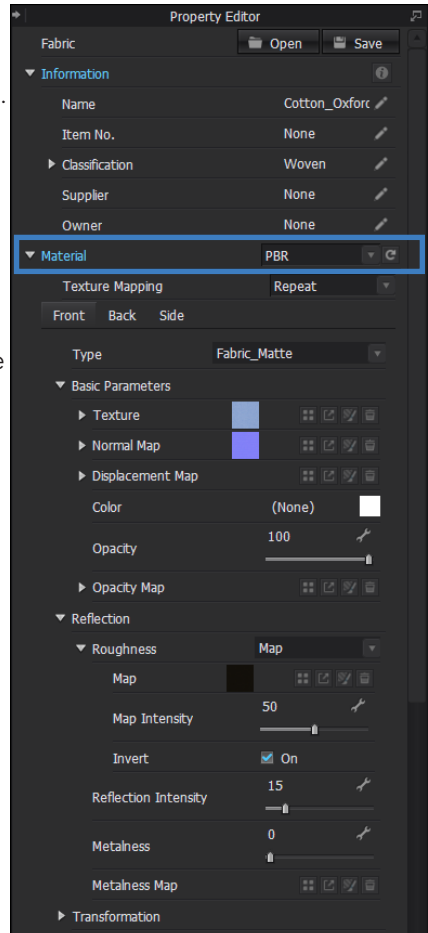
- CLO default fabrics come with physical properties already assigned, but these can be changed to custom values
- To manually assign properties, select the fabric header in the Object Browser, and scroll to the bottom of the Property Editor under Physical Properties > Details



VISUAL PROPERTIES / TEXTURE

The weave/knit, print/texture, color, shininess, etc, that creates the surface appearance of the fabric.

- CLO Library Fabrics come with Maps and texture settings already applied, but these can be changed.
- All Maps can be found under the Material Section of the Property Editor when the Fabric is Selected in the Object Browser
- By default the back and side of the Fabric have the same color and Maps as the front, but these can be edited individually
- Many Map types and settings are covered in the Texture Application & Editing section, and further information can be found in our [Maps Guide](#), or on our Youtube channel



5| FABRIC PROPERTIES

INTRO TO MAPS

Each Map type is set up in a different way for CLO to express the corresponding property correctly. The more Maps that are layered together, the more realistic a material can appear.

*For best results and correct scaling, apply all Maps first, then scale and edit with the **Edit Texture Tool**.*

Maps Checklist:

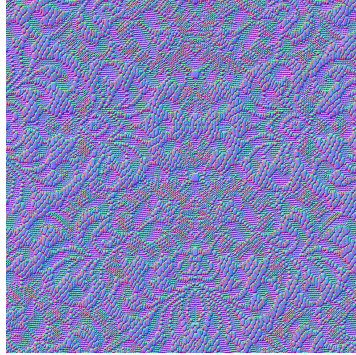
- Repeats are clean
- Maps are saved at 300 PPI and RGB color format
- All Maps are the same dimensions



5| FABRIC PROPERTIES



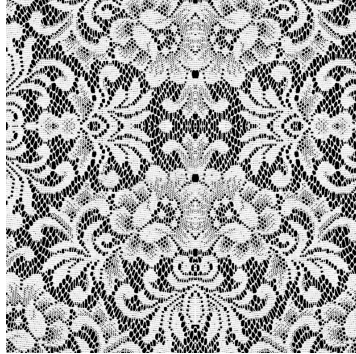
Texture/Diffuse



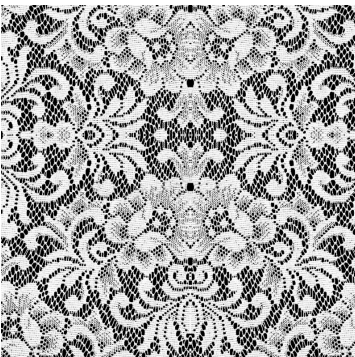
Normal



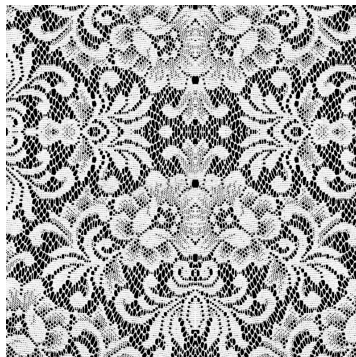
Displacement



Opacity/Alpha

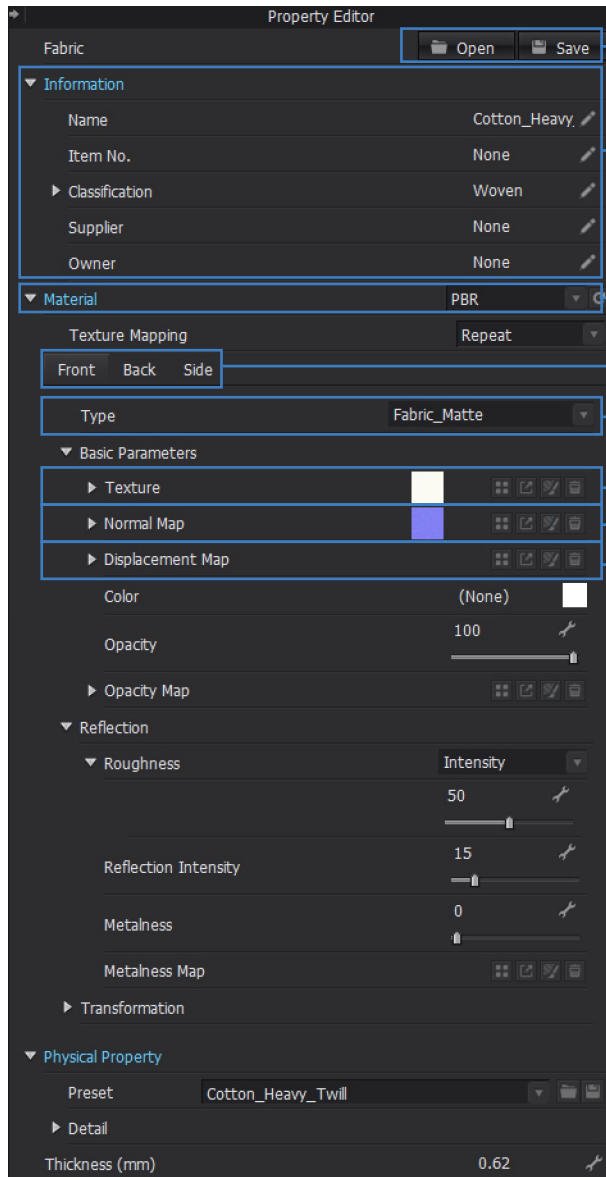


Roughness



Metalness

5 | FABRIC PROPERTIES



FABRIC PROPERTIES

OPEN/SAVE

Open an existing *zfab*, or save a newly created material

INFORMATION

Input name, fabric classification, fiber content, or supplier info in any field with pencil icon next to it

MATERIAL

Choose between PBR and Substance material texture

FRONT/BACK/SIDE TABS

Set texture for all 3 sides simultaneously, or uncheck "Use Same Material as Front" in Back or Side tabs to edit separately

TYPE

Apply fabric appearance presets in the dropdown. "Render Only" options will be visible only in the Interactive Render Window

TEXTURE

Texture makes up the top layer of the materials visual properties. These can be the fabric texture or a print. The image can be Desaturated in the Dropdown. See Texture Application & Editing section for further information

- Accepted file types: XTex, Normal & Specular Maps, Adobe Substance SBSAR, JPEG, PNG, PSD, AI, TIFF

NORMAL MAP

Normal Maps are the second layer of materials visual properties. Normal Map gives the appearance of the weave or knit fabric texture. In the drop down, an Intensity slider will strengthen or lessen the sharpness of the normal Map

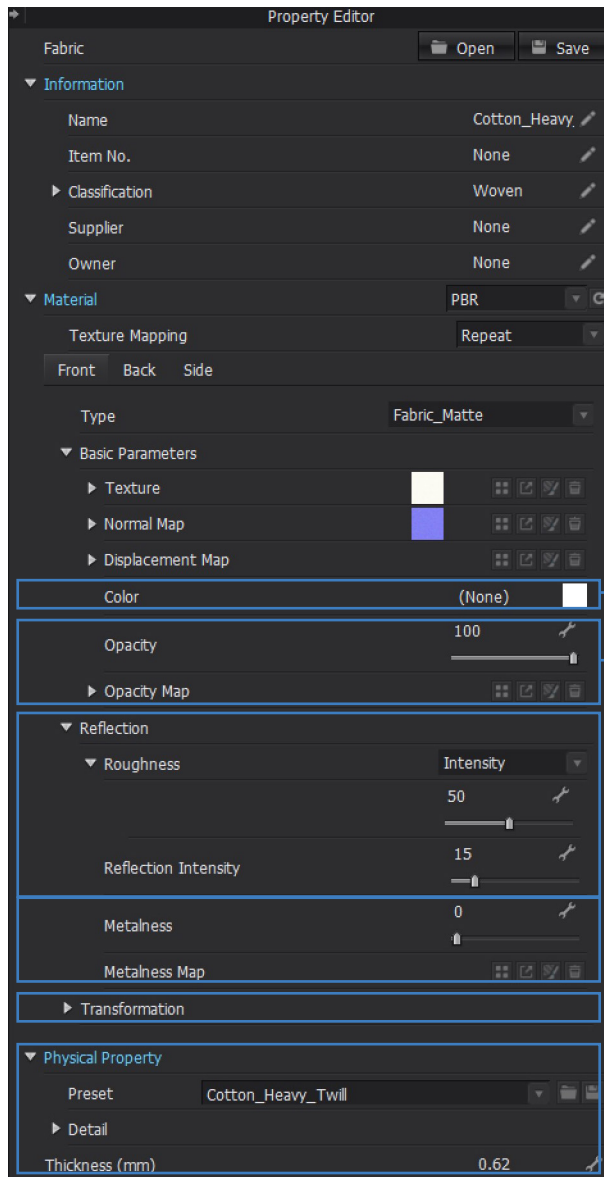
- Accepted file types: JPEG, PNG

DISPLACEMENT MAP

Displacement Maps can express concentrated raised areas in fabric or graphics such as cable knit. They will only be visible in the Interactive Render window

- Accepted file types: JPEG, PNG

5 | FABRIC PROPERTIES



COLOR

Use the color palette to edit the color of fabric, trims, or topstitches. See Color Palette section for more information

Accepted file types: ASE, ACO (RGB color format)

OPACITY & OPACITY MAP

Adjust the opacity of the material, or apply an opacity/alpha Map if needed to express partial opacity

Accepted file types: AnF, JPEG Alpha/opacity Map

REFLECTION

Reflection determines the shine and reflection level of the material surface. A Roughness Map can be applied as a JPEG

- Roughness: Determines fabric shine. The closer the value is to 0, the higher the fabric shininess
- Reflection Intensity: Determines how much light is being reflected from the fabric surface. More light will be reflected at higher values

METALNESS & METALNESS MAP

Expresses metal texture in a fabric. Apply a metal texture image in the metalness and roughness Map area (Inverted) to achieve metal textures on a material. Metalness of the entire surface can also be adjusted manually

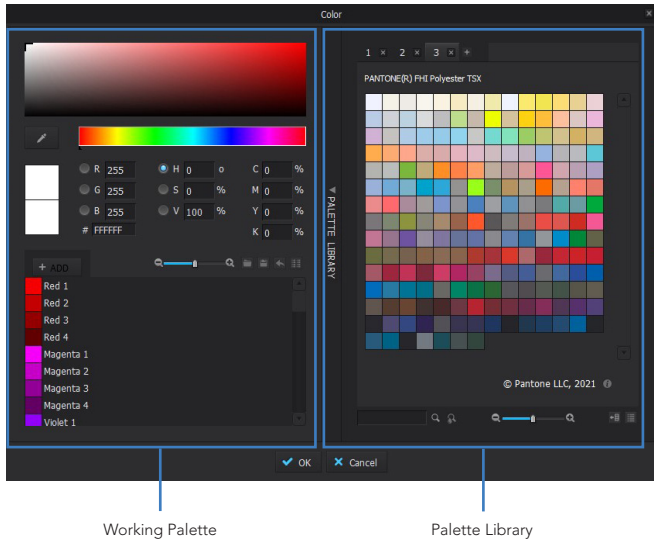
TRANSFORMATION

Change the size and rotation of the texture or Maps by overall dimension or percentage

PHYSICAL PROPERTY

Change the drape preset, edit physical properties manually in the Details dropdown, or change the fabric thickness

5 | COLOR PALETTE



COLOR PALETTE

Use the color palette to edit the color of fabric, trims, or Topstitches. The color palette is divided into 2 sections, the Palette Library and the Working Palette. Import an ASE or ACO (RGB color format) color palette into either section.

- Palettes in either section are saved when opened in a new CLO file, they will have to be reset manually to return to default appearance

PALETTE LIBRARY

Use the Pantone palettes, or import a custom palette.

- Import as ASE or ACO (RGB color format) to either section
- To import a palette to this section, click the + icon to to the right of the last palette tab
- Search by name or Pantone TSX/TCX in the search bar in the bottom left of the Library section

WORKING PALETTE

Import an existing palette, create a new one, and export.




- To import a palette to this section, click the folder icon



- To save a new palette, click on the floppy disk icon
- Input RGB, HEX, HSV, or CMYK values, or click in the color window to pick a custom color
- The eyedropper will pick colors within or outside the CLO window
- Click the + ADD button to add it to the palette below
- To delete a color chip, select it and press the Delete key
- Change the chip view by clicking on the bottom right-most icon, and double-click on a color name to rename it



APPLYING TEXTURES

There are several ways to apply textures to fabrics.

- Any texture will be automatically tiled
- Drag & drop the image from the Library or File Explorer onto the fabric header in the Object Browser
- Drag & drop the image from the Library or File Explorer directly onto the fabric in the 2D or 3D window
- Select the fabric in the Object Browser, and click on the  Gallery icon next to Texture to select the image from the File Explorer
- Apply an Xtex file by right-clicking on the fabric header in the Object Browser, and select Import (Add)

COLOR AND TEXTURE BLOCKING

If there are multiple colors and/or texture versions of the same fabric applied to different pattern pieces, the fabrics can be copied and reassigned:

- Select the fabric header in the Object Browser and click the  Copy button
- Select the pattern pieces with the **Transform Pattern Tool** and click the  Assign icon next to the desired fabric in the Object Browser
- The fabrics will now edit separately. Apply different properties as needed



Any edits made to textures and graphics can be refreshed as long as they are saved with the same name and file location. Right-click in the background of either window → select Refresh Textures (shortcut F5).

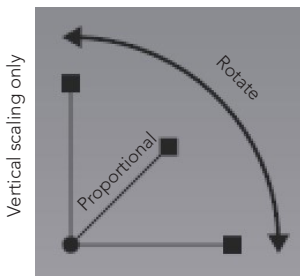


EDIT TEXTURE (2D - T)

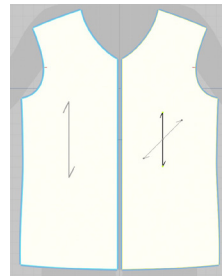
Edit Grainline, texture or print placement, scaling, and rotation.

- This tool is in both 2D and 3D toolbars
- To edit the Grainline of a pattern, click on it and select the Grainline Arrow that appears and rotate from the top or bottom of the arrow.
- To edit the scale or rotation of the texture, click on a pattern piece with the texture applied, and the Texture Gizmo will become active in the upper right corner
- Scale by a specific measurement or percent in the 2D window by clicking & dragging any of the handles and right-clicking to bring up the precision box
- Using in the rotation arc will only change the print rotation, not Grainline
- Click & drag the texture placement per pattern piece

Edit Texture Gizmo



Edit Grainline



Change the Grainline of the pattern pieces in the Property Editor Fabric section by selecting the pieces with the **Transform Pattern Tool**.



FABRIC FACES

These options are all available in the 3D Vertical Toggle Menu

Textured Surface vs. Thick Textured Surface



- Textured Surface: The back fabric face is shaded with a dark gray overlay, and the fabric thickness and render thickness are not expressed



- Thick Textured Surface: There is no shading on the back face, and the fabric thickness and render thickness are expressed



Textured Surface



Thick Textured Surface



Front & Back Texture Surface



- To switch between the front and back face of the fabric in 2D, select either Front or Back Texture Surface from the Fabric vertical toggle menu

Flip Normal

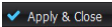
- To switch which face of the fabric is outward/inward, select the pattern pieces with the **Select/Move Tool** in the 3D Window, right-click, and select Flip Normal
- This can be especially important when using the Fur settings

TEXTURE EDITOR

Layer, tile, and blend multiple textures per fabric.



- Access the Texture Editor by clicking on the paint brush icon next to the Texture field in the material Property Editor
- The width, height, and PPI is determined by the first layer applied. To resize the tile, type in the desired dimensions in the fields, the bounding box will change accordingly
- To add another layer to the texture, click the + Add button at the top of the layer panel, or Drag & Drop directly from the Library
- Click on a layer in the layer panel to activate the Edit Texture Gizmo in the top right corner of the texture preview, move the layer placement, and see editable options for that layer
- If a layer is scaled using the Edit Texture Gizmo, the tile bounding box will not change
- To change the blending mode of the layer, select the layer and select a mode in the Blend dropdown to apply
- Select a layer and click the Copy button to create another version of the layer

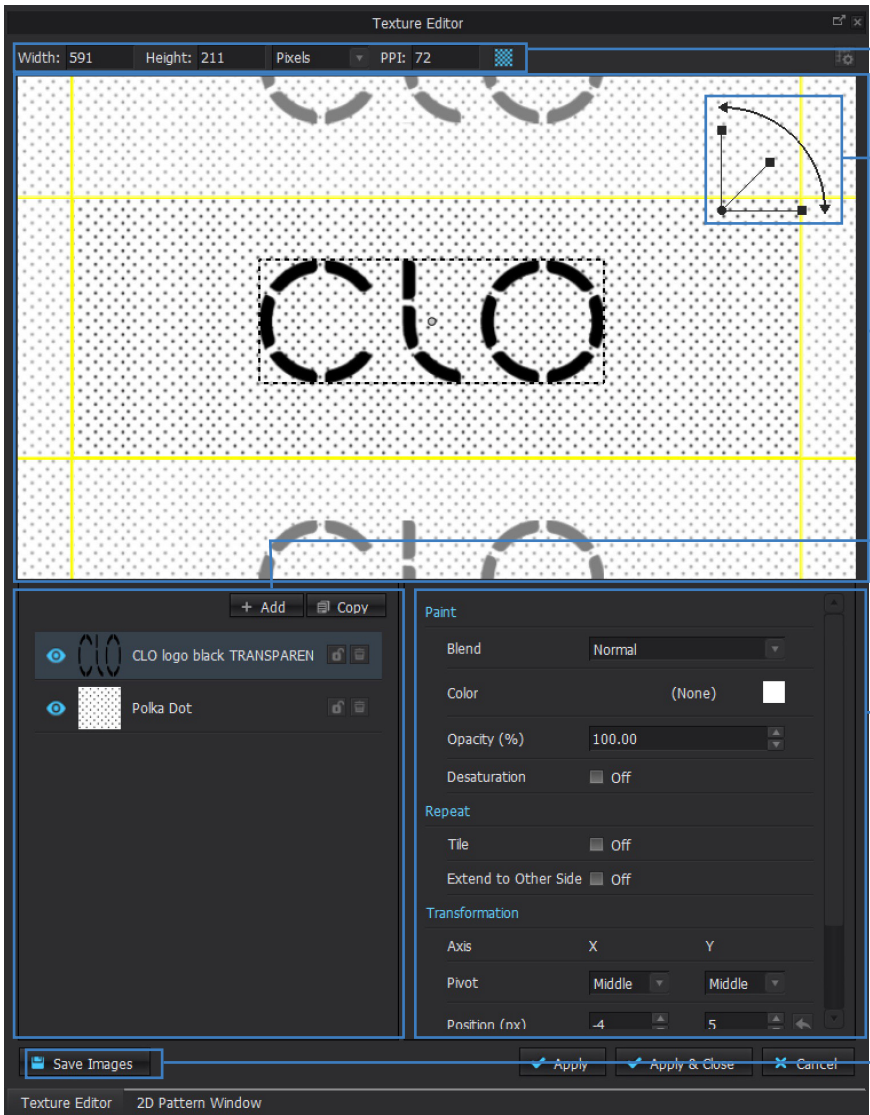


- To apply the newly created texture to the garment, click the Apply button
- To apply the new texture and close the Texture Editor Window, click the Apply and Close button
- See and save the baked texture tile by clicking on the texture thumbnail in the material Property Editor

To add a print layer that will edit completely separately from the base texture, click the  Add Print button next to a fabric name in the Object Browser.



5 | THE TEXTURE EDITOR



THE TEXTURE EDITOR

DIMENSIONS

View and edit the tile dimensions and PPI in the fields. The yellow bounding box visually marks the tile in the preview window

EDIT TEXTURE GIZMO

When a layer is selected, scale and rotate it. The precision box cannot be used in the Texture Editor

PREVIEW WINDOW

*See the texture repeat, and move layers around. A layer may be moved or scaled **ONLY** if it is selected in the layers panel first*

LAYERS PANEL

See the number and order of layers. Drag & Drop to reorder. Click the eye icon to hide a layer, click the lock icon to prevent a layer from being moved or edited, and click the garbage can icon to delete layers

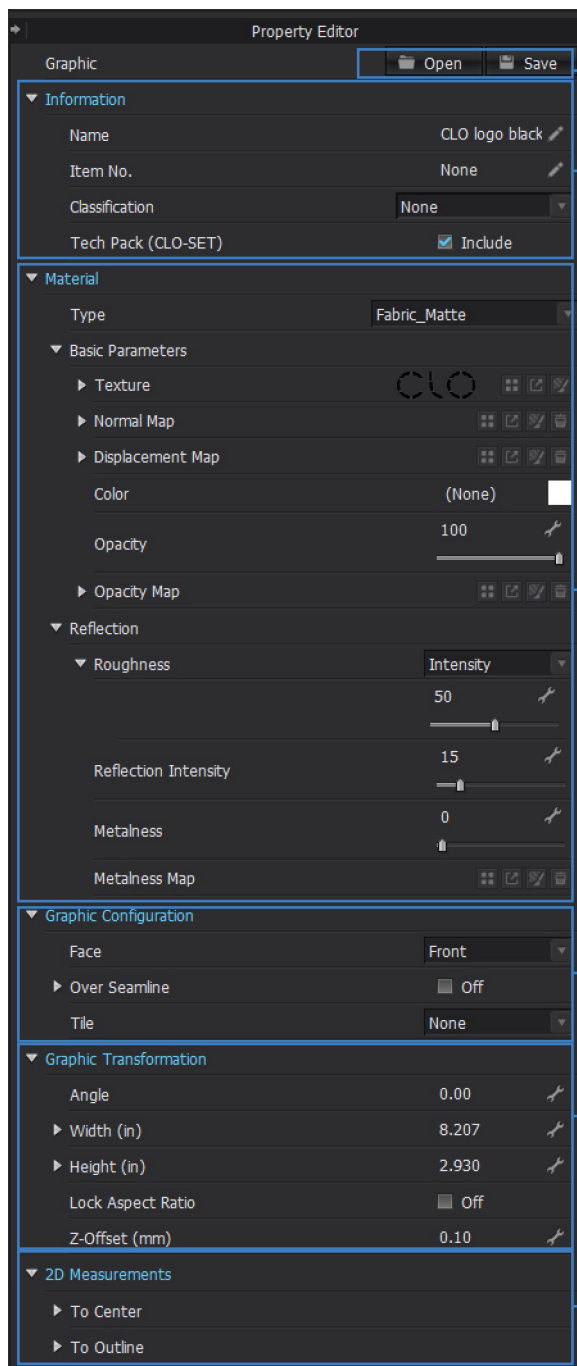
LAYER EDITOR

Select a layer to see the editable options in the right side of the Texture Editor. Choose blending options, tile, recolor, and change dimensions

SAVE IMAGES

Save all layers as separate PNG files

5 | GRAPHIC APPLICATION & EDITING



GRAPHIC APPLICATION & EDITING

OPEN & SAVE

Graphics can be saved as a .GRP file, which saves the artwork and any Maps, and Property Editor settings that can be opened in any CLO file

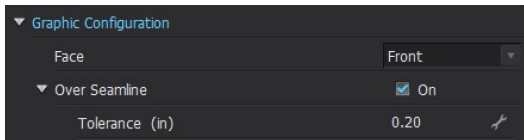
INFORMATION

Change any naming conventions of the graphic

MATERIAL

Add Maps or color, functions the same as fabrics

GRAPHIC CONFIGURATION



Change the face, turn on over seamline, or tile.

Note: Tiling and Over Seamline cannot be used at the same time
To allow the graphic to extend over a seamline, select the graphic and check Over Seamline in the Property Editor. *The Tolerance must be higher than the length of the difference of the sewing lines.* Check the sewing line difference with the **Edit Sewing Tool** and adjust Tolerance accordingly if the graphic does not extend over seam after the option is selected

GRAPHIC TRANSFORMATION

Change the angle or dimensions of the graphic. Z-Offset is used to float the graphic above the surface of the fabric. This may need to be changed if there is a displacement Map applied on the fabric surface

2D MEASUREMENTS

Check the placement of the graphic from pattern edges either measured from the center or outline of the artwork

APPLYING GRAPHICS

There are 2 main methods to apply graphics:

- Graphics can be in PNG, JPEG, PDF, AI, or PS format
- To apply, right-click on a graphic in the Library and select Add as Graphic, or;
- Click the **Graphic icon** in either the 3D or 2D window and select the graphic from the File Explorer
- Once the artwork is selected, the **Transform Graphic Tool** will be auto selected.
- Click on a pattern piece to place the graphic in the 2D or 3D window. When placing in 2D, the Add Graphic window will pop up and allow the scale and position of the graphic to be manually adjusted before importing
- To maintain color consistency, export the artwork in RGB color format



TRANSFORM GRAPHIC

Scale, rotate, or modify graphics.

- **Only this tool can Select/Edit Graphics!**
- The right-click menu allows for additional options in the 2D window (i.e. Duplicate to Symmetric Pattern, Flip, Tile, etc.)
- Control the placement and scaling. To scale by a specific amount, start to scale the graphic in the 2D window and right-click for a precision box
- Adjust size, add Maps, change tiling or face, and apply over seams in the Property Editor. See previous page for descriptions



TOPSTITCHING

- Locate Topstitching in the Default Library in Hardware & Trims —>Topstitch
- Add a new Topstitch directly to the Object Browser by dragging & dropping a Topstitch from the Library
- Add a Topstitch from the File Explorer by clicking the + Add button in the Topstitch tab of the Object Browser, click on the new Topstitch header, and click Open in the Property Editor
- If symmetry is applied on patterns, Topstitching will apply symmetrically

APPLYING Topstitches

Topstitch application tools work very similarly to sewing tools.

SEGMENT Topstitch (K)

*Apply Topstitching to a segment (point to point). Functions similar to **Segment Sewing**.*

- Hover over the desired segment and click to apply
- Segment Topstitching is affected by segment points

FREE Topstitch (L)

*Apply Topstitch without being affected by segment points or pattern corners. Functions similar to **Free Sewing**.*

- Click on a point to begin (a highlight will appear), and click again to end the Topstitch line



SEAMLINE TOPSTITCH (;)

Apply Topstitch along both sides of a seam, or straddling a seamline.

- Hover over a seamline. Perforated lines will appear to indicate which seam will be selected
- Click on a point to begin (a highlight will appear on the seamline of both patterns), and click again to end the Topstitch line
- Lines are affected by seam relationships. A seamline Topstitch cannot traverse multiple seamlines
- Set a seamline Topstitch on one side of a seam by selecting it with the **Edit Topstitch Tool**, and changing Placement in the Property Editor



ASSIGNING & EDITING Topstitches

Topstitch assigning works very similarly to assigning fabrics.



EDIT TOPSTITCH (J)

Assign, lengthen, shorten, move, delete, and change properties of Topstitches. Works similarly to the **Edit Sewing Tool**.

- Select the desired lines in the 2D window and click the Assign  arrow next to the Topstitch name in the Object Browser
- To delete a Topstitch in the Object Browser, reassign segments to another Topstitch, and a garbage can icon will appear to delete it 
- All Topstitch lines will highlight bright pink when selected
- Select the circular end point of the Topstitch and click & drag to lengthen or shorten it
- Select the middle of the Topstitch and click & drag to move it
- To delete a line, select a Topstitch line, right-click and select Delete or press the Delete key

PUCKERING

- To change the appearance of a puckering style, select the style in the Puckering tab of the Object Browser, and edit Material, Density (%), and Width in the Property Editor
- For added emphasis, locate puckering textures in the Default Library in Hardware & Trims>Puckering
- To apply the texture, drag & drop into the Texture field of a puckering style
- Add puckering from the File Explorer by clicking the Add button in the puckering tab of the Object Browser, click on the new puckering header, and click Open in the Property Editor
- If symmetry is applied on patterns, puckering will apply symmetrically

APPLYING PUCKERING

Puckering application is the same as Topstitching.

SEGMENT PUCKERING



*Apply puckering to a segment (point to point). Functions the same as **Segment Topstitch**.*

FREE PUCKERING



*Apply puckering without being affected by segment points or pattern corners. Functions the same as **Free Topstitch**.*

SEAMLINE PUCKERING



*Apply puckering along both sides of a seam, or straddling a seamline. Functions the same as **Seamline Topstitch**.*

When in the Render window, puckering appearance can be made more dramatic by adjusting Seam Puckering Intensity in Render Properties. For more information on rendering and properties, see Chapter 6 Presentation.



ASSIGNING & EDITING PUCKERING

Puckering assigning works exactly the same as Topstitches.



EDIT PUCKERING

*Assign, lengthen, shorten, move, delete, and change properties of puckering. Functions the same as the **Edit Topstitch Tool**.*



- Select the desired lines and click the Assign arrow next to the puckering name in the Object Browser



- To delete a puckering style in the Object Browser, reassign lines to another puckering type and a garbage can icon will appear to delete
 - All puckering lines will highlight bright purple when selected
 - Select the circular end point of the puckering and click & drag to lengthen or shorten it
 - Select the middle of the puckering and click & drag to move it
 - To delete a line, select a puckering line, right-click and select Delete or press the Delete button



COLORWAY MODE

Create different versions of your garments by changing the Print Textures and Colors of Fabrics, Topstitching, Trims, Graphics, etc.

CHANGE OF MODE

- Access Print Layout mode in the drop down menu in the top right corner of the CLO window
- The selected colorway appears in the 3D window, then the Colorway Editor appears

COLORWAY ADD/DELETE

Select a colorway and click the + Add at the top-right corner in Colorway Editor.

- Current Colorway is duplicated
- To edit the name, double-click the added colorway name, rename it, then press Enter

COLORWAY EDITOR

Click on a swatch from a colorway or an item in Object Browser.

- Properties in the Property Editor appear

CHANGE THE TEXTURE

- Colorway in the 3D window changes to newly selected materials
- Click the Update button at the left-top corner in Colorway Editor to update the Colorway thumbnail window

WHAT YOU CANNOT CHANGE IN COLORWAY MODE

- The Fabric Type; it will change on all colorways
- The placement of a graphic
- Add Print to only 1 colorway; Adds to all colorways

CHANGE COLORWAY VIEWER

Click the VIEWER button at the bottom-right corner.

- Colorway window switches to VIEWER. You can see the colorway thumbnails only. Edit colorway is not available in VIEWER mode
- Size thumbnails by controlling the scroll bar at the bottom-left corner, or arrange the thumbnails in single or multiple lines by clicking the arrangement button
- Colorway Layout is changed
- Click the LIST button at the bottom-right again
- Screen switches to LIST mode where colorways are editable

SNAPSHOT

Click on the Save Image button at the left-top corner.

- Save Image window appears
- Select either 3D window (Colorway Thumbnail) or Colorway Editor(ver 6.0), then click OK
- File Explorer window appears
- Save the image after choosing the saving path and file name

* Note (ver 6.0)

Select multiple swatches while holding down the Shift or Ctrl key.

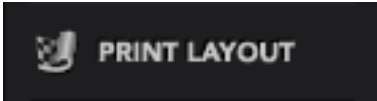
- Right-click on a swatch and click Select all with Same Color, then automatically the same color is selected within the current colorway.

* Note (ver 6.1)

All colors used in the garments are now listed under Thumbnail.

- Select one of these colors to change in all Materials in Colorway
All Materials are separated by category for easier location.
Show/Hide Graphic on Colorways by toggling the Eye icon on/off

5 | PRINT LAYOUT MODE



PRINT LAYOUT MODE

See and edit the pattern layout, nesting, and grain.

- Access Print Layout mode in the drop down menu in the top right corner of the CLO window
- View different fabric layouts by selecting the corresponding tab at the top of the 2D window
- If any patterns are Bonded, a Bond tab is auto generated
- Change the roll width by selecting the fabric in the Object Browser, the Roll section is located at the top of the Property Editor
- Move patterns to adjust the texture placement in the 2D window, or by using the Edit Texture Tool in the 3D window
- If patterns are rotated in the 2D window in this mode, it will change the grain direction
- Click the Reset 2d arrangement button in the Print Layout toolbar to reset patterns on the roll.
- Click the gear icon to set nesting, and click play to start the nesting
- Save Image will save an image of the fabric roll as a PNG, JPEG, or PDF. In the dialog box, select where to save and format, then select dimensions and which information to display in the final image

6 | Presentation

Prepare Your Garment

Snapshots

Quality & Schematic Render

Videos

Rendering & Render Properties

6 | PREPARE YOUR GARMENT

HI-RESOLUTION/LOW-RESOLUTION GARMENT

Enhance or lower the resolution of Garments. Use this function to enhance the Garment in order to emphasize reality and higher quality of a Garment, or reduce it for faster adjustments.

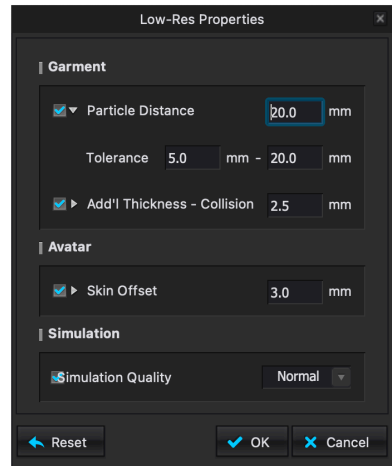
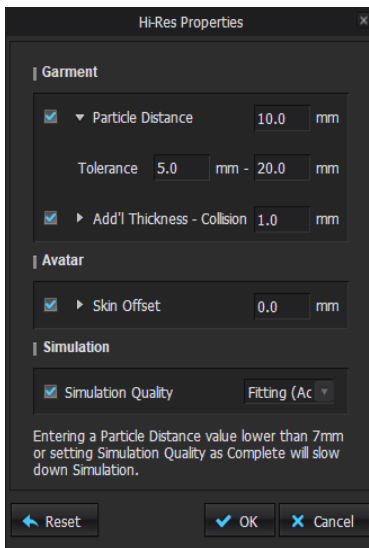


Hi-Res Garment



Low-Res Garment

- 3D Toolbar—>Hi-Res Garment / Low-Res Garment
- Hi/Low-Res Properties window appears



UNDERSTANDING THE HI-RES/LOW-RES PROPERTIES

Garment	Particle Distance	<p>Sets the Particle Distance value applying to all Patterns.</p> <ul style="list-style-type: none"> - Hi-Res Garment default value: 5mm - Low-Res Garment default value: 20mm
	Tolerance	<p>Applies only for Patterns within the range of application of Particle Distance.</p> <p>The default tolerance value is between 5mm ~ 20mm, and any Pattern within the range set above is going to be applied.</p> <p>※ Note: This is provided to maintain the particle distance value of small patterns below 5mm for more stable simulation. Being mindful of the tolerance can avoid unintentional changes to these patterns.</p>
	Add'l Thickness - Collison	<p>Sets the collision thickness value applying to all patterns.</p> <ul style="list-style-type: none"> - Hi-Res Garment default value: 1mm - Low-Res Garment default value: 2.5mm
	Tolerance	<p>Any Pattern within the range set above is going to be applied.</p>
Avatar	Skin Offset	<p>Sets the skin offset value applying to Avatar.</p> <ul style="list-style-type: none"> - Hi-Res Garment default value: 0mm - Low-Res Garment default value: 3mm
	Tolerance	<p>Any Avatar within the range set above is going to be applied.</p>
Simulation	Simulation Quality	<p>Sets the simulation quality as Complete or Normal.</p> <ul style="list-style-type: none"> - Hi-Res Garment default value: Complete - Low-Res Garment default value: Normal <p>※ Note: Set the simulation quality on Complete for material properties generated in Emulator Mode to result the most accurate simulation. However it may slow down the simulation speed therefore it is recommended to apply this setting when enhancing the garment completion.</p>
Check On/Off Menus		<p>Toggle option whether to apply on Garment, Avatar, Simulation settings.</p>



CUSTOM RESOLUTION

Save and open customized resolution of the 3D Garment as needed.

- Select the **Custom Resolution Tool** from the 3D toolbar. The Custom Resolution widget will appear on the right top corner of the 3D window

Save Custom Resolution

- Click on the Add icon in the right-top corner of the Custom Resolution widget
- Current resolution will be saved and listed in the Custom Resolution widget
- The resolution includes Particle Distance, Add'll Thickness Collision/Rendering, Avatar Skin Offset, and Simulation Preset

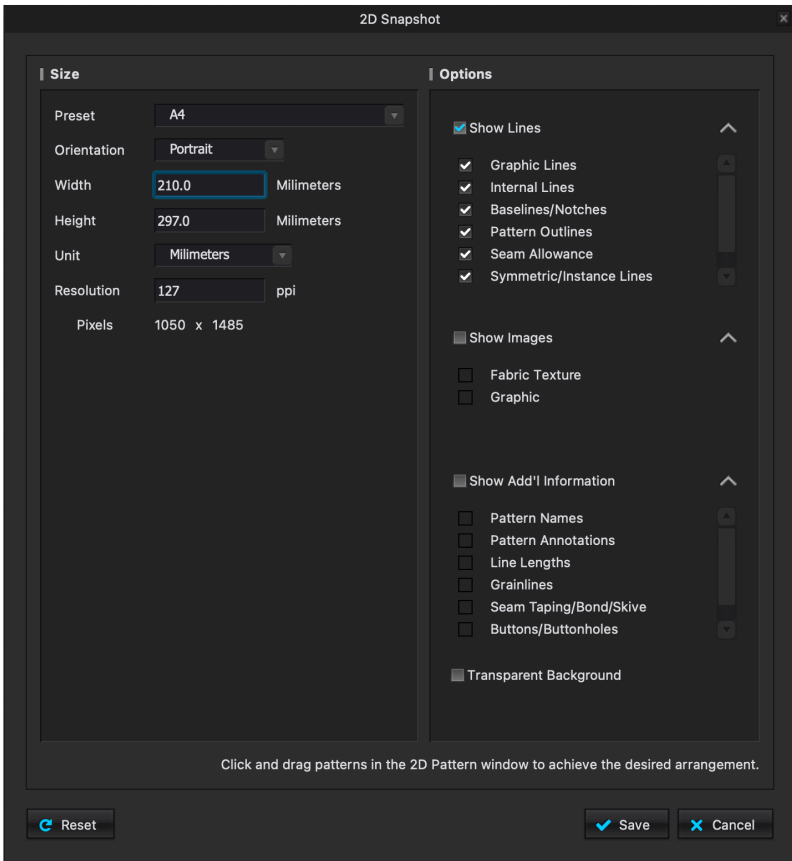
Open Custom Resolution

- Double-click the saved custom resolution to return to that resolution setting while working on the 3D Garment
- The custom resolution will be reflected on the 3D Garment

Snapshots

Quickly save imagery from your 2D and 3D window.

Main Menu—> File—> Snapshot—> 2D Patterns (1:1)



2D Patterns (1:1)

The 2D window expands and the 2D Snapshot window appears.

- Preset; Select one among provided Presets
- Orientation; Decide orientation of the image
- Width, Height; Type in desired Width and Height for the image
- Resolution; Assign Resolution for the image. (exceeding 150 PPI may cause exporting issues)
- Select which lines, images, and additional information to be included in the exported image
- Save the image with transparent background
- Click Save. The browser window opens
- Choose location to save the file
- Choose the desired format; PNG, JPG, or PDF
- Configure Options for format chosen
- Click Save

**When saving pattern pieces using this method, choose the desired Preset. CLO will add page layout boxes onto the 2D window to see how the page will lay out. To create a one page, full size document, choose one of the Wide Format Presets or Create a Custom layout.*

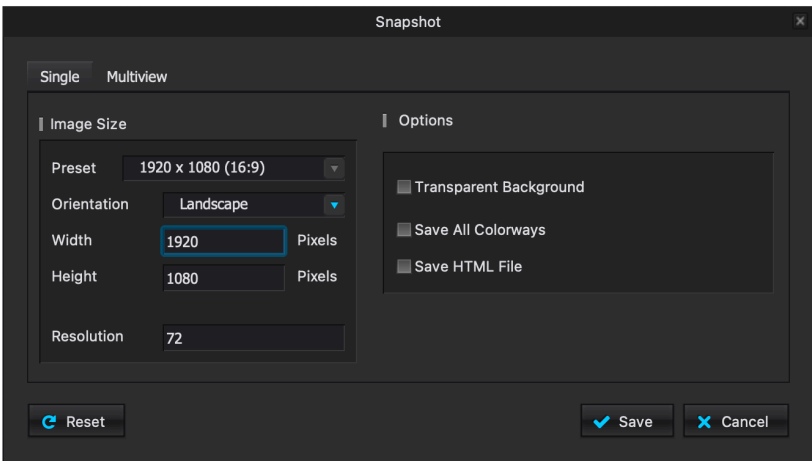
Arranging patterns in the 2D window will optimize the layout.

SNAPSHOTS - 3D Window

Quickly save imagery from your 2D and 3D window.

Main Menu—> File—> Snapshot—> 3D window

Single View



- Save 3D window snapshots from a single view

OPTIONS FOR SAVING SINGLE VIEW SNAPSHOTS

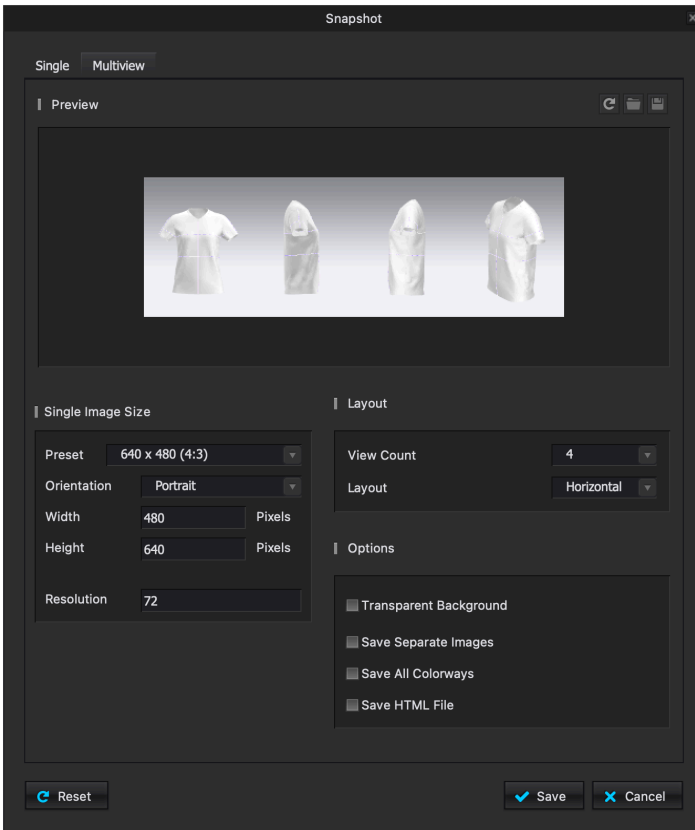
Image Size	Preset	Customize or select from provided preset options
	Orientation	Select from Portrait or Landscape Orientation Options
	Width	Set the Width of the image
	Height	Set the Height of the image
	Unit	Set the unit of measurement of the image
	Resolution	Set the Pixels Per Inch (PPI) for the image. (PPI will automatically adjust depending on the selected paper size for optimal printing results.)
Option	Transparent Ground	Save the image with a transparent ground
	Save All Colorways	All Colorways are saved
	Save HTML File	An HTML file of the Snapshot is saved.
Reset		Resets the options to the program default settings.

SNAPSHOTS - 3D Window

Quickly save imagery from your 2D and 3D window.

Main Menu—> File—> Snapshot—> 3D window

Multi View



- Save 3D window snapshots from multiple views

OPTIONS FOR SAVING MULTI-VIEW SNAPSHOTS

Preview	Preset	Mouse-over on the preview image Select desired view option from drop-down menu
	Custom	Customize view angle in the 3D window. Mouse-over on the preview image. Click on the camera icon.
Layout	View Count	Select the number of views to capture. Set it up to 10 views.
	Layout	Select from horizontal/vertical/box layout options
Single Image Size	Preset	Customize or select from provided preset options
	Orientation	Select from Portrait or Landscape Orientation Options
	Width	Set the Width of the image
	Height	Set the Height of the image
	Unit	Set the unit of measurement of the image
	Resolution	Set the Pixels Per Inch (PPI) for the image. (PPI will automatically adjust depending on the selected paper size for optimal printing results.)
Option	Transparent Background	Save the image with a transparent ground
	Save Separate Images	Save the multi-view in individual images
	Save All Colorways	All Colorways are saved
	Save HTML File	An HTML file of the Snapshot is saved.
Open/Save	Save All Colorways	All Colorways are saved
	Save HTML File	An HTML file of the Snapshot is saved.
	Reset	Resets the options to the program default settings.

QUALITY RENDER

Heightened, more realistic visualization/representation of the garment in the 3D window; adds depth to shadows and highlights.



Quality Render OFF Quality Render ON



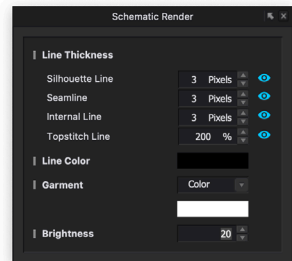
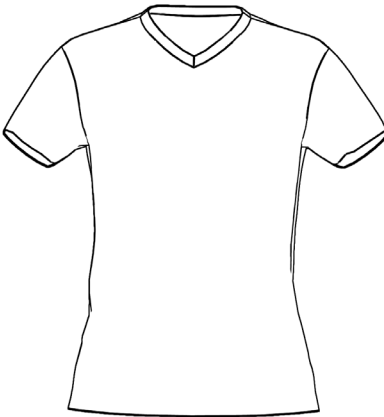
SCHEMATIC RENDER

Render 3D Garments into technical drawings for Tech Pack. Select the tool/menu indicated in Location. Render the 3D garment according to the schematic format.



Set the following options as needed

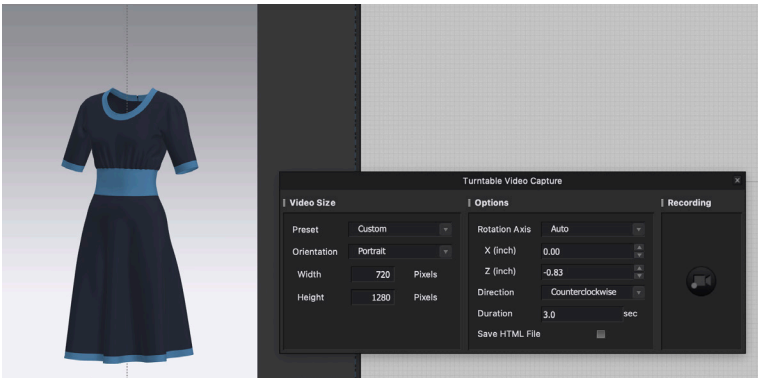
- Line Thickness; Show or hide the silhouette line (the outline of the area where the garment and the background meet and the line of the wrinkled area inside the garment), seam line, internal line and topstitch line and adjust the line thickness
- Line Color; Adjust the Color of the line
- Garment; Show the Texture or Color of the garment
- Brightness; Adjust how light or dark the shadows appear



TURNTABLE

Easily record 3D garments with Turntable, utilize it when communicating.

- Main Menu—> File—> Video Capture—> Turntable
- Turntable dialogue window appears at the bottom-right corner
- To Quit; X button on the top-right corner of Turntable dialogue—> X Button



Video Size	Adjust the orientation, width and height of the turntable video window.	
Options	Rotation Axis	Set the rotation axis of a Turntable video.
		Auto The axis is set to the center of the garment and avatar in the 3D window
		Center (0,0) The axis is set to the center (0.0) in the 3D window.
	Custom Enter the desired value of the X and Z-axis to set the desired axis.	
	Direction	Set the direction (clockwise/ counter-clockwise) of the turntable.
	Duration	Set the duration of the turntable video. Minimum of 1 second and a maximum of 60 seconds.
	Save HTML File	The turntable is saved as HTML.
Video Codec	Set the codec to use when recording video. *Note: it is available to save MP4/AVI for Windows and MOV files for MAC without installing a separate codec.	
Record		Start or delete the recording and return to the initial state.

RENDERING INTRODUCTION

Since real-life lighting and reflection are not applied to the 3D environment in CLO, 3D Garments have less realistic look in the 3D window. Therefore, to create photo-realistic 3D Garments, an additional process called rendering, which simulates real-life lighting and reflection on the 3D Garment, is needed.

The following information is an introduction to the tools/options in the Render area of CLO. Use the [CLO Support Forums](#) and [YouTube channel](#) to get more detailed information about achieving the desired final result.

3D Window Quality Render



VRay Render



Main Menu—> Render—> Render

OR

Main Menu—> Display—> Window—> Render

V-RAY RENDER PROPERTIES



INTERACTIVE RENDER

- The 3D Garment and Avatar in the 3D window are rendered in real time, reflecting the 3D view. Any changes made to material properties are applied to the Render window in real-time when the Interactive Render is active



FINAL RENDER

- The final render image is saved according to the render properties, light properties, and image/ video properties



STOP RENDER

- Stop current render and make adjustments or exit



COPY CURRENT IMAGE

- Copy the image in the render window to the clipboard for pasting into a document



SAVE CURRENT IMAGE

- Save image as it appears in the Render window



SHOW IN SAVED FOLDER

- Open the folder where render files have been saved

V-RAY RENDER PROPERTIES



IMAGE/VIDEO PROPERTIES

- Configure image/ video properties depending on the final output of the rendered 3D Garment



CAMERA PROPERTIES

- Create a dynamic image for 3D Garments with enhanced camera settings replicated from real-world film/DSLR/ video cameras: IOS, F-Number, Effects, and more



LIGHT PROPERTIES

- Configure the light properties for the final render image. See examples on the next page



RENDER PROPERTIES

- Properties that relate to how the hardware processes the image
- Options include which Render Engine is used, how much Noise is eliminated, how long each image will take to render, as well as the Quality of the Light and the Materials
- Adjust Linear Workflow in Color Mapping



RENDER VIA CLO-SET

- Uploads File to CLO-SET to render. The settings applied in CLO will be saved for the rendering via the cloud in CLO-SET

LIGHT DESCRIPTIONS



DOMELIGHT

The default is the "Studio Low Contrast." These include an environment map image that can be shown to create a visual environment. CLO includes 11 default options. 3rd party HDRI files can be used.



RECTANGLE LIGHT

Large lights whose size, intensity, direction, and color can be changed.



SPHERE LIGHT

Globe shaped light whose size, intensity, and color can be changed. Effect is similar to a lightbulb in a frosted glass globe.



DIRECTIONAL LIGHT

Small light whose size is static, but intensity and color can be changed.



SPOT LIGHT

Cone shaped light whose size, intensity, direction, and color can be changed. The cone, penumbra angle and shadow radius can be changed to add effect to the environment.



IES LIGHT

IES files describe how light from a lamp is distributed in a room. This data is provided by many manufacturers so that lighting designers can realistically simulate how a project will look when a specific light source is used.

Each environment can only have 1 Dome Light. You can add as many of the other lights to your environment as desired.



LIGHT EXAMPLES



LIGHT PROPERTIES (UNIVERSAL)

Each light has properties unique to their type. These properties are the same in the all the light types;

Activate

- Turn light on or off

Show

- Show/hide the light in the 3D window and the Render Image

Ground Shadow

- Adds shadows to environment in the Interactive Render and Final Image Render

Add a "floor" to your environment with a pattern piece or and imported OBJ; you do NOT need to have "Ground Shadow" on for the shadows to appear.



| Appendix

Modes

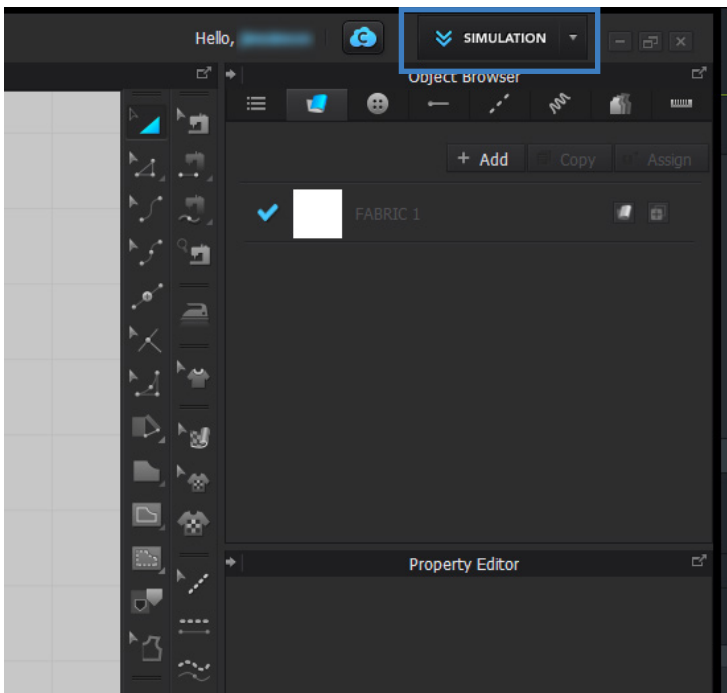
Index

MODES

MODES

CLO provides total of Nine Modes as follows: Simulation, Animation, Print Layout, Colorway, Emulator, Modular, UV Editor, Review and BoM Mode.

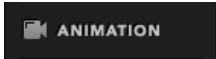
- Switch between Modes using the button on the right-top corner of the window.
- You will spend most of your time working in SIMULATION MODE.



MODES



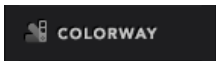
Create and edit patterns in the 2D Window and Simulate 3D Window.



Record, play and edit Garment animations.



Match up prints on fabric in the 2D window, and calculate fabric consumption in the 3D window.



Create different color variations of a garment by changed the color and textures of the materials. (See Chapter 5)



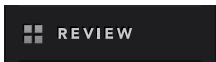
Digitize new fabric and save as a file in Emulator Mode.



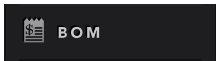
Customize your own design by simply combining and modifying Pattern Blocks.



Create UV maps of Patterns, Buttons, Zippers and more to bake all types of Image Maps.



All Grading Sizes of Garments and Avatars can be compared on one screen.



Estimate cost per the number and price of fabric, buttons, and buttonholes.

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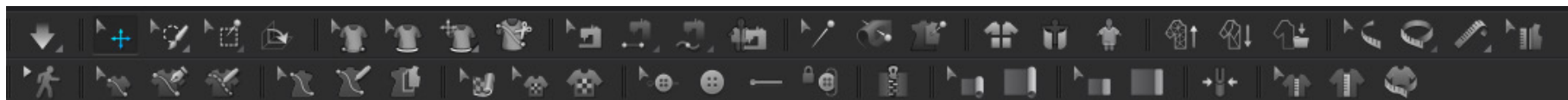
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TOOLBAR GUIDE - 3D WINDOW
























-  **Simulate** *SPACE*
Simulates / drapes the garment
-  **Select / Move** *Q*
Select/Move points or patterns in the 3D window
-  **Select Mesh (Box/Lasso/Brush)**
Select sections of the garment freely
-  **Pin (Box/Lasso)**
Create larger pinned areas freely
-  **Fold Arrangement**
Pre-fold patterns before simulation
-  **Edit Styleline**
Move Selected Styleline Points in 3D
-  **Scale Styleline**
Adjust Scale of Selected Styleline in 3D
-  **Move Styleline**
Move the Styleline in 3D
-  **Draw Styleline**
Create new Styleline & Cut & Sew Patterns in 2D
- SEWING**
-  **Edit Sewing** *B*
Select/Modify sewing lines
-  **Segment Sewing** *N*
Sew patterns segment-to-segment
-  **Free Sewing** *M*
Sew together patterns creating the start & end points freely
-  **Auto Sewing**
Patterns are automatically sewn based on their placement on avatars.

-  **Edit Tack**
Move or delete existing tacks
-  **Tack**
Temporarily tack two points of the garment together
-  **Tack on Avatar**
Temporarily tack points of the garment to the Avatar
- ARRANGEMENT**
-  **Reset 2D Arrangement (All)**
Rearrange patterns as organized in the 2D Window
-  **Reset 3D Arrangement (All)**
Rearrange patterns to positions before Simulate was activated
-  **Redrape 3D Arrangement**
Drape 3D garments based on the size of the avatar

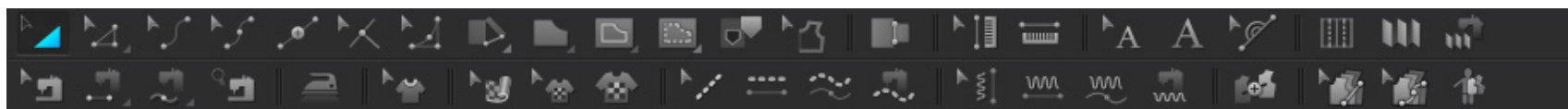
- GARMENT RESOLUTION**
-  **High Res Garment**
Raises particle distance & collision thickness of fabric & avatar
-  **Low Res Garment**
Lowers particle distance & collision thickness of fabric & avatar
-  **Custom Resolution**
Set your own resolution presets

- AVATAR MEASUREMENT**
-  **Edit Measure**
Edit avatar measurements.
-  **Basic Circumference Measure**
Measure a circumference of an Avatar.
-  **Surface Circumference Measure**
Measure circumference of any part of the Avatar
-  **Surface Tape Measure**
Measure a specific length over the Avatar's surface.
-  **Basic Tape Measure**
Measure a linear length of part of an (arm/ leg/back length)
-  **Linear Measure**
-  **Height Measure**
Measure height of Avatar's specific point such as head & shoulder from the ground.
-  **Attach to Measure**
Snap a pattern outline or internal marking to any part of avatar tape
-  **Play Motion**
Stop & start motions & pose changes







- 3D TEXTURE & TRIMS**
-  **Edit Texture (3D)**
Scale, rotate, & edit textures & grainlines
-  **Transform Graphic**
Scale, rotate, & edit graphics
-  **Graphic (3D Pattern)**
Add a graphic in the 3D Window
-  **Select / Move Button**
Select/Modify Buttons & Button Holes
-  **Button**
Add buttons to the 3D garment
-  **Button Hole**
Add button holes to the 3D garment
-  **Fasten Button**
Connect buttons to their buttonholes
-  **Zipper**
Add zippers to the 3D garment
-  **Edit Piping**
-  **Piping**
Add piping to edges of patterns
-  **Edit Binding**
-  **Binding**
Add binding to edges of patterns
-  **Press**
Flatten two layers sewn together

- 3D EDITING**
-  **Edit 3D Pen (Garment)**
Convert 3D line to internal shapes, or cut & sew
-  **3D Pen (Garment)**
Draw lines onto garment
-  **Edit 3D Pen (Avatar)**
Edit & delete avatar lines
-  **3D Pen (Avatar)**
Draw lines onto the avatar
-  **Flatten**
Extract patterns directly from the avatar
- GARMENT MEASUREMENT**
-  **Edit Measure (Garment)**
Change the points where the measurement is arranged
-  **Linear Measure (Garment)**
Measure total length of garment or segment
-  **Circumference Measure (Garment)**
Measure the total circumference of the garment in 3D

TOOLBAR GUIDE - 2D WINDOW





PATTERN EDITING





-  **Transform Pattern A**
Scale/Move patterns or internal shapes
-  **Edit Pattern Z**
Select/Move points, lines, or patterns
-  **Edit Curvature C**
Manipulate curvature of pattern lines
-  **Edit Curve Point V**
Add/Move curve line points
-  **Add Point / Split Line X**
Add or split straight pattern lines
-  **Smooth Curve**
Rounds off corners of pattern pieces

SLASH & SPREAD

Spread a particular area evenly based on selected segments.

-  **Fullnes (Point)**
-  **Fullnes (Line)**





PATTERN ORGANIZATION

-  **Set Sublayer**
Set layering relationship between two overlapping pattern pieces in 2D
-  **Edit Annotation**
-  **Pattern Annotation**
Create text annotations on pattern pieces in 2D
-  **Pattern Symbol**
Create pattern markings for gathering, CF markings etc.





PATTERN OUTLINES

-  **Polygon H**
-  **Rectangle S**
-  **Ellipse E**






INTERNAL MARKINGS

-  **Internal Polygon / Line G**
-  **Internal Rectangle**
-  **Internal Ellipse R**
-  **Dart**









REFERENCE MARKINGS

-  **Baseline Polygon / Line**
-  **Baseline Rectangle**
-  **Baseline Ellipse**
-  **Baseline Dart**




PATTERN DETAILS

-  **Create Notch**
Add notches along pattern outline
-  **Trace I**
-  **Seam Allowance**
Add & edit seam allowance along pattern edge
-  **Pleats Fold**
Select pleat style & assign fold angles
-  **Pleats Sewing**





SEWING

-  **Edit Sewing B**
Select/Modify sewing lines
-  **Segment Sewing N**
Sew patterns segment-to-segment
-  **Free Sewing M**
Sew together patterns creating the start & end points freely
-  **M:N Segment Sewing**
Sew multiple segments to multiple connecting segments
-  **M:N Free Sewing**
Free sew multiple edges to multiple connecting pieces
-  **Check Sewing Length**
Easily check for sewing mistakes
-  **Steam**
Shrink or stretch portions of garment
-  **Seam Taping**
Reinforce pattern edges




2D TEXTURES

-  **Edit Texture (2D) T**
Scale, rotate, & edit textures/grainlines in the 2D Window
-  **Transform Graphic**
Scale, rotate, duplicate, & edit graphics in the 2D Window
-  **Graphic (2D Pattern)**
Place graphics/logos on the flat pattern




TOPSTITCHING

-  **Edit Topstitch J**
Select/Modify existing topstitches
-  **Segment Topstitch K**
Create topstitches segment-to-segment
-  **Free Topstitch L**
Create topstitches by establishing the start & end points freely
-  **Seamline Topstitch ;**
Create topstitches that straddle both sides of a seam

PUCKERING

-  **Edit Puckering**
Edit lines & properties of puckering
-  **Segment Puckering**
Apply puckering to the perimeter of patterns, as well as internal lines or seams
-  **Seamline Puckering**
Apply puckering to both sides of a seamline

GRADING

-  **Edit Grading**
Edit Grading on Segments
-  **Edit Curve Grading**
Edit Grading on Curve Points
-  **Auto Grading**
Automatically grade patterns based on the avatar size.

