Section 2 - 3D Essentials Layout & User Settings

Lecture 2 | Layout & Workspace

WORKSPACE

This is the CLO workspace. The interface is similar to other softwares as there is a menu bar along the top of the screen. Each menu has a drop down of options. Under file you will find all your saving, importing, and exporting options.

- Edit will give you editing options that would otherwise be accessed with quick commands or by Right-Clicking.
- The 3D Garment, 2D Pattern, Sewing and Materials tabs are all alternative ways of accessing tools and options that can also be found in your toolbars or by Right-Clicking in the 2D and 3D backgrounds.
- The Editor Menu is new to version 7. Two options which were previously in the Modes Drop down menu are now here; Bill of Materials and Colorways. Plus there is a new Editor called Parametric Pattern Editor
- The Avatar menu gives you options for editing your Avatar. Some of these options can also be found in the 3D toolbar.
- Render is going to take you to the internal Render engine or allow you to render via CLO-set.
- Display allows you to hide or show different things in your 2D or 3D windows. Most of these options are also located in the vertical toggle bars in each window. I'll go over those in full at the end. You also can hide or show toolbars located in your 3D or 2D window.
- Preferences allows you to customize settings within the program like your gizmo, simulation properties, fit maps, or camera properties. Many of these options are also available by Right-Clicking in the 2D or 3D backgrounds.
- Settings will allow you to change your language, adjust user settings, access a plug-in, or log out of the software.
- Help is going to give you options for accessing information to help guide you in using the program.

In the far-right corner of the menu bar, you will see your login username, the Share to CLOSET icon and Drop Down with all the CLO Modes.

LIBRARY

Starting In the top left is the Library. There are three tabs, a STAR, C Cloud and the CLOSET Connect logo. The C Cloud will link to your CLOSET account. The Connect Logo is linked to CLOSET Connect and the items you have purchased will be available in the "My Items" folder.

The star tab contains all the default assets that come with the program: things like Avatars, Garments, Hardware and Trims etc. In addition to the default assets, you also can link folders from your computer into your library so that you can access things quickly and easily. To link a folder, click the plus sign in the top right-hand corner of the library. Then navigate to the folder that you want to add. You don't need to click into the folder, simply select it. Now my folder has been added to the bottom of the list of folders in my library.

To the left of the add button is the download button. This button may have a blue dot beside it when you first download or update the software. You will also see blue dots next to the folders as well. The blue dot indicates that there are default library assets available that you have not yet downloaded. Click the download button to update your library to the latest assets of CLO.

New to version 7, the CLO Library now has a tree structure that allows you to see the folders inside of folders. When you start CLO, the folders are always collapsed. Next to any folder which contains other folders is an arrow that when clicked shows the contents. You can continue to open folders where arrows appear and Double-Click to see the contents in the explorer below. Note that "Stage" does not have an arrow; that is because there are no folders within. Click the arrows again to collapse the folders.

To open a folder in the library just double click it. The folder's contents show up in this area below; this is like the sidebar in a normal window in your computer. Double click the sub folders as much as you need. The folder icon at the top with the 2 dots beside it will take you back one folder. To open something from your library, just double click on it or right-click and you will get a set of options depending on what that file is. For things like fabrics and print images, you can simply click and drag and drop them where you need them to go in CLO; this is one of the benefits of adding your own folders from your desktop to have easy access.

You can view all library folders as icons or lists by clicking this button. When you hover your mouse over the edge of the library you get an icon with 2 arrows that allows you to expand or collapse the library. You can fully collapse the library at the top right by clicking the arrow in the library bar. To get it back, click Library on the black bar on the left. The shortcut for this is the letter "Y" on your keyboard. "Y" also brings the library back.

If you make any changes to the folders linked to your library, click the refresh button here. This will update all the folders in your library to match those on your computer.

The search bar on the left allows you to search by name for a folder or file within the folder that you're already in. This drop-down arrow allows you to sort your folders by category and arrange them in ascending or descending order. Be sure to clear this search box when finished.

Lastly in the top right-hand corner is the reset button. This will take you back to the default library and delete any folders that have been added.

On the left hand side there is a toolbar that shows the history tab and modular configurator.

The history tab will show you all of the actions you've taken in this file since opening. You can select an action to move back to the step in the file. If you'd like to save the project at a certain

point but continuing working you can use 3D state. At the top right corner you can select the 3D state button. This saves a copy of the file within the project that is accessible only here. The 3D states will save with your project file and you can open at any point. You can continue working within the file without changing the saved 3D state.

By Right-Clicking you can delete a 3D State or rename it. You can also rename it by just clicking in the text. You can save multiple 3D states throughout your file. Close the history by clicking on the arrow in the top right-hand corner.

Also in the left side bar is the modular configurator. This is a block library that allows you to mix and match different parts of a garment and create a block to work from.

You'll notice after clicking into it, even if you don't use it, you'll get these grey shapes in your 2D background. Right-click in the 2D background and select "Remove Modular Relationship" to get rid of these.

3D & 2D WINDOWS

To the left of center is your 3D window. This is where your avatar and your 3D garment will be. The toolbar at the Left are all your 3D tools. To the right of center is your 2D pattern window. Your 2D pattern and 3D garment are one and the same, each respective window just allows you to view it in different states. The toolbar at the right of the 2D window are all your 2D tools.

If you hover the mouse over the center, you get the icon with the select / move tool icon that allows you to adjust the size of the windows. You also have the ability in the top right-hand corner to undock the windows. This allows you to move one to a different monitor or you can rearrange them left to right if you prefer the 2D on the left.

TOGGLE BARS

In the upper left corner of the 3D and 2D windows you have vertical toggle menus that allow you to hide and show different attributes within those windows. In 3D you have attributes related to the garment, Garment Details, the Avatar, fabric views, Fit maps, and different options for viewing the surface texture of your avatar.

By hovering over the double black bars within the tool bars, you can undock that set of tools and rearrange them as you wish. If you want your entire toolbar to the top or bottom of the 3D & 2D windows, you can change that in User Settings. Please watch the next video in this series to understand user settings.

In 2D you have garment detail, pattern options, information and measurements, and different options for viewing the texture of your pattern pieces. If you hover over any of the icons, it will tell you exactly what it does and if there is a hot key associated with that tool. And if anything, ever looks like it's missing or is showing something, you don't want to see, always make sure you check these menus first.

MATERIALS

The area in the top right-hand corner is the Object Browser. This is like your Bill of Materials. It houses a scene tab, your fabrics, graphics, buttons, buttonholes, topstitchings, puckering, grading and point of measure; each of these are represented by an icon. If you hover over the icon in the tab, the full tool name will appear . If you click on something in the Object Browser, its properties are listed below in the Property Editor.

The Scene tab will be familiar to you if you have worked in other 3D software. This allows you to navigate to specific parts of your 3D project file that you may otherwise have trouble finding including smaller properties like trims or other properties that you may want to edit. You are also able to remove items from this menu by holding delete and

As mentioned before, the Property Editor displays all the properties of what you select and allows you to edit them. This is true of things within the object browser, as well as anything that you click on in the 2D or 3D window. Most things in the program will have editable properties.

EXTRAS

At the bottom right-hand corner, there are buttons to see only your 3D, only your 2D, or both windows at the same time. The button on the far right is your reset button. This is going to reset the layout of the entire workspace to the default arrangement. This is helpful if you find you're missing a tool or have moved around windows.

At the bottom left-hand corner, you will see the current version of CLO that you are using.

User Settings

GRAPHIC OPTIONS

Let's have a look at the User Settings. Go to the Settings Menu→ User Settings. This window will appear.

I am going to cover the most common settings that might be changed. Should you need want information about any of these options, have a look at the PDF document for this lesson which is included with the resources. You can also go to our CLO Support Forum.

The first section, Graphic Options, refers to the visual settings in your 3D Window.

"Use VBO's" (or Vertex Buffer Objects) correlates to the rendering speed. It is a faster way of rendering, but if your computer does not have a graphics card that can handle it, you may experience issues while rendering. This could include black flickering in the background of your 3D window while working or other issues. If this is the case, you should uncheck this box. This is one of the settings that will ask you to restart CLO. This just means that the change won't go

into effect until you close and re-open CLO, but you can do that at any time after making the change. You don't have to do it immediately.

Antialiasing is common with gaming. The number corresponds to speed and the smoothing of curves and edges. If your screen doesn't have a high enough resolution to process the graphics, you get jagged edges and antialiasing will smooth it out. The default is x16. There should be no need to adjust this unless you are seeing an issue with the graphics in your 3D window.

NORMAL BLENDING

Normal blending takes a collection of the normal maps used in a style and changes how the maps are blended together. Normal Blending Method allows you to choose from a drop down list of different options. You can see the blending result in the 3D window and the UV editor.

- Alpha blending the default in the software, which simulates the normal blending effect with the alpha value.
- Partial Derivative blends the height map using partial derivatives of the normal map.
- Whiteout uses a technique optimized to reduce the amount of computation and it is a way to preserve detail while maintaining the tendency of a relatively flat normal.
- UDN - Compared to Whiteout and Reoriented, the detail of the normal map is slightly reduced but the optimized calculation method is useful for low-end platforms.
- Reoriented - A method that preserves the intensity of all mixed normal maps while maintaining the trend of the flat normal map and the details of the complex normal map well. This is the most accurate and slow method by rotating the normal of the detail to match the normal of the base.
- Unity is the same method as reoriented but the error in certain situations (when two mixed normals are orthogonal) is abandoned and the performance is improved.

VIEW CONTROLS

View Controls refers to your mouse navigation set-up and your point of view in the 3D Window. The default on a PC is a Regular Mouse. If your mouse does not have a scroll wheel, the default zoom will be the Left Mouse Button and Alt. If your mouse has a scroll wheel, your scroll wheel will be your zoom by default.

On a Mac the default will be set to Magic Mouse. The other settings allow you to match your navigation settings to other 3D programs.

Tablet is the setting used for a Wacom Tablet or a Laptop Trackpad. CLO is not yet compatible with a touch screen. User Preset at the top will pop up if any of the drop-down options are customized. There are also settings for Maya, 3DS Max and other input devices.

Axis Constraint Key refers to the key that is held when you want to lock yourself into 45 and 90 degree angles. This might be locking your axis of rotation in 3D or used when pattern editing,

among other things. By default, this key is Shift. You can choose different keys from the drop-down menu.

Smart panning allows you to pan while doing other things without interrupting that action, for example when sewing in 2D. I find this nearly essential for CLO workflow, so I do not recommend unchecking this box.

Auto Focus means that if you click on something, it becomes your central point of rotation in 3D. If this is unchecked, the center is always the same- 0-0-0 where your Avatar loads. The option below it will revert to center as the point of rotation once everything is de-selected. If unchecked, you will need to hit the 2 key to bring your point of rotation back to center. The video on Navigation and Selection covers this in greater detail.

These are the default settings for your Viewpoint in the 3D window. If changed you will see your 3D "eye level" moves up and down, or tilts forward and backward. This number will change the distance from your avatar and garment when using the default viewpoints.

SHORTCUTS

The shortcuts menu allows you to customize keyboard shortcuts. To do this, select the shortcut and you can simply delete it or if you click on the shortcut itself, you just need to type in the key that you want to be the shortcut. If you want it to be a combination of keys, you need to press them both at the same time. The reset button will reset the shortcut to the default. Please know CLO will not allow you to set shortcuts that are already in use, so you will need to remove it where it exists by default, before adding it somewhere else.

Down here at the bottom you will notice a different shortcut for the QWE gizmo when adding pins. That's because the W shortcut has its own function with that gizmo. For more on this, skip ahead to the 3D settings section of this video.

USER INTERFACE

Unit

- The User Interface tab firstly allows you to customize your units of measure within the software.
- Here you can check this box to use ligne as the units for button width. If you don't use ligne button width will default to your chosen unit of measure.
- Here you can select the units for thread thickness.
- Currency can be changed from the drop down list and is used in the BOM mode.

Mode & Toolbar

- Default mode allows you to choose which mode you'd like to open the file in. Next time you open the file it will open in the mode selected from the drop down list.
- Here you can change the placement of your tool bars in the 3D and 2D windows. These are the default settings but can be changed based on preference.
- Group Tools nests similar tools under one main tool. If you have a small screen keeping this off may help.

- This box determines whether the learning links pop up when you hover over a tool in the tool bar. These links take you to our website and show either a video or written description of the tool. Here you can change the font used within the program. Using these is a good way to further your learning of CLO.

Appearance

- You CAN change which font is used in the CLO interface. If this is changed and you see abnormalities, be sure to change back to Tahoma.
- You can change the visual appearance of selected objects here. In these lessons we use the default options, though Thickness and Line Length Size may be a bit larger that your defaults.
- Automatic scale will optimize your visual display in most cases. If your screen needs some more adjusting you can try from the drop down menu and select QHD, FHD or 4K. These options WILL NOT be available on MAC. You will need to adjust your Display Resolution in the System Preferences.

3D

Mesh

Now let's look at the 3D tab. Here you can adjust whether the default mesh is triangular or quad, meaning rectangular. In 3D software, everything is made of mesh. In CLO, by default, we use a triangular mesh, as it is optimal for getting the soft drape of fabrics and the curves of the human body. You can change the type of mesh on an individual pattern piece in the property editor but if you change it here, it will change your default for creating any patterns.

Arrangement

Under arrangement you can change the default arrangement setting of your pattern pieces from curved to flat. By default, when using arrangement points, the pattern pieces will curve around the avatar. You can also change this on individual pieces in the property editor if you do not need to change it for everything. You can see more on this in the Avatar & Arrangement Video. You can also change the Arrangement Point Size as well.

Sync fold arrangement makes sure that when something is folded using the fold arrangement tool in 3D, the fold angle is adjusted accordingly in the property editor.

By default, the gizmo is a unified gizmo that allows you to select, move and rotate all at once. If you select divided gizmo, you will need to hold the Q key to select, the W key to move and the E key to rotate. Remember if you select this gizmo, the keyboard shortcut for adding an individual pin will have to change.

2D

In the 2D menu, you can adjust the default particle distance, which is set to 20mm.

Checking this box means that when you cut 2 patterns apart in the 2D window, they will automatically shift to put a small space between them. If unchecked, they will stay touching where they are cut.

These two options mean that your pattern notches will visually get bigger as you zoom out, to see them from far away. Or they will stay the same size and be to scale, no matter how you zoom.

OTHER

Now I'm in Other Settings. Under Modular Configurator, this setting when checked on will allow you to change seamlessly between blocks when the naming convention has been set up to do so, like going from a single to double breasted jacket using the same sleeves. When unchecked, switching from one block to another will require you to start over.

This option below will maintain your fabrics between blocks if you have already set those.

These settings are for connecting directly from CLO to a plotter and they'll depend on the plotter you are using.

This option allows you to set the download location of DMIx Cloud files.

This area shows the applications you have added to the Open Texture option. You can add and remove here as well.

DEFAULT FILES & PLUG-IN (CLO API)

Default files show the file location where things are automatically saved or pulled from. You can adjust the file path by clicking the folder icon and you can reset back to the default folder by clicking the arrow.

PROJECT; where the default project is saved. You can customize a project and save here to have your own project layout. You also have the option to have a Multiview thumbnail. If checked, you can choose from a default layout or Custom File (MVS).

AVATAR; If you are using custom avatars that need permission files, you can add those permissions here.

MATERIALS; Specifies where and how various Fabrics & Textures are saved.

SIMULATION PROPERTY; default location of SMP file

AUTO SAVE; Here you can adjust the time interval that CLO autosaves. By default, it is set to save every 10 minutes. You can also reference the file path in case you didn't get the pop-up to open the autosaved file in CLO and you want to search for it on your computer.

CUSTOM COLOR PALETTE; you can create and save your own custom palette and save in this location.

GARMENT INFORMATION; JSON file locations.

If you have or create your own plug-in for CLO, you can access it here through the plug-in menu by clicking the plus sign. To delete a plug-in you can click the trashcan icon.

CLO API

This shows the PlugIns you have installed in CLO.

CLOSET

Lastly the CLO-set tab allows you to link your CLO-set URL automatically from CLO. This used to allow you to pre-login to your CLOSET account so that when uploading or rendering directly out of CLO, it would go straight to your account. This created issues with company CLOSET accounts and now takes you directly to the login screen instead. If your company has its own CLOSET URL, you can enter that here instead of the CLO-SET.com URL.

Intro to CLOSET

Lecture 3 | Navigation & Selection

Hi everyone, this lesson covers Navigation and Selection. You can follow along with any CLO Project file

INTRO

- Review how to link this folder to your library.
    - Select the + (add) button and navigate to the folder & Select folder
- Double click to open or Right-Click to add the project file into the workspace.
    - Right-Click, you have the option to open or add a project file.
    - Combine Files
    - Default add at the 0,0,0 point which represents the X, Y and Z axis.
- The 2D & 3D windows are linked
- Avatar in the 3D window; 2D window by a silhouette outline of the avatar.
    - Silhouette is proportional to the avatar in the 3D window; used as a guide when positioning or drafting patterns in both windows

NAVIGATION

Let's begin navigating in our 3D window.

- Commands based on a regular 3 button mouse; recommended, because it allows you to navigate entirely with one hand.
    - Easiest if you're a beginner.

- User Settings to set up your device if anything I show here doesn't seem to be working for you.
    - PC, your user settings will be set to a Regular 3-button mouse.
    - Mac, you will have the option to use a Magic Mouse.
    - Select any device from the drop down menu in user settings and see the appropriate keys to follow along.

ZOOM

- Middle scroll wheel to zoom in and out.
- Both your 3D & 2D windows.
- Magic Mouse or a trackpad; 2 fingers and drag up and down or however you currently scroll on that device.

ROTATION

- Rotating is only applicable in the 3D window.
- Right-Click, hold and drag
- Hold shift to lock your axis
    - X or Y axis
- Magic Mouse or trackpad; the same
    - Depending on what version or generation you have of your laptop or mouse, you may need to work with the settings of this on your computer

PAN

- Hold down your scroll wheel button and then move around your screen.
    - Same in 2D or 3D.
- Magic Mouse or a Trackpad; Option key on a Mac or the Alt key on a PC, while Left-Clicking and moving.

RESET YOUR VIEW

- Get back to default window views
- Right-Click in 3D background,
- Viewpoints of your 3D window.
- Front, ¾ Left... hot keys associated with them.
- Imagine the avatar is standing on the 5 key of a number keypad
- 2 is probably the most useful; front and center; perfectly straight on
- 2D window, to reset your view, you can Right-Click in the 2D background;"Zoom Extends All". OR Shift-zero - right parenthesis
    - Clip your window to everything that you have in it.
- focus zoom = F key
    - in 3D center the pattern piece in window

    - in 2D fills the window with the selected pattern piece

Selection

- Main selection tools; Select/Move tool (Hotkey Q) in the 3D Window, Transform Pattern tool (Hotkey A) in the 2D window.
    - "Home Tools"
- Selected on a tool highlights blue
- On both of my selection tools.
- Only 3D Tools, only 2D Tools
- Crossover tools select in both windows [sewing]
- Select = Left-Click.
    - Pattern Highlights yellow in both windows
- Select in 3D, little blue dot in the 2D window. This is called a picking point.
    - Geographic location of selection in 3 D window
- Select in each window, that same pattern will highlight in both windows.
    - In 3D it highlights in 2D and vice versa.
- 2D window patterns are highlighted in a brighter blue outline; symmetric copy.
    - No highlights, no symmetric copy.
- Front and back, so they're not linked, left and right are linked.
    - Edit one, the other side is going to edit
    - Move the pieces, both pieces will need to be selected.
- Multi-select, hold down shift and select the pattern pieces.
    - Going back and forth between 2D and 3D.
    - Select something that's already selected to de-select it
    - Multi-select in 2D is to marquee over things. Y
    - You will need to marquee over the piece entirely.
        - partial selection will not select at all
    - When you multi-select in 3D, you will see that you do get a picking point for every pattern
- Use CMD or CTRL Z to edit undo any pieces you accidentally move
- CMD or CTRL Z to undo back to the beginning of the project
    - Note History palette

- Select all is CMD or CTRL A; Mac or PC.
- Option for selection = Right-Click on something in the 2D window, at the very top menu you get the option "Select all with same property."
    - Same layer, same particle distance, same fabric.
    - More about Particle Distance and layering in future lessons.
    - Most useful; "select all with same fabric".
- Delete anything; backspace key or the delete key.
- Same with your avatar.
    - Clear your entire screen with that.

GIZMO

- Select any pattern piece in either window, you will get this tool in the 3D window. This is called a “gizmo”
- All 3D software uses a gizmo
- Allow you to move things in 3D when simulation is off, so when things are just solid pieces like this.
    - We’ll learn about the gizmo in the lesson about Arrangement.

Thank you for watching and we will see you in the next tutorial

Section 3 - Building a Garment - Sewing

Lecture 4 | Avatars

Hello everyone, this lesson will cover the basics on Avatars and Arranging your garment. You can follow along with your own file or by downloading the practice file.

AVATARS

- Library→ Avatars
- Double Click or Right Click to add to Workspace.
- Version 6.2 - 16 humans, and 5 geometric shapes
    - 6 male, 6 female and 4 kids
    - Many Styling options
        - hair, poses, shoes, motion files (which is animation), texture (which is their skin).
            - Easy to add; double click in Library, Right click to remove
- Default Avatars have joints Rigged with a skeleton
    - Move joints & Save as a pose.
- Default Avatars are editable by size.
    - The Avatar editor allows you to change their points of measure.
    - basing their Avatar off their dress form and sometimes you may only have a few basic points of measure, so we have an option for that as well.
- CLO Also now includes ASTM Sizing.
    - Available in the Library.
        - Eg. Female Avatars have 63 different ASTM presets you can apply, including Maternity.
- Change hair, shoes, poses, etc.; create your own without a lot of hassle.
- Adult Avatars - Body Styling
    - Easy appearance adjustment
- Child Avatars
    - Texture Folder –> Drag and drop the texture into place.

ARRANGEMENT

- Practice File
- Arrange the wearer's right side to look like the wearer's left.
- Best Practice Tips
    - 3D Toggle Menu→ Textured Surface; front & back of Fabric
    - Move my pattern out of the way; this will help me to see the arrangement points.
    - 2 key to bring myself front and center.
    - Use your 2D window for selecting things.
        - not trying to drag pattern pieces towards your Avatar, which you do not need to do when you're arranging.
    - The way to arrange is to use these "blue dots" or arrangement points.

    - 3D Vertical toggle menu→ Avatar Display→ 2nd icon arrangement points.
    - "blue dots" on Avatar. (Shortcut; Shift +F)
- Select a pattern piece
    - wearer's right side in the 2D window.
    - click once, then as I hover over the blue dots; ghost outline of pattern
    - NOT dragging pattern pieces into place,
    - Pattern where you want; click that blue dot,
- The pattern piece sits between the blue dots and your Avatar.
- The pattern piece is highlighted yellow and curved around the Avatar
- The Arrangement Point has turned from blue to yellow.

- Note; sleeve and my cuff are arranged in the 2D window→ 3D they are also sitting nicely together.
    - Arrange patterns together
- Exact placement is not important.
    - CLO will sort this out when sewn/simulated
    - After we sew we can move pattern pieces to be sure important areas wrap around limbs
- Leggings front→ Marquee select.
- Place them together.
    - Lay out nicely in 2D window for easy placement.
    - Ok to do them individually, better together.
- Note CLO places back of fabric towards Avatar→ charcoal surface.
    - Thick Textured Surface; both sides and thickness.

Lecture 5 | The Gizmo

- Specific Practice File
- Arrangement points here, it's going to wrap the skirt
    - Property Editor→ Offset; better
    - Property Editor→ Flat; OK
- Undo and turn arrangement points off.
- Select in either window
- All 3D applications have Gizmos; allow you to move these pattern pieces in 3D window.
- Mentioned previously; Not super important that things are perfectly arranged. Note following;
    - On the correct side of the Avatar,
    - Arranged in the correct places next to each other.
    - Fully wrap around the arm/leg/neck so the seams come together.
    - Do not have major sewing lines intersecting the body.

- Note threads through arms
- Haven't learned simulation yet.
- Simulate to see errors. Stop & Undo CMD or CTRL-Z
    - Simulation button or Spacebar
- Use Gizmo to move/rotate Patterns
    - Near body/avoid arms
    - Gizmo [default Screen Coordinate Gizmo]
    - DIFFERENT GIZMOS
        - No better or worse gizmo; personal preference.

        - Right-Click 3D window background to change
        - Screen Coordinate - based on the camera axis. Change the camera view in order to change the gizmo axis. Selected object moves along with the camera axis
            - "Your point of view"
        - Local Coordinate - 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.
            - "Other 3D programs; X, Y and Z axis constant, forward and backward always going to be forward and backward
            - useful if you want things to always be at right angles and perpendicular or square
        - World Coordinate - based on 3D space regardless of screens or objects. Selected object moves based on 3D space regardless of screens or objects
        - Central cube
            - faces move along planes
- 3 AXIS'
    - Green→ Y Axis "up & down"
    - Red→ X Axis "left to right"
    - Blue→ Z Axis "front to back"
        - circles rotate around the corresponding Axis
        - box moves along that plane
- Gizmo Target
    - Click the target then you click on Avatar
    - Pace the pattern piece on that spot;
    - Not curved
    - Quick pattern piece placement
        - Good for small patterns [pockets, etc]

Lecture 6 | Reset Arrangement

Practice File

- Arrangement points register the location of the pattern within the software. R
- Remember where you put it; easy to go reset
- Reset 3D Arrangement Tool, here in the 3D Toolbar.
    - All patterns will snap to the arrangement
- Initial simulation is bad - Reset 3D arrangement fix position. Simulate again

Reset Individual Pieces

- Example; Right Sleeve & Right Hood
- Select Pieces. Right Click in 3D Window→ Reset 3D Arrangement Selected.

Reset 2D Arrangement

- Reset 2D Arrangement Tool→ reset everything to arrangement in 2D window.
    - Negate your 3D arrangement

    - Be sure Patterns arranged well in 2D window

Reset Individual Pieces

- Reset one piece to get it to be flat again.
- Select Pieces. Right Click in 3D Window→ Reset 2D Arrangement Selected

Hello everyone. In this tutorial video we will begin sewing in CLO. I invite you to follow by using your own files or by downloading the exercise files from the CLOSET link in the description of the video below. Let's get started.

Lecture 7 | Segment Sewing

- Location in toolbars - 2D & 3D
- Most common sewing tools - segment & free sewing
- Start with Segment Sewing
    - Sew together 2 full Segments
    - Important that lengths match.
        - Excess will be distributed evenly and will appear smocked or puckered.
    - Not recommended if you have ease that needs to be placed.
    - To use this tool, click twice; simply left click once on each Segment
    - Note as I hover; it highlights blue
    - Note after click - marks designate the start of the sewing,
        - Place marks on the segments in the same direction.
        - Click to sew segments together.
        - View in 3D with your sewing lines;
            - If Twisted; reverse sewing CMD/CTRL-B immediately
        - Edit with Edit Sewing Tool
- Symmetric Garment
    - Sew using Segment Sewing
    - Sewing applied to both sides at the same time
    - Check in 3D window for errors
    - Sew center front & back
- Segment Sewing in 3D window; same as 2D window.
    - Note mark at the start
    - 2 clicks

Lecture 8 | Free Sewing

- Pattern has extra segment points; cannot use Segment Sewing
- Click to start, hover and move. click to end
    - CLO will lock you into the direction you take
        - CMD/CTRL Z or ESC to end if necessary

    - Note Mark at start of the sewing
    - view in 3D window
- Click on matching segment, starting in same direction
    - Blue picking point appears; stop point
        - appears with or without a segment point
    - Wrong direction; delete or backspace to start matching segment over
        - First segment stays
- Hover and move. click to end.
- 4 clicks.
- If Twisted; reverse sewing CMD/CTRL-B immediately
- Edit with Edit Sewing Tool
- Free Sewing in 3D Window
    - Same as 2D Window BUT double click at each end
        - directions on cursor
- Sweatshirt pocket
    - Sew Pattern to Outline & Pattern to Internal Lines separately

Lecture 9 | Precision Sewing

- Click, hover & move. Right click and precision dialogue will appear
    - Mac Magic Mouse; CONTROL instead of Right Click
    - enter specific length.
    - *PRECISION BOX TECHNIQUE SAME WITH OTHER TOOLS
    - Click OK
- Free Sew other segment; use blue picking point or Precision.

EDIT SEWING

- Sewing machine with the cursor arrow.
- All EDIT tools in CLO; indicated with the little cursor arrow.
- Select and delete it backspace or delete key
- Right-Click
    - to delete
    - reverse the sewing if crossed/twisted. hot key for this is CMD/CTRL B.
        - Select the SeamLine Pair Group & CMD/CTRL B to reverse sewing.
        - Last Sewing is active; CMD/CTRL B to reverse sewing.
- Select SeamLine Pair Group and drag to move it around.
    - select sewing in the middle, it will slide along pattern edge.
- Select only point at either end, move point and change the sewing length.
    - Select poin on other half to move the other side to match,
        - Note blue picking point to stop to match the sewing length.
    - Overlapping or Sewing Ends that match up will show a drop down
        - This happens when clicking on 2 things at once
        - Which one do you want to select?
            - Selected will fully highlight SeamLine Pair Group

- Sewing end points will also snap to each other
    - easy to match without overlapping them.
- Other Edit Sewing Options
    - *similar options as main selection tools, but only apply the sewing.
    - Adding a point at the start or end of the sewing; mark the pattern & add a point.
    - Merge that seam. This is an option also available with the Edit Pattern tool and I find most users access it there more often.
    - Deactivate the sewing. The sewing will turn white
        - temporary technique used for things like twisting part of the garment.
    - *List & review other options
    - CMD/CTRL A to select all sewing

Lecture 10 | 1:M & M:N Sewing

1:M SEGMENT (One to Multiple).

- 1 to M and M to N Sewing File.
- Segment and Free Sewing option to sew 1 seam to multiple seams; 1 to M [Multiple] sewing
- START One total Segment that sews to multiple smaller Segments.
- Sew 1 Segment first before sewing the multiples to it.
- Pay attention to Start mark.
- Will dictate both the direction to sew each pattern, and the order to sew
- Sew the first pattern, press & hold SHIFT, sew the multiple patterns
- Do nto release SHIFT until you are finished with all the sewing.
- Pay attention to both the order in which you sew your multiple pieces, as well as which end the ticking mark is on.
- Fail to press shift before the second pattern, first pattern will simply sew to your second pattern.
- Release shift before you finish, Sewing Relationships will be established with the pieces you had sewn before you release shift.

1:M FREE SEWING

- Very similar but used when pieces are segmented poorly.
- Sleeve cap to multiple armhole pieces.
- Sew the 1 piece first. Click to start and click to end on the sleeve cap.
- Press & Hold SHIFT until completing the entire armhole.
- Mess up one step in the process; press delete or backspace on your keyboard and start that step over.
- One section reversed?
    - Different color SeamLines
    - RIght Click & Reverse Sewing

M:N SEWING (Multiple to Numerous)

- Click and hold the tool icon and choose M:N
- Note the icon image changes, and text beside your cursor.
    - Indicates that you're in M:N Sewing.
    - Click and hold the tool icon to go back or use the hot keys (N) Segment Sewing or (M) Free Sewing.
- M:N Free Sewing on the armhole. Works like regular Free Sewing.
- Sew across sleeve cap in order, clicking to start and clicking to end.
    - NO need to hold SHIFT.
    - Press ENTER on my keyboard after I complete the sleeve cap.
    - Next move around the armhole, press enter after I complete all the armhole pieces.
    - Sew in the same order, and pay attention to Start marks.
- M:N Segment Sewing on the bottom band, sewing it to the body.
    - Works the same exact way
    - Click on each Segment and press enter when for the bottom band.
    - Same order, noting Start marks to the same side and press enter when I complete all the body pieces.

SEWING PROPERTIES

- Each SeamLine Pair Group has its own properties in the Property Editor.
- Sewing Line Type. Default all sewing is Custom Angle of 180 degrees; flat
    - All seams are effectively pressed open, like normal body seams on a garment.
    - If something is sewn to an internal line, like a pocket, CLO automatically assigns a Turned Sewing Line Type.
    - Turn the sewing in the Property Editor.
        - Neck trim and internal neck trim facing.
        - Top and bottom edges set to 180 angle because they are the edge of the fabric and CLO does not know to turn them.
            - Neck trim is puffy and rounded.
            - Change to Turned to flatten after simulation.
                - Most common; facing pieces, collar and undercollar, a lapel facing, a cuff and an under cuff.
- Tension. Default setting strength of .1 and ratio of 100. This is your seam tension.
    - Strength is the tightness of those stitches. Higher you go, the more tension
        - Turn the strength up, my seams start to hold tight and pull on my garment.
        - Uncheck Tension if it is affecting the drape of the garment.
        - Ratio default is 100; neither stretched nor eased when sewn.
            - Above 100%, the seams become stretched out. More intense; higher the strength
            - Less than 100% seams will shrink and be eased by the sewing. Much less significant strength down to .1,
            - Suggestion; keep your strength at .1 and your ratio at 100

- 3D Seamline
    - Normal map applied to all sewing to make it look more 3-dimensional.
        - "Shadow" on the seamline.
            - Change either the intensity or the thickness to 0 OR remove with trash icon to turn off
            - Thickness is the width of the normal map. Default is .059.
                - Increase this number, the line becomes thicker.
                - Most common use isdefault setting or turning it off by bringing one of the values down to 0.

Section 4 - Visualization; Simulation & Particle Distance

This video covers simulation and particle distance. I am using the Lesson linked before the video.

Lecture 11 | Simulation

- TABLECLOTH + SIMULATION
- Closed Library→ Arrow at top right OR Hotkey[Y]
- 3D window only→ button in the bottom right. For this file you only need the 3D window.
- Simulation on→ click the down arrow button in the 3D window here.
    - Hotkey for simulation is the Spacebar.
        - Change shortcut in Settings if necessary
- Simulation→ tablecloth falls on the table
    - 1-Down arrow in the toolbar turns blue
    - 2- the fan on your computer may start running.
        - Simulation is on,computer is making constant calculations to apply gravity to the properties of your fabric.
        - Requires a lot of computing power.
        - TIP; turn simulation on to check drape, turn off when fabric stops moving
- Simulation→ main selection tool in 3D[Select/Move Tool] changes to a hand.
    - Select pattern piece to move/drape in 3D window.
- DEPTH IN CLO
- Pull things up and down or left and right.
- Cannot push or pull toward or away from you.
    - pull toward yourself; rotate view so that "toward" becomes left or right.
- 3D world everything is mesh.
    - garment as well as any avatars.
    - Display views to mesh mode.
    - CLO mesh is triangular by default; allows for softer curves when fabrics drape over the human form.
        - Can be changed in your User Settings or manually by pattern piece in the property editor.
            - alternative is a quad or rectangular mesh, which is the standard for hard 3D modeling software.
    - Mesh objects can pass THROUGH each other.
    - 3D garment mesh & Avatar mesh entangled; called COLLISON
        - TIP; Pulling up and away from the avatar or other garments.

            - EG. even out my tablecloth, IRL, I might pull this end down. CLO; gently pull it up and over, so as not to pull it directly into my table.
        - Practice to note how hard or easy to pull
- SIMULATION GAME
    - Training game for practicing moving with simulation on.
    - Remember; you cannot pull things toward or away from you with simulation on.
    - Check your perspective by rotating around 3D window.
    - Depth perception is a bit off in 3D; not as many cues as there are in the real world→ takes some getting used to.
- Simulation off will "pause" the game; freezing your patterns
- Click on them in this state→ gizmo.
    - Click and drag them; equivalent of using the yellow square on your gizmo.
        - Learn about gizmo in Avatar and Arrangement lesson.
- The purpose here is to move things using hand tool while simulation on.
    - If paused to rotate and would like to continue, click on your pattern and hold before turning simulation back on with Spacebar.
        - Allows you to hold the pattern when simulation comes back on. Otherwise, your pattern will fall to the ground where it is.
- SIMULATION MODES
    - GPU+SIMULATION
    - 3 kinds of simulation
    - Click and hold simulation icon in toolbar→ drop-down menu for all modes
    - NORMAL SIMULATION; default working simulation. Click to Start; arrow turns solid blue
        - Speed should be relatively fast with garments in low resolution.
        - Speed depends on the power of your computer; working in real time and my garment moves similarly to the real world.
        - The more things you have in the 3D window, the more calculation CLO must do and the slower the simulation runs.
    - FAST (GPU). when Active; BLUE arrow outline as the icon.
        - Option may not show up if;
            - you do not have a dedicated graphics card
            - using CLO on Mac Computers.
        - GPU simulation means simulation speed is running off your GPU rather than CPU
        - Fastest simulation
        - Useful especially with large garments [bridal or home goods]
        - Used during draft phase of garment; affects the collision thickness of pattern pieces
        - Not ideal to use on garments with many layers.
    - FITTING (ACCURATE FABRIC) simulation.
        - Final garments in high resolution.
        - Most accurate simulation for fitting and drape.
        - When active; icon is double red arrows with red line underscore

        - Default mode when for Hi-Res Garment button.
        - Ensures the drape of the fabric represents the accurate retention of the garment;
            - It falls, but also springs back as it would IRL.
        - Do not pull/adjust; allow everything time to drape/relax on its own
    - when simulating, wait for garment to stop moving, then turn simulation off.

Lecture 12 | Particle Distance

- Earlier discussion; everything in 3D is made of mesh.
- COLUMNS FILE
- Square patterns draped over columns. Note corners showing through.
    - Has to do with the particle distance.
    - Corners of column at holes in the triangles of the mesh→ column show through.
- "Resolution" in CLO, most important aspect is Particle Distance.
    - Average distance between the vertices of the mesh.
        - Default working particle distance in CLO is 20; each vertex is 20 millimeters apart.
        - A property of the pattern pieces.
        - Change on individual pattern pieces in property editor.
            - Particle Distance just under Simulation Properties.
- Default for High Resolution is 5mm.
    - Simulate; fill in the holes, wrinkles will become more realistic and defined.
- PARTICLE DISTANCE FILE
- Garment with different patterns in different particle distance.
    - Skirt is set to 75' looks like crumpled paper.
    - Bodice is 20, neck band is 5.
    - Simulation on skirt incredibly fast.
        - Particle distance affects the simulation speed.
        - High PD, fewer vertices, fewer calculations for gravity.
            - Why default particle distance is 20.
                - Get a decent looking garment, keeping the simulation speed fast while working.
                - No GPU simulation option? Very large pattern pieces?
                    - PD above 20.
- Set skirt at 20 now & check simulation speed.
    - Garment still drapes plenty fast, though neck trim is set to 5.
        - Normal; set pattern pieces that are smaller than your hand in width or length to lower particle distance, even while working.
            - Shouldn't slow your simulation down
            - Help smaller pieces not collide with other patterns.
                - Less mesh & mesh is too open; small pattern pieces more likely to entangle with other patterns.
                    - 20 & simulate = collision

        - PD Less than 5→ pop-up warning.
            - Ignore & continue
            - Only for very small/thin
                - EG. spaghetti strap, etc
- Set all my pattern pieces to 5 Particle Distance.
    - Garment looking kind of pebbly.
        - Always need to simulate after changing to re-drape.
    - Lift skirt; simulation speed much slower.
        - Also; elastic smocking waistband is significantly different
            - Anything with gathers, wrinkles, elastic; look much better once you change the particle distance.
    - Check then change the particle distance back and keep working.
- PD does not change drape of the fabric.
    - Drape of the fabric is determined by fabric's physical properties.
    - Unrealistic edge if the mesh is too big.
    - Do all virtual fittings when the garment is in high resolution and use our most accurate simulation mode ; FITTING (ACCURATE FABRIC).

HI-RES/LOW-RES GARMENT

- Factors that create a Hi-Res/Low-Res Garment
    - Particle Distance
    - Collision
        - "Additional Thickness-Collision" or Collision Thickness.; Default is 2.5mm.
        - Think "buffer" or "invisible forcefield"
    - Avatar Skin Offset
        - Default is 3mm
    - "Additional Thickness-Render" does not relate. Default is 0
    - All can be changed in Property Editor
        - Select Pattern[s]; Simulation Properties→ change PD & Collision
        - Select Avatar; Surface→ change Skin Offset
- Garment into Hi-Res; Hi-Res Garment Tool.
    - 3D toolbar, the half t-shirt icon with an arrow pointing up.
    - Pop-up. Default Settings
        - All patterns >5 particle distance down to 5.
            - Not affect any pattern pieces that are already smaller than 5.
        - Collision thickness
            - The default is down from 2.5 to 1mm.
                - Between patterns & avatar, and patterns & each other.
        - Skin offset will be brought down to 0.
            - Ok to set at 1; won't be noticeable.
        - Settings save with the program.
            - Experiment & use your own settings
    - Simulation; default for Hi-Res is FITTING (ACCURATE FABRIC)

            - This will be slower than Normal and if your computer is very basic,
                - Ok to leave at Normal
                - Must use for active, swim, intimate wear
                    - Close fit to body
    - OK→ few seconds to load all those settings.
    - Simulate to drape in hi-res.
- Want to Edit Hi-Res Garment→ Low Res Garment Tool
    - Bring settings back to working settings.
    - Be mindful of Pattern Pieces you want to stay Hi-Res
        - This will avoid things like the neck trim on the dress getting entangled.
    - Select Pattern Pieces & Change PD in Property Editor

Section 5 Practice/Workflow

Lecture 13 Practice/Workflow Instructions

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*There are 2 practice garments. Do one at a time.

1. Add Male Avatar
2. Import DXF
    1. From Library→ Right Click Add to Workspace
    2. File Menu→ Import or Import (ADD) & Browse to file
3. Unfold at Center Lines
4. Symmetric

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5. Arrange in 2D Window over Avatar Silhouette
6. Reset 2D Arrangement in 3D Window.
    1. Move pattern pieces to fully view Avatar
7. Activate Arrangement Points on Avatar
8. Arrange Patterns around Avatar

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9. Sew Patterns & Simulate
    1. Depending on garment, add linings & pockets
10. Add Buttons & Zippers
11. Add "notions" if necessary
    1. Fusible Fabrics, Elastic Techniques, Binding, Piping
12. Drape & Fit
    1. Check for stability of garment
    2. Use Fit Maps & Check Sewing Line Lengths
    3. Adjust CLO Properties if necessary
        1. Add'l Thickness - Collison
    4. Use Steam to help with Darts
13. Edit Patterns as needed
    1. Add details as desired
14. Add Materials
    1. Fabrics - Include/adjust Normal and Displacement Maps based on desired appearance
    2. Topstitching - Must be added to represent real life garment.
    3. Puckering - Will go a long way to making the garment look more realistic.
    4. Trims - Think about the garment; ribbons, ties, cords, buckles
    5. Add Materials to Trims (metal/plastic zippers, color topstitching, metal/plastic buttons with textures)

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15. Save garment as a finished project
16. File→ New Garment. Repeat Steps 2 - 13