

HOUDINI 12.1

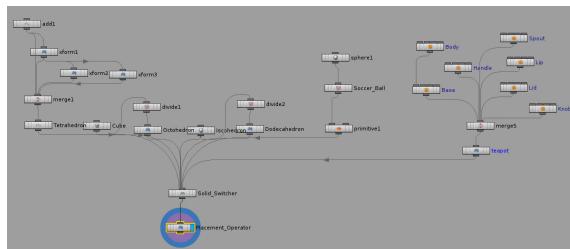
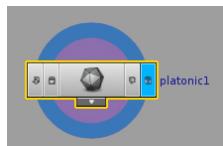
DIGITAL ASSETS

INTRODUCTION

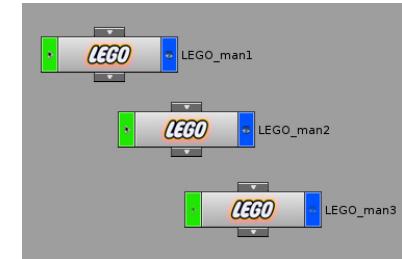
A **Houdini Digital Asset (HDA)** is the end result of a procedure converts an entire node network into a single operator, which is then saved externally from the Houdini environment. This new **custom node (HDA)** can then be utilised in any other scene as either an object in its own right, or as a custom operator in another network. Digital Assets can be created at any level of Houdini and can be easily shared between different users. They can also be modified and refined after their creation, and can even be containers for other Digital Assets.



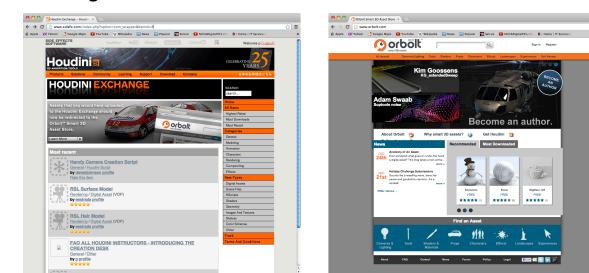
The **Platonic Solid SOP** is one of many pre-made Digital Assets within the Houdini environment. With it you can switch between various pre-defined shapes (tetrahedrons, Icosahedrons, Utah Teapots etc). Its status as a HDA is visually revealed by its blue node name. This indicates that there is an internal accessible network inside it that can be examined by pressing **i** or **ENTER** on the keyboard with the node selected.



Digital Assets are a great way for sharing resources in group-based working. Digital Assets are also valuable learning tools, as internal networks can be examined, deciphered and replicated.



Digital Assets can also speed up production work where multiples of a specific event is required. For example, an army of differing LEGO Men could be generated from a single LEGO Man Digital Asset where elements such as clothing, hats, and faces can all be procedurally controlled on a per instance basis. Digital Assets can also be uploaded and shared with other Houdini Artists via the Houdini Exchange (www.sidefx.com/exchange) or the Orbolt website (www.orbolt.com). These are online libraries of Digital Assets kindly generated, shared and uploaded by the wider Houdini community working in Production.

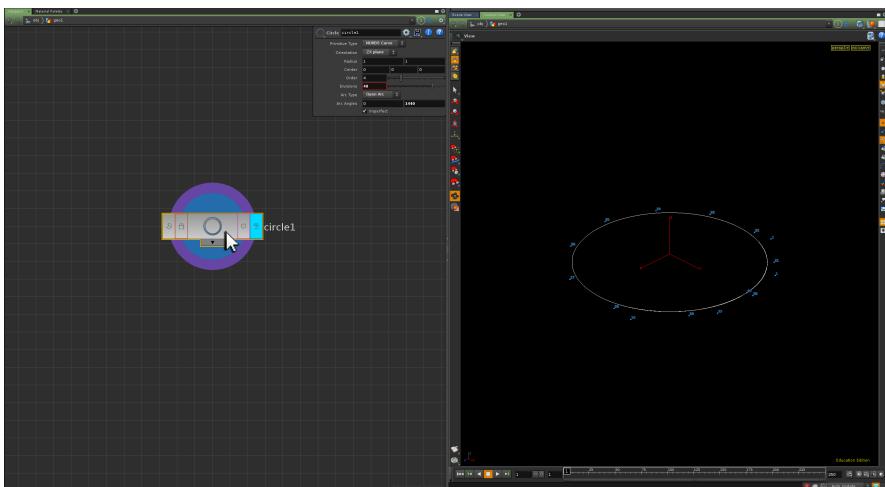


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CREATING A SPIRAL GENERATOR DIGITAL ASSET

This exercise will look at the creation of a custom operator specifically for generating spirals, and will demonstrate the principles of HDA generation, modification, and design. In a new Houdini scene, create a Geometry Object and at Geometry Level, delete the default File SOP, in its place creating a Circle SOP.



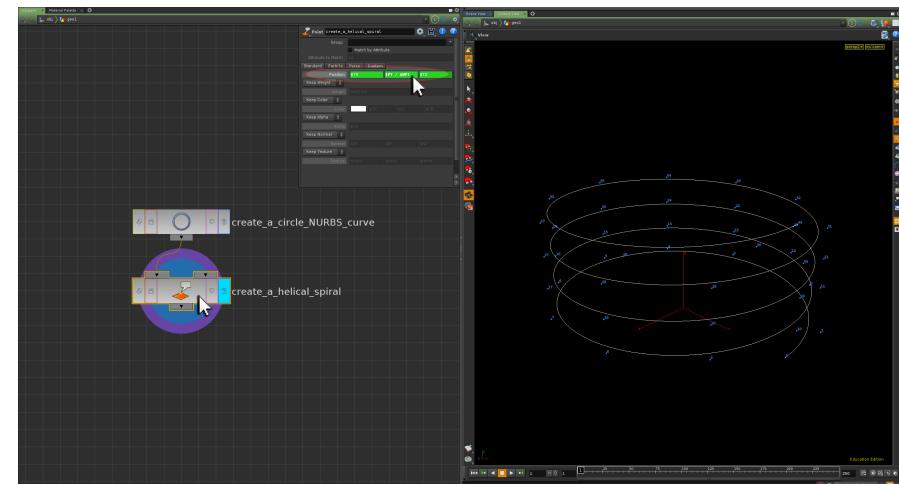
In the **parameters** of the Circle SOP specify:

Primitive Type	NURBS Curve
Orientation	ZX plane
Divisions	40
Arc Type	Open Arc
Arc Angles	0 1440

This will create a NURBS curve that loops upon itself four times.

Append to the **Circle SOP** a **Point SOP**. This operator will affect the curve on a per point basis. In the **Parameters** for the **Point SOP** specify:

Position	\$TX	\$PT / \$NPT
	\$TZ	



This will iterate through each point on the curve in turn and set its Y position to the current point number (\$PT) divided by the total number of points (\$NPT). Visually this will create a helical spiral that loops 4 times (due to the 1440 end arc angle specified in the Circle SOP).

NOTE: The **Point SOP** variables **\$TX**, **\$TY**, and **\$TZ** are essentially 'empty' variables that collect and store the point positions of any input geometry. The variables **\$PT** and **\$NPT** are local to the **Point SOP** and documented in its **Operator Help Card**.

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CREATING A SECOND SPIRAL

Copy (Ctrl + c) and Paste (Ctrl + v) the Point SOP to create a second one.

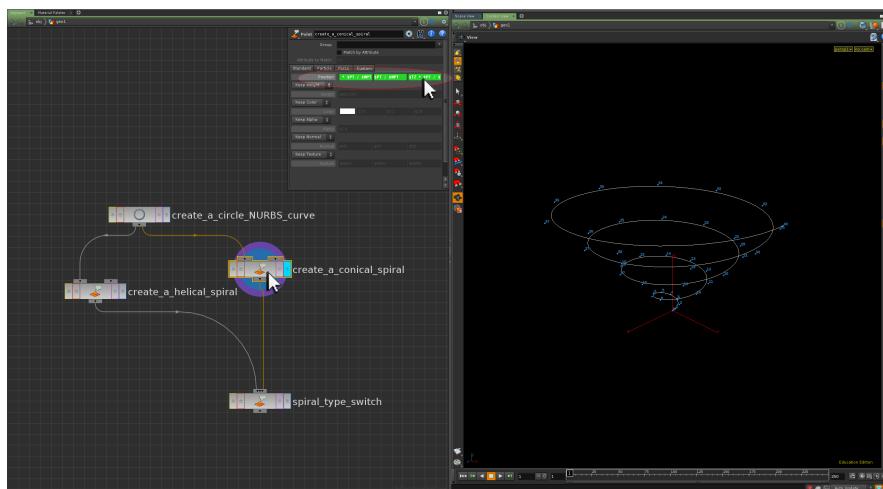
Modify the Position parameter from:

Position \$TX \$PT/\$NPT \$TZ

to

Position \$TX * \$PT/\$NPT \$PT/\$NPT \$TZ * \$PT/\$NPT

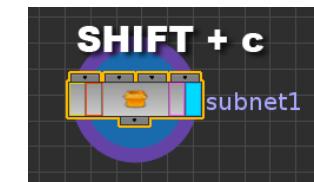
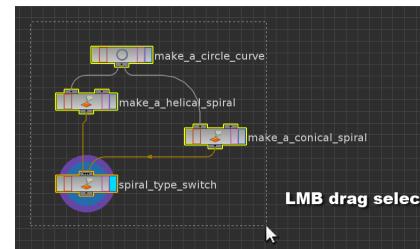
This will change the helical spiral into a conical spiral. Rename the two Point SOPs to **helical_spiral** and **conical_spiral** respectively and wire them both into a Switch SOP.



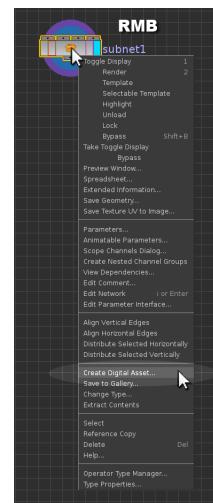
The Switch SOP will be utilised to switch between the two spiral types.

CREATING THE DIGITAL ASSET

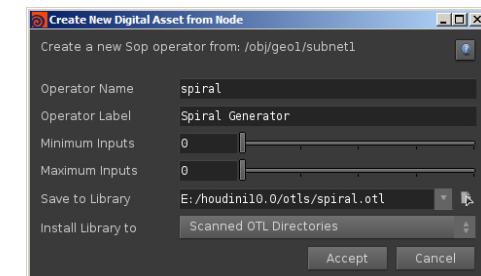
It is possible to generate a Digital Asset even with this simple network. The advantage of creating the Digital Asset now, is that it will allow the Asset to be tested as well as allowing a more complex network to evolve inside it.



In the **Network Editor**, select all the nodes and press **SHIFT + c** on the keyboard. This will collapse all of the nodes into a sub network from which the Digital Asset can be generated.



RMB on the subnet, and from the resulting menu choose **Create Digital Asset...**



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The resulting window is responsible for the primary setup of the Digital Asset. Everything contained within this dialog can be modified later on apart from the Operator Name, which is no longer changeable after Digital Asset creation. It is therefore important to get the Operator Name correct at this stage. Set the Operator Name parameter to:

Operator Name spiral

The Operator Name is the name the node will display in the Network View (for example a Platonic Solids SOP has the Operator Name 'platonic'). The Operator Label is the longer operator name Houdini will list in the TAB menu system. Set the Operator Label parameter to read:

Operator Label Spiral Generator

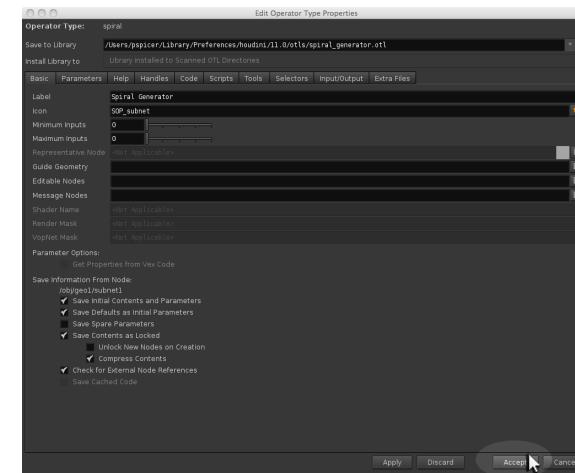
The Minimum and Maximum Inputs parameters control the number of inputs associated with the new Digital Asset. For example a Copy SOP has a maximum of two inputs and a minimum of one connected input in order to function. If a Copy SOP is created and not connected to a network it will return the red error icon on the node. The same is true for Digital Assets. As this Digital Asset will generate spirals, it will not need any inputs in order to function. Both of these parameters can be left at the default settings of zero.

The Save to Library parameter gives the destination of the Operator Type Library (OTL) in which the Digital Asset will be saved. More than one HDA can be stored in an OTL. It is advisable however to assign only one Digital Asset to an OTL. This allows the name of the Digital Asset can be utilised in

the OTL name. This can aid data and project management. Specify the Save to Library parameter as:

Save to Library \$HOME/houdini12.1/otls/spiral.otl

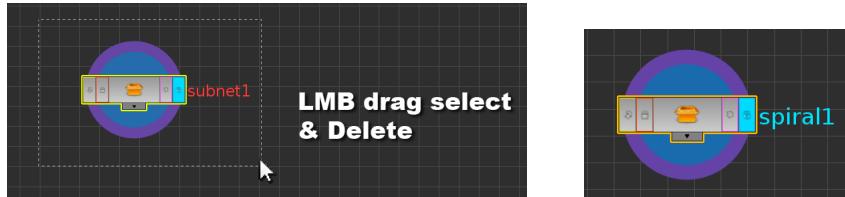
The location for saving the OTL is by default inside the directory Houdini creates for the user (\$HOME/houdini10.0/otls). OTLs stored here can be automatically scanned and read into Houdini when it is launched. The Install Library To parameter tells Houdini which scene file the OTL should be associated with. Specifying an Install instruction of Current Hip File Only will install the OTL into the currently open scene. Specifying an Install instruction of Scanned OTL Directories will mean that the OTL is accessible in every scene. As this is a Digital Asset for generating geometry it can be installed to every Houdini scene by selecting Scanned OTL Directories. With these options specified, press Accept.



Doing this will also activate the **Edit Operator Type Properties** window. This window will be used to generate the end user interface of the Digital Asset. For the moment however press Accept button to close this window. See `spiral_generator_stage1.hipnc`

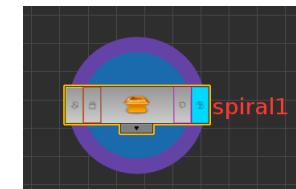
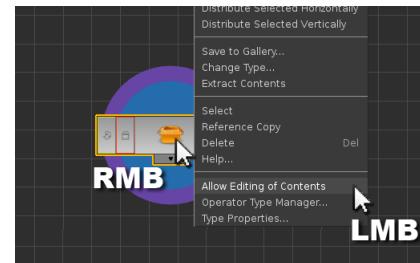
ACTIVATING THE DIGITAL ASSET

As the Digital Asset has now been created, it can be activated as a new operator. In the Network View, delete the `subnet1` node. In its place press TAB and type **Spiral Generator**.



UNLOCKING THE DIGITAL ASSET

When a HDA node is activated, it is by default locked. This means it is not possible to edit or modify the internal network. The blue operator name label visually indicates this. A HDA can be unlocked by **RMB** on the node icon and from the resulting menu choose **Allow Editing of Contents**. The operator name label will turn red indicating its editable status.

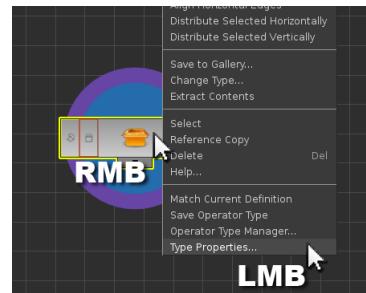


This process of activating and unlocking the Digital Asset can be done at any stage of its development to help ensure the asset is working as expected.

NOTE: For this process to work correctly, the **Edit Operator Type Properties** window must be closed down.

CREATING PARAMETERS FOR THE SPIRAL GENERATOR

At the moment there are no End User controls for the Digital Asset, and its Parameter window is empty. **End User parameters for Digital Assets can be created and activated using the Edit Operator Type Properties window.** When configuring Digital Assets, care should be taken over the design of the End User Interface to ensure only the core controls for the asset are activated in a clear, coherent and logical way. Digital Assets must be unlocked to allow for parameter creation and activation.

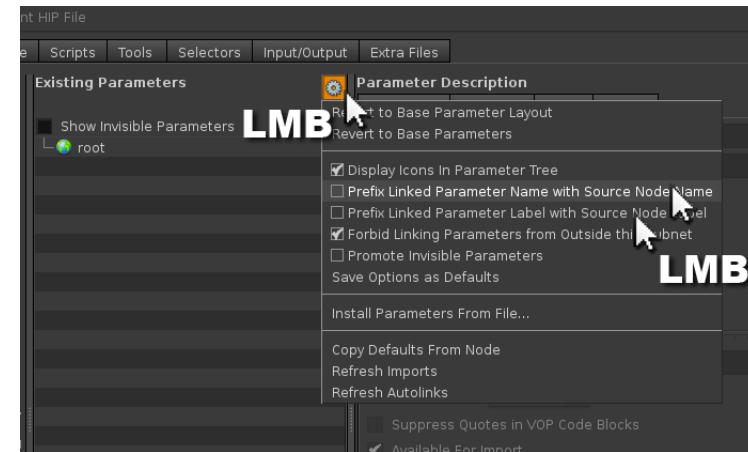


RMB on the unlocked Spiral Generator node, and from the resulting menu choose **Type Properties...** This will re-activate the **Edit Operator Type Properties** window for this Digital Asset.

The first End User control that can be activated is a parameter for switching between the two spiral types. As this mechanism is already established as part of the internal network, it can be ported up directly from the spiral type Switch SOP.

SIMPLIFYING PARAMETER NAMES

Before parameters are retrieved from the internal Digital Asset Network, **two naming convention options must be deactivated** in the **Edit Operator Type Properties** window. This is to prevent the entire path name for the parameter also being ported to the top level of the Digital Asset.



LMB on the **Cog Button** found next to the central **Existing Parameters** list of the **Edit Operator Type Properties** window **Parameter** section. From the resulting menu deactivate the following options:

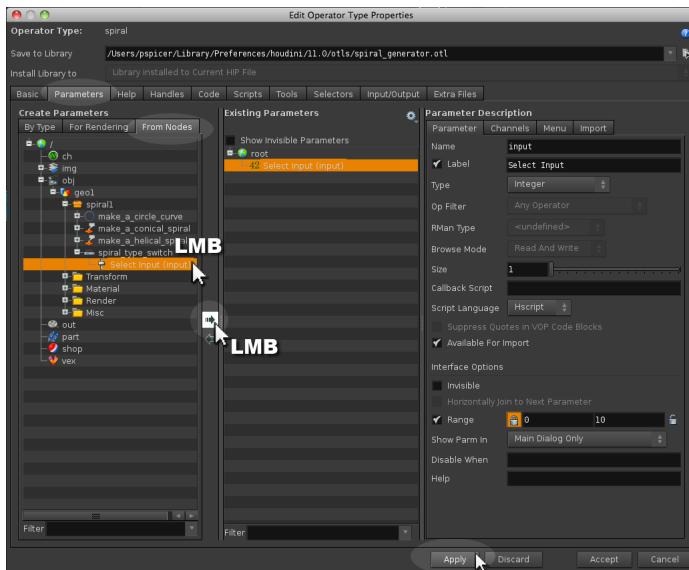
- Prefix Linked Parameter Name with Source Node Name
- Prefix Linked Parameter Label with Source Node Label

Now when parameters are ported up to the top level of the Digital Asset, only the parameter name and label will be ported rather than its full location path.

CREATING THE SPIRAL TYPE SWITCH PARAMETER

Using the **From Nodes** section of the **Create Parameters** list, **unstow** the **Select Input** parameter from the **spiral_type_switch** node. With this parameter selected, port it across to the **Existing Parameters** list using the

right facing arrow. With this done, press the **Apply** button to see the effect of this action.

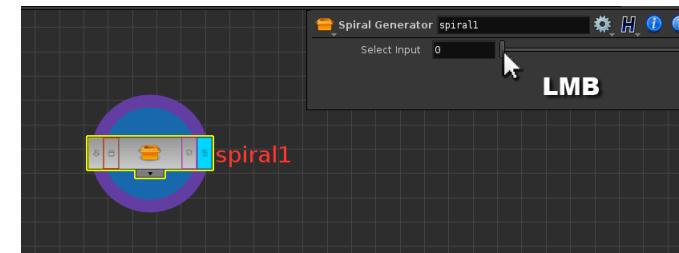


THE DIFFERENCE BETWEEN ACCEPT AND APPLY

If **Apply** is pressed in the Edit Operator Type Properties window, the changes are instigated with the window remaining open. If **Accept** is pressed, the changes are instigated and the Edit Operator Type Properties window closes. If the Edit Operator Type Properties dialog box inadvertently gets closed, it can be reactivated by RMB on the Digital Asset node icon and choosing **Type Properties...** from the resulting menu.

MODIFYING THE PARAMETER FUNCTIONALITY

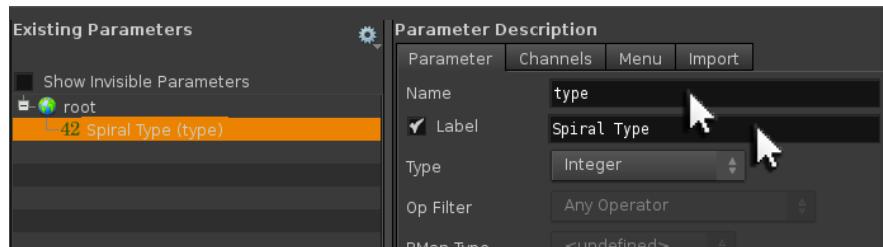
When the Parameters pane for the Spiral Generator is examined, the **Select Input** slider can be seen. When the slider is increased from 0 to 1, the switch mechanism inside the Digital Asset is triggered and the different spiral types can be seen in the Viewer.



While the switching mechanism itself is working, the End User control for it could be much more intuitive. As this parameter is integer based, the Edit Operator Type Properties window can be used to convert this parameter from a slider to a drop down menu.

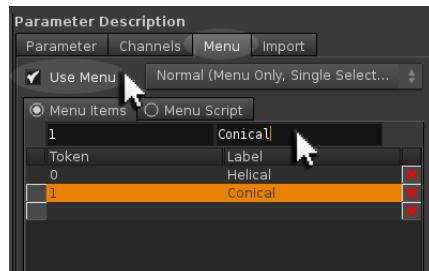
CREATING A MENU

Reactivate the Edit Operator Type Properties window, and under the Parameter Description section set the internal parameter **Name** to **type** and the external parameter **Label** to **Spiral Type**. This will create more intuitive names for this Digital Asset Parameter.

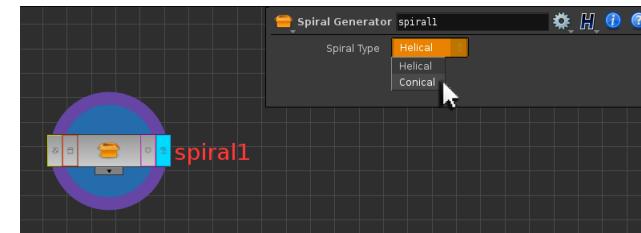


In the **Parameters Description > Menu** section, activate the **Use Menu** toggle, and in the two text entry fields underneath the **Menu Items** listing, enter the following respectively and press **ENTER**:

0	Helical
1	Conical



This will create a drop down menu system for the spiral type where the integer values of 0 and 1 are replaced by the words Helical and Conical. With this set, the **Accept** button can now be pressed.

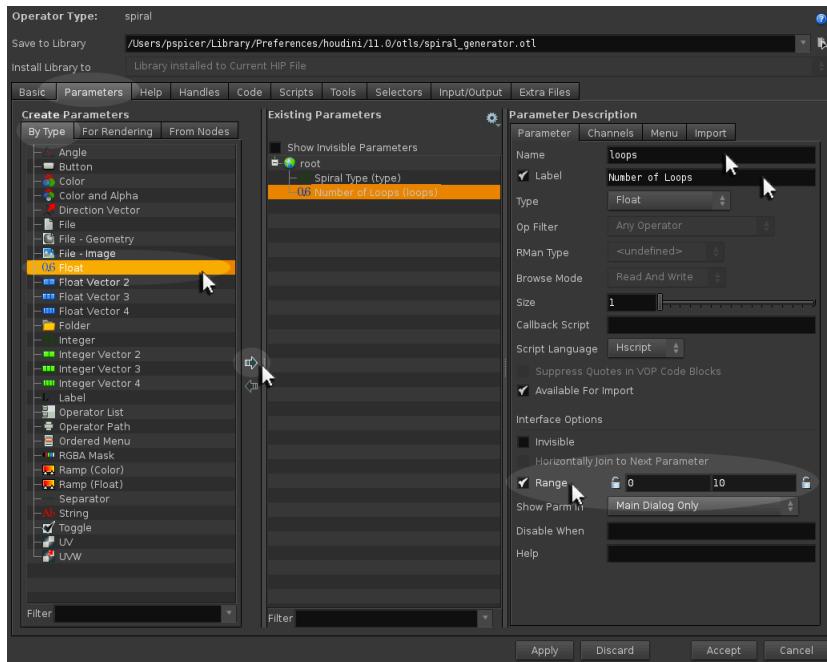


When the **Parameters Pane** for the Spiral Generator is re-examined, the integer slider has been replaced by a drop down menu describing each spiral type.

CREATING A CUSTOM PARAMETER

Another useful control for an End User is the ability to control the number of spiral loops. At present the internal network for the spiral generates 4 loops, although there is no explicit parameter controlling this. Instead a custom parameter can be created at the top level of the Digital Asset, and then fed back into the internal network for controlling the number of loops being generated.

Reactivate the **Edit Operator Type Properties** window, and from the **Create Parameters By Type** list, select a **Float** parameter and using the right facing arrow, port it over to the **Existing Parameters** list.



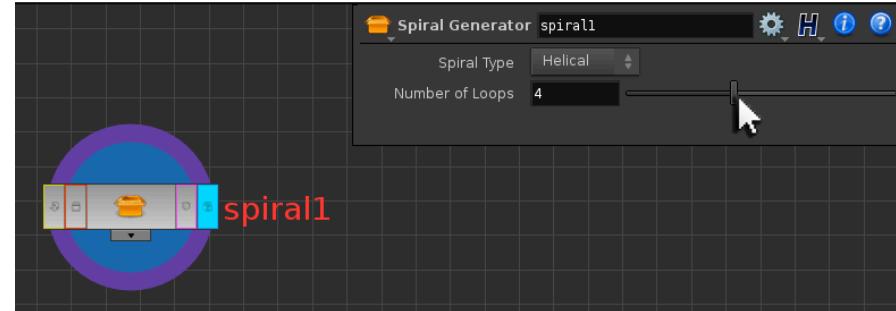
In the **Parameters Description > Parameter** section specify:

Name loops

Label Number of Loops

Range

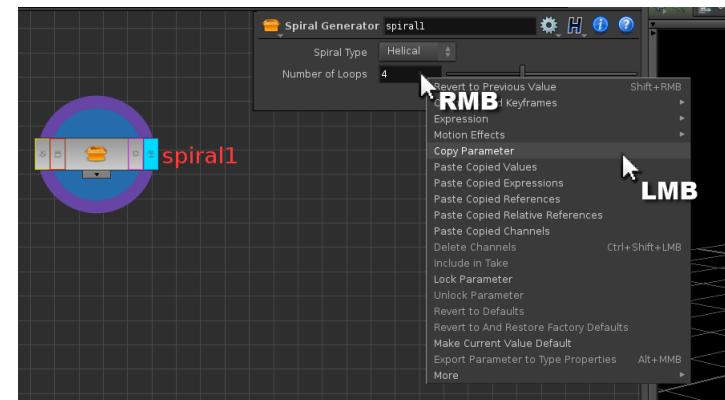
Under the **Parameters Description > Channels** section of the window, specify a **Defaults** value of 4 for this new parameter.



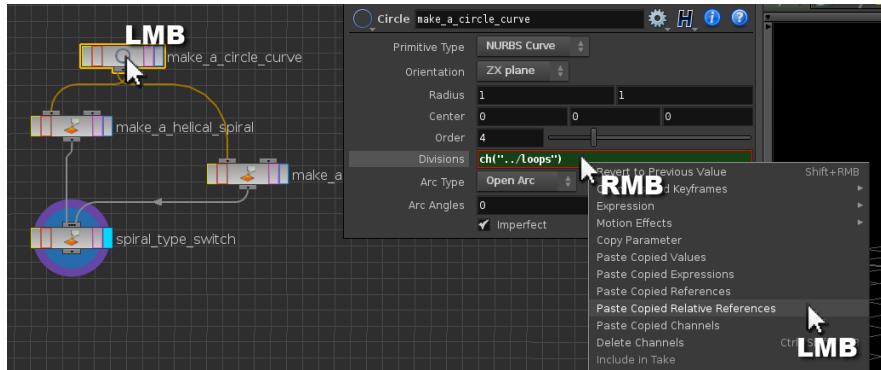
With this in place, the **Accept** button can be pressed. Now the spiral generator Parameters has a currently unlinked slider that can be utilised to control the number of spiral loops.

ACTIVATING THE CONTROL

RMB on the newly added parameter and choose **Copy Parameter**.



Go inside the Spiral Generator internal network, and select the Circle SOP.

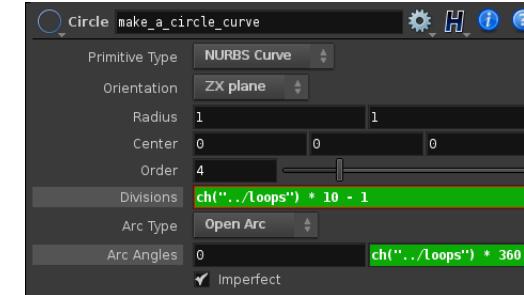


RMB over the **Divisions** Parameter and choose **Paste Copied Relative References**. This will create a path expression linking the Number of Loops parameter value to the number of points creating the NURBS circle. Modify this path expression from

`ch("../loops")` to `ch("../loops") * 10 - 1`

This will ensure that if the Number of Loops Parameter has a value of 3, 30 points will be generated. If the value is 4, then 40 points will be generated, and so on. This can be verified by MMB on the Circle SOP node.

Locate the End Arc Angles parameter of the Circle SOP (currently specified as 1440), and RMB over it to again choose **Paste Copied Relative References**.



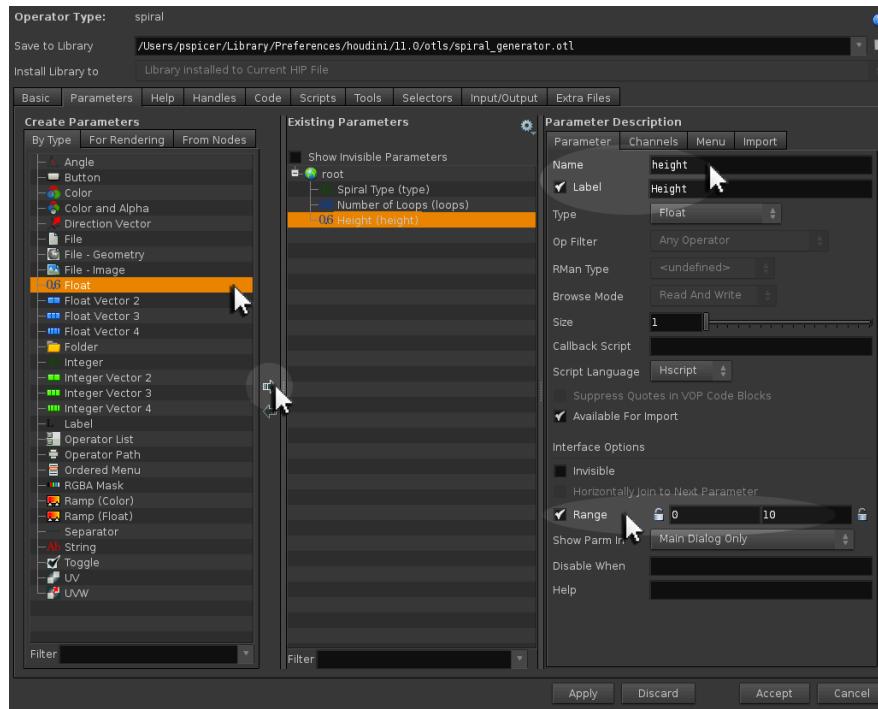
This time modify the path expression to read:

`ch("../loops") * 360`

As the Number of Loops parameter is currently returning a value of 4, multiplying it by 360 will return an End Arc Angle parameter value of 1440. The number of spiral loops and also the number of points constructing the spiral, are now controlled directly by the Number of Loops parameter located at the top level of the Digital Asset.

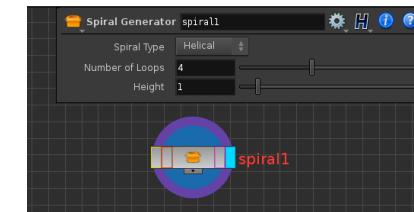
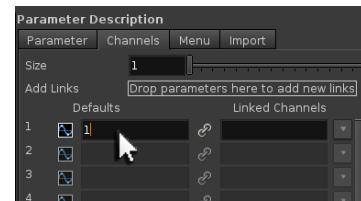
CREATING A HEIGHT CONTROL

A custom parameter can also be used to control the height of the spiral. A default height of 1 is given to the spiral through the expression `$PT/$NPT` found in the Point SOPs creating the different spiral types. This value can be modified to include a height multiplier parameter set at the top level of the Digital Asset.



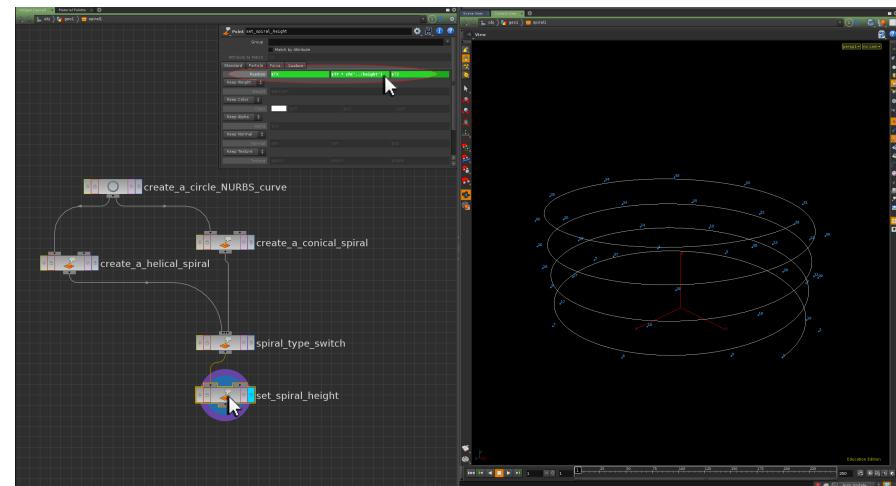
Reactivate the **Edit Operator Type Properties** window, and as before port across a new **Float** parameter. Under the **Parameter Description** section specify the **Name** of this new parameter as **height** and the **Label** as **Height**. Activate a **Range** for this parameter.

Under the **Channels** section of the **Parameter Description** area, set a **Default Value** for the **Height** parameter of **1**. When the **Accept** button is pressed, the **Height** parameter slider can now be seen on the Spiral Generator Digital Asset.



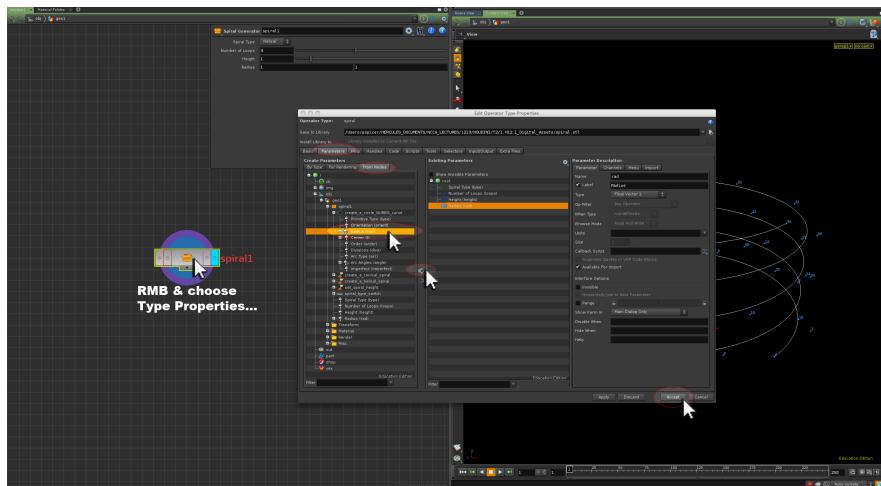
The **Height** parameter can be activated by returning back to the internal network, and appending a new Point SOP to the end of the spiral network. In the parameters for this new Point SOP specify

Position	\$TX	\$TY * ch("../../../height")
	\$TZ	



CREATING A RADIUS PARAMETER

RMB on the Spiral Generator node, and reactivate the Type Properties window. Under the Create Parameters from Nodes List, locate the Radius parameter found in the Circle SOP node, and port it across to the Existing Parameters List. When Accept is pressed, the Radius parameter will be active at the top level of the Digital Asset.

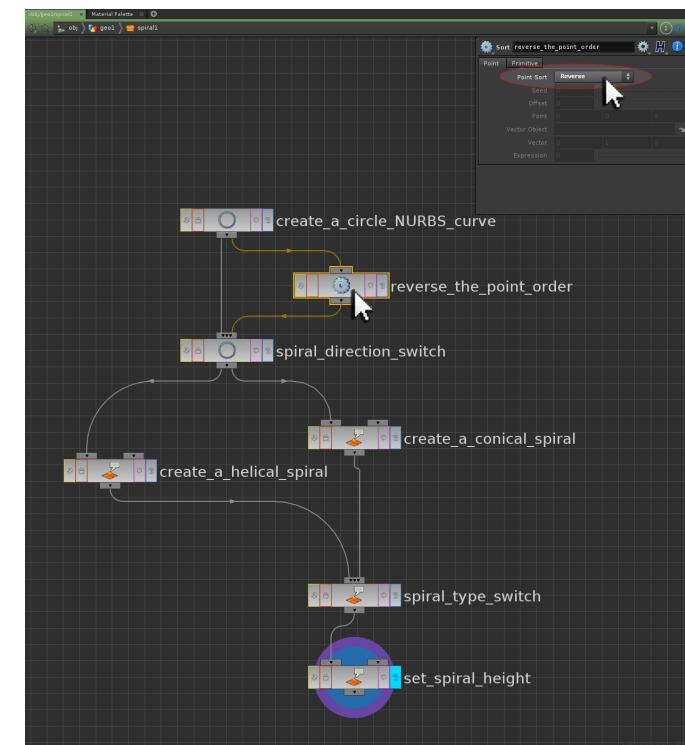


The Height parameter will now increase or decrease the height of the spiral in the Viewer. Similarly the Radius parameter can be used to adjust the X and Z size of the spiral. See file **spiral_generator_stage2.hipnc**.

REVERSING THE SPIRAL

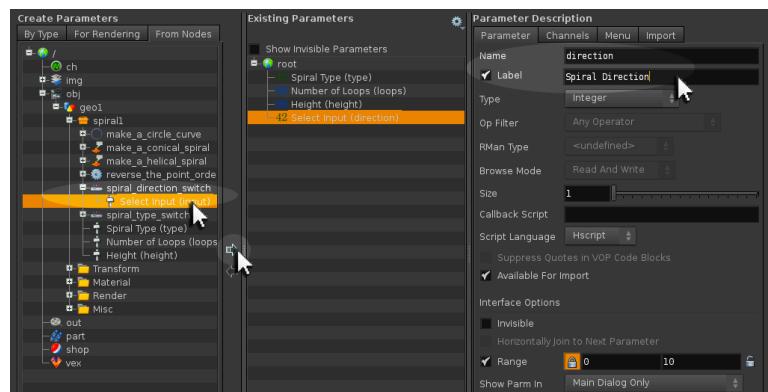
Once a Digital Asset has been established, its internal network can be further modified in order to add functionality. Currently the direction of the spirals is the same. Another useful feature for the Spiral Generator might be to give the user choice over the spiral direction.

Go back into the internal network for the spiral generator, and RMB append a Switch SOP to the Circle SOP. Rename this Switch SOP to **spiral_direction_switch**. MMB on the output of the Circle SOP to create a Sort SOP as a separate chain. Pipe the output of the Sort SOP as the second input into the Switch SOP. Rename this Sort SOP to **reverse_the_point_order**, and set the **Point Sort** parameter of the Sort SOP to Reverse.



NOTE: Whenever a network is modified, the Display and Render Flags must be set back to the final node in the network, as any alternate location will become the default whenever the Digital Asset is resaved.

Reactivate the **Edit Operator Type Properties** window for the Spiral Generator, and from the **Create Parameters > From Nodes** section, identify the **Select Input** parameter found inside the **spiral_direction_switch**. Port this parameter across to the **Existing Parameters** list, and give it a new **Name of direction**, and a new **Label of Spiral Direction**.



Under the **Parameter Description > Menu** section, activate the **Use Menu** toggle option, and specify in the **Menu Items**:

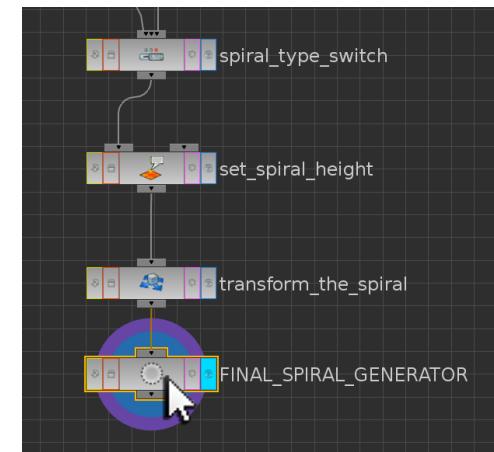


Now when **Accept** is pressed, a drop down menu for controlling the direction of the spiral can now be seen at the top level of the Digital Asset.

CREATING ADDITIONAL TRANSFORM CONTROLS

While the Spiral Generator is functioning, it cannot be positioned or resized. At present an End User would have to append a Transform SOP in order to move the spiral around and change its shape. While this is not overtly problematic as a workflow, it might be better to embed transform controls directly into the Spiral Generator itself.

Activate and minimise the **Edit Operator Type Properties** window for the Spiral Generator. When the **Edit Operator Type Properties** window is open and active and the asset is unlocked; additional parameters can be ported directly up to the top level of the Digital Asset either through the **Parameter Pane RMB Menu** or through the **Viewer Pane Tool RMB Menu**.

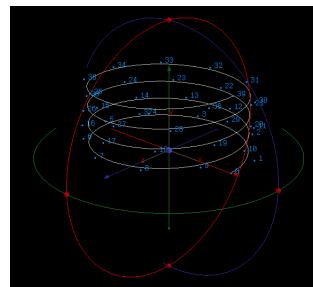
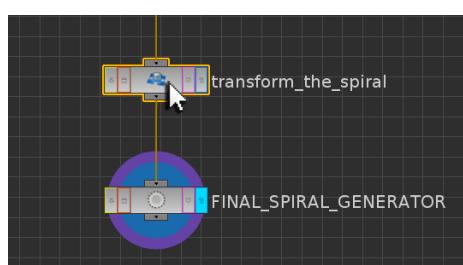


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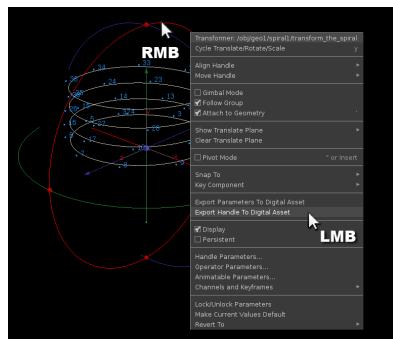
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Inside the Network, append a **Transform SOP** and a **Null SOP** to the **spiral_type_switch**, and rename them appropriately.

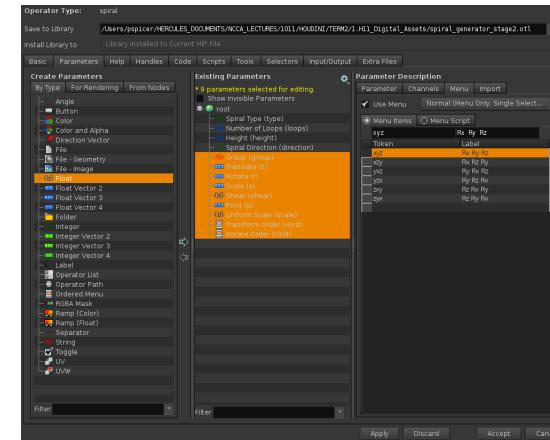
Select the **Transform SOP** in the **Network Editor**, and press **ENTER** with the mouse over the **Viewer**.



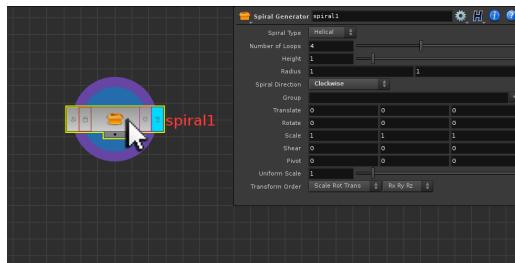
This will activate the **Tool Mode** for this operator and reveal the interactive transform handles in the **Viewer**. **RMB** on the handle, and from the resulting menu choose **Export Handle to Digital Asset**. This will port both the handle and its associated parameters directly to the Existing Parameters list as a single step.



When the Existing Parameters list of the **Edit Operator Type Properties** window is examined, the transform controls are now listed. Automatically created handle listings can also be examined under the **Handles** section of this dialog.



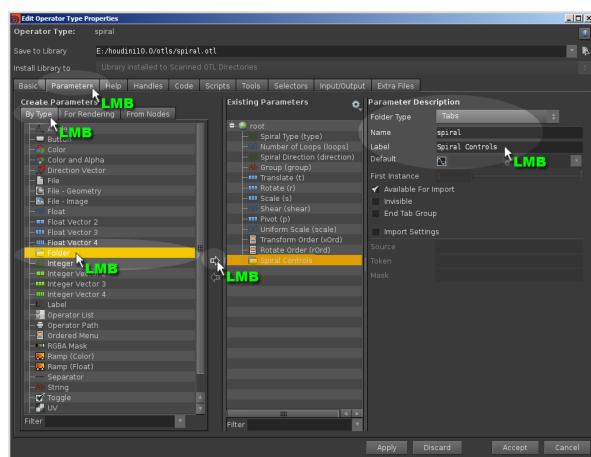
Press the **Apply** button, and then minimise the **Edit Operator Type Properties** window. When the **Parameters** of the Spiral Generator are examined, the additional transform parameters can now be seen. Also, the interactive transform handles can be activated and deactivated in the **Viewer** as part of the standard tool mode for the spiral generator.



TIDYING UP THE INTERFACE

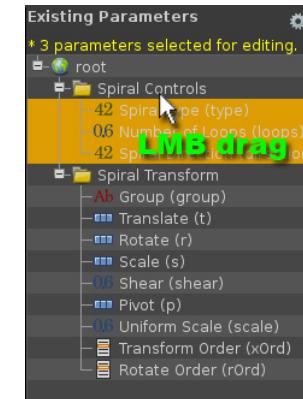
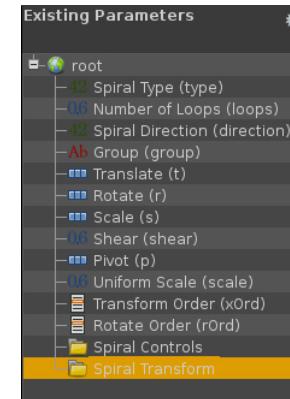
Some of these newly created parameters are useful to an End User; some are not (for example the Group parameter). Extraneous parameters can be deleted from the Digital Asset, and also the necessary parameters can be organised to make the interface more intuitive.

In the **Edit Operator Type Properties** window, go to the **Parameters By Type** list and select **Folder**. Using the right facing arrow port the Folder over to the Existing Parameters list.

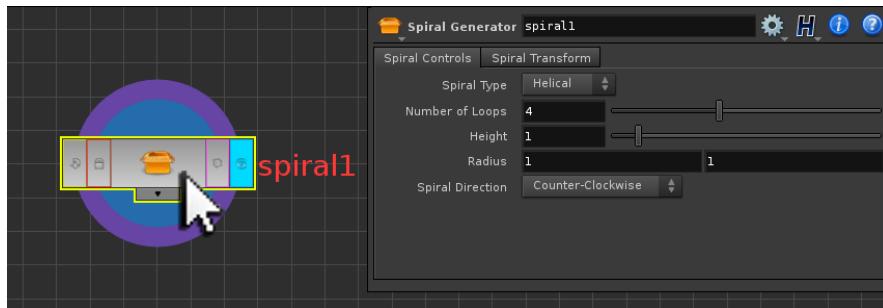


In the **Parameter Description** for the **Folder**, set the **Name** of the folder to **spiral** and the **Label** to **Spiral Controls**. Repeat this operation to create a folder called **Spiral Transform**.

LMB drag all of the **Spiral** parameters into the **Spiral Controls** folder. Repeat this, **LMB dragging** all of the **Transform** parameters into the **Spiral Transform** folder.



When **Apply** is pressed on the **Edit Operator Type Properties** window, the **Spiral Generator** parameters pane will update accordingly, with each set of parameters being stored within its own section.

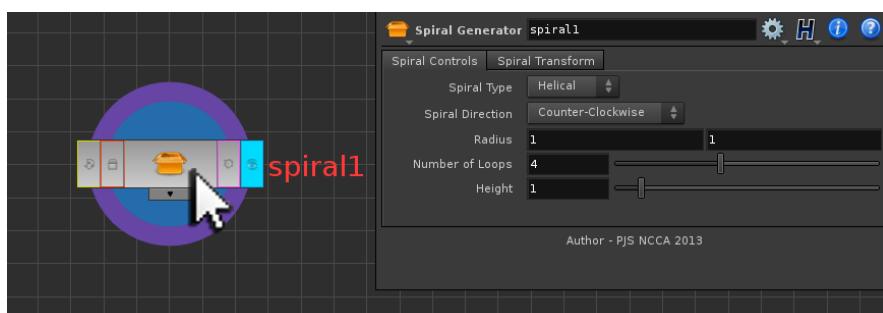


DELETING AND REORDERING PARAMETERS

The removal of an unnecessary parameter (for example the Spiral Transform Group parameter) can be done by selecting the parameter in the Edit Operator Type Properties listing and pressing the **DELETE** key. Parameters can also be LMB dragged up or down in the list to reorder them appropriately.

ADDING LABELS

A label can be added to articulate the Digital Asset interface in a similar way to the creation of a folder. Labels can for example record both additional parameter information and HDA authorship.

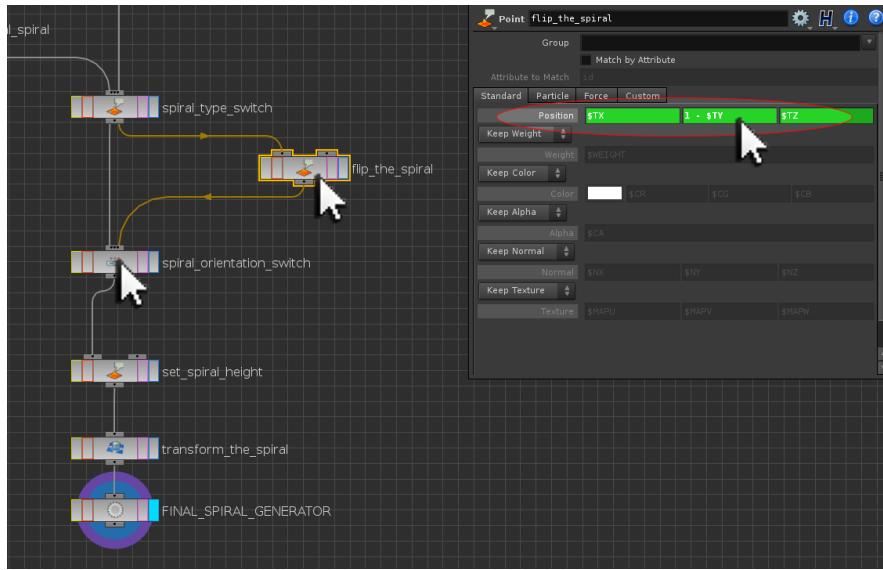


See file **spiral_generator_stage3.hipnc**.

ADDING FURTHER FUNCTIONALITY

As mentioned, the contents and functionality of an unlocked Digital Asset can be added to and refined after creation. This need for additional functionality may simply be to increase the flexibility of the tool or may be as a result of an End User request. In this example, it would be useful to flip or re-orientate the Conical Spiral, as well as allowing the user to convert the Spiral from a NURBS curve to a Polygon.

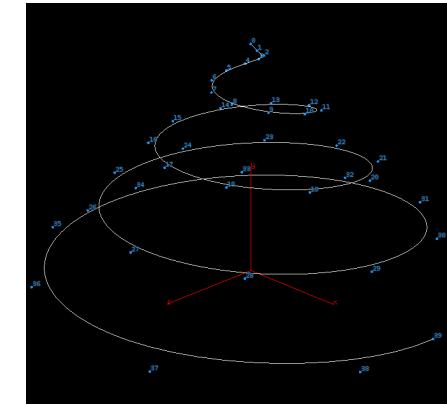
Using the Spiral Generator parameters, change the **Spiral Type** to **Conical**, and activate and minimise the **Edit Operator Type Properties** window. Inside the Spiral Generator network, append a new **Switch SOP** to the output of the **spiral_type_switch**. Rename this Switch SOP to **spiral_orientation_switch**.



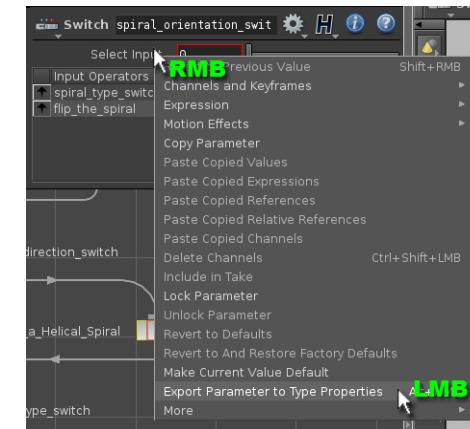
MMB on the output of the **spiral_type_switch** to insert a **Point SOP** as a new network branch. Rename this **Point SOP** to **flip_the_spiral**, and wire its output as the second input of the **spiral_orientation_switch**. In the **parameters** for the **flip_the_spiral Point SOP**, specify:

Position	\$TX	1 - \$TY	\$TZ
----------	------	----------	------

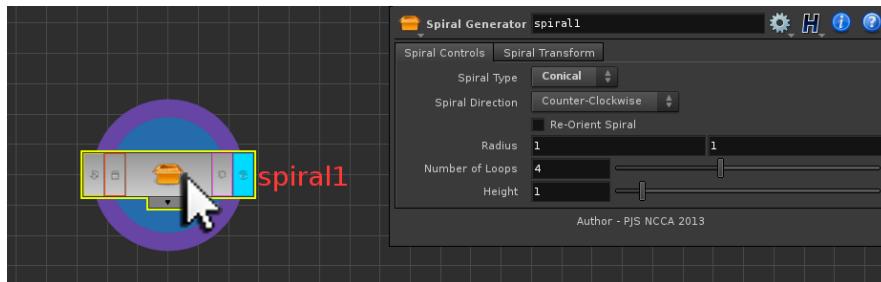
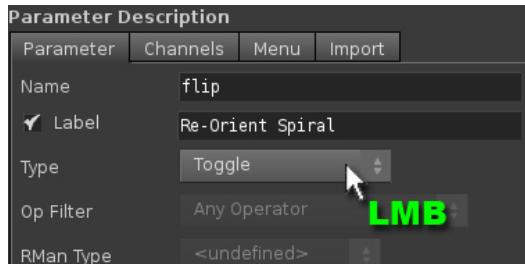
When the **spiral_orientation_switch** is activated, this will invert the conical spiral.



A higher-level parameter can be quickly created for this reorient function, by utilising the **Export Parameter to Type Properties** option. This can be found by **RMB** on the **Spiral Orientation Switch's Select Input** parameter.



This control can be set as a toggle based option by changing the **Type** setting from **Integer** to **Toggle** in the **Parameter Description**. The **Name** and the **Label** of this parameter should also be modified accordingly.

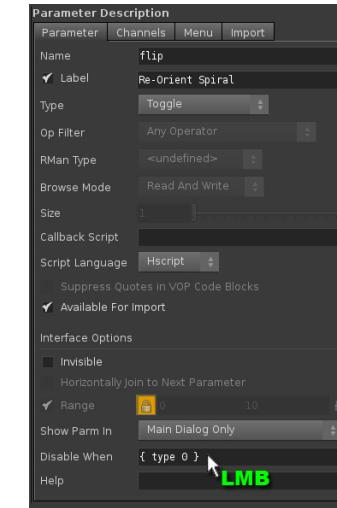


NOTE: As with exporting Handles, the Edit Operator Type Properties window needs to be active to allow this direct porting of parameters up to the top level of a Digital Asset.

DISABLING PARAMETERS

As the Re-Orient toggle performs the same operation as the Spiral Direction parameter when the Spiral Type is set to Helical, it can be disabled until the

Spiral Type is set to Conical. To do this, the Re-Orient's Disable When parameter must be activated in the Edit Operator Type Properties.



Disable When

{ type 0 }

This translates as saying; when the type parameter (Spiral Type) is set to its first input (0 – Helical), disable this flip parameter. When the Spiral Type parameter is now set to Helical, the Re-Orient parameter will no longer be active.

BOOLEAN DISABLING

This **Disable When** syntax can also form the basis of an **OR** list command which other parameters could be added to. This would disable the parameter when any of these listed parameters return the appropriate values.

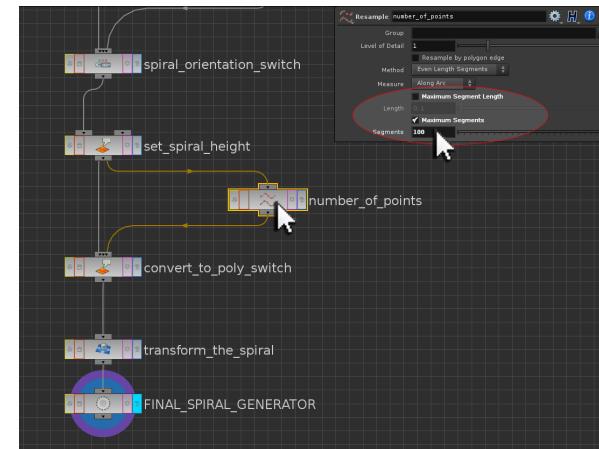
```
Disable When { parameterX 0 }{ parameterY 5}{parameterZ 4}
```

An **AND** list can also be created by specifying more than one parameter in a pair of braces. This would require both parameters to be set to the appropriate values before the disable function would work.

```
Disable When { parameterX 0 parameterY 5 }
```

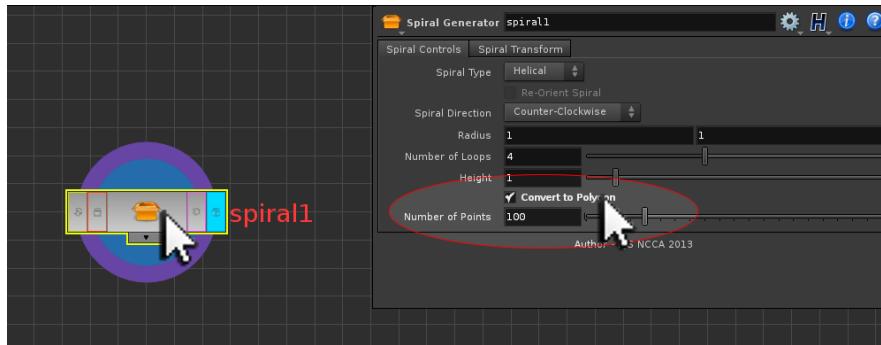
CREATING A POLYGON SPIRAL

RMB on the output of the **set_spiral_height** Point SOP to insert a new **Switch SOP**. Rename this switch from **switch1** to **convert_to_poly_switch**. MMB on the output of the **spiral_orientation_switch** to insert a **Resample SOP** as a new network branch. Rename this Resample SOP to **number_of_points**, and wire its output as the second input of the **convert_to_polygon_switch**.



In the **parameters** for the **Resample SOP**, deactivate the **Maximum Segment Length** parameter, and activate the **Maximum Segments** parameter. A default setting of **100** will provide sufficient points to maintain the spiral shape when converted to polygon.

The **Convert to Polygon Switch** can also be **RMB** activated as a **toggle based Digital Asset control**. Disabling the **Number of Points** parameter when the **convert to polygon** toggle is not activated can be controlled as per the **Re-Orient** parameter example.

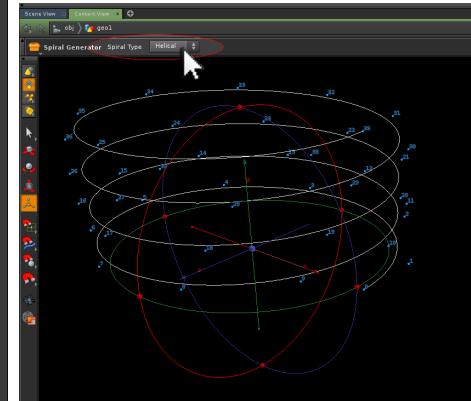
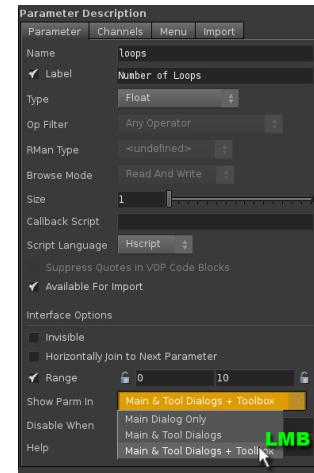


The channel reference of the Maximum segments parameter created by porting it up to the top level of the digital asset, can also be modified to subtract 1 from its value ensuring that a Number of Points value of 100 will result in exactly 100 points being generated for the polygon spiral (as opposed to 101 points).

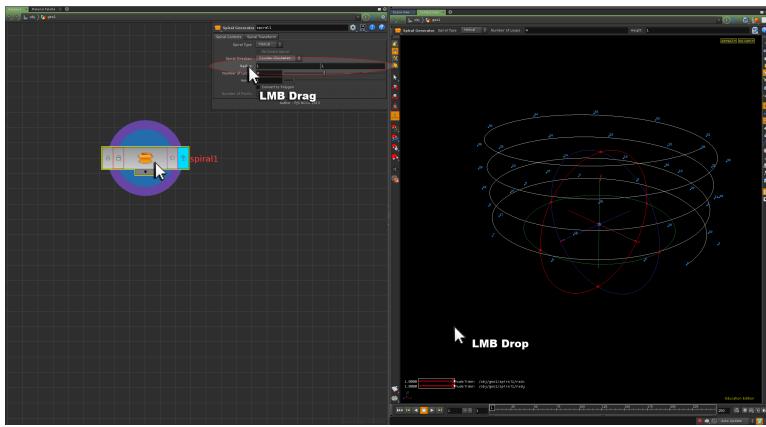
See file **spiral_generator_stage4.hipnc**

INTERACTIVE VIEWER CONTROLS

Set the Network Editor to look at the top level of the Spiral Generator Digital Asset. If **ENTER** is pressed with the **mouse over the Viewer**, the ported **Transform Handle** will appear. It can also be advantageous to have other core controls for the Spiral Generator appear in the Viewer.

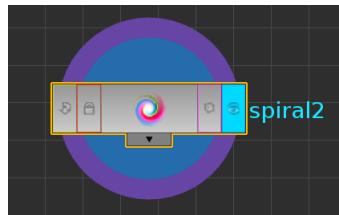


To have core controls as part of the main Viewer interface, the desired **Parameter Description** can be modified to appear in the **Main & Tool Dialogs + Toolbar**. Parameters can also be **LMB dragged** directly onto the Viewer to create **Heads Up Displays (HUD Sliders)**. These can also be activated as a permanent control for the Digital Asset if necessary.



EMBEDDING A NODE ICON OR IMAGE INTO A HDA

Under the **Basic** section of the **Edit Operator Type Properties** window it is possible to specify an icon for the Spiral Generator. All standard image formats will be accepted; however the icon must be square. A new Spiral Generator node will need to be created to see the icon after it has been created.



To embed an icon or image or other file type into a Digital Asset, the file must be loaded into the **Extra Files** section of the **Edit Operator Type Properties window**. It can then be called in the **Icon** parameter of the **Basic** section of the **Edit Operator Type Properties** window using the **opdef:** command.

For example, an image called **spiral.pic** loaded into the **Extra Files** section of the **Spiral Generator Digital Asset** can be called as an icon in the **Basic** section by using the command:

```
opdef:/Sop/spiral?spiral.pic
```

This translates as:

```
opdef:/hda_level_location/hda_name?image_name.xxx
```

WRITING THE DIGITAL ASSET HELP

Under the **Help** Section of the **Operator Type Properties** dialog enter the following text:

This is a Digital Asset for creating spirals. By default it will output a NURBS curve with a point number relative to the number of spiral loops.

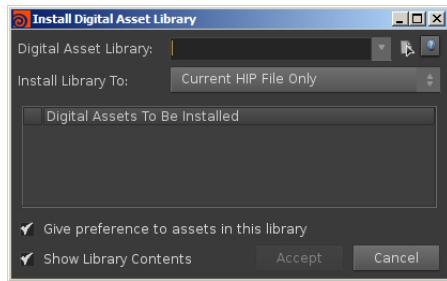
With the Help complete, Accept can be pressed in the **Edit Operator Type Properties** window.

NOTE: MMB Node help can be assigned using the **Edit Comments...** option located under the **Cog Button** of the Digital Asset's parameter pane.

INSTALLING DIGITAL ASSETS

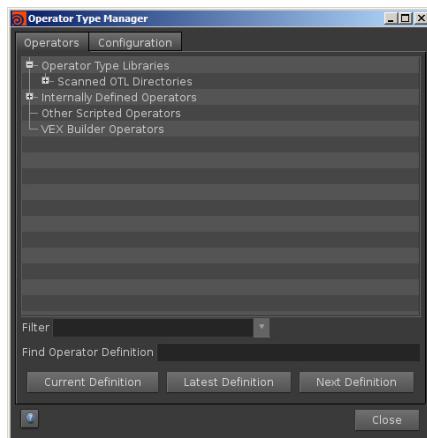
Digital Assets can be installed into any Houdini scene by going to the main File menu and choosing **Install Digital Asset Library**. The **Install Digital**

Asset Library window can then be utilised to locate and install an .otl file into Houdini.



MANAGING DIGITAL ASSETS

There is also an Operator Type Manager located under the main Windows menu that can be utilised to switch between Digital Asset versions, and if necessary remove Digital Assets from the current scene.



REFRESHING DIGITAL ASSETS

Offline modifications to an installed Digital Asset can be accessed by going to the main File Menu and choosing Refresh Operator Type Libraries.

ADDING OTHER SPIRAL TYPES

Now that the spiral OTL is complete, more spiral types could be added by creating other Point SOPs in the correct location of the Digital Asset network. Some expressions to create other spiral types are:

Archimedean:

PosX	PosY	PosZ
$\$TX*\$PT/\$NPT$	$\$TY$	$\$TZ*\$PT/\$NPT$

Logarithmic:

PosX	PosY	PosZ
$\$TX*pow(\$E,\$PT/\$NPT)*(1/(tan(10)))$	$\$TY$	$\$TZ*pow(\$E,\$PT/\$NPT)*(1/(tan(10)))$

Involute:

PosX	PosY	PosZ
$(\cos(\$PT)+\$PT*\sin(\$PT/2))/\NPT	$\$TY$	$(\sin(\$PT)-\$PT*\cos(\$PT/2))/\NPT

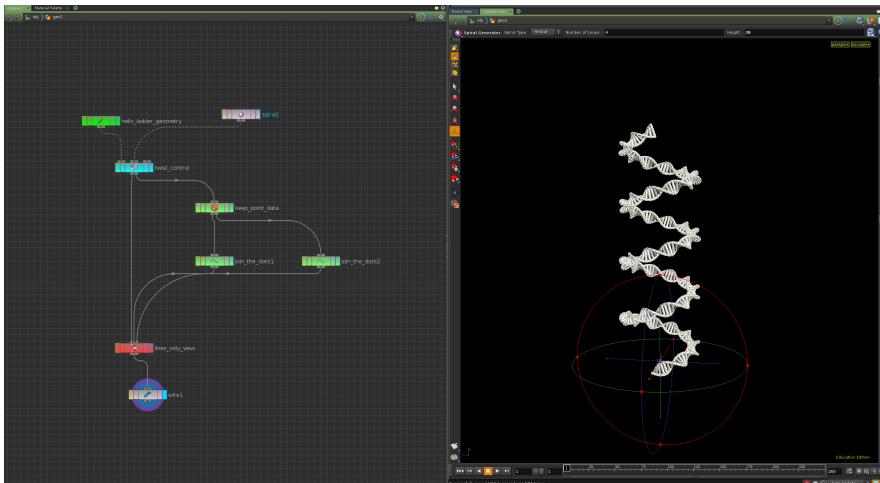
The advantage of creating a Digital Asset to manage the generation of spirals is simply that the expressions responsible for creating them never have to be seen again.

HOUDINI 12.1

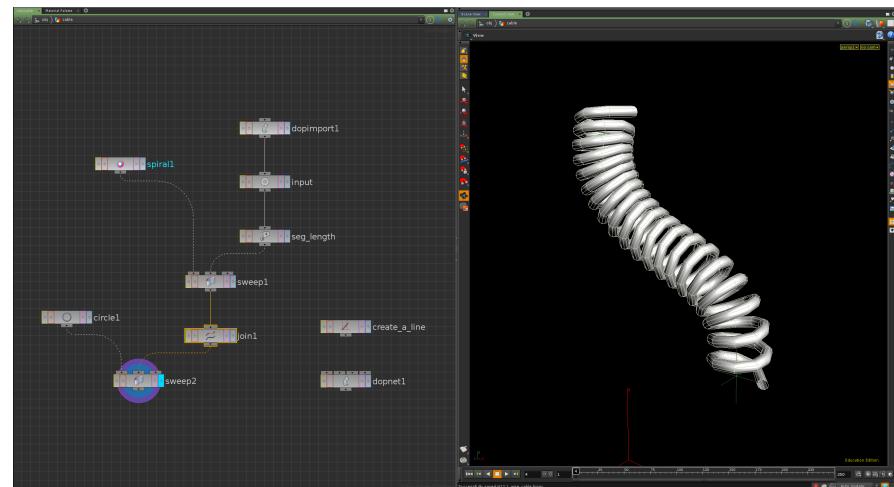
DIGITAL ASSETS

THE SPIRAL GENERATOR IN ACTION

Open the scene **H12.1_procedural_DNA.hipnc**. This scene contains a DNA model which utilises the Spiral Generator as a construction node.



Open the scene **H12.1_wire_cable.hipnc**. This scene contains an elastic telephone cable that bends and stretches dynamically.



Either of these networks could eventually be turned into their own Digital Assets with the Spiral Generator Digital Asset nested and referenced inside it.