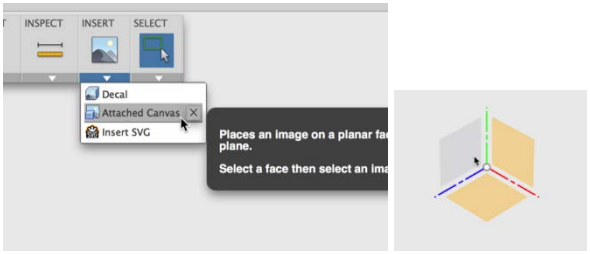
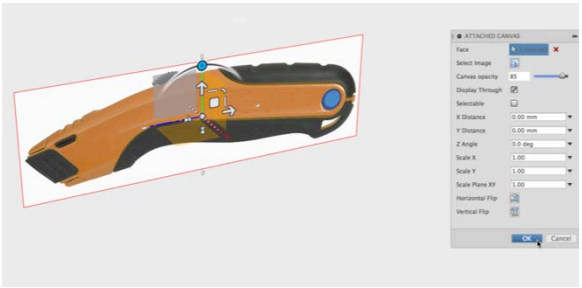
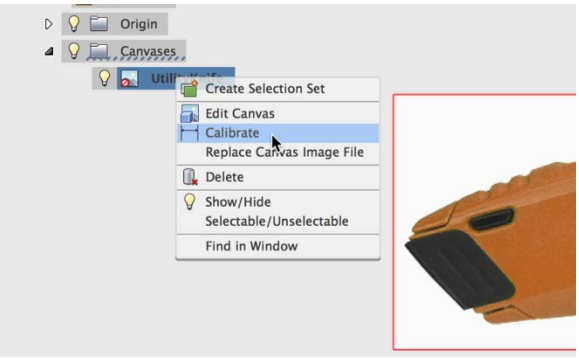
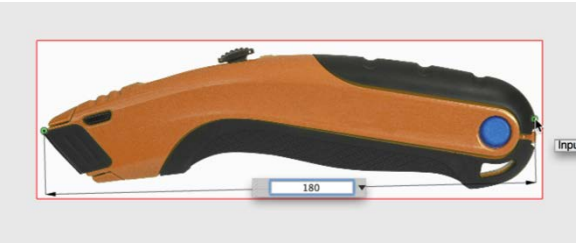
Create a T-Spline Form from a Reference Image

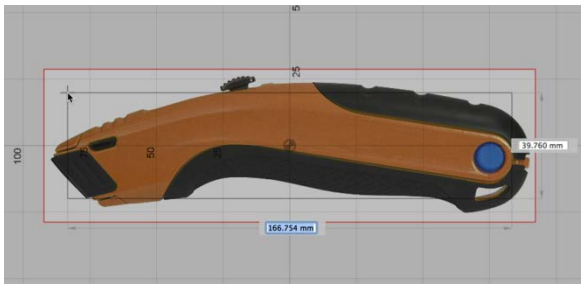
In this section you learn how to create a T-Spline form based on a calibrated reference image. With the freeform capabilities that come along with sculpting Fusion 360, this is a very common workflow. Let's get started by creating with a blank slate by creating a **New Design**.

Design Setup – Attach Canvas: The first step is to learn how to attach a reference image to a particular plane and calibrate it to ensure an accurate design.

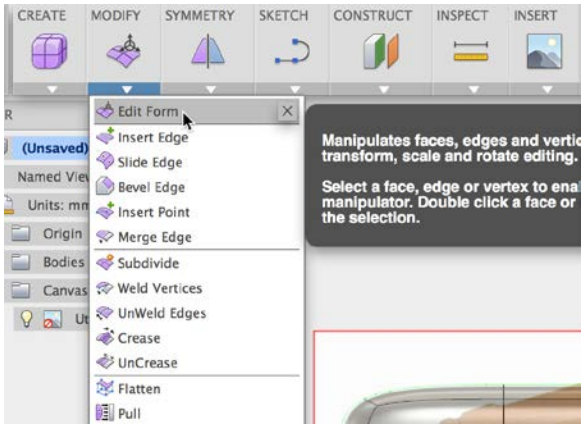
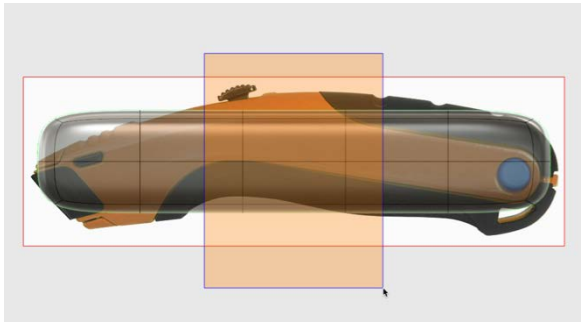
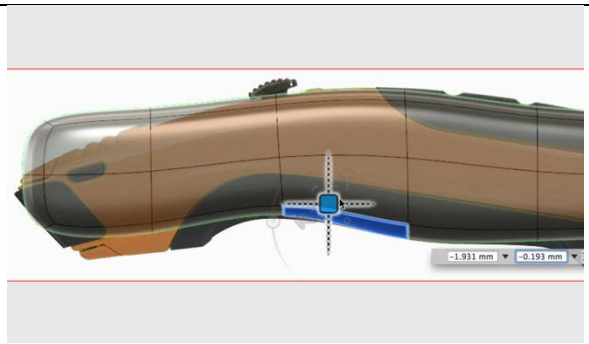
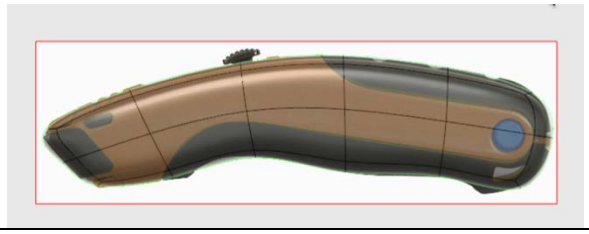
Step 1 – Attach a canvas 1. Click **Insert > Attached Canvas**. 2. Select the **YZ Plane** (between the green and blue axes) to set the Canvas' orientation. 3. In the dialog window, click the **Select Image** button and navigate to the **03_UtilityKnife.jpg** file in the downloaded .zip folder.	 Launch Video
Step 2 – Setup the canvas 1. If necessary, **rotate** the canvas **90 degrees** to orient it properly 2. Lower the opacity to **85**. 3. Check the box for **Display Through** to ensure that the canvas can be seen through your T-Spline form. 4. Click **OK**.	 Launch Video

Step 3 – Start the calibrate command 1. We need to calibrate our canvas to make sure our utility knife fits in our palm, and not on our fingertip! 2. In the Browser, click the drop-down arrow next to the **Canvases** folder. 3. Right-click on **UtilityKnife** and select **Calibrate**.	 Launch Video
Step 4 – Calibrate the canvas 1. Click **Right** on the ViewCube to view the utility knife from the side. 2. Click once at the **front** of the utility knife. 3. Click once at the **back** of the utility knife. 4. Enter the approximate length, **180 mm**. 5. The canvas will scale up accordingly.	

Create Primitive Form: With the canvas in place, the next step is to create a T-Spline primitive form on the proper plane.

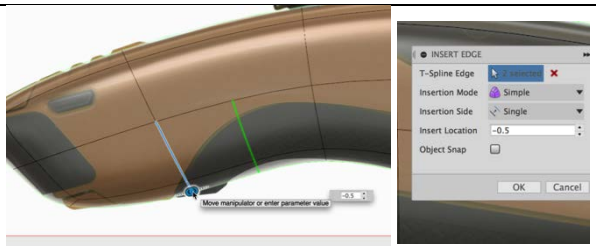
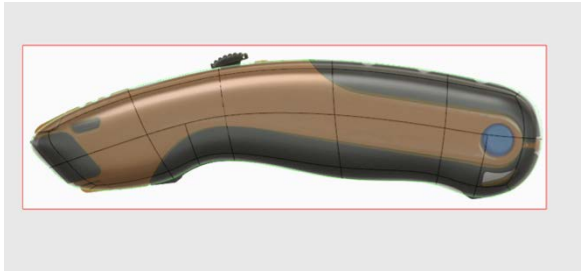
Step 1 – Start the box primitive 1. Click the **Create > Create Form** icon to enter the Sculpt workspace. 2. Click **Create > Box**. 3. Select the same side plane (YZ) as the canvas to specify the plane that the Box is placed on. 4. Click once at the **origin** to specify the Box's center point 5. Move the mouse and **click** again to draw its 2D profile.	 Launch Video
Step 2 – Specify the box primitive 1. Set the Box's **Length, Width**, and **Height** equal to **175, 35,** and **25 mm**, respectively. 2. Set the number of Length Face equal to **5**, and the width and height faces equal to **2**. Looking at the form of the utility knife, the complexity is along the length of the knife, so we set additional faces in that direction. We can always add or remove these later on.	 Launch Video
Step 3 – Add symmetry 1. In the dialog window, change the **Symmetry** from None to **Mirror**. 2. Check the box for **Height Symmetry**. 3. A green line is displayed that indicates where we have symmetry set up. 4. With no more symmetry to add to our form, click **OK**.	 Launch Video

Edit the T-Spline Form: Our T-Spline primitive is now in place, but we need to edit its geometry to better match our reference picture. In the following steps, we'll edit our existing geometry to match the canvas as best as we can. After that, we can add and subtract more edges to fine-tune our design.

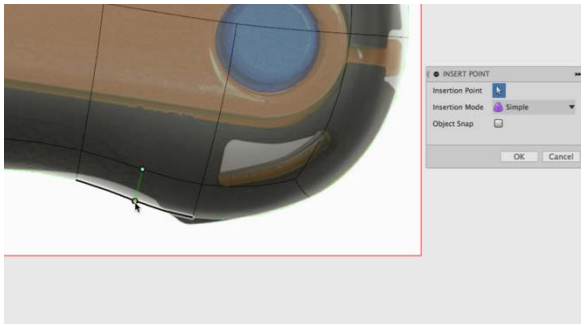
Step 1 – Start the Edit Form command 1. Click **Modify > Edit Form**. 2. For simplicity, ensure you're looking at the form from the **Right** view. To set this, you can click Right on the view cube. Common to most workflows, we stick to modifying our form from just one view, proceeding to 3D manipulations as a final step.	 Launch Video
Step 2 – Select a loop of faces 1. Select the middle loop of faces going down the length of the utility knife with a **window selection** (left-click and hold), as shown in the picture. 2. Dragging left to right will select all the geometry that is *fully captured* by the window, while right to left will capture everything that touches the window.	 Launch Video
Step 3 – Start modifying the form 1. Using the **Planar Translation** manipulator, move the selected faces to align the top of the T-spline body with the top of the utility knife. 2. To align the bottom in this section, select the bottom face and use the planar translation and rotate manipulators. 3. Repeat the previous 2 steps for the rest of the T-spline form. It will also be helpful to use the **single-direction scale** manipulator in some cases. 4. For more controlled editing, try modifying individual edges. 5. Don't worry if the finer details of the	 

contour are not matched, as we will accomplish this in the next step by adding and subtracting edges. Shoot for the image on the right!	Launch Video

Add Additional Details – Insert Edge: Our T-Spline form is starting to resemble our reference image, but there are without a doubt some details that we need to add! As the form is right now, there simply are not enough edges available to capture all of the details that we would like. To combat this, you implement the earlier-discussed method of inserting and deleting edges into a T-Spline form.

Step 1 – Insert additional edges 1. Hold **Shift** then select the edges shown. 2. Click **Modify > Insert Edge**. 3. Drag the direct manipulator to the right to position the new edges at an **Insert Location** around **-0.5**. 4. Click **OK**. We'll now repeat the previous steps to insert another set of edges.	 Launch Video
Step 2 – Insert more edges 1. Holding **Shift** then select the edges shown. 2. Click **Modify > Insert Edge**. 3. Drag the direct manipulator to the right to position the new edges at an **Insert Location** around **-0.5**. 4. Click **OK**. The form will change due to the additional edges. In the next step we will edit our form to our liking.	 Launch Video
Step 3 – Edit Form 1. Use the **Edit Form** command to manipulate the recently inserted edges to achieve the result shown on the right. 2. The planar translation manipulator will be extremely useful. As you can see, the reference image will help us roughly capture the correct form, but the fine details are entirely up to us.	 Launch Video

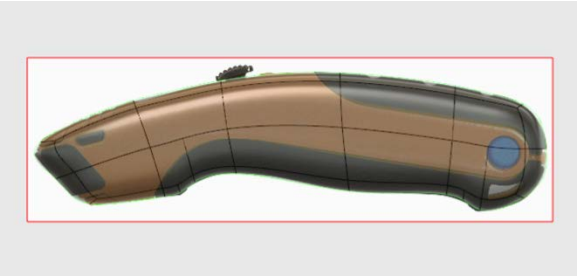
Add Additional Details – Insert Point: To insert the final two edges we need, we'll actually learn a new command, the Insert Point command. Slightly different from Insert Edge, the Insert Point command will easily insert an edge by connecting two points together.

Step 1 – Start the Insert Point command 1. Click **Modify > Insert Point**. 2. Hover over the middle of the top edge shown until a **red circle** appears – this indicates the midpoint 3. **Click** and repeat for the edge directly *beneath*, located along the line of symmetry.	 Launch Video
Step 2 – Insert Point details 1. Leave the **Insert Mode** set to **Simple**. 2. Click **OK**. An Insert Mode of **Simple** will add the desired edge, but the form will change slightly. An Insert Mode of **Exact** will add the desired edge, as well as *additional edges* to maintain the previous form. As you can tell, this setting will be a trade-off between maintaining form and reducing the number of edges.	
Step 3 – Repeat Insert Point 1. Click the **Modify > Insert Point**. 2. Construct an additional edge as shown to the right. 3. Leave the **Insert Mode** set to **Simple**. 4. Click **OK**.	 Launch Video

Step 4 – Edit Form

1. Use the **Edit Form** command to manipulate the recently inserted edges (as well as the surrounding geometry) to achieve the result shown on the right.
2. Click **Finish Form**.

Congratulations! You've completed your first sculpting workflow in Fusion 360. Feel free to sculpt the utility knife's sides for even more detail. With a more complex form, a similar workflow can be utilized, but with *multiple* calibrated canvases.



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