

➤ Derived Parts - part 3

In This Exercise

This exercise uses a jigsaw puzzle piece to show how you can use a derived part to model a design that requires symmetry and associativity within its base sketch. This is a variation of *Derived Parts - part 2*.

Note: If you are unfamiliar with the fundamentals of how to create and modify a derived part, you may want to first take a look at Skill Builder *Derived Parts - part 1*.




Using Derived Parts to Create Associative Symmetry

Tip: Consider creating a project to easily access any practice parts you may create for this exercise.

Note: It isn't necessary to recreate the puzzle piece to study this example, but for expediency you can create a simplified version of your own, as desired.

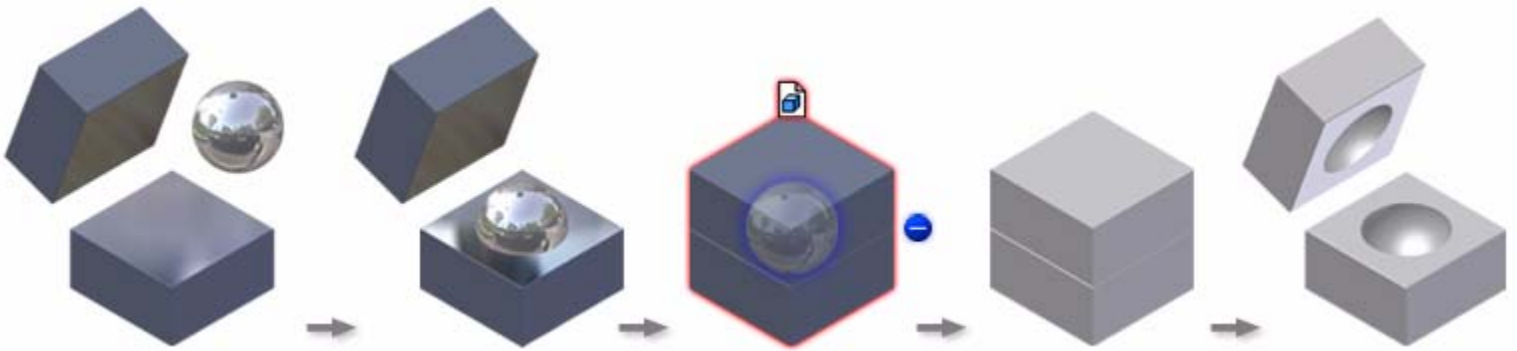
The requirement: Create a puzzle piece where the male and female portions are exactly symmetrical and associative, such that any change to the male portion is precisely and automatically reflected in the female portion. In addition, draw the spline freehand, so to speak, with no constraints or dimensions attached to the spline points.

The solution: A derived part that takes advantage of derived functionality particular to assemblies.

If you've ever created a derived part using an assembly as the parent, while working with the Derived Assembly dialog box, you may have wondered just what the blue icon with the horizontal dash  was trying to tell you. This is the Exclude/subtract icon — it's simpler to use than explain, but we'll give it a shot.

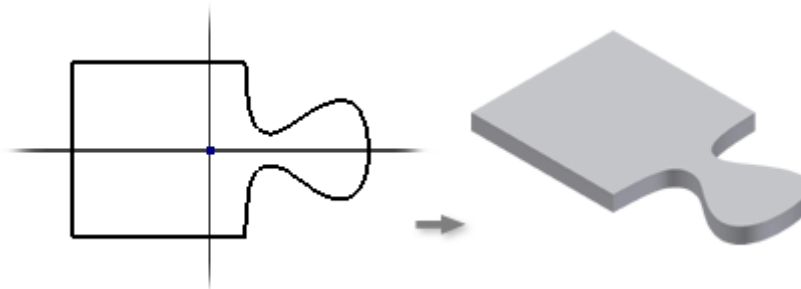
When you use an assembly for your derived part, and you specify this icon for any part or subassembly within that assembly, that part or subassembly will not appear in the finished derived part but will use its volume to perform a Boolean remove on any overlapping component in the parent assembly. For example, if you assemble two mold halves, along with the piece to be molded positioned within the halves, you can

exclude the piece to be molded from the mold halves, creating the desired cavity within each mold half in the derived part.

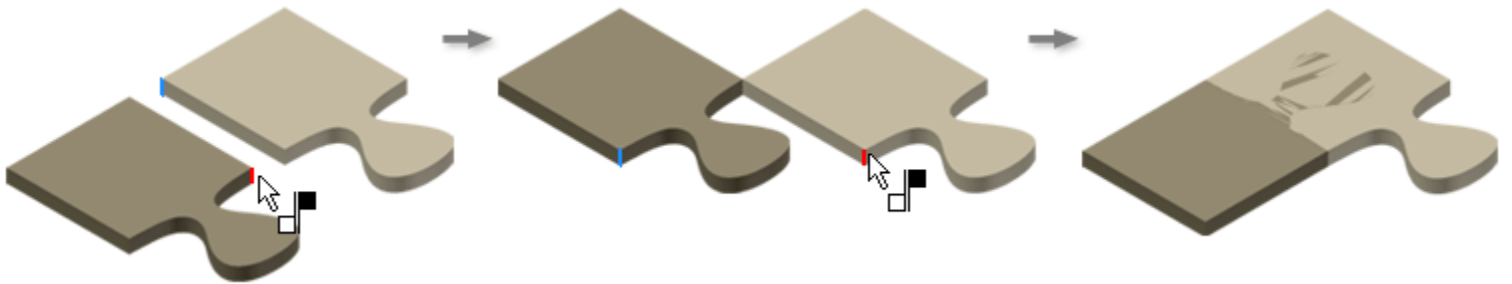


This function was used to create the female portion of the puzzle piece. Hang on — we'll shed more light on this with a few more illustrations and workflow instructions.

Approximating the following illustration, sketch the puzzle piece, creating the rectangular and male portions only. Extrude and save.

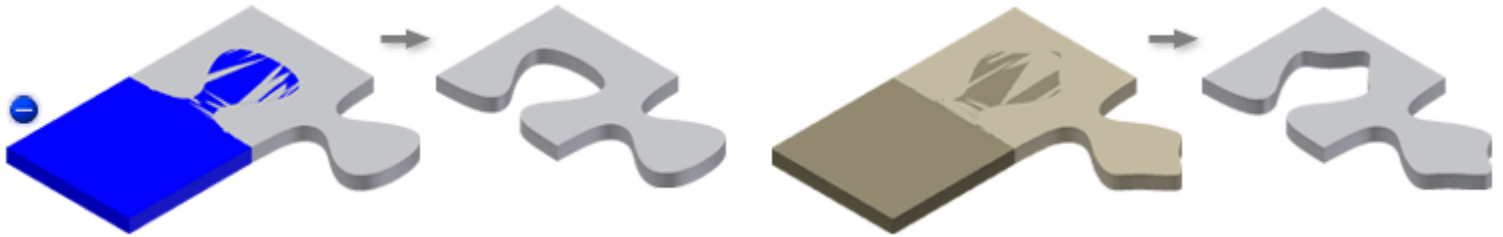


Open a new assembly, add two instances of the puzzle piece, and constrain as shown (the colors of each instance were changed for clarity). Save the assembly.



Create a new part and exit the blank sketch. Activate the Derived Part tool, and then browse to and select this assembly. Specify the Exclude/subtract icon for the second instance of the puzzle piece (the piece in the preceding illustration with the darker beige color). This excludes this instance of the puzzle piece from the derived part and also subtracts material from the first instance, yielding the desired shape and behavior

potential for the finished derived piece. The female portion exactly matches the male portion, and both shapes within the derived part will update identically if the parent part or assembly is modified.



As is the case with many processes within Autodesk Inventor, you may have guessed by now that there is at least one other way to achieve the same result.

You could have constrained the spline points in the sketch for the male portion with dimensions, and then copied and pasted that spline into the sketch for the female portion. It would then be a matter of rotating and positioning the sketch appropriately, replacing the dimensions with the respective parameter names from the original sketch, and using an extruded cut to remove the material. Because the copied spline references the dimensions from the original sketch, it will automatically update to match any changes. However, as mentioned earlier, this would have interfered with the ability to modify the spline by freely dragging the spline points.