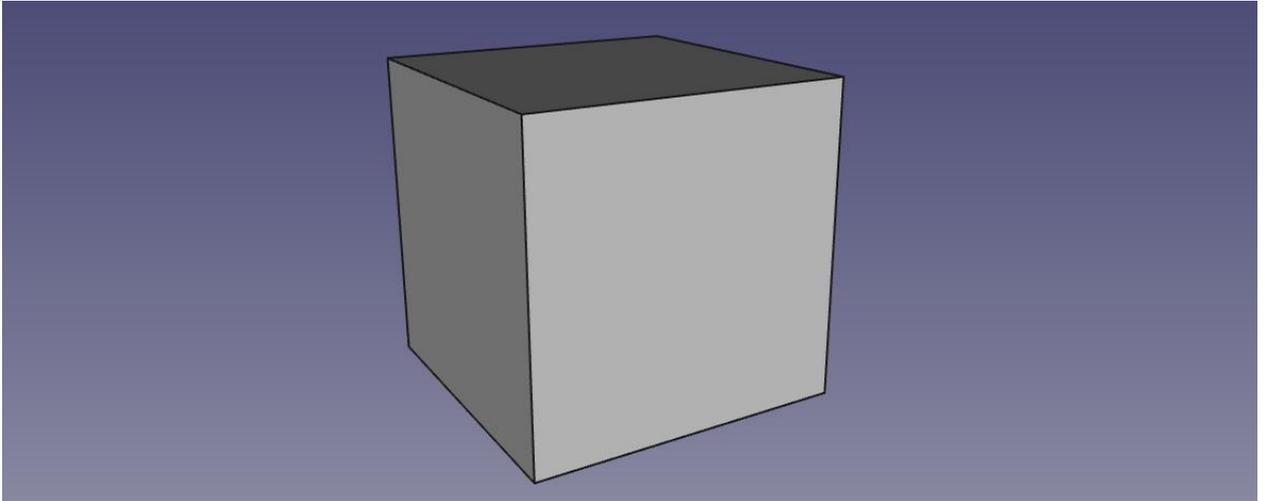


Lattice2 workbench basic tutorial

Tutorial 1. Polar array of boxes.

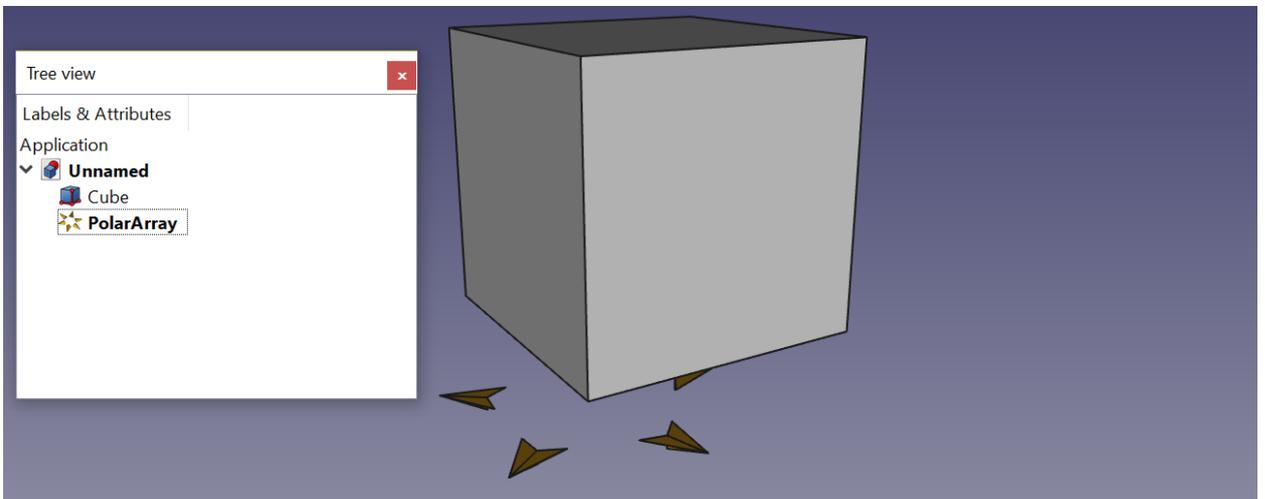
Requires Lattice2 on FreeCAD v0.17. Steps 1-6 should work on FC v0.16, too.

1. Open FreeCAD, create new project
2. Switch to Part workbench, and create a cube.



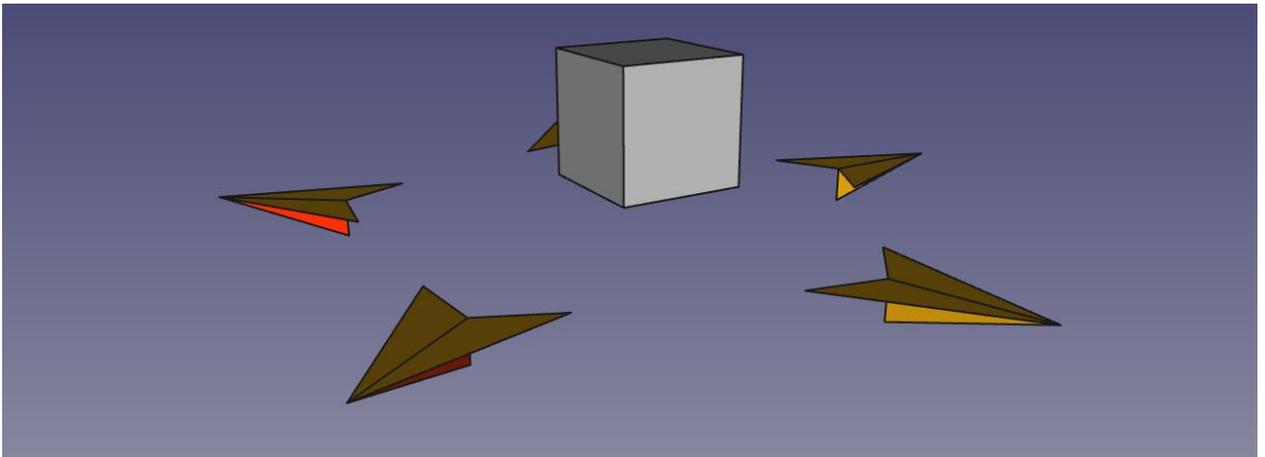
3. Switch to Lattice workbench. Make sure nothing is selected, and click  **Polar array** on toolbar.

→ an array of paper planes appears



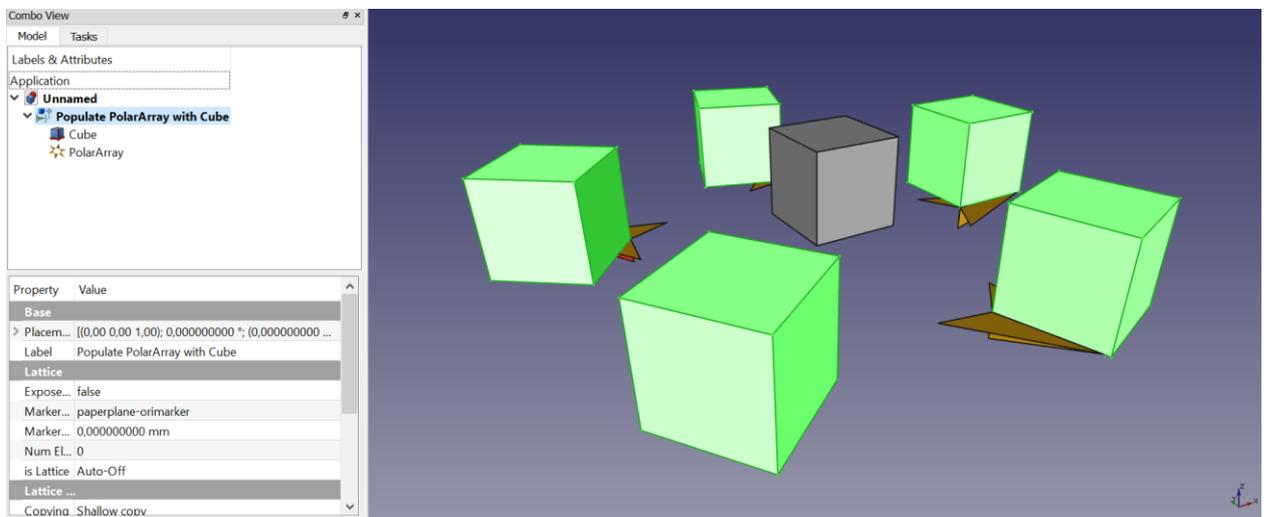
Each plane represents a placement. Plane's back T-joint vertex is the origin of the placement, direction of plane is local X axis, local Z axis points up and local Y axis is to the left.

4. Select the polar array, and in properties, alter Radius to something larger, say 20 mm. The array should expand in size. Feel free to play with other properties of the array.



5. Select the cube, the array, and pick  Populate With Copies on toolbar (first variant in dropdown).

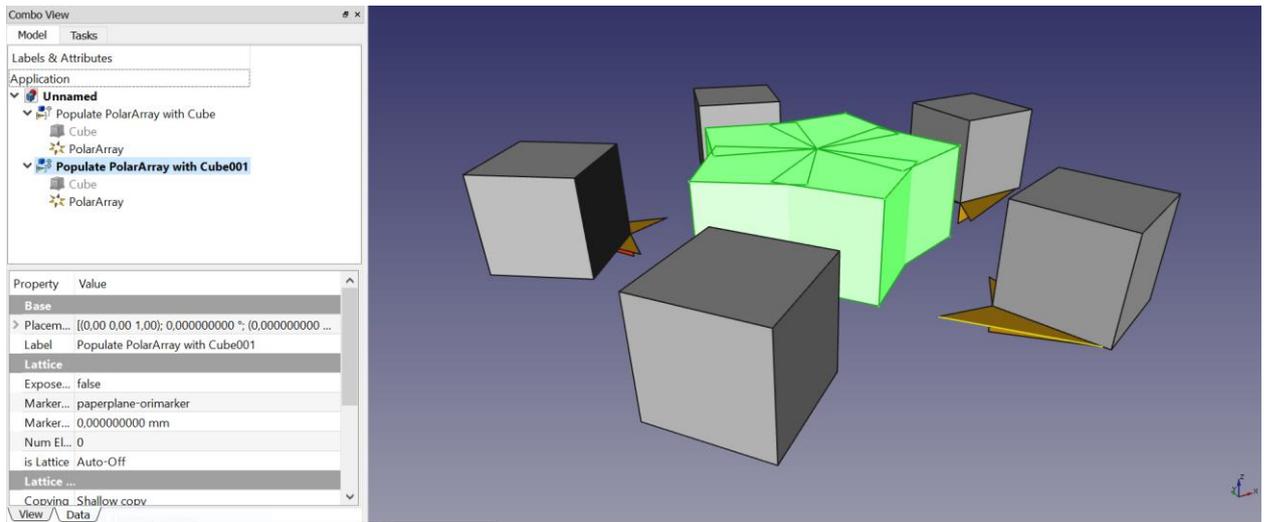
→ the cube is now replicated at each placement of the array. None of them matches the original, because each placement in the array has nonzero translation component.



In tree, you should see “Populate PolarArray with Cube” object, which contains all the cubes of the array. The shape of that object is a compound of solids. You can always check the shape structure with Lattice Inspect tool.

6. Often, you would want a polar array in Draft workbench style – where one of the copies matches the original. To do that, select the cube, the array, and pick  **Populate With Copies: build array** on toolbar.

→ now you have an array where one copy of the cube matches with the original, the result usually seen in Draft workbench.



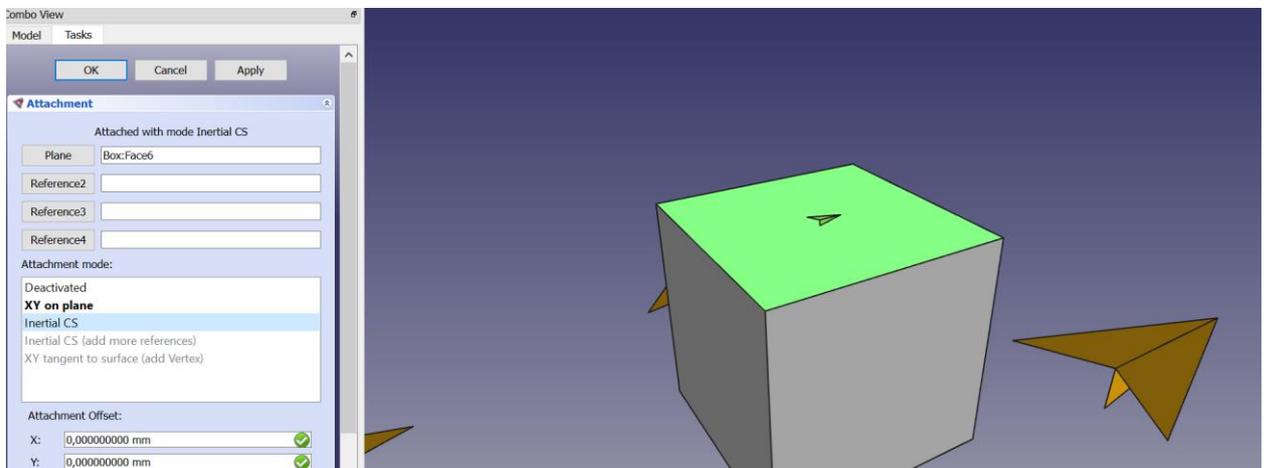
After step 5, the shape of the cube was taken from global coordinate system. After step 6, the shape is taken from the perspective of the first placement of the array. That placement was used as *reference*. As a result, applying the first placement of the array does nothing to the cube.

We can supply an external reference placement, let's do that now. So, delete all the Populate features to free up some space, and let's try it.

7. Select top face of the cube, and pick  Attached Placement from toolbar.

Attachment dialog opens. Select attachment mode "Inertial CS", click OK.

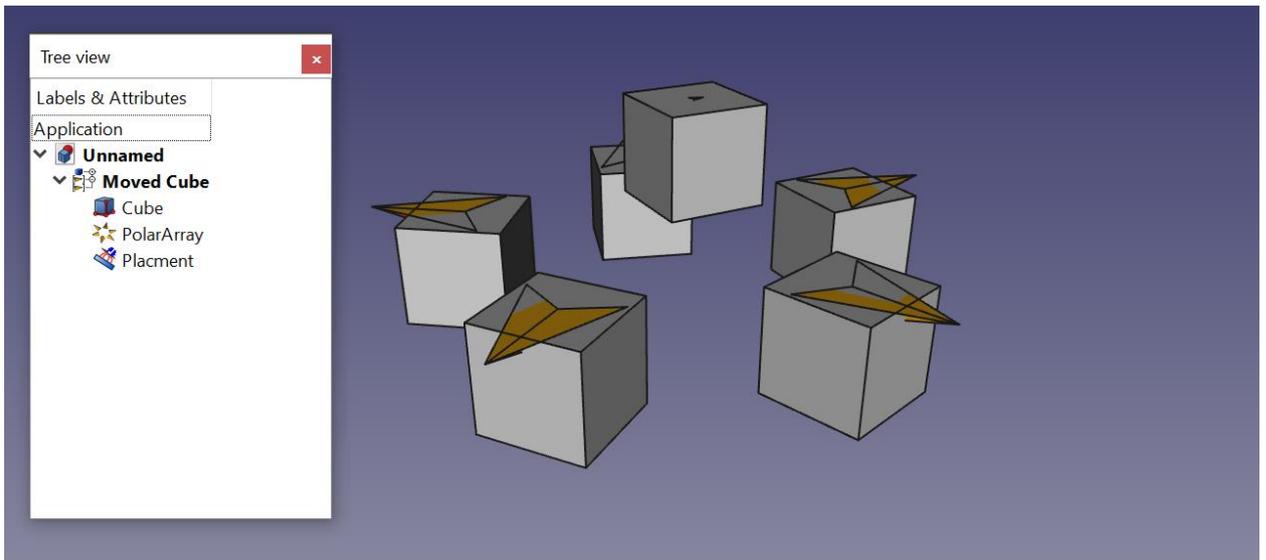
→ a paper plane is attached to the middle of the cube's face. It is quite small (1mm). You can make it bigger by adjusting "Marker Size" property of the placement.



8. Select the cube, the attached placement, and the polar array. Order of selection matters: "object () move from () to ()". And pick  **Populate With Copies: moved object**.

Populate With Copies: moved object

Now you have an array of cubes, where for each target placement, the cube was moved as if it were picked up by the reference placement as a handle, and dragged to make that reference placement line up with target placement.



That's it for the tutorial!

Lattice2 wb is roughly divided into two sets of tools: those that create and manipulate placements, and those that work on shapes. Population tools are the bridge between them.

Those paper planes are also shapes, and most other workbenches will see them as just shapes. You can use faces of paper planes for sketches, and import their edges as external geometry into sketches; you can use them as revolution axes and extrusion directions, etc.etc. In that sense, Attached Placement is somewhat close to PartDesign Datum Lines and Planes, but for other workbenches.