# Create a reference point on the center of gravity.

In some situations it is requested to indicate the center of gravity (COG) of an object or assembly on the drawing. For parts with a simple shape this can be calculated by hand, but for strange-shaped parts or assemblies this is difficult to do by hand. Luckily computers are great at doing calculations and in this guide I give one way to let Creo measure the COG location and use a point to display the values on a drawing.
There are probably more ways to accomplish the same. I got the inspiration from [this](#) site, because I couldn't exactly understand the way it was done there I tried to find my own method and that is what I share here.

The steps in this guide should work regardless of the part. Prerequisites are three planes on the X, Y and Z axis of the coordinate system.

A small side guide to create the three standard planes on imported parts. When you import a step file it often contains only a coordinate system and no planes. To get the three default planes before the coordinate system in the feature tree, move the 'inert here' arrow between import feature and coordinate system, suppress the coordinate system create a plane. Three planes are created at once. In this case I have renamed them to top, front and right.
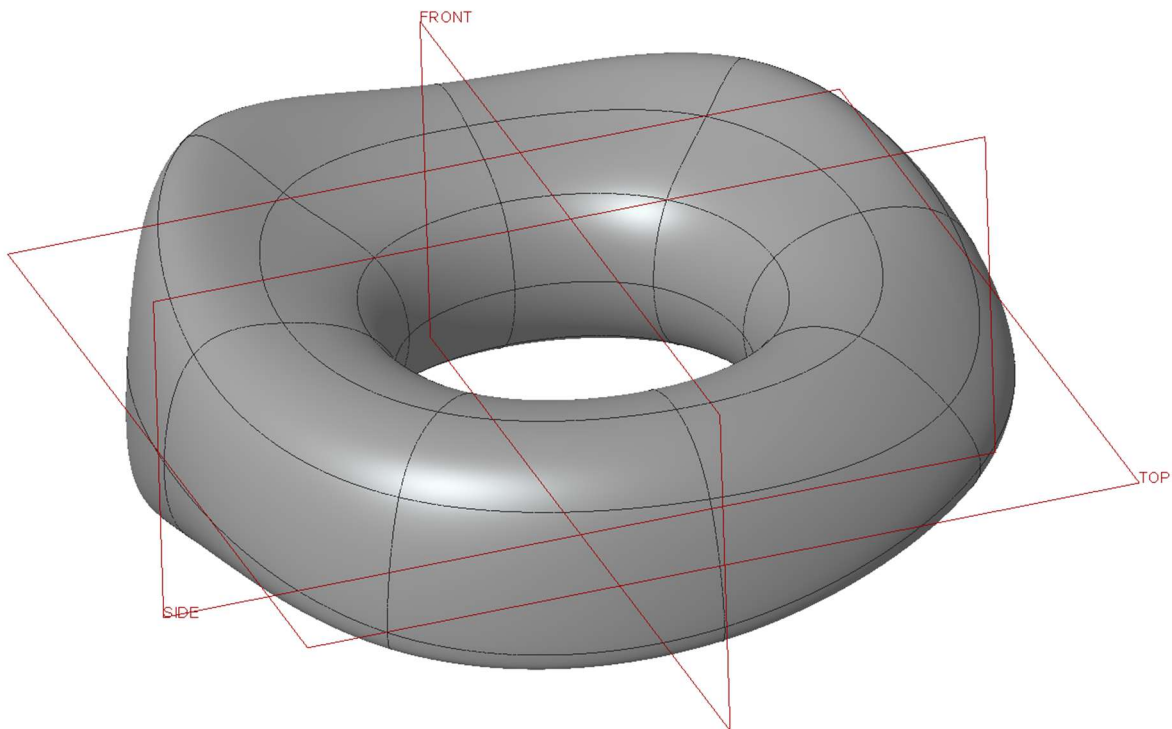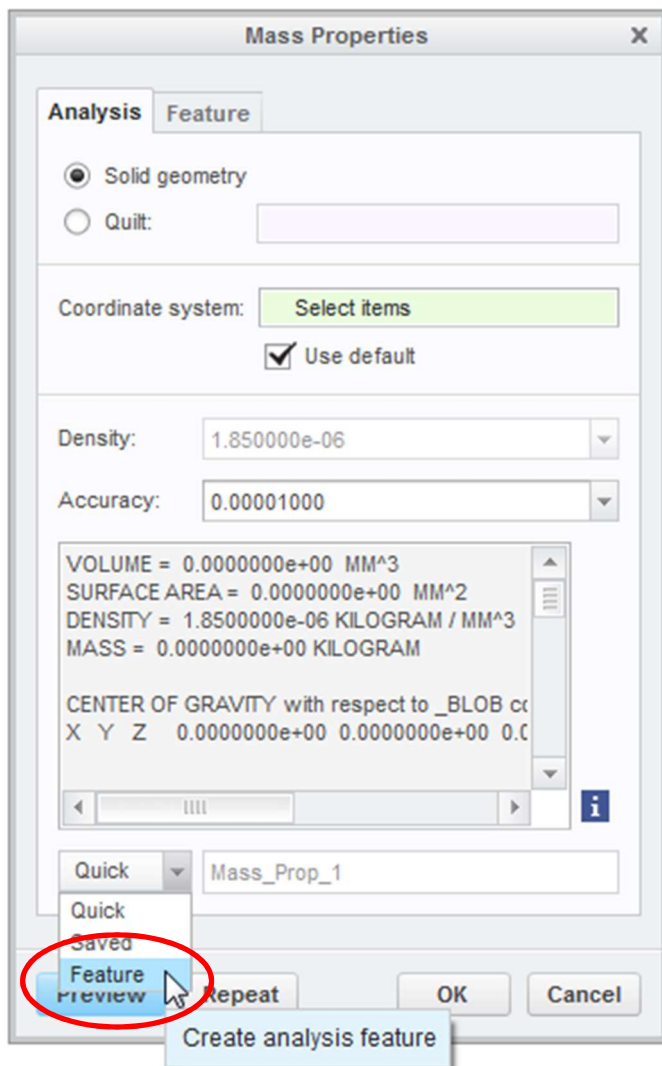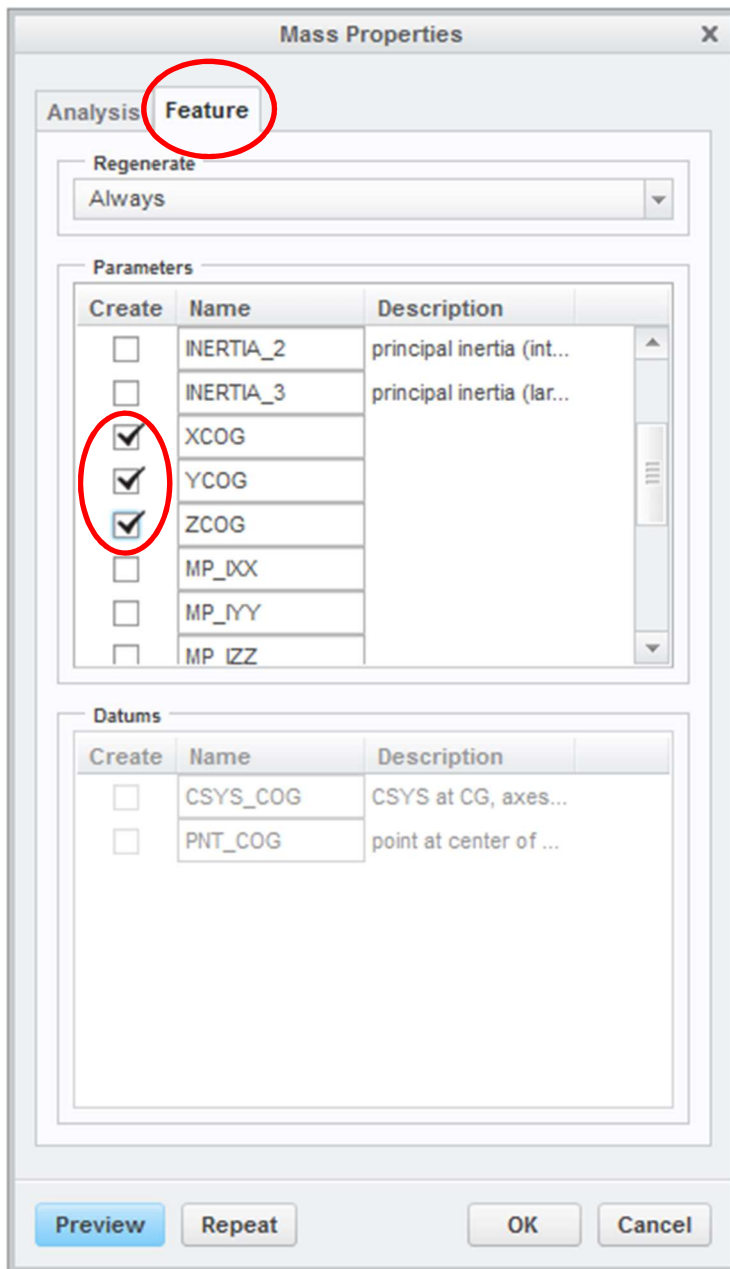

Create the analysis feature

1. To start, calculate the mass properties with analysis tab -> mass properties :
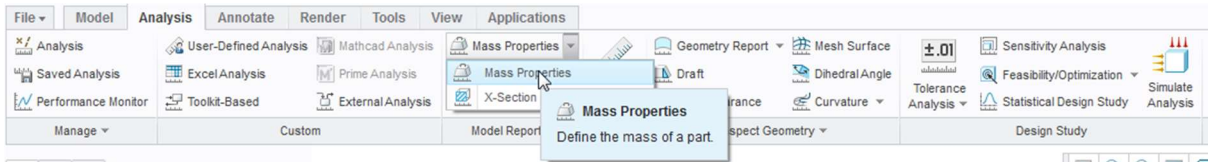
2. Use the 'create analysis feature' option from the dropdown menu. With this option the analysis is stored as feature in the feature tree. Because the analysis is in the tree, it will be calculated at every regeneration.

 MASS_PROP_1

Mass Properties

Analysis   **Feature**

Regenerate
Always

Parameters

Create	Name	Description	
☐	INERTIA_2	principal inertia (int...	
☐	INERTIA_3	principal inertia (lar...	
☑	XCOG		
☑	YCOG		
☑	ZCOG		
☐	MP_IXX		
☐	MP_IYY		
☐	MP_IZZ		

Datums

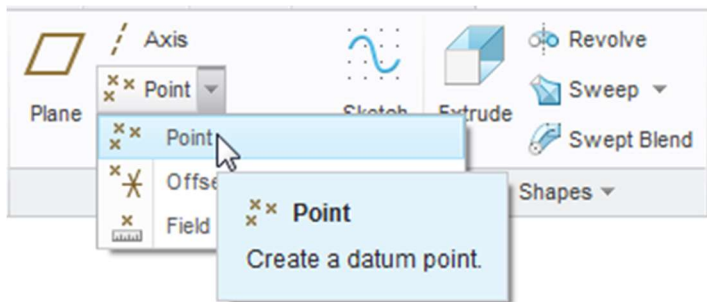| Create	Name	Description	
☐	CSYS_COG	CSYS at CG, axes...	
☐	PNT_COG	point at center of ...	

Preview   Repeat   OK   Cancel

3. Go to the feature tab and toggle on the three *COG parameters. Toggling these causes the values being listed as parameters. Close with OK

Create a offset point

    4.   Go back to the model and create a point with three offsets to the three base planes.


Just selecting three planes in point mode won't work, you will not be given the opportunity to create an offset distance.

To get a point offset from the three planes, first select one plane and change the reference type to offset, then activate the offset references field, hold CTRL key, and select the two other planes in the model. You should now have a point with offset distances to three planes. Give every offset a random value other than zero. Close with OK.
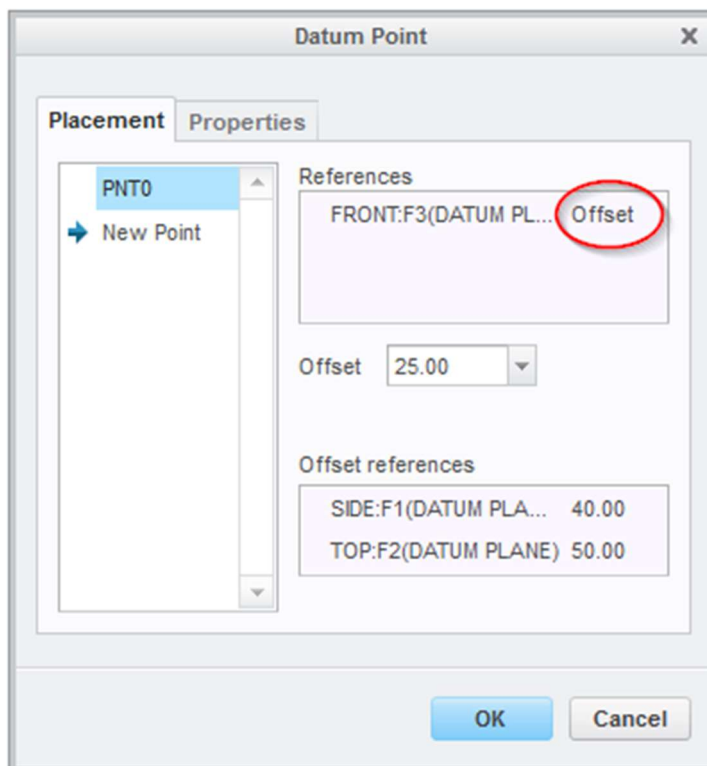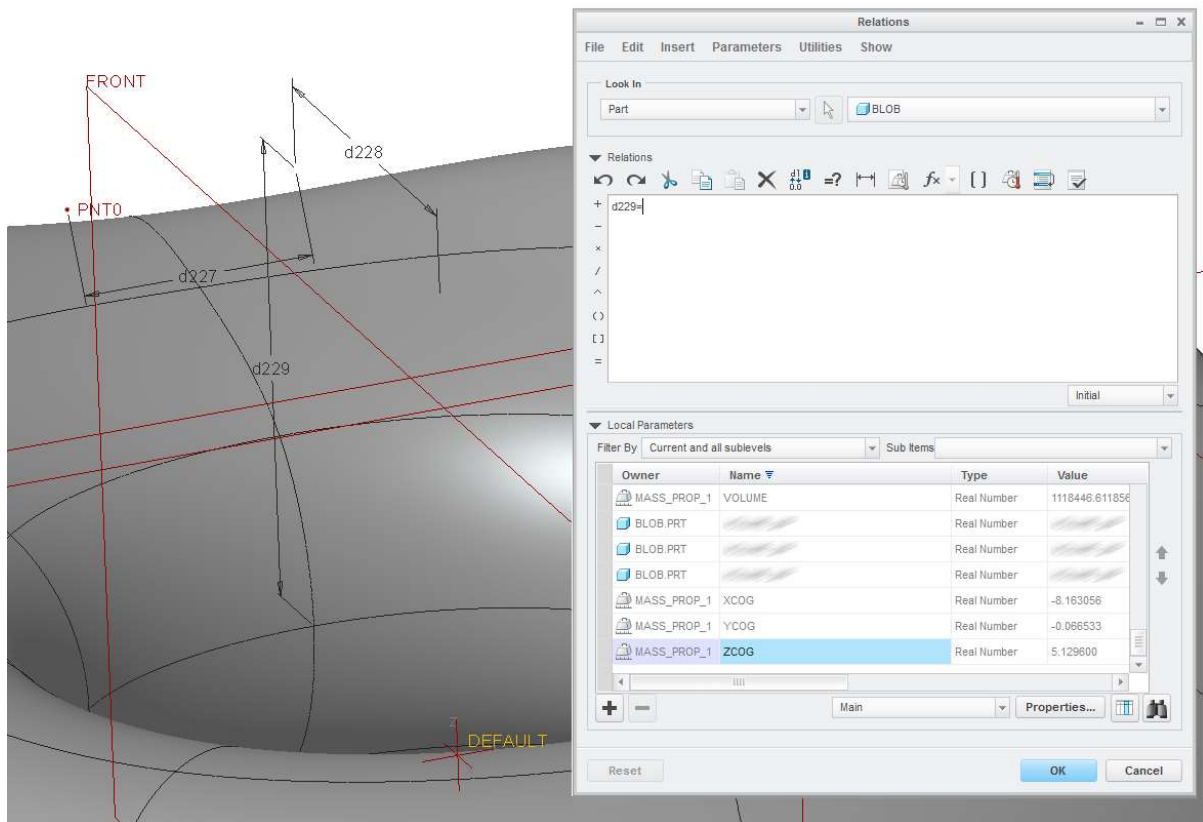
Relate the point to the analysis

5. Open the relations screen (tools tab -> relations).
    Expand the relations editor to also show the parameters by clicking on the arrow in front of 'local parameters' (see screenshot below). You would expect the see the analysis parameters here because we enabled them at step #3, but they are not in the general parameter list.
    To see and select the parameters, change the 'filter by' from 'default' to 'current and all sublevels'. Look for the XCOG, YCOG and ZCOG parameters in the list.
    Without performing any action, go to the next step.
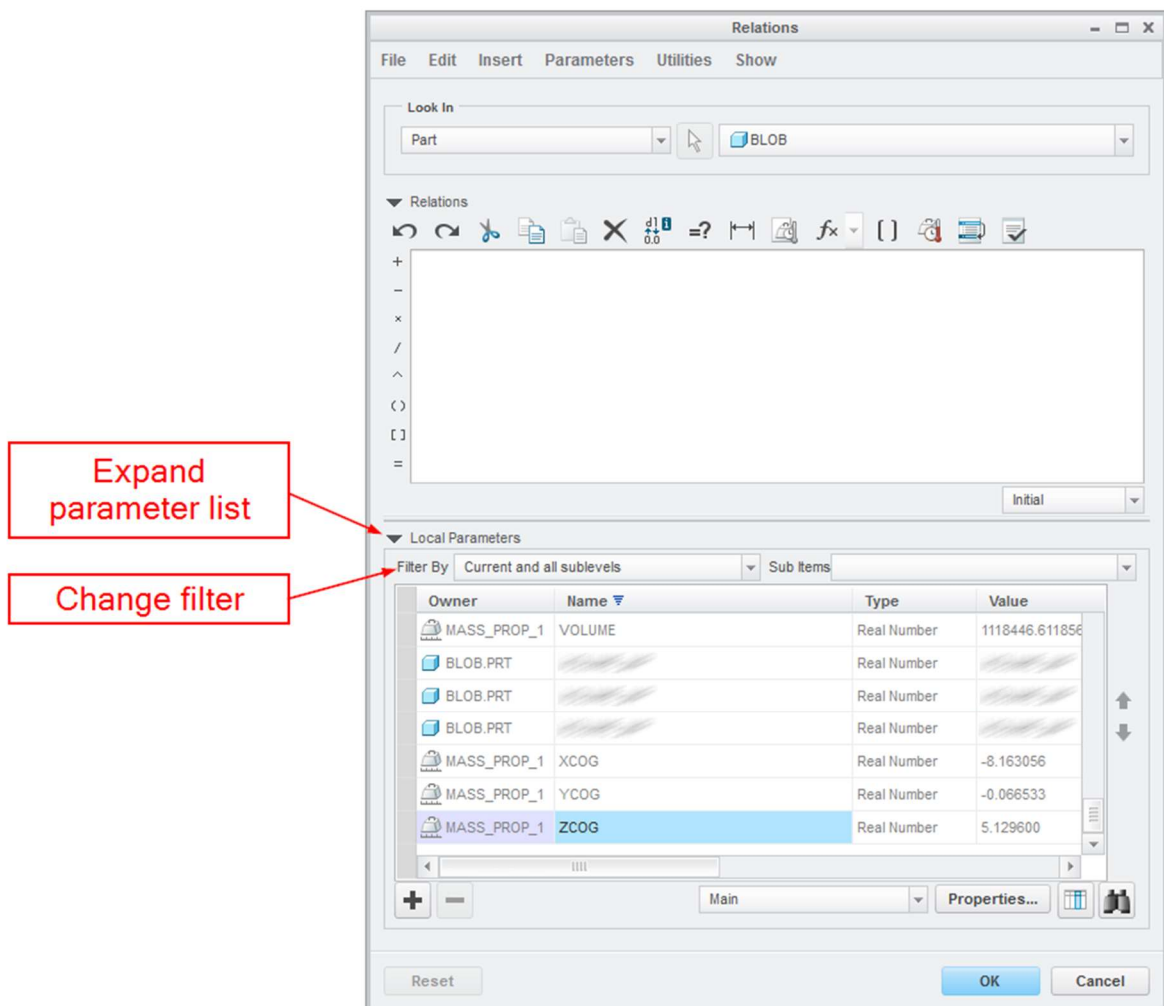
6. With the relations screen still open, click on the point feature in the feature tree.
    Now the dimensions to the point will show with their dimension code. (see screenshot)
    Copy one of the dimension codes (d*) to the relations editor, the easiest way is to activate the relation editor field and just click on one of the dimensions, for example the vertical dimension (d229 in my example).
    Next, add $ in front of the dimension code (this allows negative values) and '=' behind the

code. My relations editor now shows '$d229='
(your code will be different)

Now we need to add the analysis parameter from step #2. This will make the point offsets be controlled by the distances calculated with the mass analysis.

The relation editor should already show 'd229=' .
To add the parameter, go to the parameter list and select ZCOG in the name field.

(I select ZCOG because I want to relate the Z measurement to the vertical direction.
Check the letters on the default coordinate system to learn which direction is XYZ. In this case, X=d228, Y=d227, Z=d229)

When on ZCOG, press RMB and select 'insert to relations'.
A code should now have been added to the relations and your screen should now look like this:
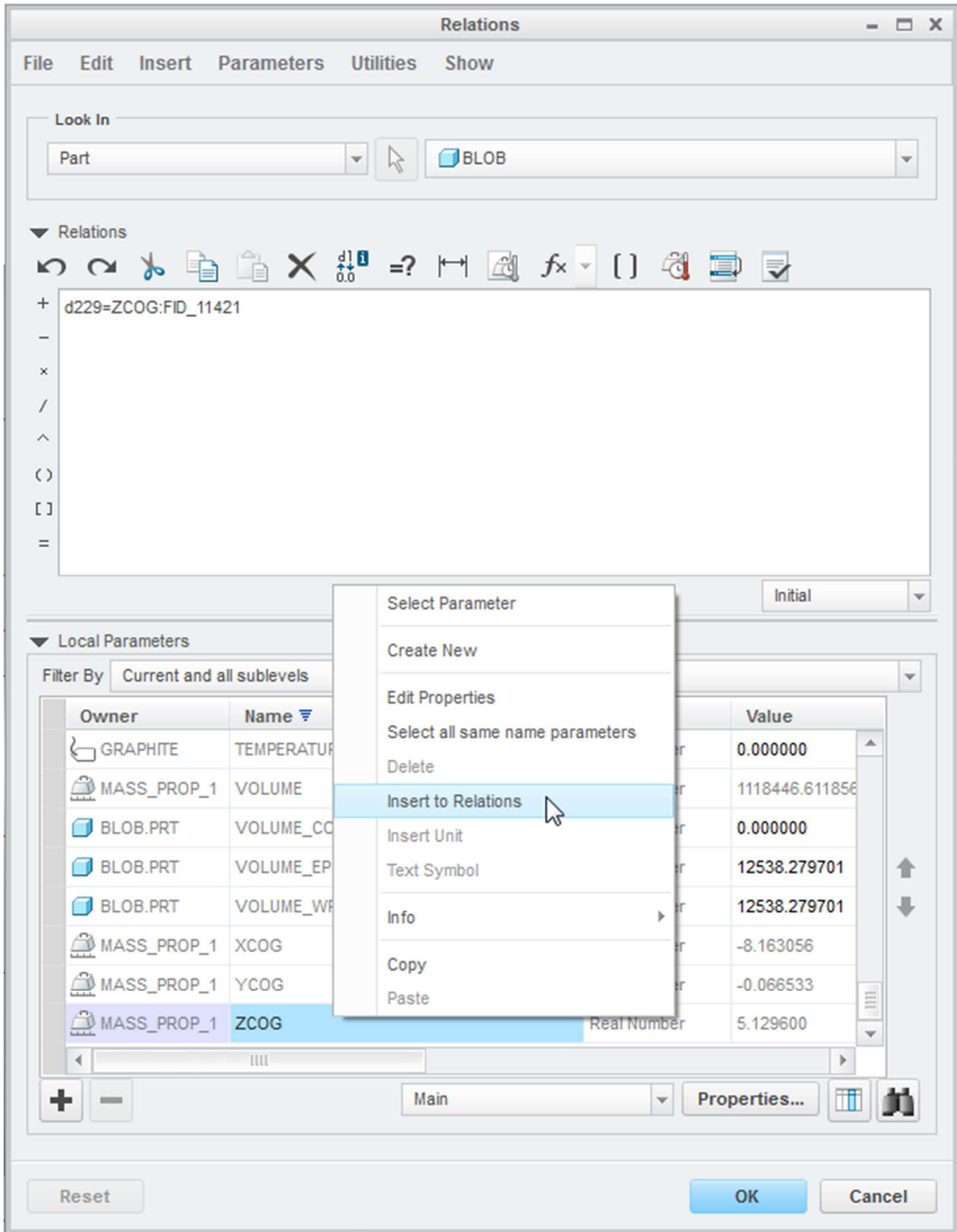
7. Repeat this for the other two dimensions.

Regenerate and now the point should be at the center of gravity.
Repeat the mass analysis to check if the point location matches with the analysis.