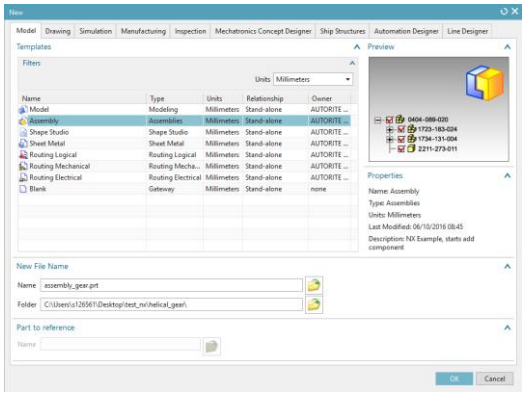
# Using Siemens NX 11 Software

# Assembly example - Gears

*Based on a NX tutorial from the NX documentation*[1].

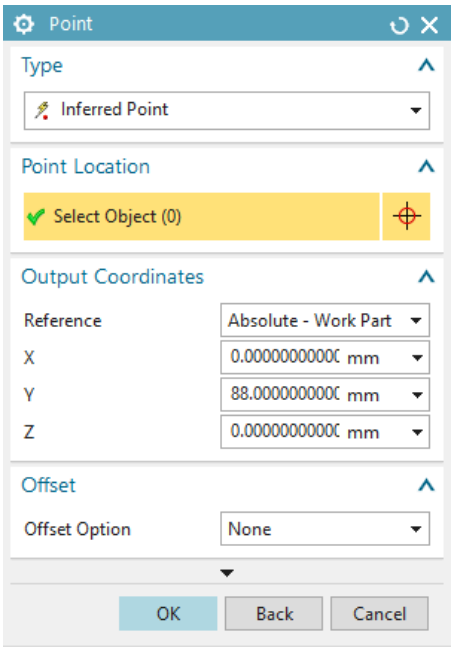
## 1 – Introduction.

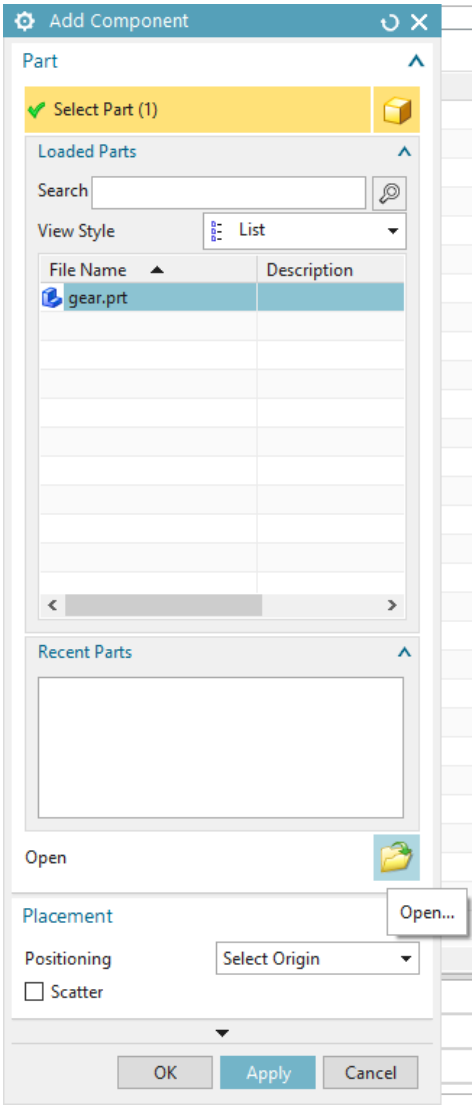
Start NX 11 and create a new assembly file called *assembly_gear.prt*.



## 2 – Adding a part.

- Add the part file *gear.prt* located in the folder *C:\Commun\NX*.
- Keep the default values suggested by the *Point* dialog box (just click *OK*).
- Add a second gear from the same part file *gear.prt* in the assembly.
- **This time**, in the *Point* dialog box, set the *Y* option of the *Output Coordinates* field to **88 mm**.
- Two gears should be visible in the visualization window.

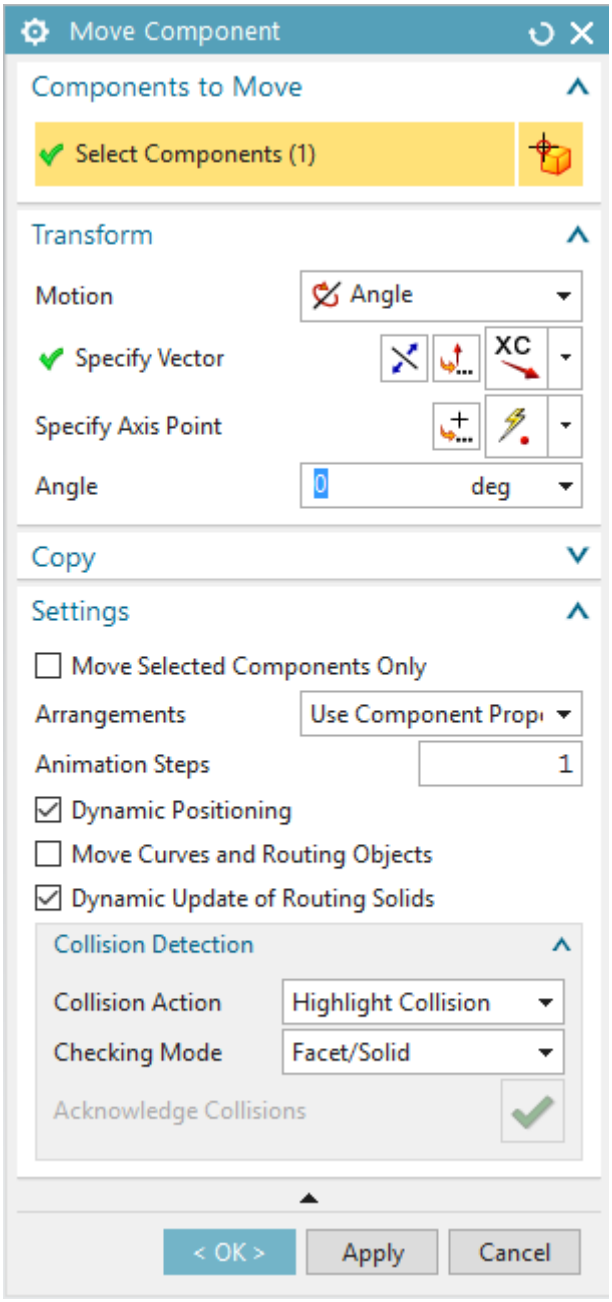


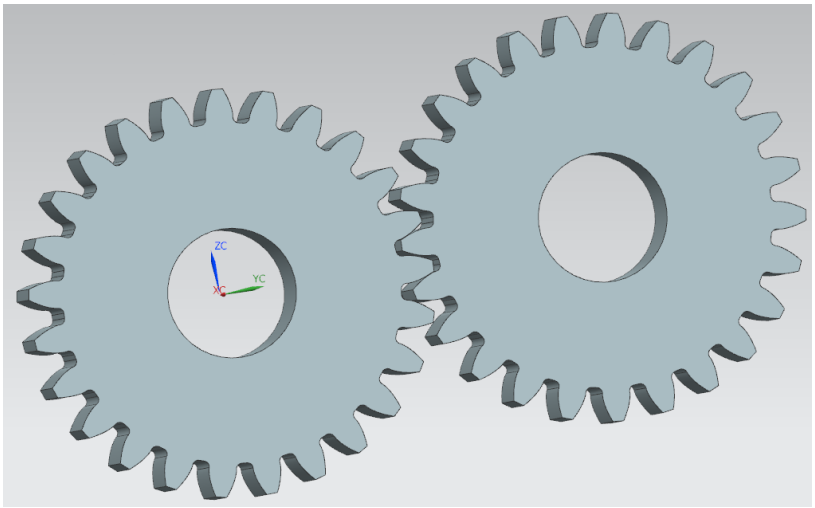




[1] *https://docs.plm.automation.siemens.com/tdoc/nx/11.0.1/nx_help*

**3 – Setting initial positions.**


- Using the *Move Component* button, rotate the first gear so that the theefs of both gears do not overlap anymore.
- In the *Move Component* dialog box, select the first gear and set the *Motion* option of the *Transform* field to *Angle*.
- In the *Specify Vector* option, select the XC vector.
- In the *Specify Axis Point* option, select the origin (0, 0, 0).
- Expand the dialog box by clicking on the lower black triangle and expand the *Settings* field.
- In the *Collision Detection* subfield, set the option *Collision Action* to *Highlight Collision* and the *Checking Mode* to *Facet/Solid*.
- Set the *Angle* option of the *Transform* field such that the gears do not collide anymore.



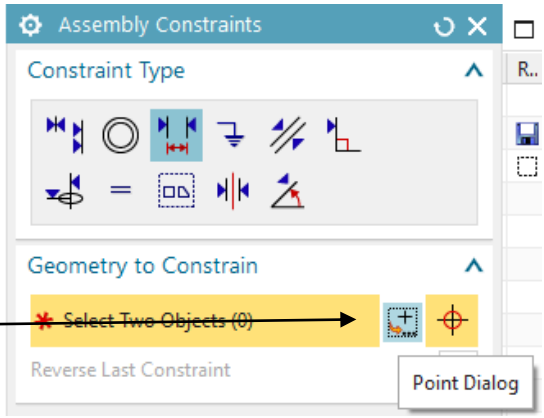



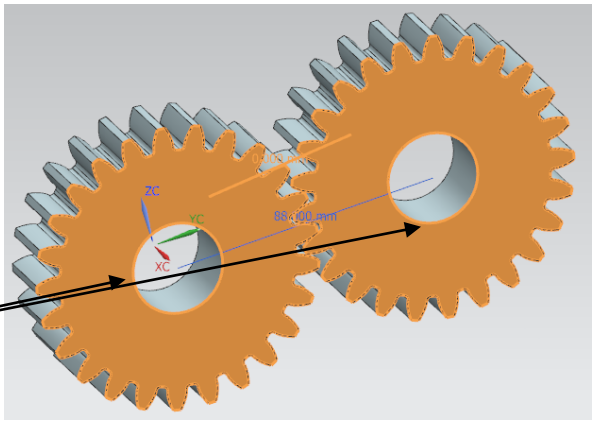
**4 – Assembly constraints.**

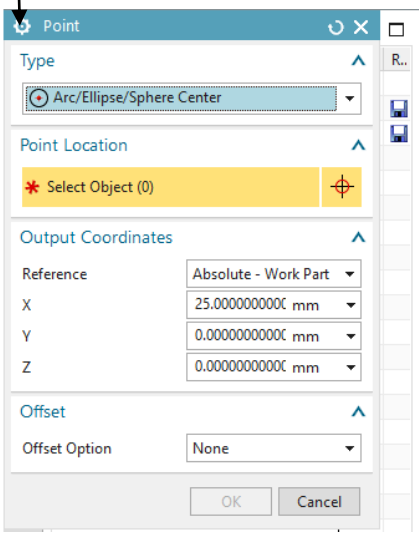
Add a distance constraint between the centres of the gears. In the *Assembly Constraints* dialog box, select the *Distance* constraint  .

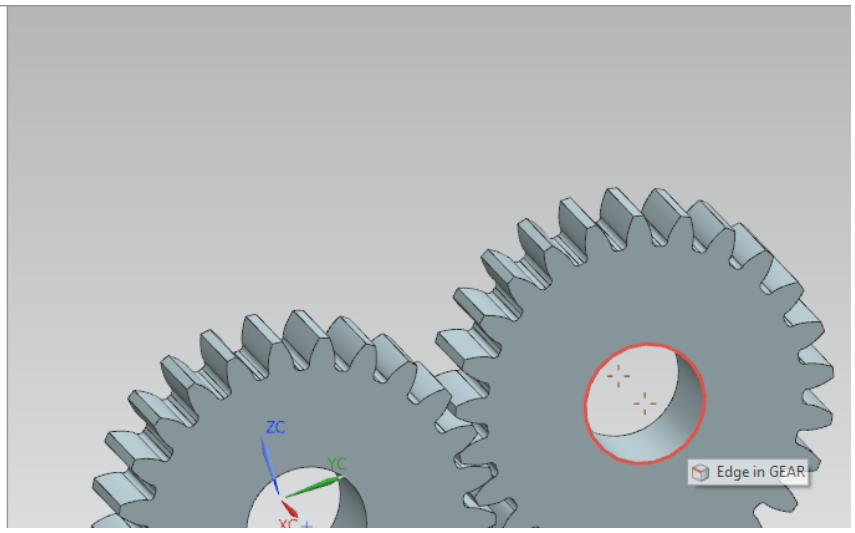
- In the field *Geometry to Constraint* select the *Point Dialog* button. This will open the *Point* dialog box.
- In the *Point* dialog box, select the field *Type* and set it to *Arc/Ellipse/Sphere Center*.
- Select one edge of the central hole of the first gear and then click *OK*.
- Redo the above operations for the second gear.

- Finally, add a second distance constraint by imposing a **0 mm** distance between to flat faces of the gears.



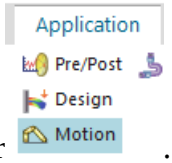



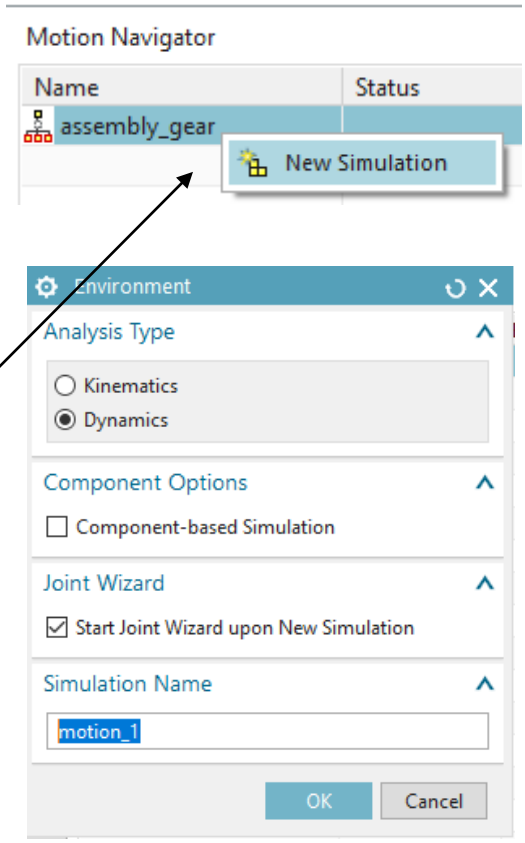



**5 – Creating a simulation.**

The goal is to make the gears rotate. Here, the parameters of the simulation will be set manually.

- Click the *Motion* button in the 

*Application* toolbar .
- In the *Motion Navigator* tree, right click on *assembly_gear* and select *New Simulation*.
- In the *Environment* dialog box, check the *Dynamic* option.
- If the *Motion Joint Wizard* dialog box opens, close it by clicking *Cancel*.

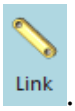



**6 – Setting simulation's parameters.**

Three kinds of physical parameters have to be set:

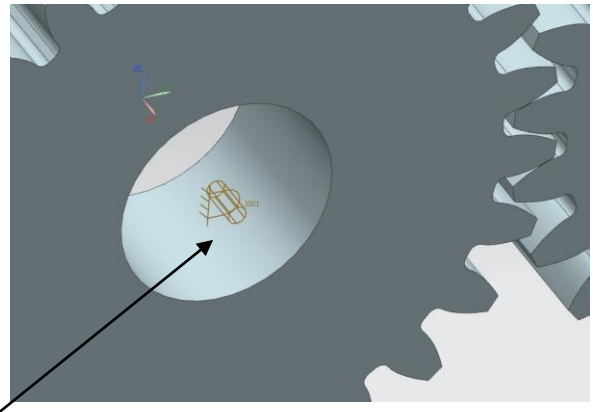
1. *Links*: the parts subject to the simulation.
2. *Joints*: movement constraints between two *links/parts*.
3. The D*river*: the type of force that will be applied on a *joint*.

**6.a – Setting the *links*.**

- Click on the *Link* button 

. In the *Link* dialog box, select the first gear and click *Apply*.
- Select the second gear and click *OK*.

**6.b – Setting the *joints*.**



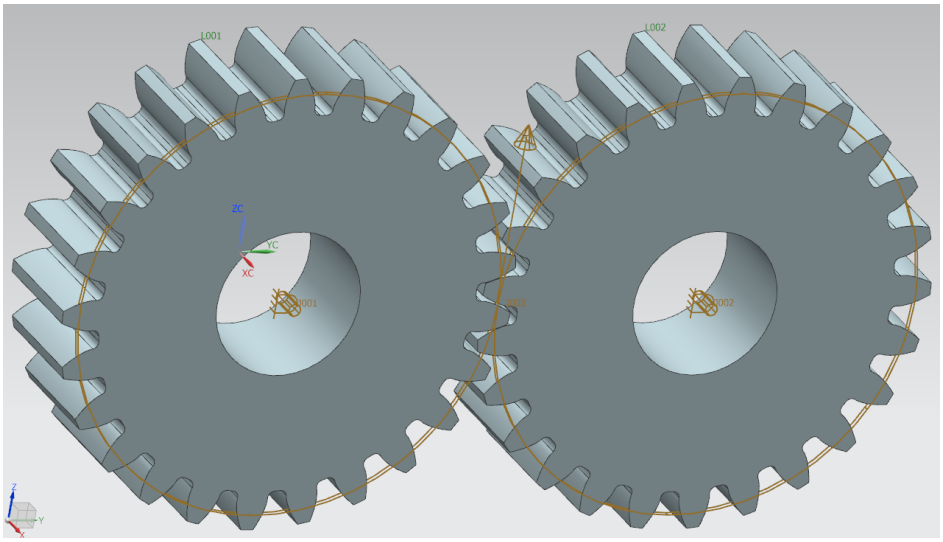
- Click on the *Joint* button 

. In the *Joint* dialog box, select the first link (probably *L001*) from the *Motion Navigator* tree.
- Check if the *Type* field is set to *Revolute*.
- Set the rotation axis in the *Action* field by specifying its origin (0,0,0) and its vector (*XC* axis). Click *Apply* to validate.
- A revolution symbol at the centre of the first gear should appear.
- Redo the above procedure for the second gear. **This time** then centre of the second rotation axis is no more (0,0,0). You will have to use the *Point* dialog box and select the centre of the gear's central hole as done in part **4** of this tutorial.

**6.c – Setting the gears.**

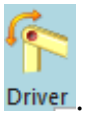
- Click the *Gear* button 

. From the *Gear* dialog box, select the two joints you just created from the *Motion Navigator*. A rotation symbol over the two gears should appear.



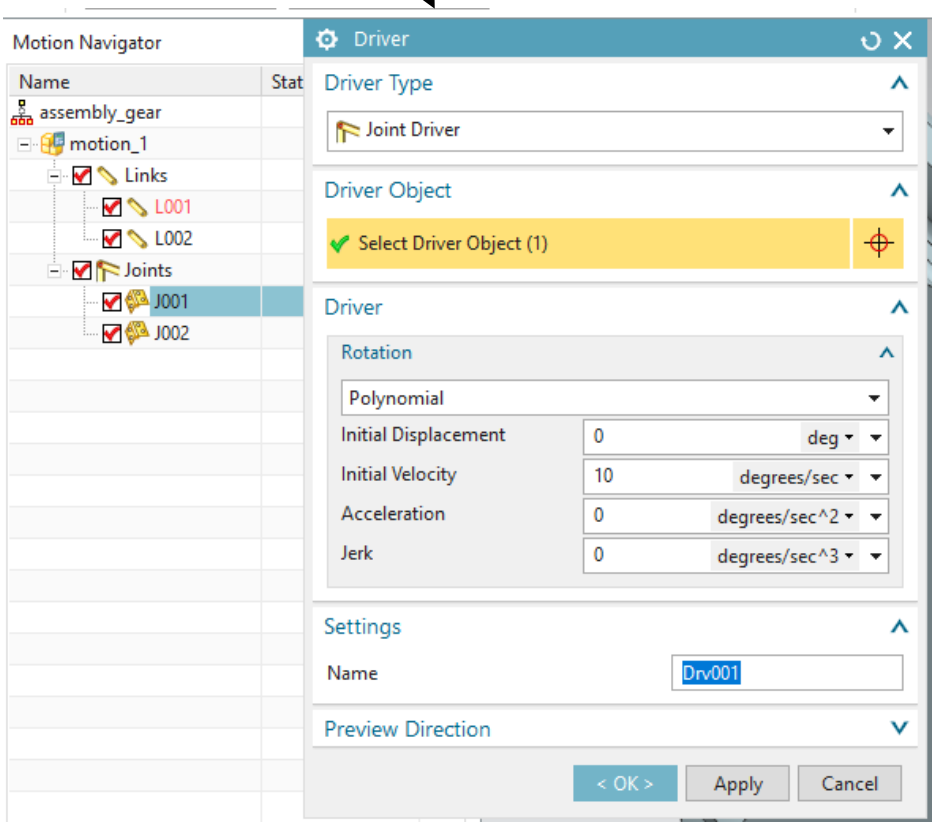
**6.d – Setting the *Driver*.**

We will apply a rotational force on the first gear so that it will make move the second one.

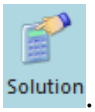



- Click the *Driver* button . In the *Driver Object* field of the *Driver* dialog box, select the first joint (probably *J001*) from the *Motion Navigator*.
- In the *Rotation* field, select *Polynomial*.
- Set the *Initial Velocity* option to **10 degrees/sec** while letting the other entries at zero.

Now, all the physical parameters of the simulation are set. The simulation might be run.



**7 – Simulation.**

- For computing the simulation, click on the *Solution* button 

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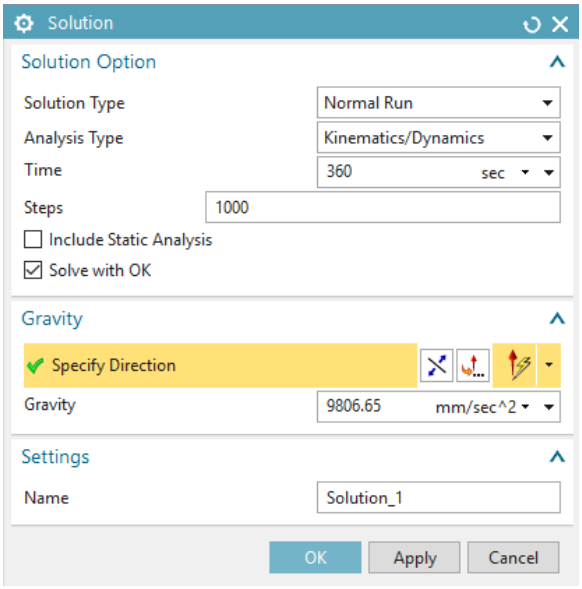
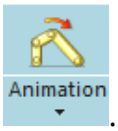
- In the *Solution* dialog box, set the simulation time to **360 sec** and the number of steps to **1000**.
- Check the *Solve with OK* option and click *OK*. This will take some time.
- You can check the current status of the computation in the *Status* bar of NX (at the bottom of the visualization window).




**8 – Animation.**

- Click on the *Animation* button 

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- In the *Animation* dialog box, click the *Play* button in order to run the animation.
- You can control the animation speed with the *Animation Delay* slide bar.