Using Siemens NX 11 Software

Assembly example - Gears

Based on a NX tutorial from the NX documentation¹.

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.

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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.

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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.









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 Driver: the type of force that will be applied on a *joint*.

6.a – Setting the *links*.

- Click on the *Link* button ^{Link}. 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 Joint. 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.





• Click the *Gear* button Gear. 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 **Driver**. 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.

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7 – Simulation.

• For computing the simulation, click on



the Solution button Solution

- 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).

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Solution Type	Normal Run 👻
Analysis Type	Kinematics/Dynamics 🔹
Time	360 sec 🔻 🔻
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8 - Animation. Click on the *Animation* button 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.