

3D Modeling with NX 12

Motion Simulation

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Motion

You can use **Motion** to simulate and evaluate mechanical systems for such things as:

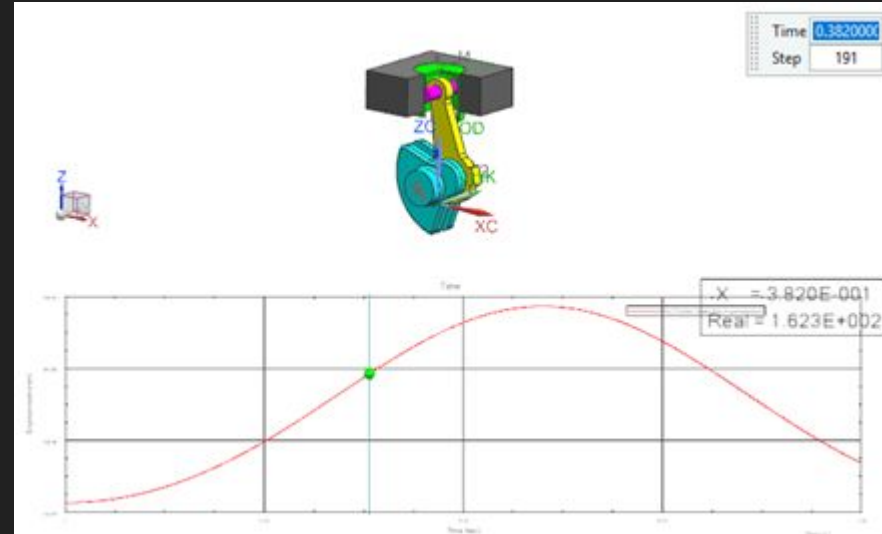
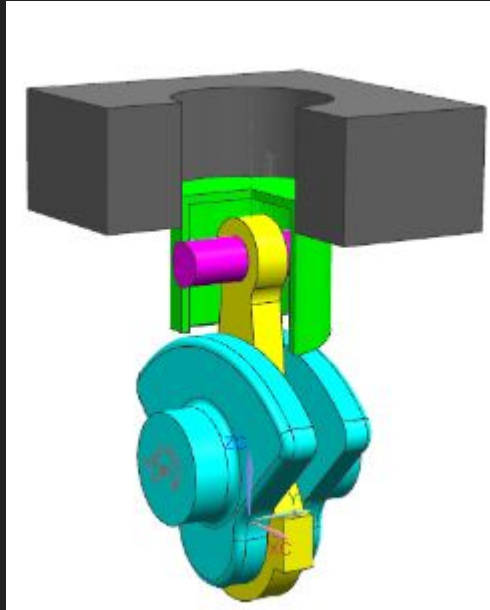
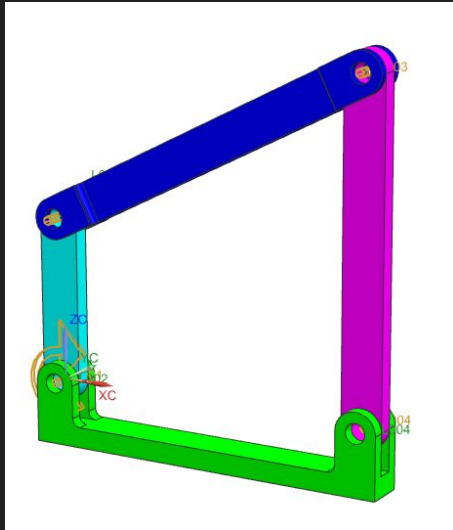
- Displacements, velocities, and accelerations
- Range of motion
- Reaction forces, inertia forces and torques, and forces and moments transmitted between bodies
- Capture of loads for finite element modeling
- Lock-up positions
- Interference

What is a Mechanism?

A mechanism consists of geometry or assembly components that move cohesively. Defining a motion mechanism consists of these general steps:

- Specifying which components move and which are stationary.
- You identify the components that move by creating links.
- Constraining the motion of the links, which determines how they move relative to each other.
- You do this by creating joints.
- Defining the desired movement of the mechanism.
- You do this by creating motion drivers.

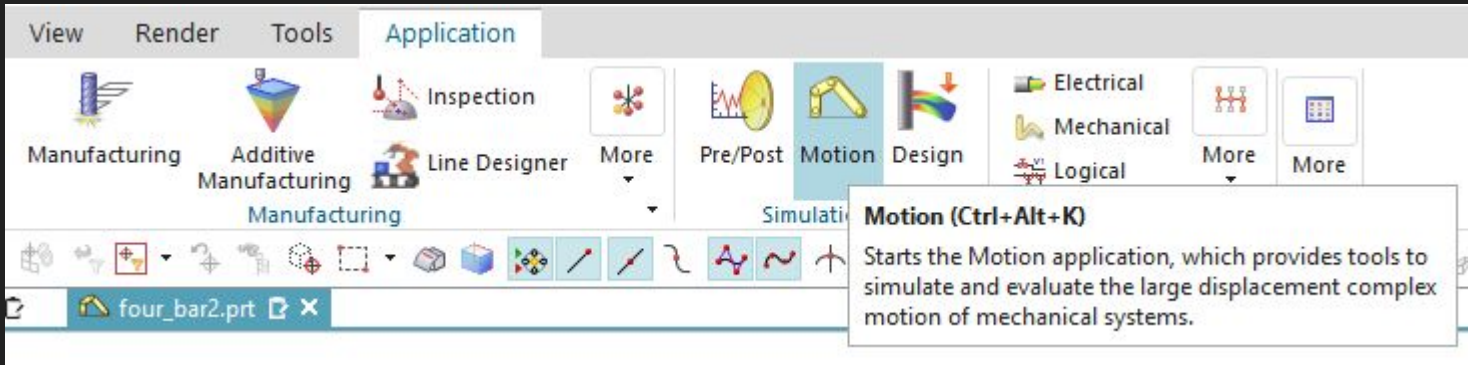
Motion Simulation Demo



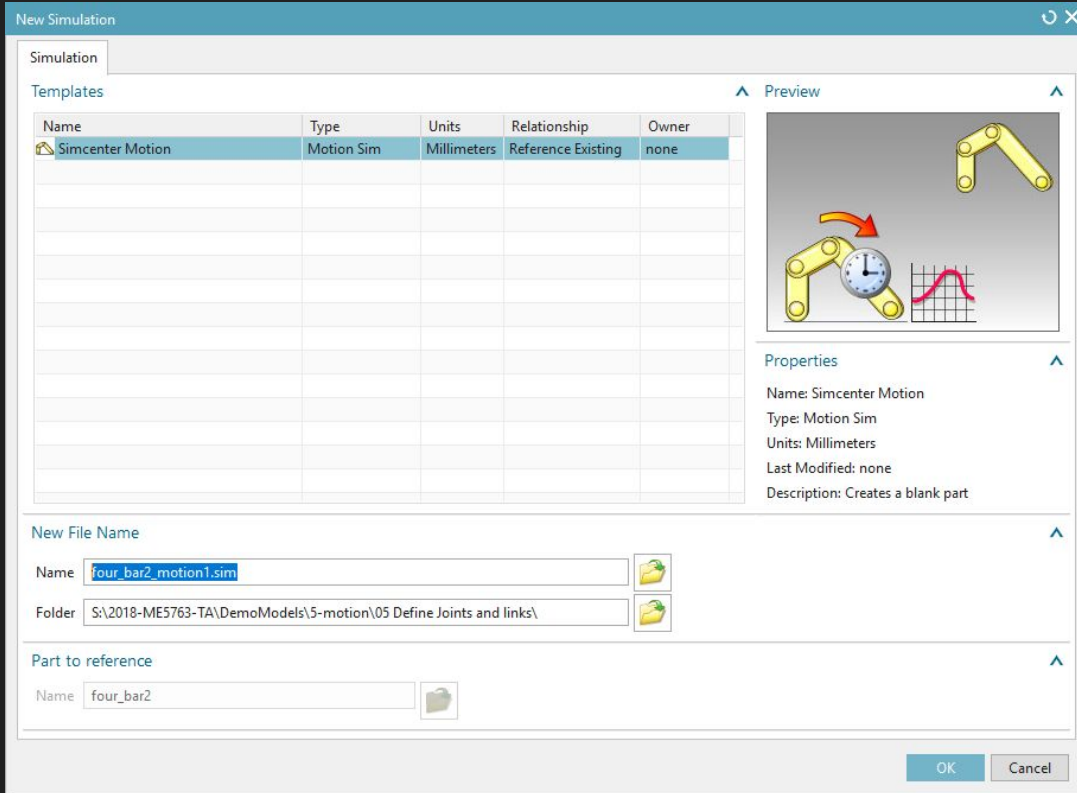
Cheatsheet

- Open an assembly
- Go to Application → Motion in the Simulation group
- Create new simulation
- Choose the Environment
- Create **links**
- Define **joints**
- Define **drivers**/Apply **loads**
- Create solution and Solve
- View Results: Analysis → Animation

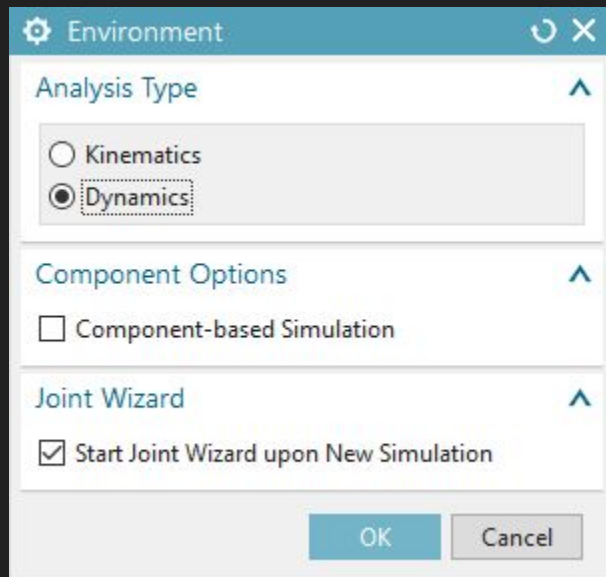
Application → Motion



New Simulation



Environment



The image shows a software dialog box titled "Environment". It has a blue header bar with a gear icon on the left and refresh and close icons on the right. The dialog is organized into three sections, each with a title and an expand/collapse arrow on the right:

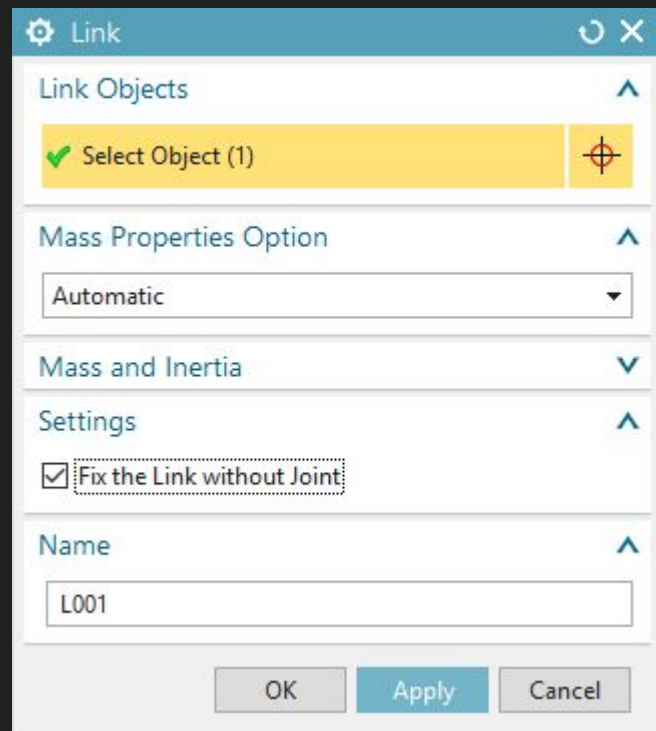
- Analysis Type**: Contains two radio button options: "Kinematics" and "Dynamics". The "Dynamics" option is selected and highlighted with a dashed border.
- Component Options**: Contains a single checkbox option: "Component-based Simulation", which is currently unchecked.
- Joint Wizard**: Contains a single checkbox option: "Start Joint Wizard upon New Simulation", which is checked.

At the bottom right of the dialog are two buttons: "OK" (in blue) and "Cancel" (in gray).

Link → Joint → Driver



Link

The Link dialog box is a software window with a blue title bar containing a gear icon, the text 'Link', and standard window controls. It features several sections: 'Link Objects' with a yellow 'Select Object (1)' button and a crosshair icon; 'Mass Properties Option' with a dropdown menu set to 'Automatic'; 'Mass and Inertia' with a collapsed arrow; 'Settings' with a checked checkbox 'Fix the Link without Joint'; and 'Name' with a text field containing 'L001'. At the bottom are 'OK', 'Apply', and 'Cancel' buttons.

Link

Link Objects

✓ Select Object (1)

Mass Properties Option

Automatic

Mass and Inertia

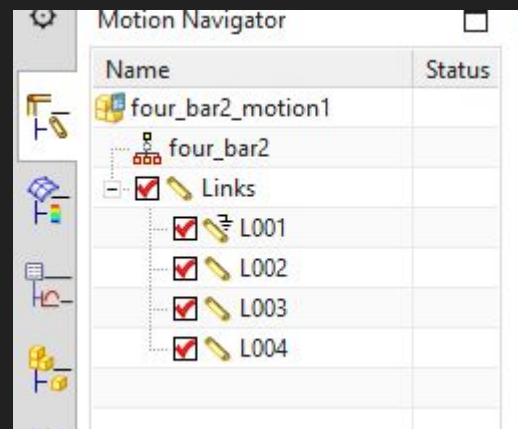
Settings

☒ Fix the Link without Joint

Name

L001

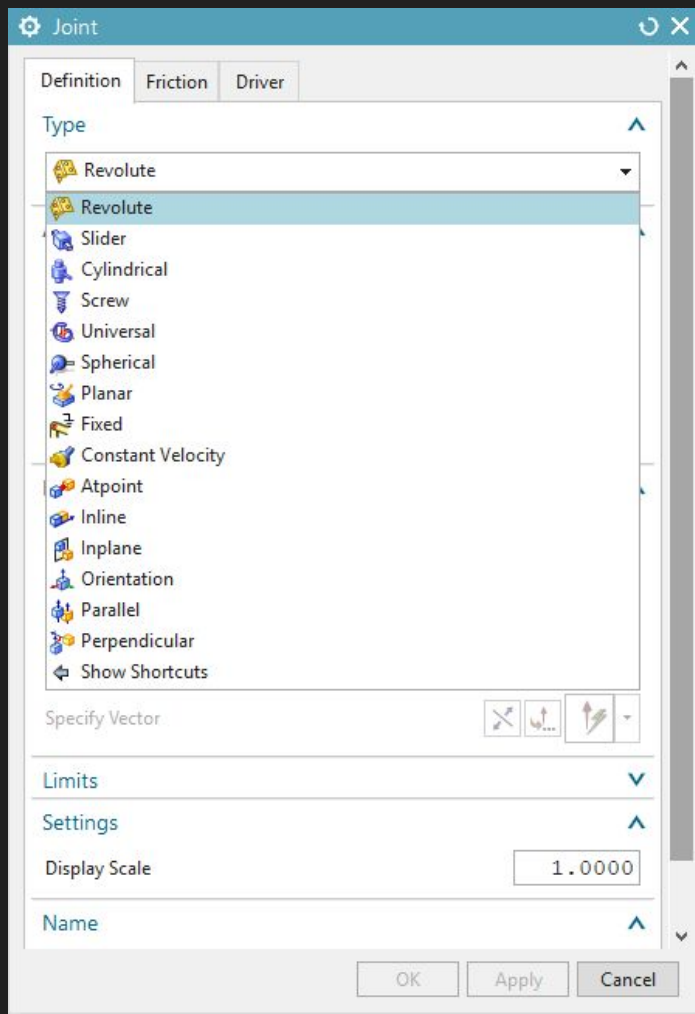
OK Apply Cancel

The Motion Navigator table is a software window with a blue title bar containing a gear icon, the text 'Motion Navigator', and a checkbox. It features a table with two columns: 'Name' and 'Status'. The table contains a tree structure of items: 'four_bar2_motion1', 'four_bar2', 'Links', 'L001', 'L002', 'L003', and 'L004'. Each item has a corresponding icon and a checkbox in the 'Status' column.




Motion Navigator


Name	Status
four_bar2_motion1	
four_bar2	
Links	<input checked="" type="checkbox"/>
L001	<input checked="" type="checkbox"/>
L002	<input checked="" type="checkbox"/>
L003	<input checked="" type="checkbox"/>
L004	<input checked="" type="checkbox"/>



Joint






Driver


 Driver  


Driver Type 


 Joint Driver 









Driver Object 


 Select Driver Object (1) 

Driver 


Rotation 


Polynomial 

Initial Displacement	0	$^{\circ}$		
Velocity	100	$^{\circ}/s$		
Acceleration	0	$^{\circ}/s^2$		
Jerk	0	$^{\circ}/s^3$		

Settings 

Name

Drv002 

Preview Direction 




☒ Preview


< OK >

Apply

Cancel

Solution

 Solution  

Solution Option 

Solution Type Normal Run


Analysis Type Kinematics/Dynamics



Time 2 s

Steps 500


☐ Include Static Analysis

☐ Solve with OK

Gravity 

 Specify Direction 

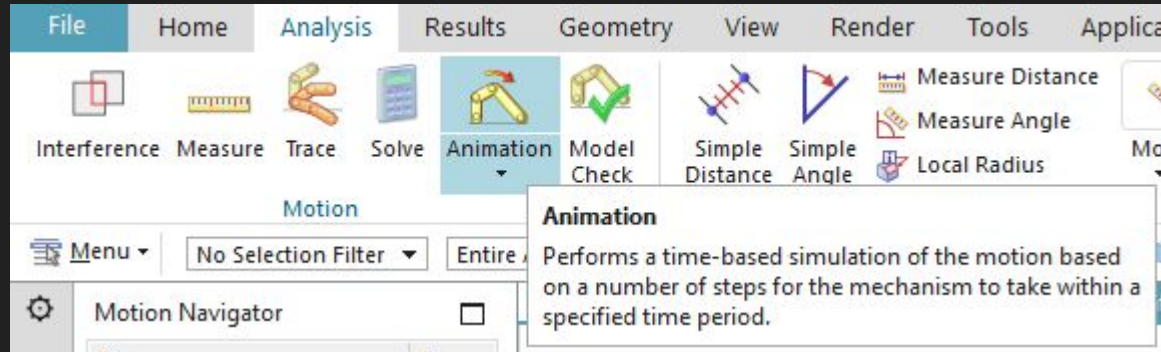
Gravity 9806.65 mm/s²

Settings 

Name Solution_3

OK Apply Cancel

Solve & Animation



Self Practice

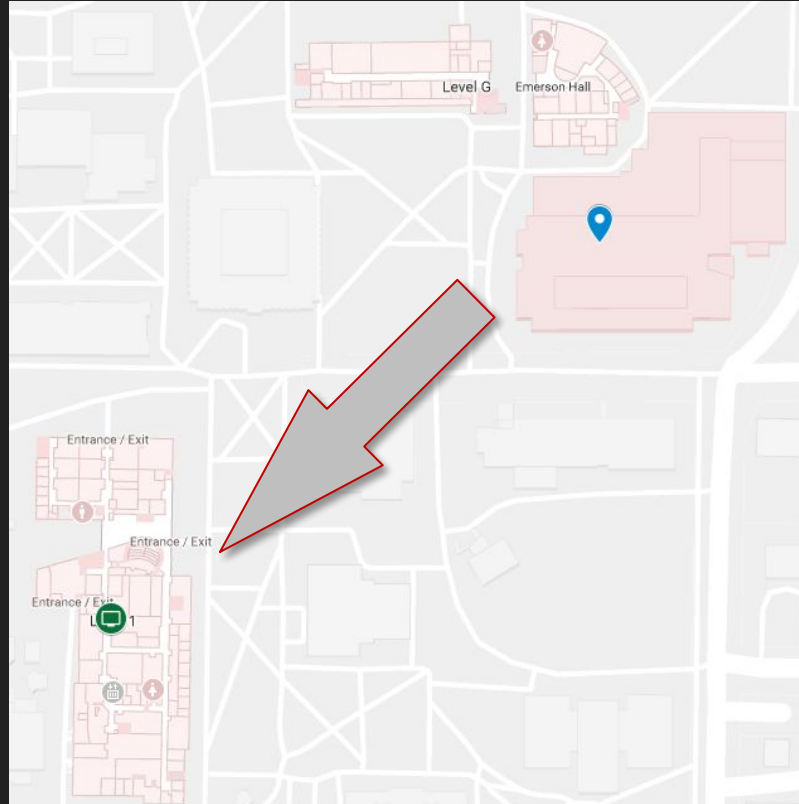
Due: Oct. 5

Project 2:

<https://me5763.github.io/lab/pages/project-2-bottle.html>

For on-campus students: Toomey Hall 200. See you there!

Toomey Hall 200



For Distance Students

There are CLC machines available for you to access software remotely.
The setup instructions are provided on Canvas.

Here's how you can speed up your NX 12 on the virtual machine:

<https://me5763.github.io/lab/pages/speed-up-nx.html>