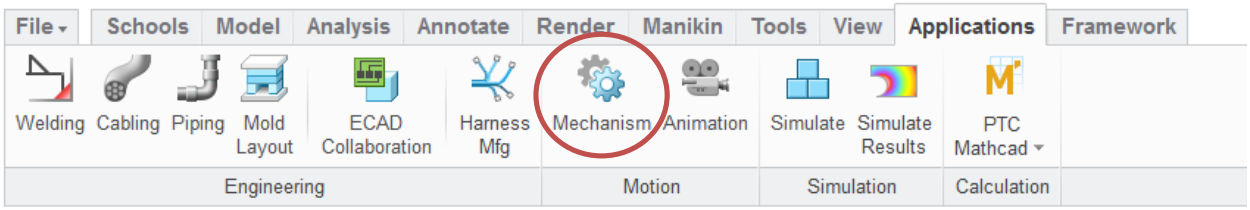
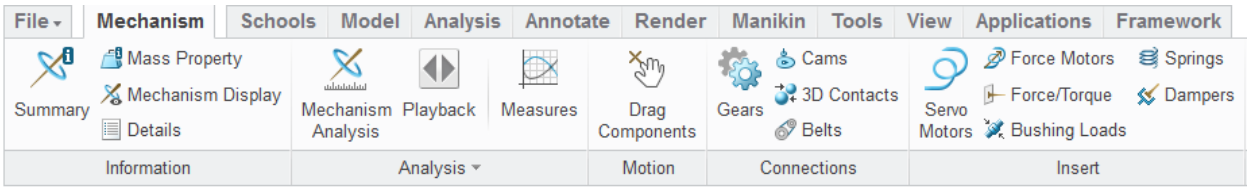
Conducting a kinematic analysis

Your robot model can be used as a prototype to test the mechanics of subsystems. By using the Mechanism tool, you can simulate motors, gears, and other forces.



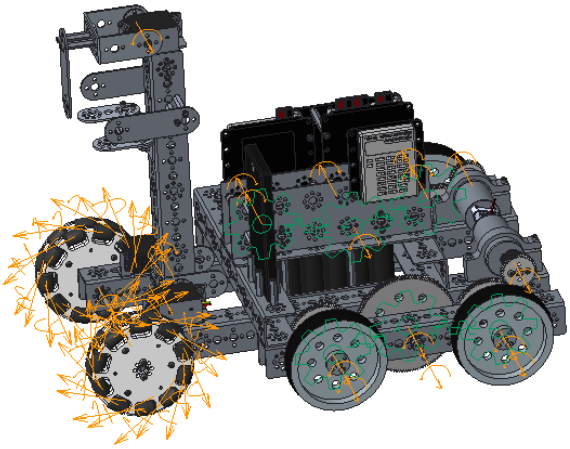
The Mechanism toolbar includes ways to simulate motors, gears, and other forces.



In 02 Detailed Design we used the Gears tool to create a gear pair. In this exercise, we use the Servo Motors tool to simulate the drive motors and the scoring mechanism performance.

1. Open your robot system model. In the example, it is **robot_system.asm**.

2. From the Applications tab, click **Mechanism**. From the Mechanism toolbar, select **Servo Motors**.



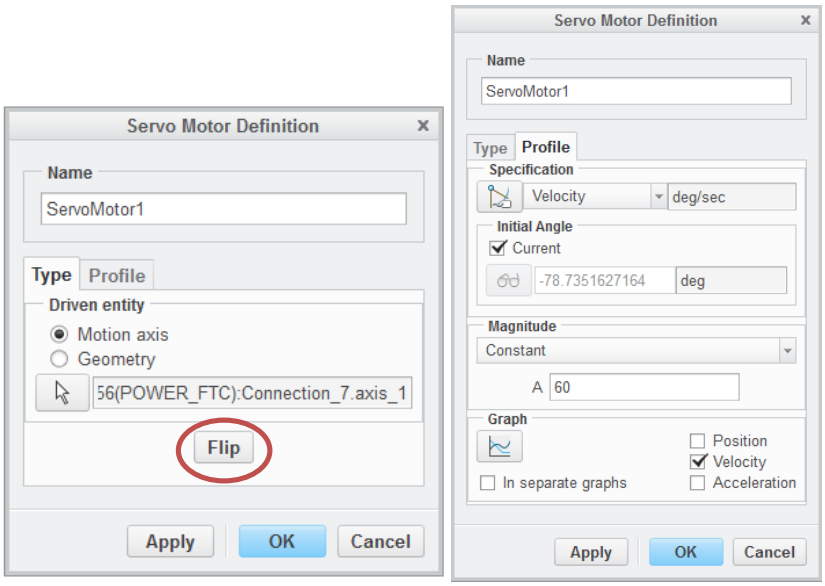
Every pin joint axis is shown with an orange arrow and arc symbol .

3. Click to select the axis symbol associated with the right gear.

By default, the motor axle rotates to the right (towards the front of the model).

In the example, the right motor should rotate left in order to drive the wheels in the forward direction.

4. In the Servo Motor Definition window, click **Flip** to change the rotation direction of the motor axle.

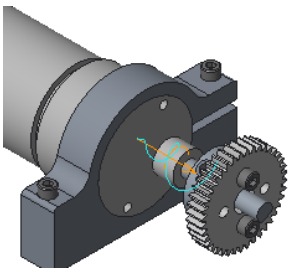


5. Select the Profile tab.
6. Select **Velocity**.
7. Set the velocity of the servo motor in degrees per second. In the magnitude field, set the constant A to the degrees per second the mechanism spins.

*In the example, the degrees per second is set to **60**, which is equal to 10RPM. Click **OK**.*

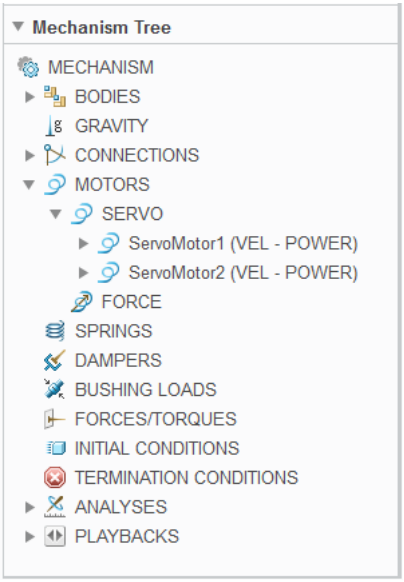
8. A servo symbol appears along with the axis symbol on the right drive motor.

Repeat the procedure to define a servo motor on the left drive motor.

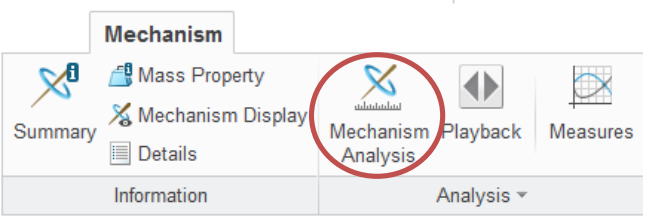


9. From the Application toolbar, select **Mechanism**.
10. In the mechanism tree that appears, expand MOTORS and SERVO.

The servo definitions created for the drive motors can be accessed from this mechanism tree.



11. From the Mechanism tab, select **Mechanism Analysis**.
12. In the Mechanism Analysis dialog box, set Type to **Kinematic**.
13. Click **Run**.

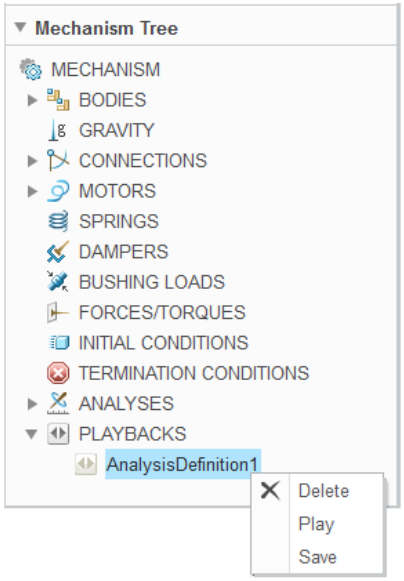


14. A percentage is shown at the bottom of the screen indicating the progress of the calculations.

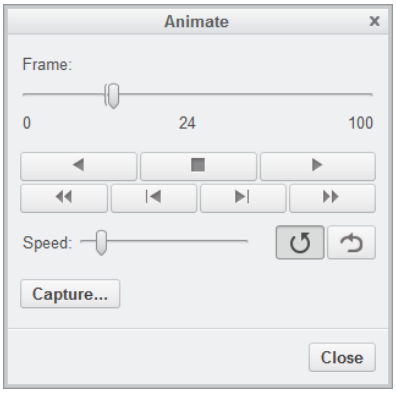
15. Once the calculations are complete, click **OK** in the Analysis Definition window to finish.

16. In the mechanism tree, expand **PLAYBACKS**.
17. Right-click **AnalysisDefinition1**.
18. Select **Play** to play back the analysis.
19. Using the Animate window, you are able to start, stop, and adjust the speed of the playback.
20. Rotate, zoom, or pan the model in the graphical area to get different viewpoints as you watch the playback.
21. Click **Capture** to record a video of the analysis playback.
22. In the Capture window, change any setting for your recording.

The name of the video defaults to the name of the model with an MPG tag.



23. The video is stored as a file in your working directory by default. You can change the location by clicking next to the name field and choosing a different location. Click **OK**.
24. The analysis complete one playback and then stops.
25. Measure position, velocity, and acceleration during the simulation.



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