1. Running RecurDyn and Creating a New Model

- Double-click the RecurDyn icon on the Desktop to run RecurDyn.
- 2. Enter "Projectile_Motion" in the Name box and click **OK** to create a new model.



Start RecurDyn	(2)			×
New Model -		shange the r	nodel name	
Name	Projectile_Mot	tion		
Unit	MMKS(Millime	ter/Kilogram/Newton/Secon	d) 🔻	Setting
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Single_Pend	lulum.rdyn	Free_Falling_Ball.rdyn	Free_Falling_E	Ball.rdyn
				-
🗹 Show 'Start	RecurDyn' Dial	og when starting		

2. Creating a Ball Body

- On the Professional tab, in the Body group, click Ellipsoid.
- 2. Click to select **Point**, **Distance** for the modeling option.
- 3. Enter (0, 0, 0) and then (10) for the Command Input.





3. Adjusting the Icon Size

- 1. On the toolbar, click the Icon Control button.
- 2. Enter "20" for the Icon Size and Marker Size respectively.
- 3. Check if the icon size has changed on the work pane and then close the Icon Control dialog box.



4. Checking the Entity You Created and Changing the Nan

- 1. On the database pane to the right, right-click the ellipsoid body that you created, and then click **Rename**.
- 2. Change the name to **Ball**.



5. Configuring Initial Launch Conditions

(Initial Launch Conditions)

- Vx = 5000*cos(60) = 2500 mm/sec.
- Vy = 5000*sin(60) = 4330 mm/sec.
- 1. Right-click the created ball body, and then click **Properties**.
- 2. In the Properties of Ball dialog box, click the Body tab, and then click **Initial Velocity**.
- In the Body Initial Velocity dialog box, for the Translational Velocity pane, select the X and Y check boxes and enter the following values in the respective boxes.
 - X : 5000*cos(60d)
 - Y: 5000*sin(60d)
- 4. Click **Close** to close the dialog box.
- 5. Click **OK** to apply the changes.

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Properties of Ball [Current Unit : N/kg/mm/s/deg]					
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Mass	3.28820031075732e-002				
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lyy	1.31528012430293		lyz	0.	
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Body Initial Velocity					
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4 Close Cancel					

6. Performing Dynamic Analysis

- On the Analysis tab, in the Simulation Type group, click Dyn/Kin (Dynamic/Kinematic Analysis).
- In the dialog box, click the General tab, enter "1" and "10000" for the End Time and Step respectively.
- 3. Click the Parameter tab, and select the "Match Solving Stepsize with Report Step" check box.
- 4. Click Simulate to run the simulation.

		RecurDyn V8R3 x64 -	
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Dynamic/Kinematic Analysis		Dynamic/Kinematic Analysis	
General Parameter]]	General Parameter	
End Time 1.	Pv	Maximum Order	2.
Step 10000.	Pv	Maximum Time Step	1.e-002
Plot Multiplier Step Factor 1.	Pv	Initial Time Step	1.e-006
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Static Analysis		Numerical Damping	1. Pv
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Simulate OK	Cancel	4	imulate OK Cancel

7. Checking the Results Graph in Plot

- 1. On the Analysis tab, in the Plot group, click Plot.
- 2. On the Plot database pane to the right, click Bodies, click Ball, and then doubleclick Pos_TY and doubleclick Pos_TX.
- 3. Click the Data Editor button.
- 4. Scroll the data sheet that appears below to the right and find the data whose Pos_TY value is 0 to check the time required for the ball to reach the ground and the distance travelled in the xdirection (Pos_TX).





8. Analytical Solution

- Refer to the initial launch conditions of the ball and
- the RecurDyn analysis results
- to calculate the time required for the ball to reach the ground and the distance travelled in the x-direction using the analytical solution, and compare the results with the RecurDyn results.

$$x_{0} = 0, x_{f} = R$$

$$y_{0} = 0, y_{f} = 0$$

$$V_{x_{0}} = 5000 \times \cos 60 = 2500 \text{ mm/s}$$

$$V_{x_{f}} = 5000 \times \sin 60 = 4330 \frac{\text{mm}}{\text{s}}$$

$$y_{f} = y_{0} + V_{y_{0}}t - \frac{1}{2}gt^{2}$$

$$0 = 0 + 4330t - 0.5 \times 9806 \times t^{2}$$

$$0 = (4330 - 4905t)t$$

$$t = 0.88 \text{ sec}$$

 $x_f = x_0 + V_{x_0}t$ $R = 0 + 2500 \times 0.88$ R = 2200 mm