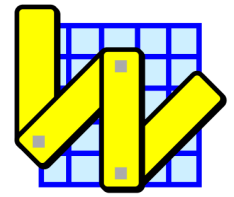


# Working Model 2004 New Features\*



## Overview

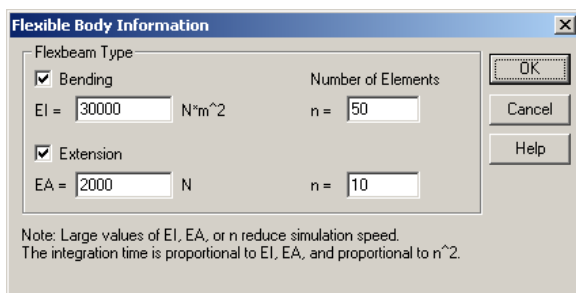
1. Improved ability to create flexible bodies (Flexbeams)
2. FlexLM licensing
3. DC Motor and DC Actuator
4. Generic Coord-to-Coord Constraint
5. Generic Point-to-Point Constraint
6. DXF import expanded to version 12 through version 2000
7. Dynamic memory allocation for objects
8. Tutorial guide (PDF format) now included – a \$50 value
9. Updated user interface
10. Improved graphing capabilities
11. Instantaneous vector values can be displayed with vectors
12. Color of bodies linked to formula language and can change on the fly
13. Feel the motion and/or collision

\* Runs on Microsoft® Windows® 95/98/98SE/Me/NT® 4.0/2000/XP

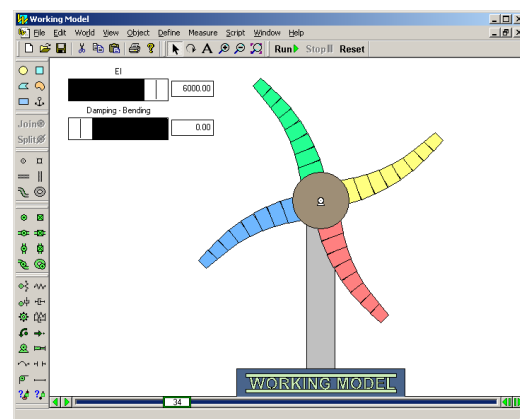
## 1. Improved ability to create flexible bodies (Flexbeams)

Significant new features have extended the popular **Flexbeam** script:

- Create flexible beams in bending mode, extension mode, or both
- Create flexible beams from rectangles and four-sided polygons (tapered beams) in any orientation
- Automatically heal polygons before creating flexible beams
- Re-attach constraints and points attached to the original body
- Create sliders for bending and/or extension stiffness and damping
- Significantly increase the maximum number of flexible beam elements
- Improve error checking



Flexbeam input dialog box



Sample Flexbeam output

MSC.Software  
Tel: 800.766.6615 or 650.381.3395  
Fax: 866.215.3457 or 650.574.7541  
Web: <http://www.workingmodel.com>  
Email: [wm2d.info@mscsoftware.com](mailto:wm2d.info@mscsoftware.com)  
WM2004NewFeatures.pdf  
Last updated 04/08/2004 by Paul Mitiguy and Michael Woo

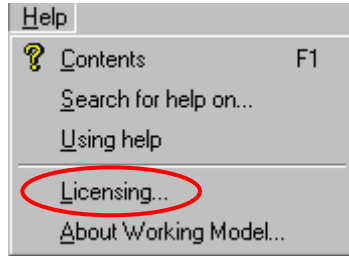


## 2. FlexLM licensing

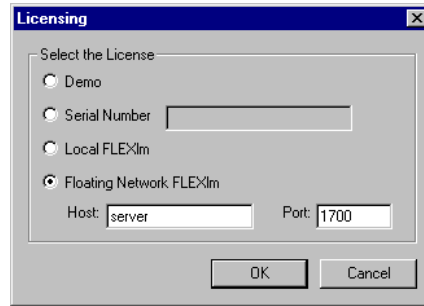
The flexibility of FlexLM licensing, e.g., network licensing across subnets, is added to Working Model 2004. New WM2004 license options include:

- Counted node-locked single-user license
- Multi-user license through a network server

Working Model 2004 also supports existing hardware dongle license options without additional charge. New or replacement hardware dongle license are available with additional charge. WM2004 also supports educational licensing with proof of full-time academic affiliation and use.



Licensing menu

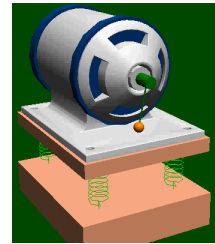


Licensing dialog box

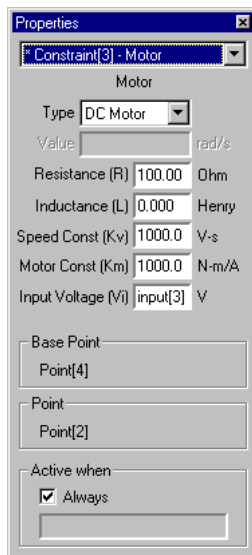
## 3. DC Motor and DC Actuator

Model DC motors and DC actuators with the following input parameters:

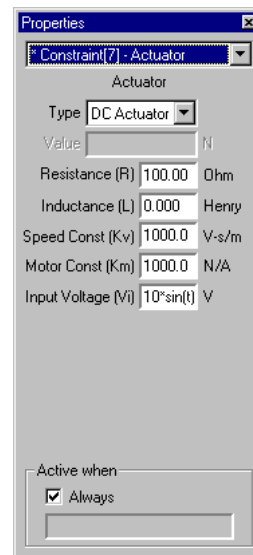
- Motor Resistance (R)
- Motor Inductance (L)
- Motor Back-EMF Speed Constant (Kv)
- Motor Force/Torque Constant (Km)
- Motor Input Voltage (Vi)



The value of these parameters can be set with a number, slider, or any Working Model formula.



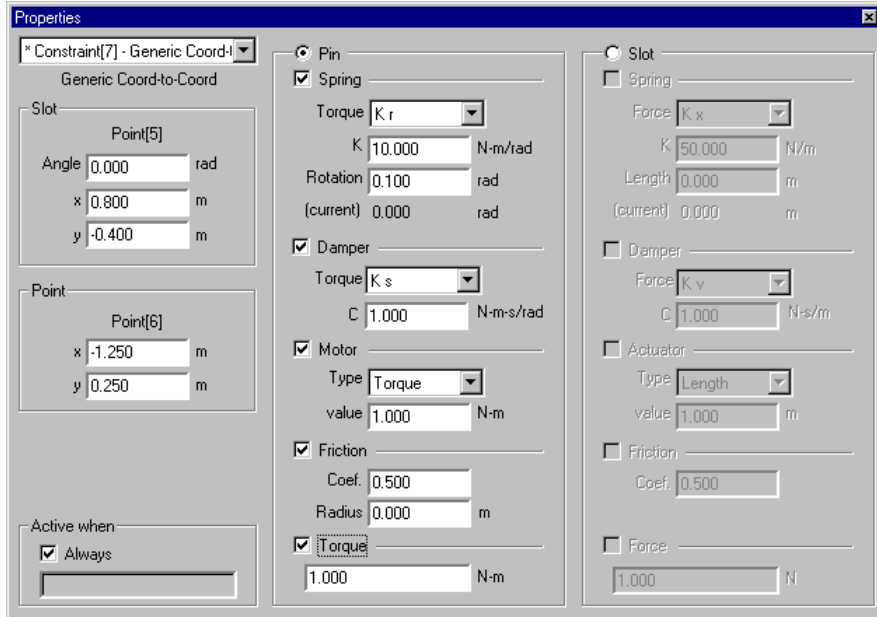
DC motor properties



DC actuator properties

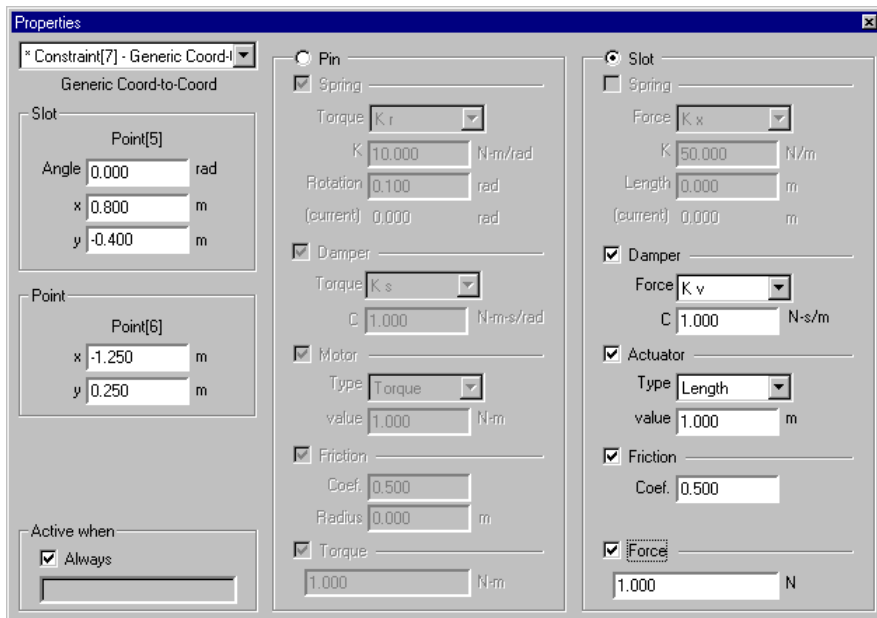
#### 4. Generic Coord-to-Coord Constraint

- The Generic Coord-to-Coord **Pin** Constraint is a powerful tool for advanced users and is useful for combining properties and measurements of various torque-producing devices, including torsional springs, torsional dampers, torque motors, rotational friction, and torques.



Generic Coord-to-Coord Properties - Pin

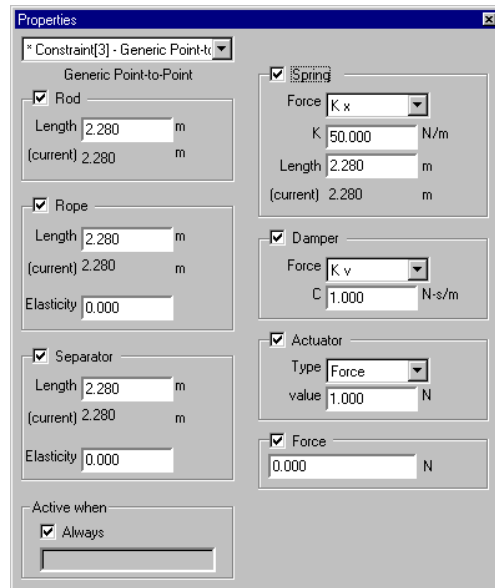
- The Generic Coord-to-Coord **Slot** Constraint is a powerful tool for advanced users and is useful for combining properties and measurements of forces along slots, including dampers, actuators, friction, and forces.



Generic Coord-to-Coord Properties - Slot

## 5. Generic Point-to-Point Constraint

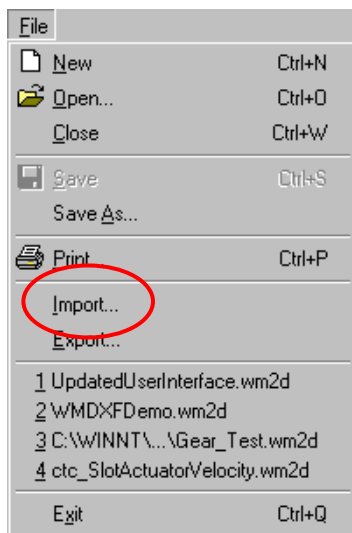
The Generic Point-to-Point Constraint is a powerful tool for advanced users and is useful for combining properties and measurements of rods, ropes, separators, springs, dampers, actuators, and forces.



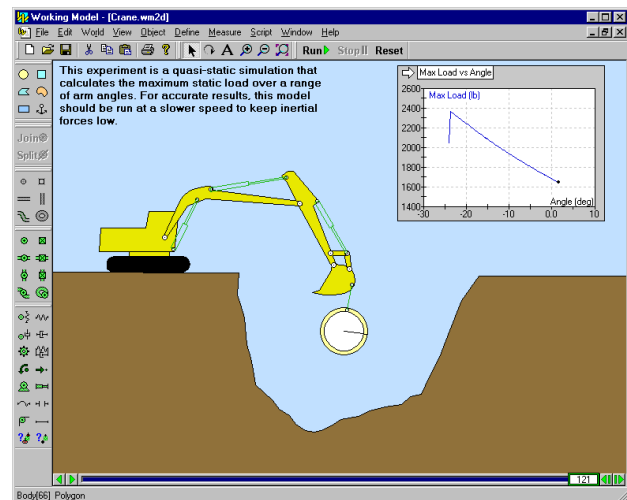
Generic Point-to-Point Properties

## 6. DXF import expanded to version 12 through version 2000

Updated CAD DXF import now supports DXF versions 12, 13, 14, and 2000. In addition, DXF import automates certain conversions from arcs and line segments to polygons.



DXF Import

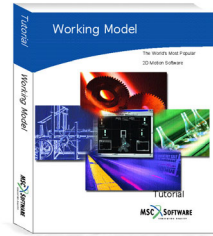


Sample DXF import

## 7. Dynamic memory allocation for objects

With dynamic memory allocation, the number of bodies, constraints, points, inputs, and output meters used in a simulation is limited only by your computer's memory.

## 8. Tutorial guide (PDF format) now included – a \$50 value

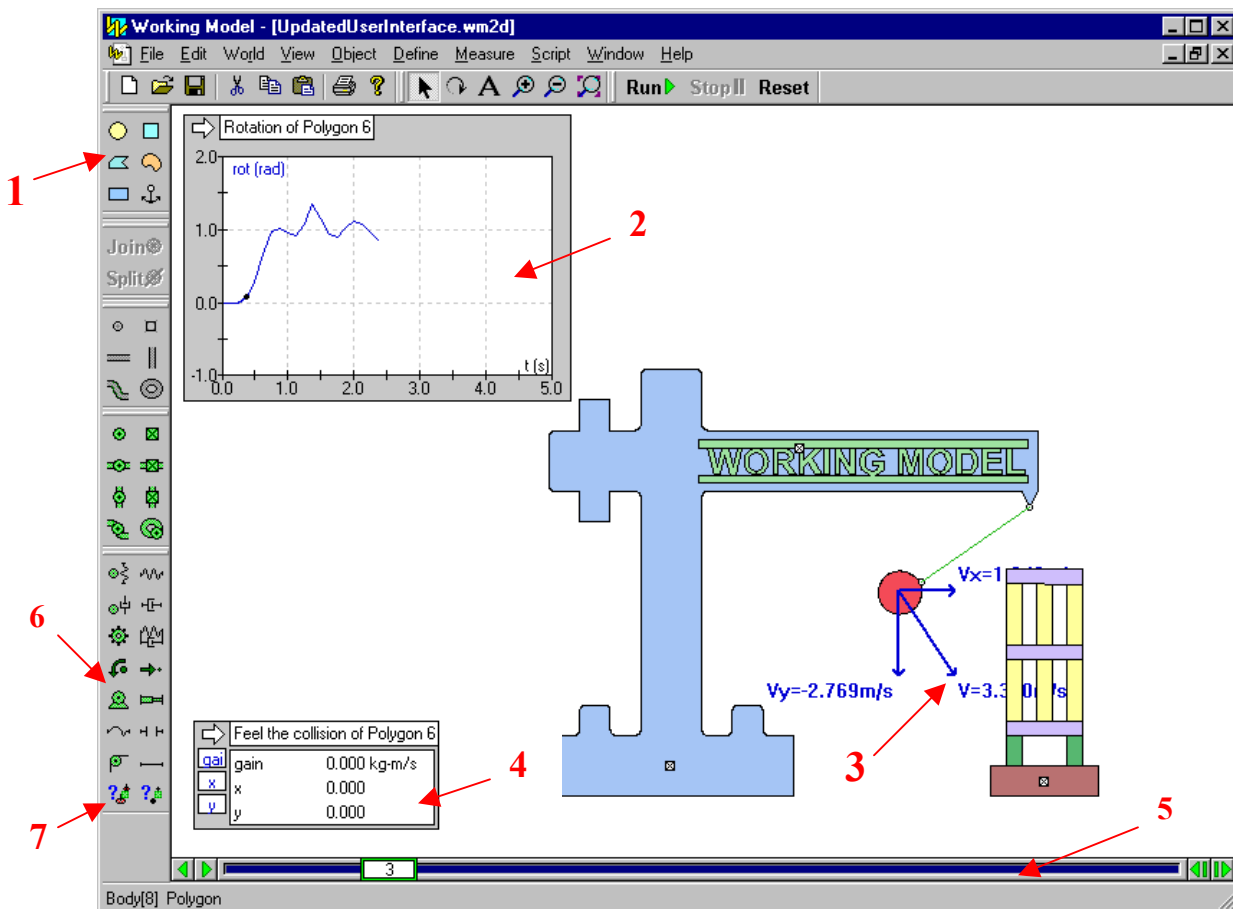


The PDF version of the tutorial guide is now included on the Working Model CD. With nine comprehensive exercises that emphasize the fundamental tools of motion simulation technology, this tutorial guide takes the user from beginning concepts to building a functional working model. Topics include:

Introductory Demonstration	Double-slotted rod	Piston Engine
Cruise Control with MATLAB	Belt-Driven Camshaft	Scripting
Making Visually Appealing Models	Earthquake Simulation	Advanced Scripting

## 9. Updated user interface

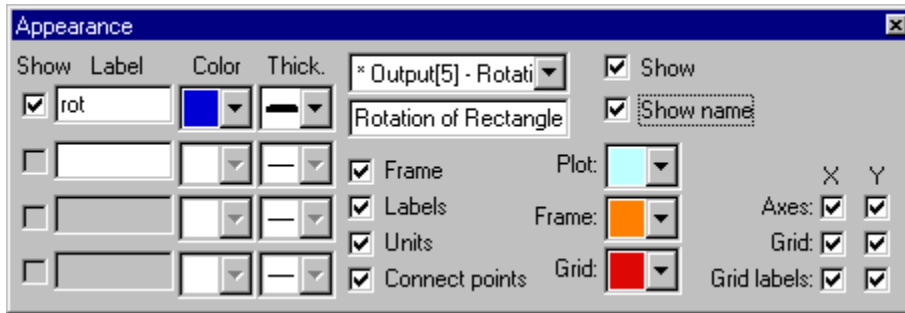
1. New default colors for bodies
2. New graphs and graphing options
3. Vector values can be displayed with vectors
4. New meter for feeling motion and/or collision (requires a force-feedback mouse or joystick)
5. New colors in the Run toolbar
6. New DC motor and DC actuator
7. New generic joints



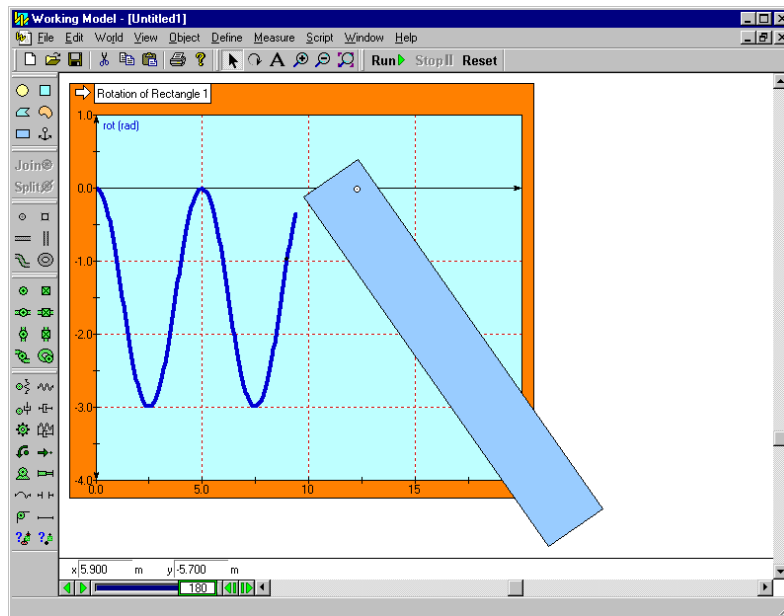
## 10. Improved graphing capabilities

New graphing capabilities allow you to control:

- Thickness of curves and lines
- Plot background and frame colors
- Scaling of curves and lines
- Display of **X** and/or **Y** axes, grid lines, or grid labels
- Grid line colors



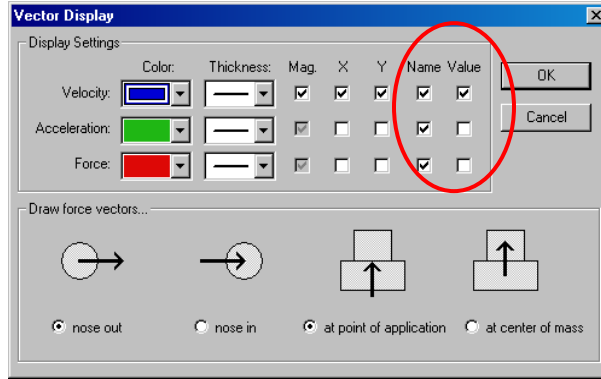
New: Appearance dialog box for graphs



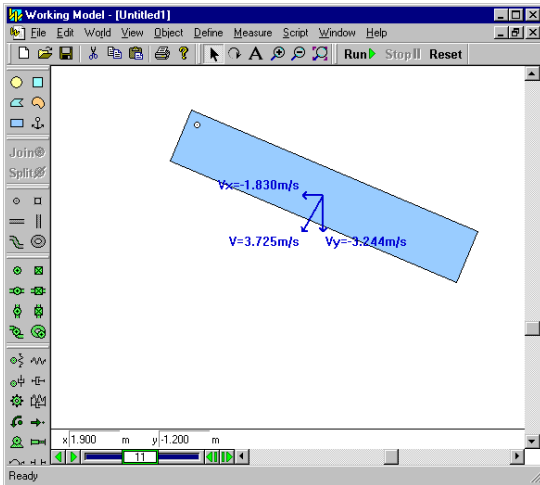
Showing a body's motion in an improved graph

## 11. Instantaneous vector values can be displayed with vectors

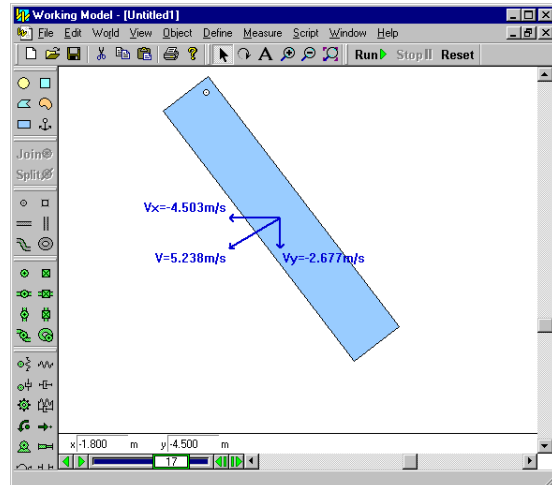
The value of various vectors and their components can be displayed on screen. The vector values change dynamically as the simulation runs and provides excellent visual feedback on the magnitude/direction characteristics of vectors.



Updated Vector Display dialog box



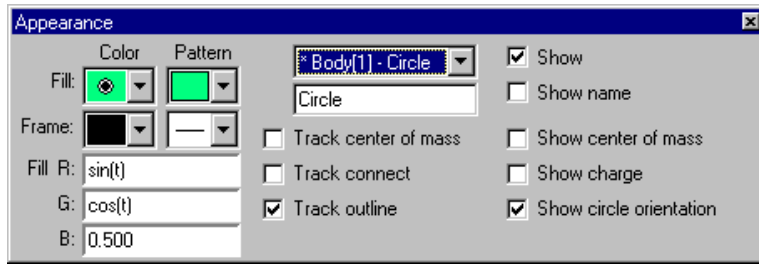
Instantaneous values shown with the vectors



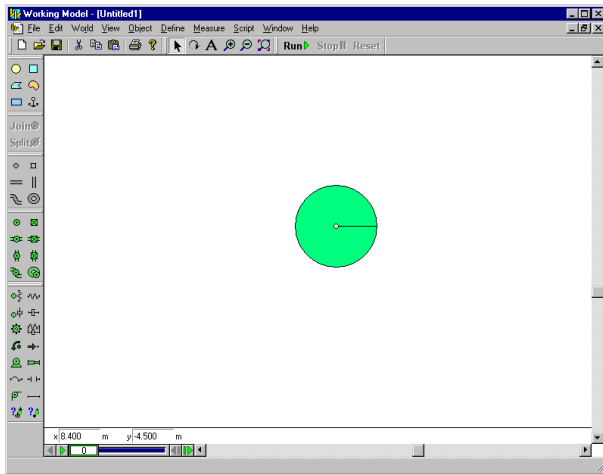
Note: Vector values change as the simulation runs

## 12. Color of bodies can be linked to a formula and vary with time, velocity, force, ...

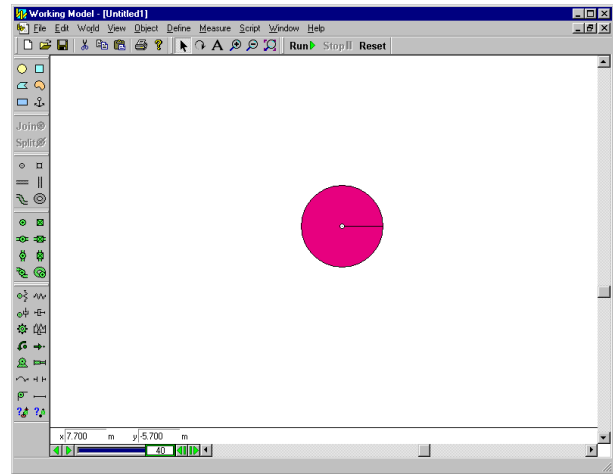
Color of bodies can be controlled with the extensive Interactive Physics formula language. Enter constants, equations, conditions, etc., in the RGB components of the body color.



Appearance dialog box for bodies



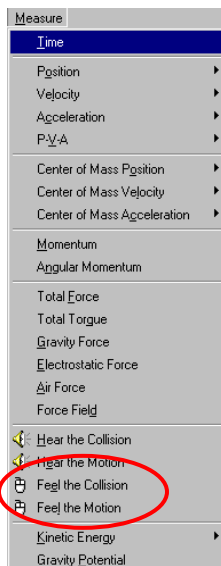
Body color at frame 0 ( $t=0$  s)



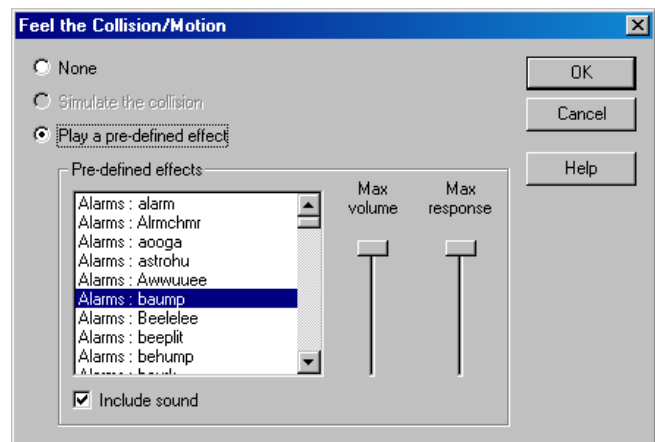
Body color at frame 40 ( $t=2$  s)

## 13. Feel the motion and/or collision (requires a force-feedback mouse or joystick)

Feel the motion and/or collision of bodies through a force-feedback mouse or joystick. Choose the default effect or an effect from the Immersion Studio library of mouse and sound effects.



Select Feel the Motion or Feel the collision



Choose haptics effects, volume, and response