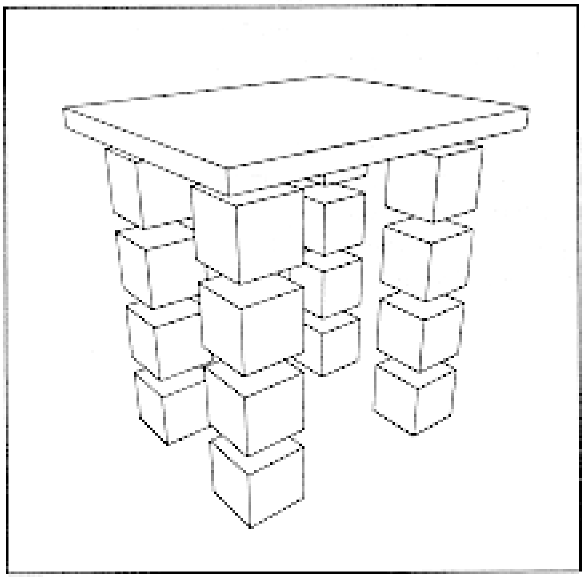
Table



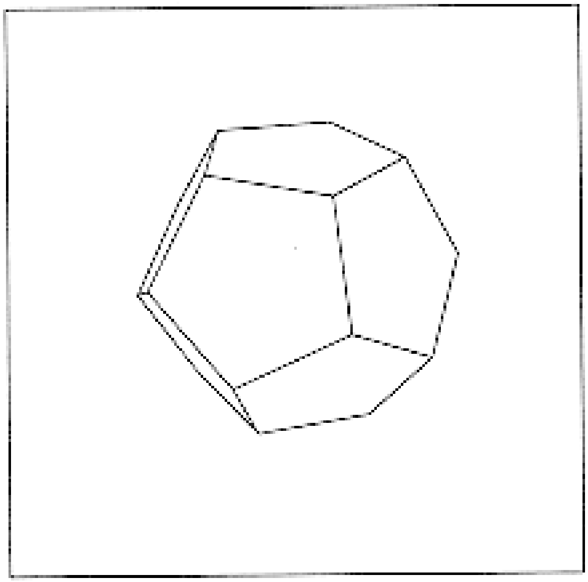
Primitives, Duplication, Transformation

- Choose **Get → Primitive → Cube** (length of 3 units).
- Select the **No hierarchy** option in the **Duplicate → Setup** dialogue box.
- Duplicate the cube using **Duplicate → Repetition**. Create three copies with a translation of -4 units along the y-axis.
- Hold down the Supra Key z while you click the right mouse button to zoom out to see all duplicates of the cube.
- Switch to Multi selection mode (choose the **Multi** menu cell). This will allow you to select all cubes at once while pressing the space bar and making a selection box around the cubes.
- Choose **Duplicate → Immediate** to create duplicates of the group of cubes.
- Use the **Translation** menu cells or press the Supra Key v to move the cubes. Repeat the duplication process to create four table legs.
- Switch back to **Single** selection mode and duplicate one cube for the tabletop.
- Use the **Scale** menu cells or press the Supra Key x to scale the cube into a tabletop.

Tip Use the "UNI" scaling mode to scale on all three axes at the same time.

You can also scale an object numerically by selecting the small triangular section of the Scale menu cells or typing directly in the cells themselves.

- Choose **Get → Primitive → Sphere, Cylinder, Cone,** and **Torus** to place several objects on the table.
- Enlarge the Perspective view by clicking the icon in the upper-right corner of the window and then select the Shade view mode.
- Press the Supra Key o while dragging the mouse to orbit the camera around your model.
- Press the Supra Key p while dragging the mouse to dolly the camera in the Perspective view.

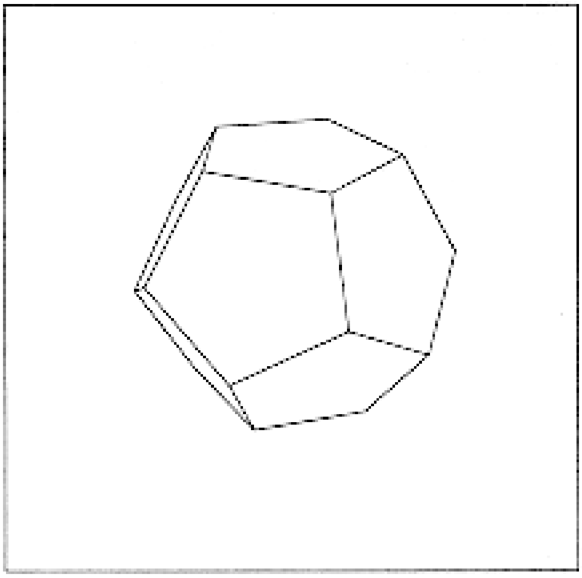


Jewel 1

Defining a Material Animation by Keyframes

- Choose Get → **Primitive** → **Dodecahedron** (use default settings).
- Move to the Matter module by clicking on the word Matter in the title bar.
- Choose the **Material** menu cell to display the Material Editor.
- Change the colour of the material by clicking the **Palette** button in the bottom left of the Material Editor. Click on a colour in the palette and select Ok to confirm your choice.
- Set the **Transparency** value to approximately 0.5 and the **Refractive Index** to approximately 1.4.
- Click the **Preview** button to render the effect of the material on the model. Click the middle mouse button in the Preview window to close it and then click the Ok button to close the Material Editor.
- Add a light to the scene by choosing **Light** → **Define** and accept the default values. Position the light above and in front of the dodecahedron (translate it). To see the result of your modifications, choose **Preview** → **All**.
- Go to the Motion module by pressing the F2 Supra Key.
- Make sure the time line is at frame 1 and that the dodecahedron is selected. Choose SaveKey → **Object** → **Rotation** to create the first keyframe.
- Go to frame 100 by dragging the time line pointer.
- Press the Supra Key c to activate rotation. Rotate the cube several times around any axis or combination of axes.
- Set another keyframe at frame 100 by choosing SaveKey with the middle mouse button.
- Preview your animation by clicking on the Forward play arrow in the playback box at the right end of the time line.

Tip The middle mouse button always duplicates the previous menu cell command chosen.



Jewel 2

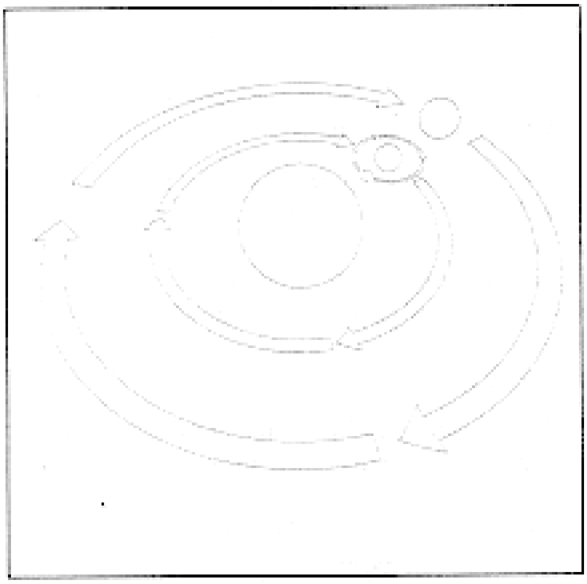
Rendering and Previewing a FlipBook

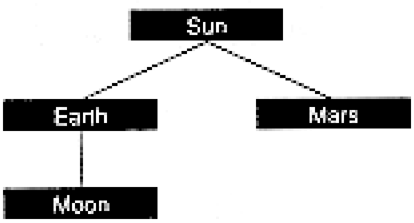
- Go to the Matter module and choose the **Render** menu cell.
- Change the picture resolution to 200 along x and 169 along y.
- Type in the file name `jewel` for your sequence and click the **Render Sequence** button to start the rendering of your animation.
- The screen will turn black and the rendering window will appear in the centre with a frame counter above. Once the rendering is complete, the interface is displayed again. You can stop or pause the rendering like a preview by pressing the middle mouse button.
- To preview your rendered animation, go to the Tools module and choose the **FlipBook** menu cell.
- Select your file name from the list or type in the name `jewel` as the Sequence Name.
- Click Ok to load the images into the flipbook. Once the images are loaded in memory, the first image will appear on the screen.
- Click the Forward arrow to play the flipbook. You can pause the preview at any time using the middle mouse button. Pressing all three mouse buttons simultaneously will stop the flipbook.

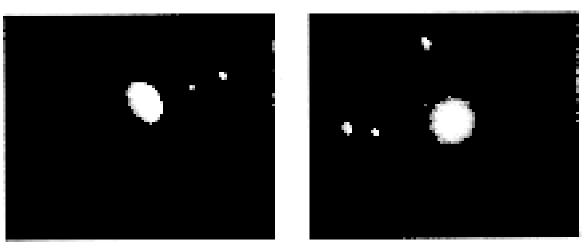
Tip You will find your rendered images in the RENDER_PICTURES directory of your database. Choose the Picture menu cell in the Tools module and use the Display button in the View Pictures dialogue box to see individual images.

Once a flipbook is displayed, pressing the number keys 1, 2, 3, etc. will scale the images up and down (only when the playback is paused).

Planets







Selections, Hierarchies, and Centres

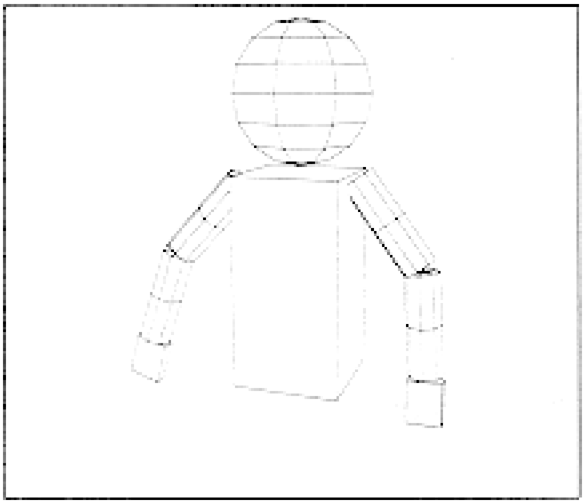
- Create a sphere with default values (Get → Primitive → Sphere) and name it Sun by choosing Info → Selection.
- Create the Earth, Moon, and Mars by duplicating and transforming the Sun sphere. Remember to name each sphere accordingly.
- Change the rotation pivots of the planets and moon by selecting the CTR mode and translating the axis icons. Move Earth's and Mars' centres to the Sun. Move the Moon's centre to the Earth's centre.
- Create a hierarchy of the solar system by using the Parent menu cell. Make the Earth the parent of the Moon, then make the Sun the parent of the Earth and Mars. Refer to the mouse line for reference.
- Experiment with your hierarchy and select the different branches and nodes by using each mouse button (Schematic view).
- Select the Moon and then go to the Motion module.
- Choose SaveKey → Object → Rotation to create the first keyframe on the Moon.
- Move the time line pointer to frame 100 and rotate the Moon around the y-axis by 360 degrees.
- Choose SaveKey → Object → Rotation again to create the new keyframe (simply use the middle mouse button on the SaveKey menu cell).
- Repeat this procedure for the Earth and Mars.
- Try assigning different materials to the spheres.
- Go to the Matter module and choose Render. Once the rendering is complete, go to the Tools module and choose Flipbook to view the animation.

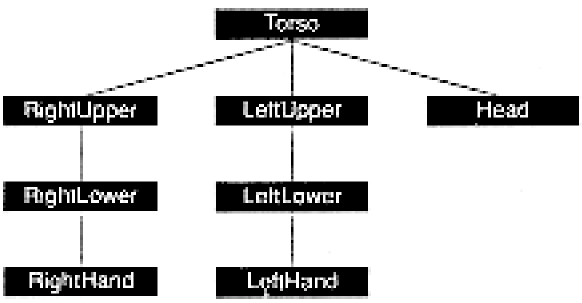
Tip Scale up the axis icons so that you can see the centres more easily.

Set the animation of the Moon first, then set keyframes for the branch containing both the Earth and the Moon.

For the Sun's material, select the Constant Shading model and activate Static Blur.

Mister Robot

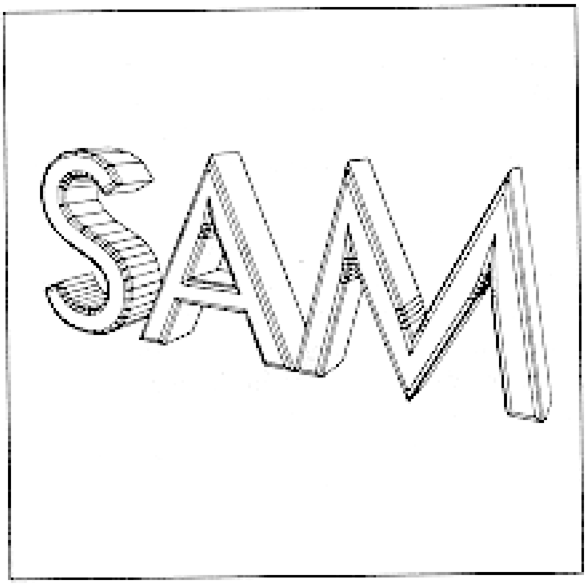




Hierarchy, Centres, and Transformations

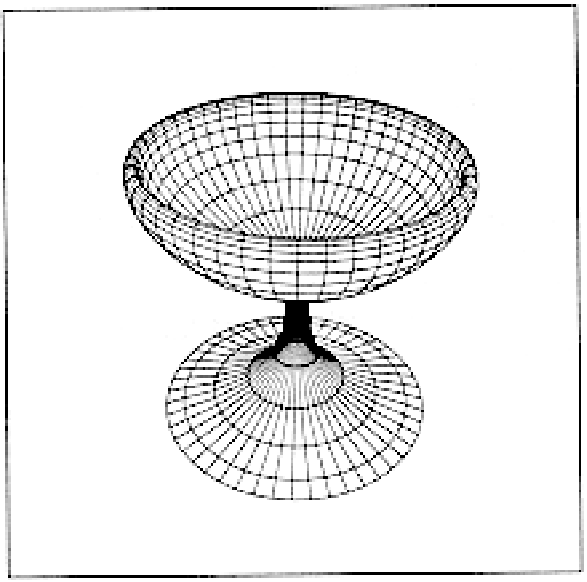
- Create a simple robot model by combining primitives. All you need for the purpose of this exercise is the upper body of the robot.
- Choose Get → **Primitive** → Cube with Length = 3.
- Scale the cube along the y-axis by a factor of 2.
- Choose Get → **Primitive** → Sphere with Radius = 2.
- Position the sphere above the torso to create the head.
- Choose Get → **Primitive** → **Cylinder** with Radius = 0.5.
- Switch to CTR (Centre) mode and translate the centre of the cylinder to its top end.
- Switch back to OBJ (Object) mode. Transform and duplicate the cylinder to create the upper and lower arms of the robot.
- Add flattened cubes at the end of each arm to create hands (also modify the centres).
- Choose the **Parent** menu cell to create a hierarchy that will allow each component of the mechanical arms to be animated.
- Press the space bar to select and deselect the various components.
- Experiment with the robot hierarchy by selecting the entire tree, the branches, and individual nodes.
- Select one of the arms as a branch by pressing the space bar while picking the upper arm cylinder with the middle mouse button.
- Go to the Motion module and choose SaveKey → **Branch** → Rotation at frame 1.
- Move to frame 100 and reposition the arm.
- Select the arm as a branch again and choose SaveKey → **Branch** → Rotation to create frame 100.
- Play back your animation.

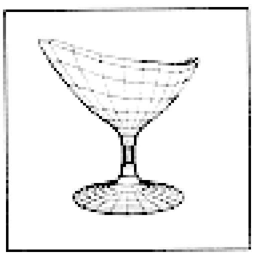
Your Name in 3D, Part 1

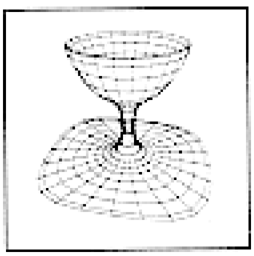


Text, Extrusion

- Choose Get → Text and select a Font.
- In the Text box, type your first name. Click Ok to confirm the text entry.
- In the Front window, open a Schematic window and look at the hierarchy.
- Choose **Surface → Extrusion** to extrude the text as a Polygon Mesh object using the following parameters:
  - Polygon
  - Subdivision - 5
  - Bevelling - Active
  - Radius - 0.1
  - No. Bevels - 2
  - Top bevelling only
  - Close - on
- Hide the original faces by selecting them (in the Schematic view) and choosing Display → **Hide → Toggle Selection**. The faces will be the larger group of objects because each character has at least one null associated with it for object placement.
- Select the Shade view mode in the Perspective window and use the Supra Key o to orbit the camera around your object.
- Save the scene for use in later workshop projects.







Wine Glass

Grid Lock, Drawing Splines, Revolution

- Enlarge the Front window to full size.
- Choose Show → Point to display the control points on the profile curve.
- Choose Draw → Curve → NURBS and draw the profile of a wine glass using the origin of the global axis as your starting point.
- Choose Preferences → Create Modelling Relation (off by default).
- In the title bar of the Front Window, click the Layout icon and turn Grid lock ON for the x and y-axes. Make the grid smaller, such as 0.5 or 0.25, instead of 1.
- Move the first and last points so that they "snap" to the y-axis. Deactivate the Grid lock.
- Choose Edit → Move Point. Edit the points of the spline until you obtain a nice profile curve.
- To create the wine glass volume, choose Surface → Revolution and use the default values of 360 degrees with 8 steps. Make the surface a Cubic NURBS. The y-axis should be the default.
- Select the Shade view mode in the Perspective window.
- If the surface is "dark," inverse the original profile curve.
- Use the Supra Key o to orbit the camera around the wine glass.
- Save your scene for use in other projects.
- Try changing the shape of the wine glass by editing points on the original spline.
- With the original profile curve selected, choose Info → Selection (NURBS Curve Info dialogue box) and lower the step value from 10 to 3. Since the modelling relation is in effect, the wine glass will automatically be updated.
- The step value sets the refinement of the curve between control points.
- Turn off the modelling relation before the next exercise.

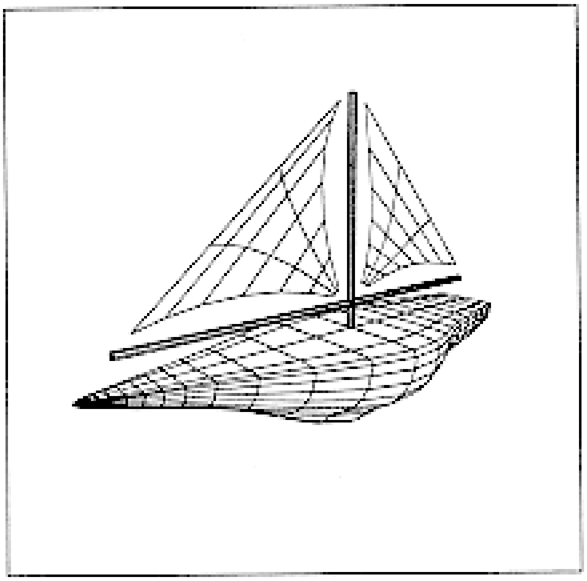
Tip

When drawing the profile curve, use the Supra Key z to zoom out in the Front window and obtain a smaller grid.

Revolutions can happen around any axis, but the y-axis/Front window combination has been the convention in the past.

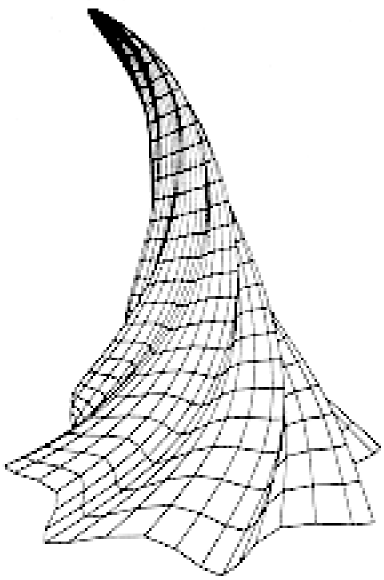
Freeing the modelling relation allows you to manipulate individual points as in the two smaller illustrations.

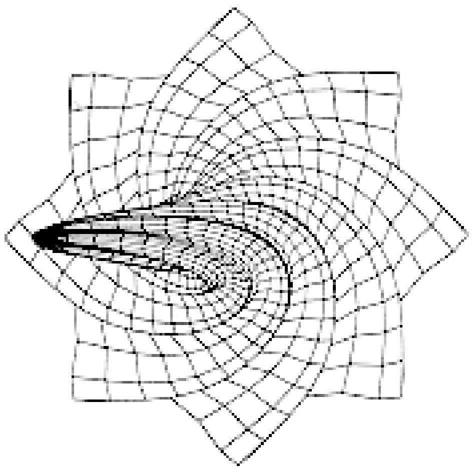
Sailboat



Skin, Tag Points

- Choose Get → **Primitive** → Arc with a radius of 3, Begin at 180, and End at 360. Make it a B-Spline curve.
- Choose Draw → Open/Close to close the arc, then choose Show → **Point** to display the points on the spline. Use the Supra Key **m** to move the two top points down to flatten the top of the curve.
- Make sure **Preferences** → **Create Modelling Relations** is inactive (the default).
- Choose **Duplicate** → **Repetition** and make five copies of the arc with a Scaling factor of 0.5 along each axis and a Translation of 5 units along the z-axis.
- Select the original arc and repeat the duplication to create three copies, but change the Scaling factor to 0.75 along each axis and the Translation to -3 units (negative) along the z-axis.
- Select the original arc (the largest) and use the Supra Key t to tag the point in the centre of the arc. Change to TAG mode and move the tagged point down along the y-axis by about one unit.
- Tag one more control point on each side of the centre point and scale the three tagged points along the x-axis to create the keel of the sailboat.
- Choose Surface → Skin and select each cross-section in sequential order starting from the *smallest spline* (use the Right window view for reference). Once each arc has been selected, click the middle mouse button. Select Patch and B-Spline in the Skinning dialogue box and click Ok.
- Choose Info → Selection and activate Capping for the Bottom of the U B-Spline. This will close the bow (the front tip) of the boat.
- In any window, select a Schematic view. Hold down the space bar and click on the various nodes to select the arc at the back of the boat (the stern).
- Choose Draw → Convert to Face to make the curve into a surface. Finish the sailboat by adding a mast (cylinder) and sails (skin between two curves again: one along the mast and the other along the boom).





Ice Cream

Duplicate Repetition, Skin

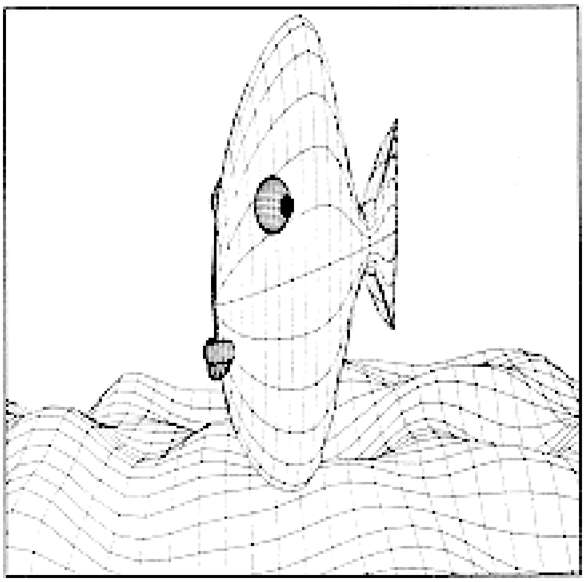
- Choose Get → Primitive → Circle with a radius of 5 units. Make it a B-Spline Curve Type and increase the Step value to 16.
- Choose Show → Point to display the control points along the circumference of the circle.
- Switch to tagged point manipulation mode by clicking TAG in the lower-right part of the screen. In the Front window, hold down the Supra Key t and the left mouse button and tag alternating points along the edge of the circle. You should tag eight points in total.
- Activate the Scale menu cell and scale the tagged points along both the x and y-axes to create a scalloped circle. Hold down the Supra Key t and the middle mouse button to untag the points when you are done.
- Choose Duplicate → Repetition using the following settings:

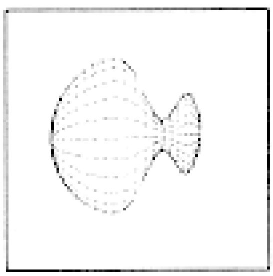
No. of occurrences: 9

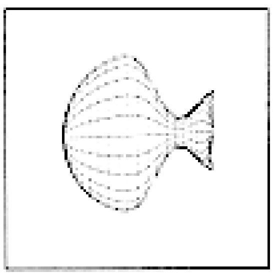
Scaling:	X = 0.7	Y = 0.7	Z = 1
Rotation:	X = 0	Y = 0	Z = 25
Translation:	X = 0	Y = 0	Z = 1

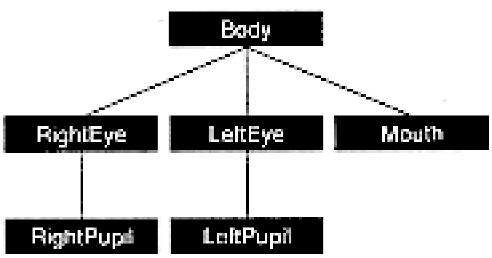
- To see all the new objects in the windows, press the Supra Key A (Shift-a) and click in each window to frame the views. Choose Select → Clear to deselect the objects. Switch back to OBJ (Object) mode.
- Choose Surface → Skin and use the left mouse button to select each slice starting from the largest to the smallest circle. Once every slice has been selected, click the middle mouse button. Select Patch and B-Spline in the dialogue box.
- Choose Info → Selection and activate Top for the U Capping.
- Rotate the object -90 degrees around the x-axis.
- Select the Shade view mode in the Perspective window and use the Supra Key o to orbit around your delicious creation!

Tip Try using a lattice to bend the tip of the ice cream by tagging and rotating subsequent lattice sections (and untagging some lattice points, rotate, etc.)









Jojo the Happy Fish, Part 1

Modelling, Hierarchy

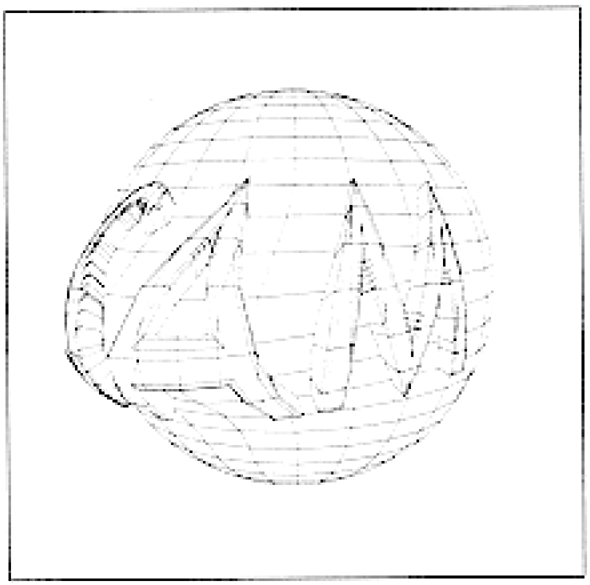
- Choose Get → **Primitive → Sphere** using the default values. Select Cubic NURBS in U and V.
- Choose Show → **Point** to display the control points on the sphere.
- Rotate the sphere by 90 degrees on the x-axis.
- Scale the sphere to approximately 0.1 on the x-axis.
- Choose Effect → Freeze → **Transformations** (needed for the next exercise).
- Enlarge the Right window and switch to TAG manipulation mode.
- Tag the second column of points to the right of the centre (about -2 units on the z-axis).
- Scale the tagged points along the y-axis to define the body and tail sections of Jojo the fish. Untag the points.
- Tag the highest and lowest points on the tail section and translate them along the z-axis to create the tail fins.
- Add the eyes, the pupils, and create the mouth from a torus folded in half (tag and rotate). Use Symmetry on the finished eye to make the second (YZ plane).

To create a hierarchy of Jojo the fish, follow these steps:

- Hold the space bar down while selecting one of the eyes with the left mouse button. Change to Parent mode and pick the corresponding pupil with the left mouse button. Click the right mouse button to end the Parent mode. Repeat the procedure for the other eye.
- Select the body of the fish. Activate the Parent mode and pick the mouth and the eyes with the left mouse button. Open a Schematic window to verify the hierarchy.
- To create the ocean floor, choose Get → **Primitive → Grid** using the default settings – make it a NURBS surface. Translate the grid under the fish.
- Choose Effect → **Randomize** using these settings: X = 0.05, Y = 0.5, Z = 0.05. Scale the grid on the y-axis to adjust the deformation effect.
- Finish your scene by adjusting the sizes of the models.

Logo

Deformation, Effects, Patch Fitting



- Choose Get → **Primitive** → Sphere. Make it a B-Spline Patch with a Radius of 8 units.
- Get the scene containing your extruded name (see "Your Name in 3D").
- Make one of the windows a Schematic view.
- Parent the individual letters together. Select the "S" first, and pick the A and M as children.

Note Use your imagination if your name isn't actually Sam: if it's "Billy Stemhobilitchky", then you've got a lot of parenting ahead of yourself. If not, consider yourself lucky!

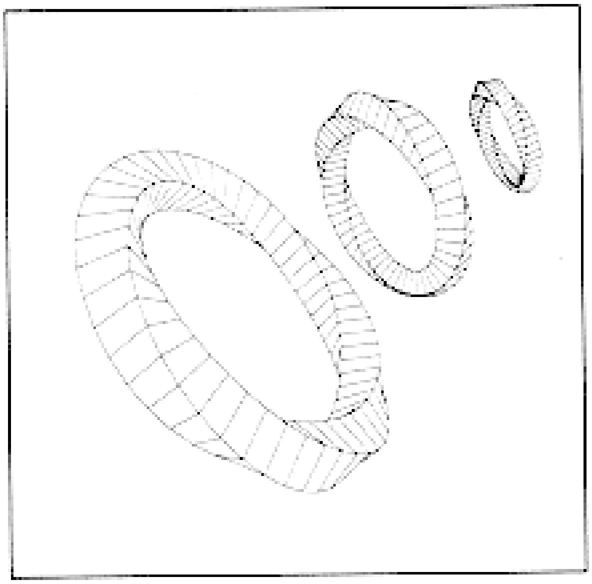
- Choose Effect → **Subdivision** to subdivide the logo into a larger number of polygons. This will enable the letter faces of the text to be deformed along the surface of the sphere. Use the following values for the Subdivision: X = 5, Y = 5, Z = 0 on each of the letters.
- Rotate the logo 90 degrees on the x-axis and 180 degrees on the z-axis.
- Choose Effect → Freeze → **Rotation** on the logo. This is required since deformations use a different global axis.
- Choose **Deformation** → by Patch → Branch → Create on the logo and pick the sphere as the deforming surface.
- Translate the text in x and z directions to move the logo across the surface of the sphere. Experiment with scaling of the text.
- Try tagging and moving some points on the sphere. Press the Supra Key r to redraw the screen and see the effect of the surface modification.

Tip The object has to be frozen before you apply the deformation.

A patch surface has only two dimensions. To move an object on a patch, you have to translate the object in x and z. If you are using Dragging mode (DRG), make sure that you translate the object in the Top view.

When you apply the deformation for the first time, the transformation values have an offset. Start the translation by resetting the values to 0.

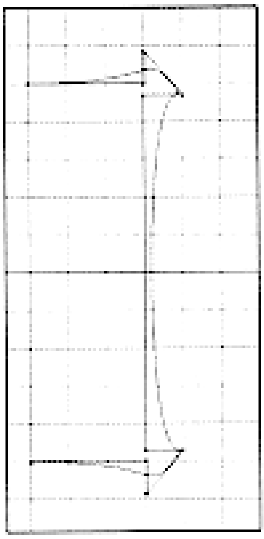
Rings

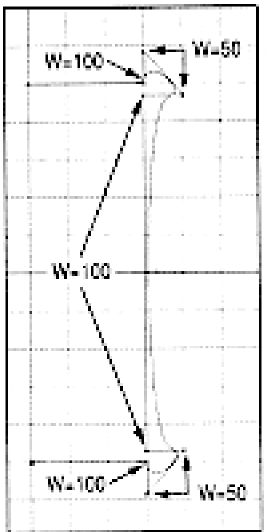


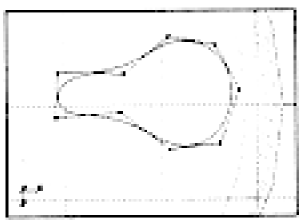
Duplicate from Animation

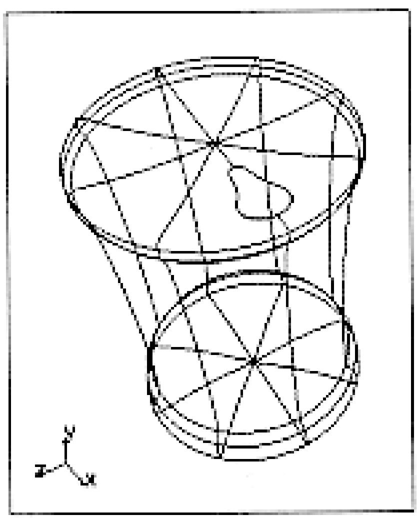
- Get a square with a length of 4.
- Rotate the square 90 degrees around the x-axis.
- Choose **Effect → Freeze → Rotation**.
- Get a B-Spline circle with a radius of 15 and 8 steps.
- Select the square and assign a deformation by spline using **Deformation → By Spline → Node → Create**, and picking the circle as the deformation path.
- Reset the translation of the square by clicking in the triangular tab in any of the **Translation** menu cells. Make sure all values are defined as 0 and select Set.
- To animate the square, set the length of the time line to 80 (end frame) and set the current frame to 1.
- Set a keyframe for the square by choosing SaveKey → Object → **Node Spline Deformation → All** in the Motion module.
- Go to the last frame. Translate the square in y until it reaches the starting position.
- Rotate the square 360 degrees around the z-axis.
- Keyframe all values again by clicking SaveKey with the middle mouse button.
- Change the function curves to linear interpolation.
- Copy the square cross-section by choosing **Duplicate → From Animation** on the square with a frame step of 10. Hide the original square.
- Choose **Surface → Skin** to connect the squares with the B-Spline and Close options.
- Raise the resolution of the resulting patch and invert it if necessary.

Tip Use the Ghost view mode to quickly see where the start key location is set to (instead of WIRE, select Ghost).









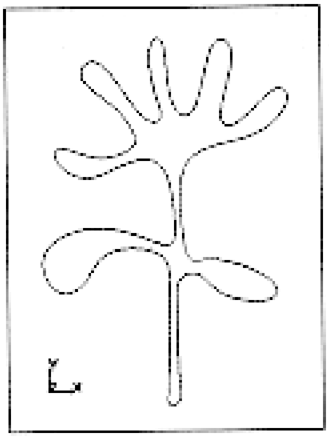
Soft-drink Can

NURBS and Trimming

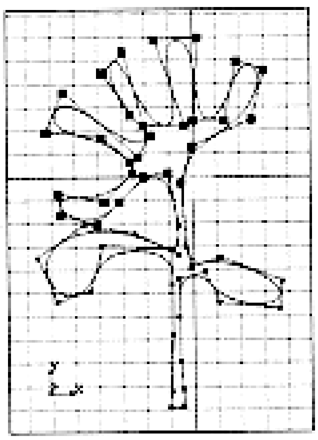
- In the Model module, choose Draw → Curve → NURBS. Draw the profile of the can in the Front view so it can be revolved around the y-axis (use the same number of points as in the first illustration).
- Change the weight (W) of the corresponding points (second illustration) in the Edit → Coordinates dialogue box.
- Activate Preferences → Create Modelling Relations.
- Choose Surface → Revolution. Select the y-axis as the rotation axis (default) and the Cubic option under NURBS (create a NURBS instead of polygon object).
- Reshape the object with relational modelling. Select the original NURBS curve and use the **m** key to edit the position of the points. Refer to a shaded Perspective view for interactive feedback.
- Choose Effect → Freeze → Modelling Relations, and then click Ok in the dialogue box.
- Choose Info → Selection and close the capping for both ends of the V section.
- Trim a hole for the opening of the can. Choose Draw → Curve → NURBS. Draw a curve as in the third illustration in the Top view. Choose Draw → Open/Close and accept the default options. Position the NURBS curve on top of the soft-drink can using the Front view for reference.
- Select the can and choose Draw → Trim NURBS Surface. Pick the NURBS curve, specify the y-axis as the Parallel projection method, and click Ok in the dialogue box leaving the other values as they are.

Flower Power

NURBS and Instances

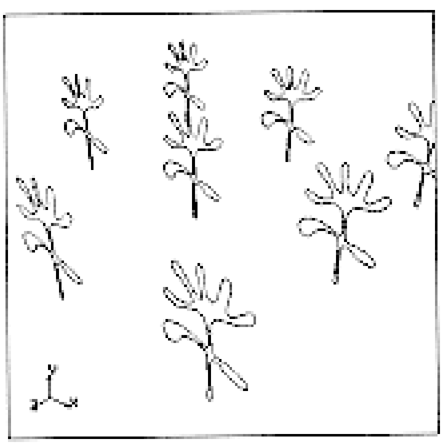


- Draw a flower face in the Front view. In the Model module, choose Draw → Curve → NURBS. Refer to the first illustration.
- Close the spline by choosing Draw → Open/Close. Use the default values.
- Convert the closed spline into a face by choosing Draw → Convert to Face.
- Create a picture file that will be edited with the paint tool. In the Matter module, choose Material. Select the Constant Shading mode and make the RGB values = 1 (white) for the Diffuse component.
- Position your camera perpendicular to the flower object and frame your object in the centre of the Perspective view. Choose Render, set the end frame to 1, give a name to the picture, and with the Filename button, specify that the file is being rendered in the PICTURES directory instead of the default RENDER_ PICTURES directory.



Note You might want to make sure that the normals of the object are facing the camera (choose Show → Normal).

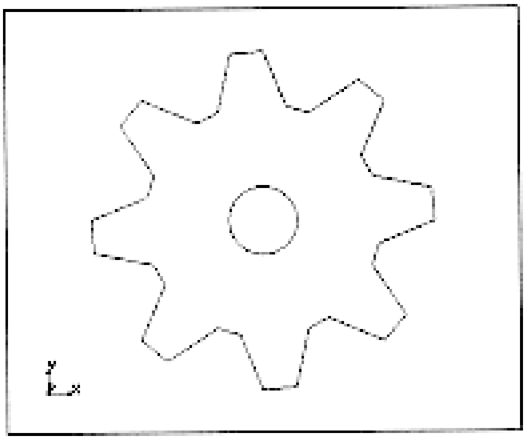
- Edit the picture by choosing Texture → 2D Global. Get the picture file, select Paint, and colour the flower by hand (use RGB only). Save the picture and click Accept.
- Select the XY mapping method. Frame the image with the cropping rectangle and select Cropped to get a better understanding of the final texture image to be used. Click Ok.
- Find out how large the flower is by choosing Info → Distance and picking two vertices on each edge with the left mouse button. Note the distance that appears in the status bar.
- Create instances of the flower by choosing Duplicate → Instance Repetition. Enter No. of occurrences as 4 and multiply the distance found in the previous step by 2 in the X Translation box.

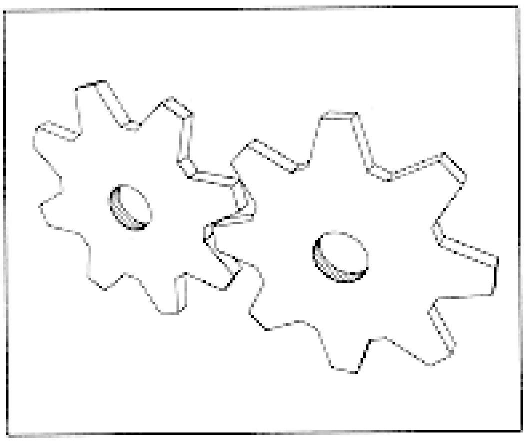


- Duplicate the instances in this first row to create a series of rows by choosing Duplicate → Instance Repetition. Enter 3 for the No. of occurrences and keep the same distance, but this time give a negative translation value in the Z box (X = 0, Z = old X value).
- Select the original flower, go to frame 50, and in the Motion module choose SaveKey → Object → Shape. Go to frame 1. Select the original flower and tag the head points, as in the second illustration. Rotate the head about -15° on the z-axis. Choose SaveKey → Object → Shape again. Go to frame 100 and rotate the tagged points about +15°. Choose SaveKey → Object → Shape again.
- Add a floor, a sky, and animate a light (with shadows) over the scene that follows the flower's head rotation.

Tip Swap the original flower object for a building.

Gears



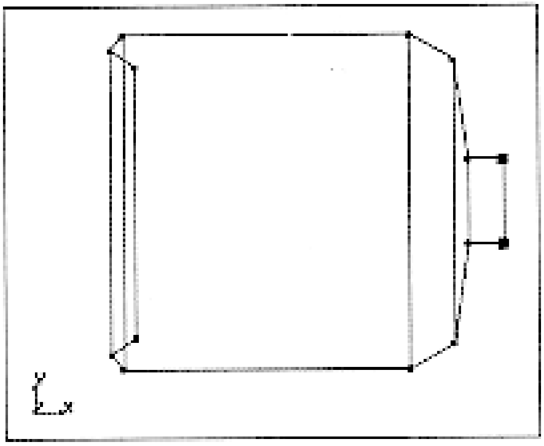


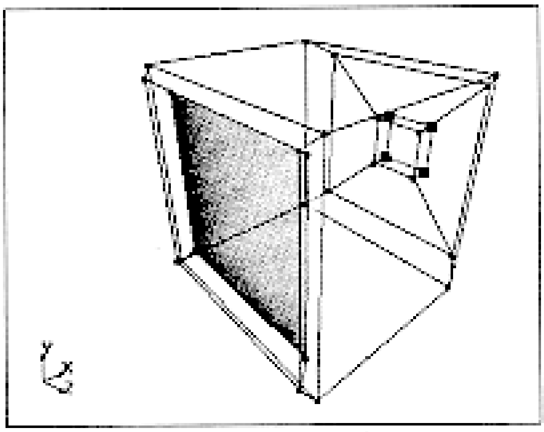
Tagging, Holes, and Extrusions

- Get a Primitive Circle with a radius of 15, and step of 32.
- Click on TAG mode in the mode selection menu.
- Tag every other set of two points starting at top of the circle (points 1 and 2, 5 and 6, 9 and 10, and so on).
- Click on the triangular tab in the Scale menu cells and enter 0.75 for X and Y.
- Switch to OBJ mode.
- Choose Draw → Convert to Face.
- Get a primitive circle with a radius of 3 (but less steps than previously defined, such as 8).
- Select the gear spline. Choose Draw → Attach Hole, then click on the smaller circle.
- With the face selected, choose Surface → Extrude. Make it a Polygon, and use the z-axis (default) with a step of 1 and a depth of 1. Select the Close check box if it isn't already active.
- Name the extruded object Gear1 in the Info → Selection dialogue box.
- Choose Display → Hide → Toggle Selection for the face of the gear.
- Choose Duplicate → Immediate for Gear1.
- Name the resulting object Gear2.
- Translate Gear2 26.5 units on the x-axis.
- Save the scene for use in the Motion section of lessons.

TV Set

Polygon Modelling



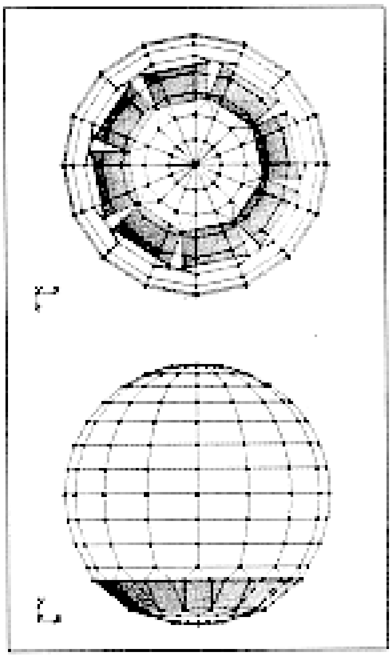


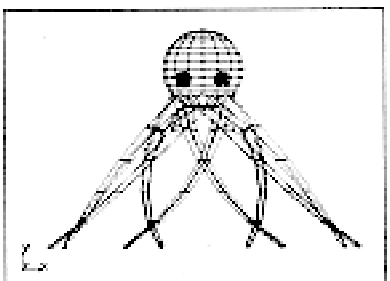
- In the Model module, choose Get → **Primitive** → Cube (default length is 10.0).
- Select a polygon on the cube by choosing **Polygon** → Select **Polygon By Rectangle**. With the left mouse button, drag a rectangle around the back (right side, Front view) polygon of the cube. Change from OBJ to POL mode, then choose **Duplicate** → **Immediate**.
- **Translate** and scale the new polygon in the positive x-axis (first and second illustrations).
- Build your TV model. Repeat the first two steps of Duplicate → **Immediate** and **Translate** for the remaining polygons. Note that the polygon for the screen is translated inside the cube to create the TV screen.

Note Be careful to have the proper polygon selected: use the Perspective view in full screen mode and orbit your camera around the TV.

- Deselect the polygon. Choose Polygon → **Select Polygon By Rectangle** and use the middle mouse button to deselect by dragging a rectangle around the polygon.
- Bevel your model by choosing **Effect** → Bevel. Accept the default values (bevel 0.1).
- Choose **Material** in the Matter module. Enter 0.2 for Diffuse, 0.48 for Ambient RGB, 250 as the Specular Decay, and 0.04 as the Reflection value.
- In the Model module, choose **Polygon** → **Select Polygon By Rectangle** and select the TV screen.
- Back in Matter, choose **Polygon** → **Assign New Material**. In the Material editor, select Constant Shading and accept the default values.
- Choose Get → DB **Exchange** and copy an existing flipbook in RENDER_PICTURE (jewel, for example) to a PICTURE file.
- Choose **Texture** → **2D Local**. Select Sequence, and select the flipbook that you just copied. Enter the correct frame range and select the YZ mapping method.
- Reposition the texture sequence. In TXT mode, reduce the scale to make it fit correctly on the "screen" polygon.
- Use a grid for the floor and define a light. Render a flipbook.

Octopus

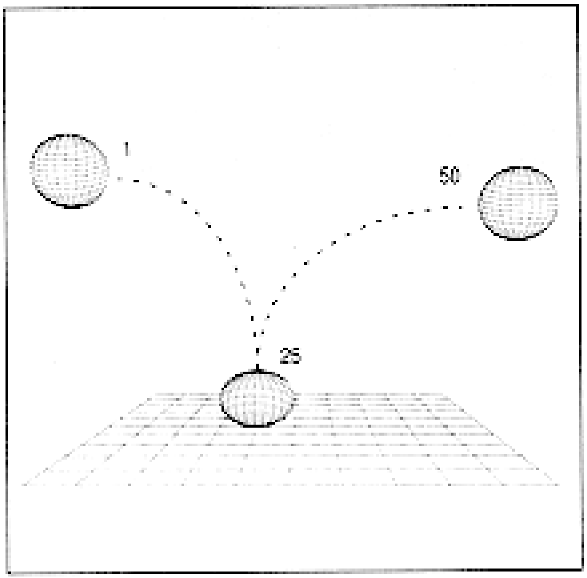




Polygon Modelling

- Choose **Get → Primitive → Sphere** as a Polygon with Radius 5, Longitude 16, and Latitude 16.
- In the Model module, choose **Polygon → Select Polygon by Rectangle**. In the Front window, draw a rectangle by clicking and dragging the cursor (left mouse button) around the third row of polygons from the bottom.
- In the Top window, deselect every other polygon by clicking and dragging with the middle mouse button.
- Click on Polygon mode (POL) in the mode selection menu.
- In the Top window, use the Supra Key x to scale the polygons uniformly until the corners closest to the centre touch (all three mouse buttons in XYZ or any mouse button in UNI). Refer to the second figure.
- Press Supra Key v to see the Translation manipulation selection. Click LCL.
- Press Supra Key c to see the Rotation manipulation selection. Click LCL.
- Press Supra Key x to see the Scale manipulation selection. Click XYZ.
- Choose **Duplicate → Repetition** to create five occurrences with these settings: Scaling X, Y, Z = 0.75, Rotating -15 on X, and Translating 4.0 on X and Y.
- Go back to OBJ Mode.
- Choose **Get → Primitive → Sphere**. Define it as a Patch, B-Spline, radius 1, and a step of 8 for Longitude and Latitude. In the **Info → Selection** dialogue box, name the sphere "Eye." Choose **Duplicate → Immediate**, scale it smaller to make the pupil, and name the new sphere "**Pupil.**"
- Pick the Pupil and choose the **Parent** menu cell. Parent it to the eyeball using the middle mouse button.
- Press the v Supra Key to translate the eye in the proper position.
- Choose **Effect → Symmetry** to duplicate the eye, and then parent both eyes to the body.
- Save your scene for use in the Actor section of the lessons.

Bouncing Ball



Keyframing, Function Curves

- Get a default grid and a B-Spline patch sphere with a radius of 1 unit.
- Activate the grid lock in the Front window using the Layout icon in the window's title bar (the little ruler icon).
- Change the mode to CTR (centre) and translate the centre of the sphere to its lower pole.
- In the Motion module, choose **SaveKey → Object → Explicit Translation** to record three key positions of the ball at frames 1, 25, and 50 (refer to the image).
- Play back the animation. You will notice that the ball seems to float. To give the ball more bounce, edit the function curves representing the translation of the ball (see steps below).
- Make sure the sphere is selected.
- Choose **FcrvSelect → Object → Explicit Translation** to display the function curve editor (the Fcurve window) and the function curve (fcurve) attached to the sphere.
- Press the space bar and click on the y fcurve (green). You can also click on the fcurve's name (sphere1.etrny) to select it without pressing the space bar. A selected fcurve turns white.
- Choose FcrvEdit → **Slope Management** (or click on SLOPE in the Fcurve window title bar) and click on keyframe 25 with the middle mouse button to break the slope.
- Choose FcrvEdit → **Edit Key Point** (or click EDITKEY in the Fcurve window title bar) and use the left mouse button to adjust the slope of the curve in and out of the key point. Play back the animation to evaluate your changes.

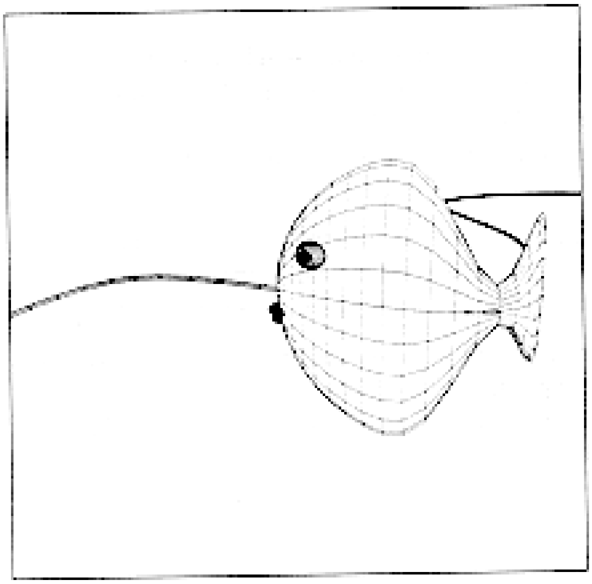
Your Name In 3D, Part 2

Keyframing, Rendering

- From your database, retrieve the scene created for Your Name in 3D, Part 1.
- Choose **Camera → Reset** and move your name to the centre of the Perspective window.
- Choose **Get → Primitive → Null** and parent the letters together as children of the null.
- Set the end frame of the time line to frame 30 and move the time line pointer to frame 30.
- Save a first keyframe by choosing **SaveKey → Object → Translation** in the Motion module.
- Move the time line back to frame 1.
- Move your name on the positive z-axis toward the camera until it is off the screen in the Perspective window.
- Save a second keyframe by choosing **SaveKey → Object → Translation**.
- Play back the animation.
- The path can always be edited to change the starting or ending position. Translation path is displayed by default (or use **Path → Show** to display the path) and use the Supra Key m to move the points of the path.
- Render the animation at a resolution of 400 x 300.

Note If the object is out of the camera's site, you will see a message "No Visible Triangles" – don't worry about it, unless all your frames do that!

Jojo the Happy Fish, Part 2

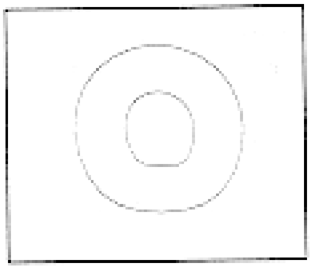


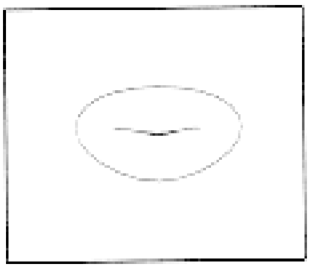
Spline Deformation, Keyframing

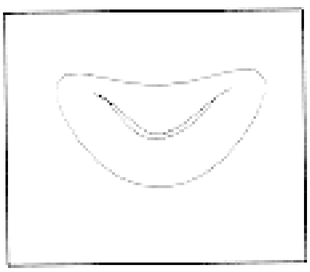
- Get the scene containing your model of Jojo (see Model Project: Jojo the Happy Fish, Part 1).
- Choose Display → Hide → Toggle Selection to hide the sea floor.
- In the Top window, choose Draw → Curve → Cardinal and draw a path for Jojo to swim along.
- With the middle mouse button, select the fish. Rotate the model by -90 degrees on the x-axis (necessary in this case to have the deformation appear correctly).
- Choose Effect → Freeze → Rotation.
- Choose Deformation → by Spline → Branch → Create and pick the path (without pressing the space bar).
- To scale your fish back to its original size, click on the triangular tab in any of the Scale menu cells. Make sure the values are all at 1 and select Set.
- Translate Jojo on the y-axis to make him swim gracefully. You will notice that the spline path has in effect become the y-axis for the model.
- To create an animation of Jojo swimming, make sure the time line is at frame 1.
- Bring Jojo back to the beginning of the path and save the first keyframe by choosing SaveKey → Object → Branch Spline Deformation → Translation.
- Move the time line to frame 100, translate Jojo to the end of the path, and save a second keyframe.
- Play back the animation.
- The path can always be edited by moving its control points.
- Save the scene for further work in the Matter Projects (see Matter Project: Jojo the Happy Fish, Part 3).

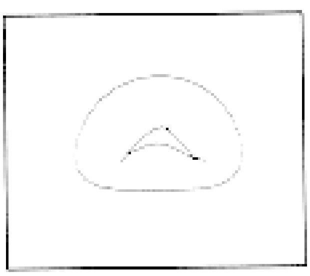
Tip For spline deformation, always align the model along the y-axis with the "nose" of the model pointing up, and the object should be at the origin. Then freeze all rotations before creating the deformation. Freezing the scaling will also prevent the object from moving beside the path.

Keep Talking









Shape animation

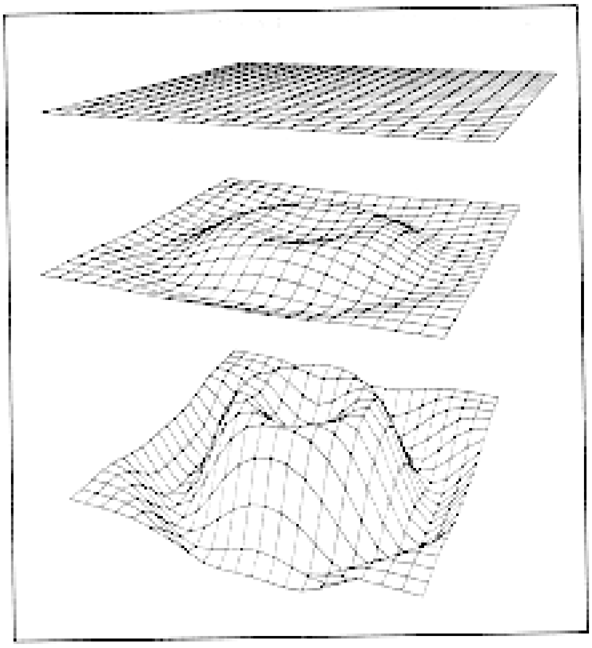
- Choose Get → Primitive → Torus and make it a B-Spline patch.
- Rotate the torus 90 degrees on the x-axis.
- Duplicate the torus three times using Duplicate → Repetition with a translation of 20 units along the x-axis.
- Change to TAG manipulation mode. Use the Supra Key t to tag points and modify each torus into a different mouth shape: an open mouth, a closed mouth, a smiling mouth, and a sad mouth.
- Change back to Object (OBJ) mode and select the closed mouth. Make sure that the time line is at frame 1 and save the first key shape by choosing SaveKey → Object → Shape.
- Move the time line to frame 20, and save the second key shape by choosing Shape → Select Key Shape and picking one of the three mouths. A key shape is automatically saved.
- In the same fashion, save a key shape using the other two mouths at frame 40 and 60.
- Go back to frame 1 and move the time line pointer to frame 80 using the right mouse button – that way the screen does not get refreshed. Save one last keyframe by choosing SaveKey → Object → Shape.
- Play the animation.

Tip To change the interpolation of the points between keyframes, choose Shape → Shape Interp.

To get a list of the different shapes or delete a shape, choose Shape → Shape List.

If a rotation is done on one of the lips, make sure to freeze the rotation – if it is not done, the animation won't work properly (all points are referenced by the centre location).

Hang Ten



Wave Overview

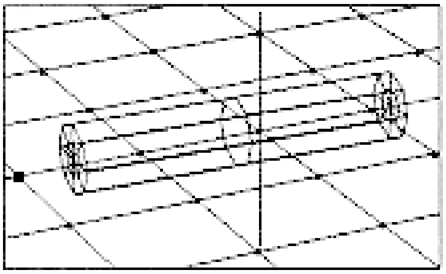
- Choose Get → Primitive → Grid as a B-Spline Patch using the default values.
- In the Front window, turn the Grid lock option ON and draw a B-Spline curve using these coordinates as control points:

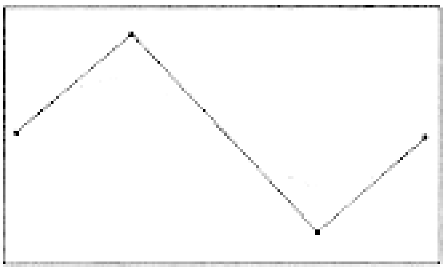
#1	X = -2	Y = 0	Z = 0
#2	X = -1	Y = 1	Z = 0
#3	X = 1	Y = -1	Z = 0
#4	X = 2	Y = 0	Z = 0

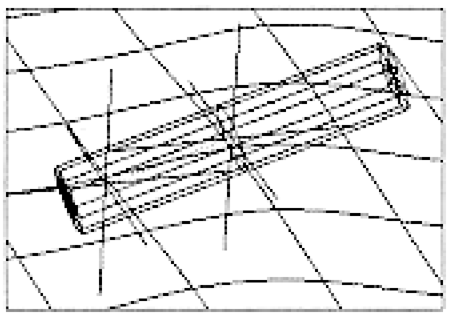
  That is, first control point at X = -2, Y = 0, Z = 0, second control point at X = -1, Y = 1, Z = 0, etc.
- Choose Effects → Wave → Create. In the Define Wave dialogue box, use all the default values and confirm by clicking Ok. A wave icon appears automatically.
- Choose Effects → Wave → Attach → Node and pick the primitive grid (without pressing the space bar).
- Select the Shade view mode in the Perspective window and play the animation.
- Experiment by scaling, rotating, or translating the wave icon to obtain different results.
- Experiment with other types of waves: planar, circular, and spherical.

Tip You can modify point locations numerically with Edit → Coordinate in the Model module.

Lumber Jack



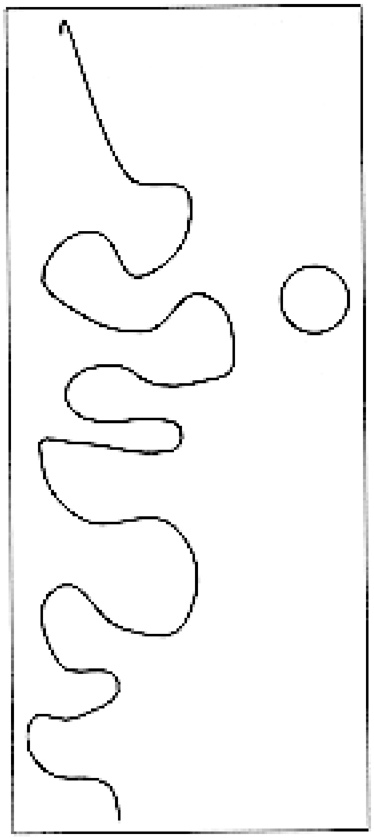




Waves

- Create a water surface by choosing Get → Primitive → Grid. Select a Cardinal Patch grid.
- Create a log by choosing Get → Primitive → Cylinder.
- Get a null by choosing Get → Primitive → Null.
- Position the log (cylinder) on the water surface (patch grid). Rotate and freeze.
- Tag a point on the grid in front of the log. Choose Shape → Set Cluster and call it "nullconstrain."
- Constrain the null to the cluster with Constraint → Object to Cluster (select the null and then select the grid).
- Untag the first point, and then tag a different point on the grid under the log. Choose Shape → Set Cluster and call it "logconstrain."
- Constrain the log to the cluster with Constraint → Object to Cluster (select the log).
- Constrain the direction of the log to the null using Constraint → Direction, then select the grid again.
- Show the centre, select the log, then constrain the direction, and select the null.
- Create a wave: draw the profile of the wave with a B-Spline curve (see the second illustration). Choose Effects → Wave → Create, then select a planar wave. Attach the wave to the grid by choosing Effects → Wave → Attach → Node. Scale the wave icon so it covers the whole grid surface.

The Digestive System



Waves

- Choose Get → Primitive → Circle and select B-Spline.
- Draw a B-Spline curve that looks like an intestine and be sure to make lots of control points (use the Front view).
- Create a linear curve going from 2, 0, 0 to 0, 2, 0. Note that the curve should be in the positive side of the y-axis since the negative side is only for the "after-effect" of a wave.

An extrusion for the intestine:

- Make sure modelling relation is off (the default).
- Extrude the circle along the spline.

Note Scale and freeze the circle if necessary – it should be about the size of the illustration.

Then a wave:

- Select the linear curve (the diagonal line).
- Choose Effects → Wave → Create. Select the spherical type of wave and set the velocity to 0.
- With the wave icon selected, choose Effects → Wave → Attach → Node and click on the extrusion (intestine).
- With the wave icon still selected, choose Path → Pick Path and click on the original spline (the intestine profile). Click Ok in the dialogue box.

Then tweak:

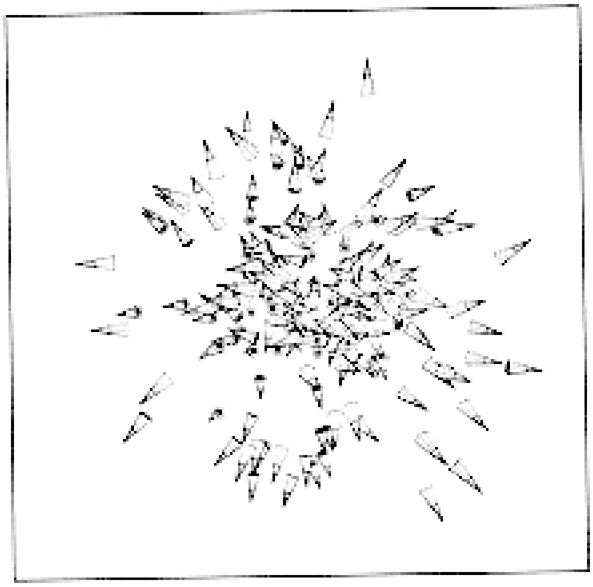
- With the wave icon selected, choose FcrvSelect → Wave → Decay. Make that fcurve flat at 1 on the y-axis (three points by default). Remove the two zero key points.
- Play back the animation.

Tip Try to put two waves on the same object.

Try to play with the scaling, and key it.

If you have the custom effect Draw → Curves → Resample +, use it on the intestine profile curve before extruding.

Sparkles



Flock Overview, Material Animation

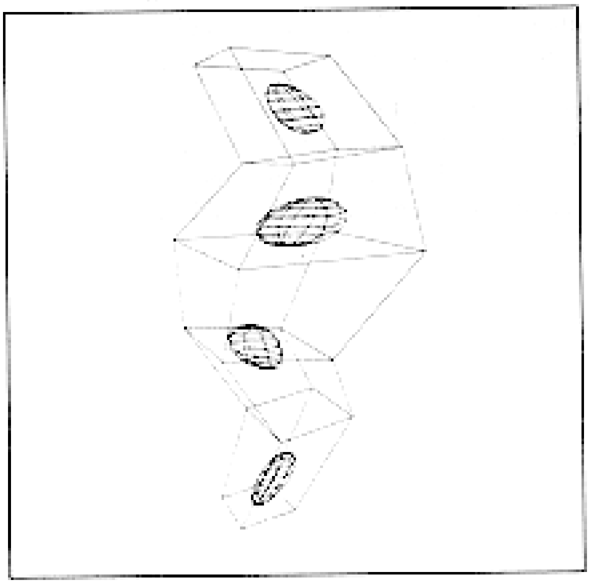
- Choose Get → Primitive → Sphere and choose a Polygon with a Radius of 2.
- Choose Duplicate → Immediate. Scale the duplicate sphere by a factor of 6 times on all three axes.
- Choose Get → Primitive → Cone using the default values.
- Scale the Cone to 0.2 units on all three axes.
- Choose Effect → Freeze → Scaling in the Model module.
- Make sure the time line is at frame 1. Choose Material in the Matter module. The Material Editor dialogue box appears.
- Use Lambert shading and make the object yellow by assigning a value of 1 to both Red and Green, and a value of 0 for Blue. Save a material keyframe by clicking on the Key button.
- Move the time line to frame 15. Make the object red and fully transparent. Save a second keyframe.
- Choose Effects → Flock Animation in the Motion module. In the Flock Animation dialogue box that appears, edit only these parameters:

Number of Particles:	50
Destination Seed:	45
Stop Frame:	15
Repetition:	8
Frame Offset:	2
Seed Offset:	3
Hide Before Start:	ON
Interpolate Materials:	ON

- Accept the setup by clicking Ok. Pick the small sphere as the Source object, the larger sphere as the Destination object, and the cone as the Particle object. SOFTIMAGE 3D will then generate the number of repetitions specified.
- Play back the animation and render a small flipbook.

Note Before rendering, hide the two spheres.

Sliding Blob

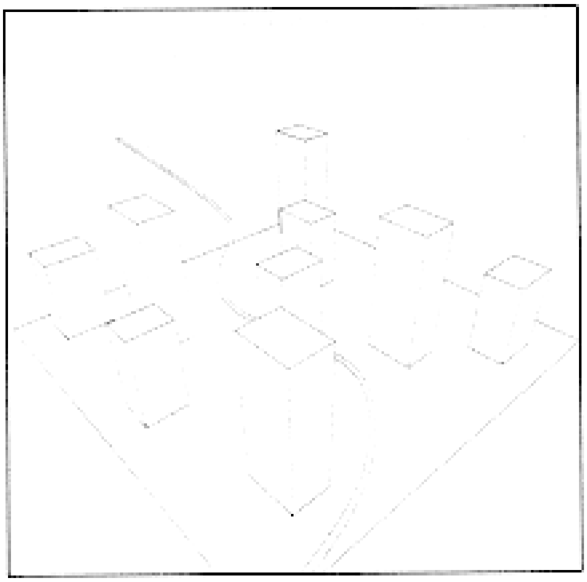


Lattice Deformation, Keyframing

- Get a B-Spline Patch sphere with a radius of 1 unit and a cube of length 4.
- Scale the cube up by a factor of 3 on the y-axis.
- Make the cube the parent of the sphere.
- Assign a branch lattice to the hierarchy by using Lattice → **Branch** → **Create** with a Curve interpolation. Using a Curve interpolation will let you achieve a smoother deformation when animating the lattice and the sphere.
- Change to TAG manipulation mode and transform the control points by using the Supra Key t to tag points on the lattice. This will deform both the sphere and the cube. Use the illustration as a basic reference for tagging, scaling, translating, untagging, etc.
- Press the space bar while selecting the cube, and make it invisible by using **Display** → **Hide** → **Toggle Selection**.
- Select the sphere and animate its position along the y-axis by saving two keyframes with **SaveKey** → **Object** → **Explicit Translation**.
- Play back your animation and render a small flipbook.
- To add animation to the lattice itself, use **Display** → **Hide** → **Unhide All** to show the lattice.
- Select the lattice as a branch using the middle mouse button while pressing the space bar.
- You can then tag points on the lattice and create keyframes by using **SaveKey** → **Object** → **Branch Lattice**.
- Play back your animation and render a small flipbook.

Tip Lattice animation allows you to animate the shape of the lattice and therefore add the animated deformation to any object included in the lattice. For example, you could create bubbles rising from a sea floor by animating a group of spheres and using lattice animation to add the effect of water currents.

City 1

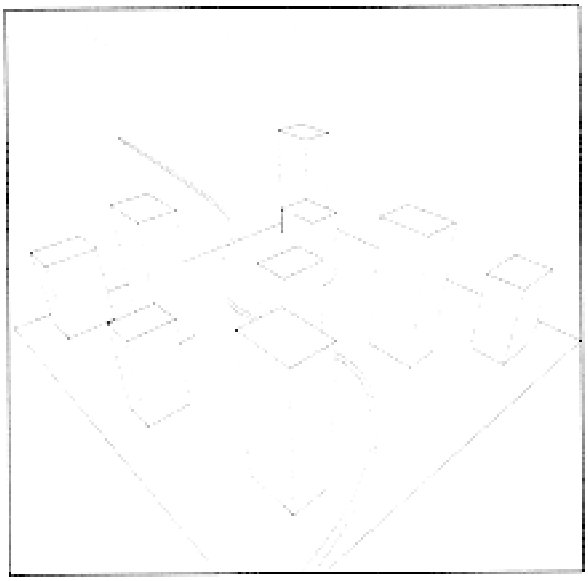


Camera, Path Animation

- Create ten cubes and a simple grid to create a cityscape.
- Draw a Cardinal spline path that goes through the city.
- Change the end frame of the time line to 300 frames.
- To show the camera, choose Display → Hide → Unhide All or make one of the window views a Schematic view. Select the Camera object in the Front view or the node called Camera1 in the Schematic view. You can also select the camera by choosing **Camera → Select Camera.**
- Animate the camera along the path by choosing Path → Pick Path in the Motion module and picking the spline path. Accept the default values by clicking Ok.
- Play back the animation. You will notice that the camera is following the path, but the camera interest stays fixed.
- To animate the camera's point of interest on the same path, select the node called cam_int1 in the Schematic view.
- Choose Path → Pick Path and pick the spline path again. This time, change the values to start at frame -20 and end at frame 280.
- Play back the animation. The camera interest is now travelling along the path slightly ahead of the camera itself.

Tip To see more of the city scene while *flying* the camera, choose Camera → Settings to increase the Camera Lens - Custom angle (Field of View) setting of the lens, or interactively set this by zooming in the Perspective view.

City 2



Channels

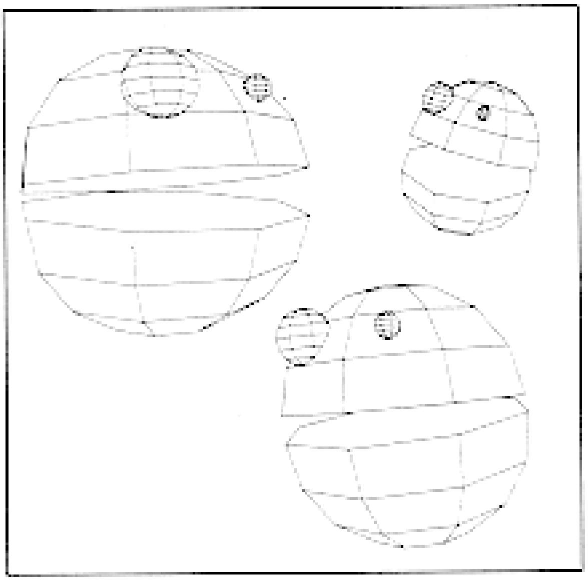
- Use the city scene and camera path you created in the City 1 lesson.
- Make sure the camera and the camera interest are animated along the path.
- Choose **Channel → Channel Setup**. There should be an active mouse driver with two channels, one for the x-position and another for the y-position. Click Ok to accept the settings.
- Choose **Camera → Select Camera**.
- Choose **Channel → Connection Setup** and select the CAM Camera1.cmtrs function curve and the CHN 1 mouse.xpos channel. Select the -> Connect -> button to set the connection. Enter 100 in the Scaling text box and then click Ok.
- Open the Connection Setup dialogue box again. Now select the CAM Camera1.cmitrs function curve and the CHN 1 mouse.xpos channel. Select the -> Connect -> button to set the connection. Enter 100 in the Scaling text box and 5 in the Offset text box. Click Ok to finish the setup.
- Enlarge the Perspective view and choose **Channel → Capture/Control → Frame I/O**. As you move the mouse from left to right, the camera will travel along the path. Click the right mouse button to exit the Frame I/O mode.
- In Multi mode, choose the **Select → All** command.
- You can also create an animation by capturing motion through channels. Make sure the current frame is set to 1 and choose **Channel → Capture/Control → Sequence I/O**.
- Click the left mouse button to start the countdown. At the beep, you can start moving the camera along the path. A function curve will automatically be recorded as long as the time line pointer is moving.
- Play back the animation. You can view the function curves by choosing **FcrvSelect → Camera → Position** or **FcrvSelect → Camera → Interest**.

Tip

You could also experiment with the roll of the camera by connecting the cmroll function curve with the mouse.ypos channel. Since it can be difficult to control both position and roll at the same time, you should animate these two parameters one after the other.

Choose **Effect → Alignment** to make all the buildings flush with the "ground," or move the centre of the first cube to the bottom of the object before duplication.

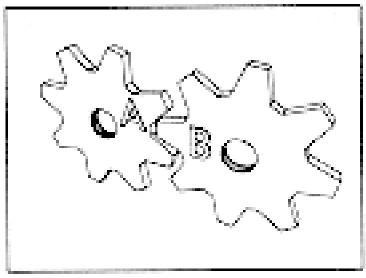
Bla bla bla...

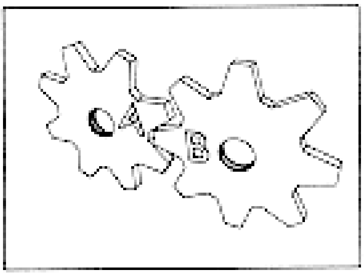


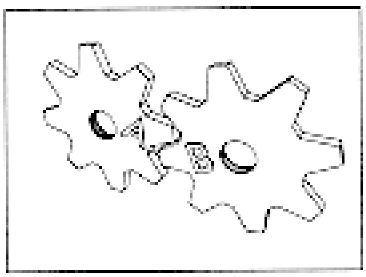
Channels

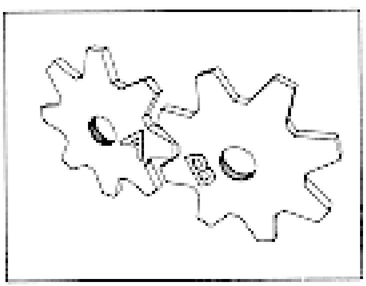
- Choose **Get → Primitive → Sphere** as a Polygon using the default values.
- Choose **Effect → Plane Clipping** in the Model module. This cuts the upper half of the sphere above the x-axis.
- In the Layout dialogue box, activate the Grid Lock option.
- In Centre (CTR) manipulation mode, move the centre of the hemisphere 5 units in negative Z. The centre should now be on the right side of the hemisphere. Deactivate the Grid Lock option.
- Go back to Object (OBJ) mode and choose **Duplicate → Repetition** to duplicate and rotate the hemisphere. Set the duplicate number to 1, and 180 degrees around the x-axis.
- Choose **Effect → Freeze → Rotation**.
- Create the eyes of the character, then assemble a hierarchy where the upper hemisphere is parent of both eyes.
- Choose **Get → Primitive →** Null and make it the parent of the top and bottom half of your character.
- Select the upper hemisphere as a branch and choose Channel → **Connection Setup** in the Motion module.
- Connect the sphere2.rotx function curve with the CHN I mouse.xpos channel. Set the scaling to -30.
- Select the bottom hemisphere and choose Channel → **Connection Setup**.
- Connect the sphere1.rotx function curve with the CHN 1 mouse.xpos to channel. Set the scaling to 30.
- Select the entire hierarchy as a tree.
- Choose **Channel → Capture/Control → Frame I/O** and move the mouse horizontally to animate the character interactively.
- To record your animation, make sure the time line pointer is at frame 1 and choose **Channel → Capture/Control → Sequence I/O**.

Expressing the Gears



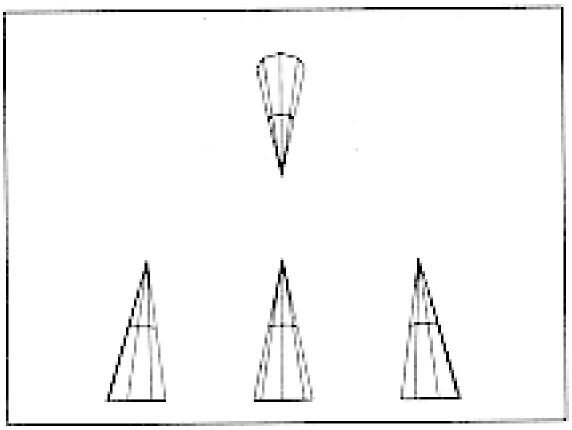






Expressions

- Get the Gears scene created in the Model section, and then in the Motion module, select the object called *Gear2*.
- Choose Expressions → Edit.
- In the Expression Editor, the name of the Affected Element appears followed by a period (.).
- Click on the Fcurves button to access the fcurves to be affected. Click on rotz, then click Ok.
- Click in the Expression text box.
- Click on the Scn Elements button and select Gear1 from the list.
- Using the Fcurves button again, assign the rotz expression.
- Click at the beginning of the line and type a dash (-) followed by a space.
- Click Validate, then Ok.
- Select Gear1 and rotate it on the z-axis.
- To offset Gear2, select it and choose Expressions → Edit.
- At the end of the Expression line, type - 12. Click Validate, and then Ok.
- Again, select Gear1 and rotate it on the z-axis.



The Meter

Expressions

- Get four simple cones. Place one at 0, 0, 0, and place the second one at 10, 0, 0. Call these two cones "border1" and "border2." Place the third one at 5, 0, 0, and name it "sheep." Take the fourth, rotate it by 180 in the z-axis, move it to 5, 10, 0, and name it "lead."

Tip Make sure to name the cones correctly because expressions are case sensitive.

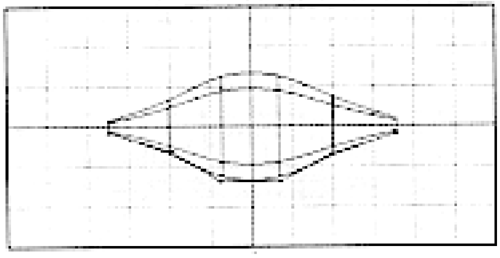
- Select the cone named "sheep" and then choose Expressions → Edit in the Motion module. In the Affected Element text box, you will see the name of your object followed by a period (.).
- Now click on the Fcurves button and select the etrnx fcurve. This will tell SOFTIMAGE 3D that you want the expression to modify the movement of the sheep on its explicit translation for the x-axis.
- In the Local Variables section, there are four text boxes:
  - In the A text box, type `border1.etrnx`
  - In the B text box, type `border2.etrnx`
  - In the C text box, type `lead.etrnx`
- In the Expression text box, type the following:

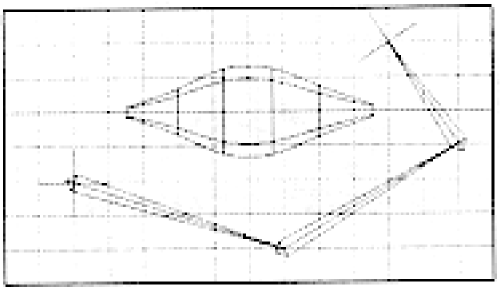
```
cond( C>A && C < B, C, cond(C<A,A,B))
```

Note This command line can be read as a standard "IF THEN ELSE" statement.

- Click on the Validate button. If the expression is valid, click Ok.
- Animate the lead - move the border.

Flex 1



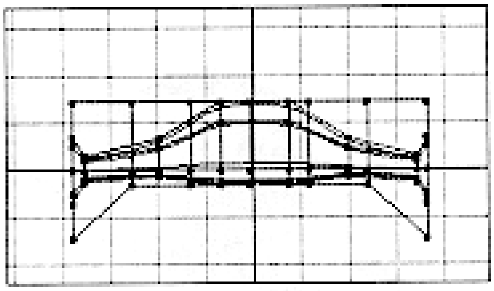


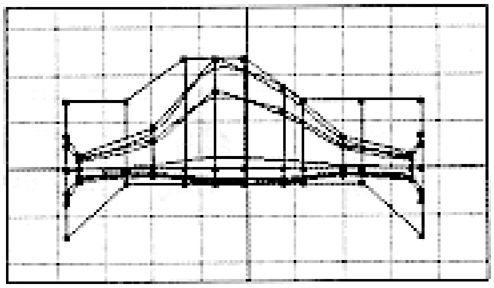
Revolution and Chains

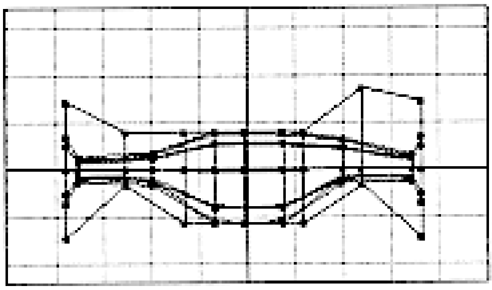
To do the lesson, you need two objects: a muscle and a bone structure. The muscle is a basic patch deformed by a lattice, and the bone structure is, of course, a skeleton.

- The muscle is created using a revolution on a spline. Use the Revolution dialogue box to create your muscle using the x-axis. The centre of the muscle should be at an extremity.
- The muscle should be around 7 units long and have a radius of 0.5 units. Rename your muscle "muscle."
- For the bone, create a three-joint skeleton that relates to your muscle.

Flex 2

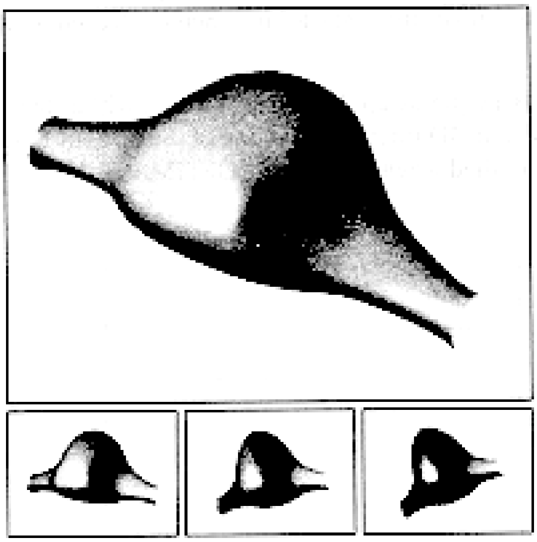






Expressions

- You now need to create a lattice on your muscle. Refer to the three pictures here to create a lattice animation using a default node lattice. The pictures relate to frame 1, frame 50, and frame 100.



Flex 3

Expressions

- Place your muscle around half way of the first joint and make it a child of that joint (jnt1_1). You may need to rotate the muscle a bit.
- Select the Muscle object and choose **Expressions → Edit**. Enter the following expressions, use the Validate, Fcurve, and Sen Element buttons to speed up your process and reduce your typos (sic).

  To enter several expressions for the same object, you need to use the Next button.

ELEMENTS	EXPRESSIONS
Muscle.rotz	jnt1_2.rotz / 2
Muscle.scalx	1 - (abs(jnt1_2.rotz) / 180)
Muscle.ltnode	jnt1_2.rotz / 70

Note Refer to the Schematic view to verify the joint names.

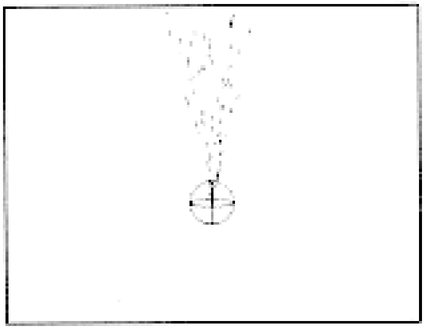
- Now assign an expression for the colour of the muscle. To do so, give the object a colour... a nice pale blue will do.

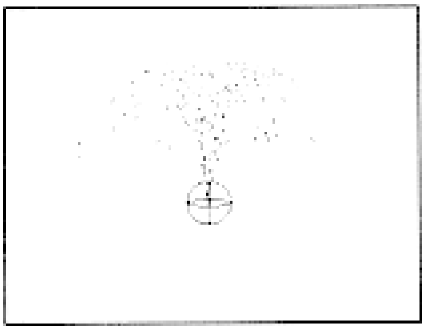
  Diffuse R: 0.7
  Diffuse G: 0.83
  Diffuse B: 0.83

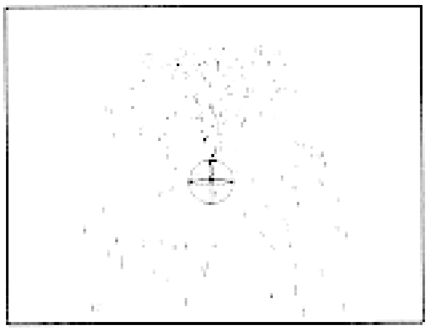
- Once the material is given, in the Schematic view in Matter mode, select the material trapezoid of the muscle. Choose **Expressions → Edit**, and enter this set of expressions:

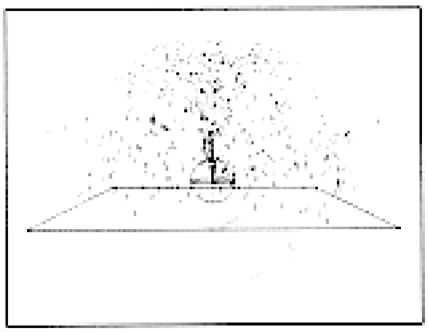
ELEMENTS	EXPRESSIONS
Muscle.mtdifg	1.0 - jnt1_2.rotz / 180
Muscle.mtdifb	1.0 - jnt1_2.rotz / 180

- Use the Copy and Paste buttons to copy the expression.









La Fontaine de Jouvence, Part 1

A Pixel-based Particle System

- In the Particle program, set the End frame to 9999 (so that the playback keeps going).
- Select the Source module and rename the Source object to "S1".
- Adjust the Spread to 3.0

Tip Make sure to press Enter after typing in all values within Particle, or they might not get accepted.

- Adjust the Speed to 6.0
- Select Color and set the color to a light blue: R=0.2, G=0.5, B=1.0, A=1.0
- Activate the Color shift.
- Set the Color to pure white: R=1, G=1, B=1, A=1
- Add a Gravity field by pressing F9, and set the Strength to 3.
- Select the File module and Setup, and deactivate the Display grid.

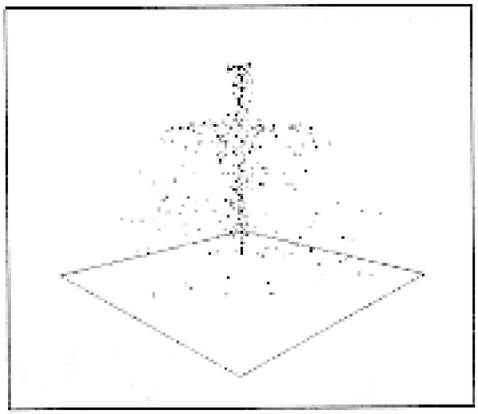
Add a new obstacle

- Select the Obstacle module, then select New and give a name to the new obstacle such as "first."
- Scale the SQUARE obstacle to X=12, Y=1, Z=12.
- Position the SQUARE obstacle at X=0, Y=-1, Z=0. Make sure that the Y position is negative 1 (-1), so that it is below the source.
- Play back the sequence: at this point the particles should be emitted from the Source and bounce off the square obstacle while the color changes from blue to white.

Copy the previous particle and change its color

- Select the Particle module and rename the Particle_0 to "P1."
- Select Copy and rename Particle_1 to "P2."
- Remove the Color shift and set the color to white: R=1, G=1, B=1, A=1

La Fontaine, Part 2



Particles

Modify the decay parameters

- In the Source module, under the Particle subsection, select Decay.
- In the Decay Parameters dialogue box, select Add.
- Select P2 and then Ok.
- Set the Number to 3, set the Speed to 2, and click Ok.
- Select the Source module again and the New button. Rename the new Source to "S2."
- Adjust the Rate to 40, the Spread to 0.05, and the Speed to 7.0.
- Use P1 as the Particle.
- Play back the sequence: two streams should be created.

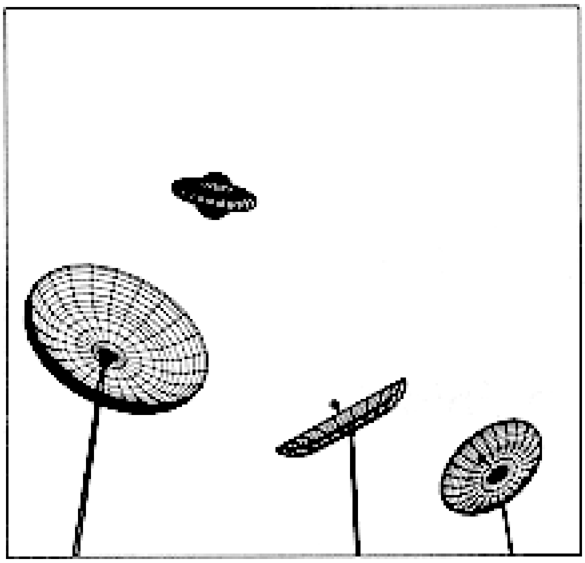
Preview with a flipbook

- Choose File → Render.
- Adjust the end frame to 150.
- Preview.

Render to disk

- If you have time, render the sequence of images to your database.

Alien Invasion

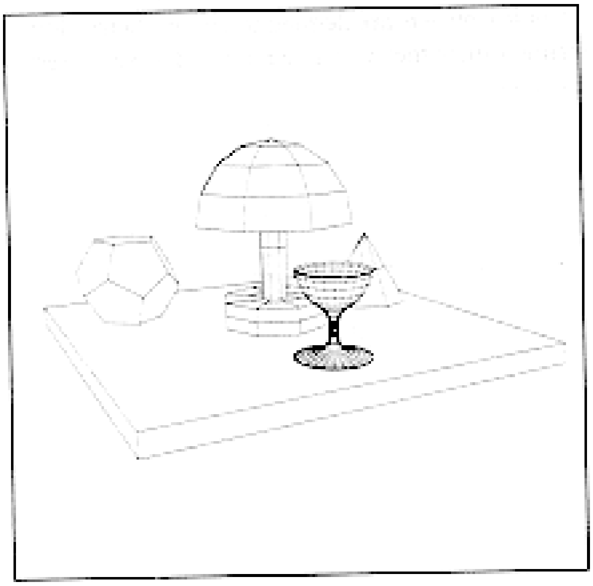


Direction Constraint

- To create this scene, you need one inter-stellar T-20Z twin turbo UFO and four HJX-106 parabolic antennas.
- In the Front view window, create the UFO from a simple B-spline and choose the **Surface → Revolution** command.
- In the Front view window, create the parabolic dish from a simple B-spline and use **Surface → Revolution** again.
- Choose **Get → Primitive → Cylinder** and **Sphere** to create the receiving antenna on a pole.
- Create a logical hierarchy so the dish is parent of the receiving antenna and the pole is parent of everything.
- In Centre (CTR) mode, rotate the centre of the dish 90 degrees on the z-axis so that the x-axis (red) becomes parallel to the receiving antenna.
- Choose **Duplicate → Repetition** and make two copies with a Translation of -25 units on the z-axis.
- With the middle mouse button, select the dish of one of the parabolic antennas.
- Choose **Constraint → Direction** in the Motion module, and pick the UFO. The dish and the receiving antenna should now be pointing toward the UFO.
- Repeat the same operations on the other two antennas.
- In Shade mode, move the UFO in space.

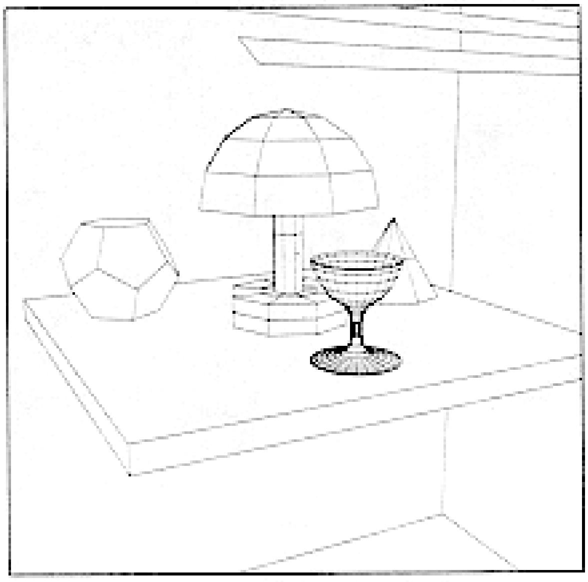
Tip The Direction constraint always constrains an object using its x-axis, so the centre of the object needs to be oriented properly.

What's the Matter? Part 1



Matter Overview

- Choose Get → **Primitive** → Sphere and make it a Polygon with a Radius of 3 units. Use **Effect** → **Plane Clipping** to cut the sphere. Rotate the hemisphere 180 degrees and move it up by 4 units.
- Choose Get → **Primitive** → Cylinder with a Radius of 0.5 units. Translate the cylinder up by 3 units. Duplicate the cylinder and scale it by 4 on the x and z-axes, and by 0.2 along the y-axis. Translate it down to form the base of your lamp.
- Make one of the cylinders the parent of the other cylinder.
- Finish the scene by adding a table and several objects on the table, such as the wine glass created in Model projects.
- Place a light inside the hemisphere by using **Light** → Define and specifying a Point light type with Raytraced shadows.
- Preview the scene by using **Preview** → **All** in the Matter module.
- Select the cylinders as a tree and choose the Material menu cell to open the Material Editor. Change the Shading Model to Blinn and the Diffuse colour values to Red = 0, Green = 0, and Blue = 0.2. Select the Ambient colour option and change all colour values to 0.2. Increase Reflectivity to 0.8 and click Ok to confirm all the settings and exit the Material Editor.
- Preview the scene by using **Preview** → **All**. You will see that the lamp now has a chrome base.
- Select the hemisphere and open the Material Editor. Change the Shading Model to Constant and the Diffuse colour values to Red = 1, Green = 1, and Blue = 0.9. Set the Transparency to 0.1 and click Ok to confirm all the settings and exit the Material Editor.
- Select the wine glass and change its material to Phong with a black Diffuse colour. Set the Reflectivity to 0.5, the Transparency to 0.8, and the Refractivity to 1.2.
- With the help of the Material Editor, define new materials for other objects in the scene. Preview the scene by using **Preview** → **All**.
- Save the scene for use in other projects.



What's the Matter? Part 2

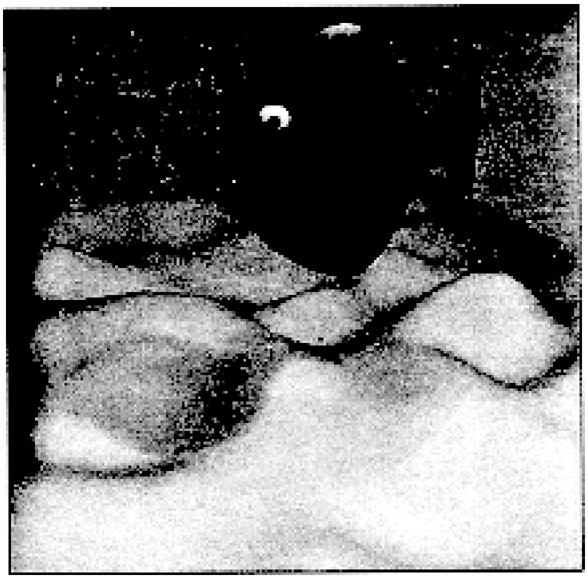
Rendering Techniques

- Retrieve the scene used in Part 1 of this project.
- Add a Spot light with Raytraced shadows and HLS values of 0.5, 0.5, and 0.3. Translate the light to position 5, 25, 5.
- To see the projected cone of light, use Show → Cone.
- Choose **Get → Primitive → Square**. Scale the square into a thin horizontal rectangle and then use **Effect → Freeze → Scaling** in the Model module on the rectangle.
- Choose **Draw → Convert to Face** on the rectangle.
- Duplicate the rectangle eight or ten times and use Parent to group all the copies to the original rectangle. You will use the grouped rectangles as a Venetian blind object.
- Move the Venetian blind to position 3, 8, 8 and rotate it by -50 degrees on the x-axis and 15 degrees on the y-axis.
- To prevent the Venetian blind from obscuring part of the scene, choose **Material** in the Matter module and change the Shading Model to Shadow Object. This will allow the object to be invisible but still cast a shadow.

Note In a hierarchy, a child that doesn't have a material automatically inherits the parent's material.

- Preview the scene by choosing **Preview → All**.
- To create a simple environment for your tabletop masterpiece, choose **Get → Primitive → Cube** with a length of 60 units and use **Effect → Inverse** in the Model module to reverse the surface normals of the cube towards the interior.
- Choose the **Material** menu cell to change the Shading Model to Lambert and assign a colour to the cube.
- To render a final image, choose the **Render** menu cell and click the Render Sequence button.
- When the rendering is complete, you can view the image by choosing **Picture** in the Tools module, and selecting the name of the file. Click the Display button to show the selected image and EXIT to leave the View Pictures dialogue box.

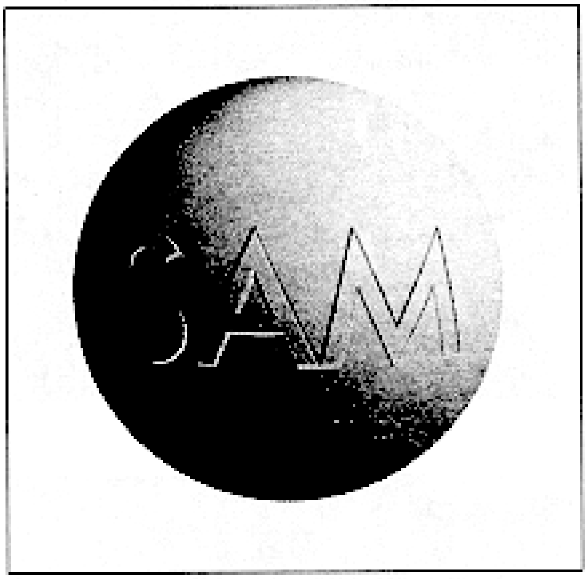
Jojo the Happy Fish, Part 3



Atmospheric Effects

- Retrieve the scene used in Part 2 of this project.
- Assign surface materials to the sea floor and to each component of the fish.
- Add a Spot light with Soft shadows, colour values of 0.5, 1, 1, a Cone Angle of 50 degrees, and a Spread Angle of 15 degrees. Translate the light to position 10, 50, 10.
- To create the effect of murky waters you will use depth-fading, but you must first determine the appropriate distance for the fading effect.
- Choose Camera → **Show Camera** to display the camera.
- Choose Info → **Distance** and use the middle mouse button in the Top window to click near the camera and then near Jojo. The status line will display the distance between the two points. You should obtain a distance of approximately 50 units. You want the depth-fading effect to start between the camera and Jojo, and to end between Jojo and the far edge of the sea floor.
- Choose Atmosphere → **Depth-Fading** in the Matter module to open the dialogue box. Activate the Depth-fading check box. Set the Starting Distance and the Ending Distance (find the right distance using Info → **Distance**). Change the colour values to 0, 0.5, 0.4, and click Ok to confirm your settings.
- Choose Preview → **All** to see the depth-fading effect (click the middle button to exit the preview).
- To enhance the underwater effect, use Atmosphere → **Ambience** and set the ambient light to a dark blue colour.
- Use the default material on Jojo's body, and then assign a 2D Global texture of bump-medium. This is found in the SI_MATERIALS database under BUMPS. Using the Select button beside the 2D Texture text box will call up both the picture and its set parameters. Change the Repeats to 1x1 instead of the 2x2 saved with the texture. Set the Mapping Method to UV Coordinates.
- Click the Paint button, then Smear and Wash the texture (use an appropriately large brush size). When you're happy with the image, click Ok in the 2D Texture dialogue box, and save the new map. Leave out the prefix and simply call the map "jojo." It will be saved in the default database in the PICTURES chapter.
- Change from OBJ mode to TXT mode and translate the texture (TransX menu cell) so that the red seam is at the top or bottom of the fish.
- Render a flipbook.

Your Name in 3D, Part 3



Bump Mapping

- Choose Get → Text and select a Font. In the Text box, type your first name. Select Ok to confirm the text entry.
- Use **Camera** → **Reset** to realign the camera. Move your name to the centre of the Perspective window.
- Choose **Material** in the Matter module, and change the Shading Model to Constant and the colour to pure white.
- Render an image of the scene with a resolution of 300 x 300 pixels. You will use the rendered image as a texture map.
- To use a picture file as a map, the file must first be moved from the RENDERED_PICTURES directory to the PICTURES directory. Use Get → DB Exchange to copy or move your image.
- Choose Get → Primitive → Sphere as a B-Spline patch.
- Choose **Material** and change the colour of the sphere. Choose **Texture** → **2D** Global and click on the Select button next to the Picture Filename text box. In the Database dialogue box, select your picture file and click Load. The picture will be displayed in the image box.
- Click the Preview button to see the texture map applied to the sphere. The picture is now applied as a colour map thereby changing the surface colour of the sphere.
- To use the picture as a bump map instead, change the Overall Blending to 0 and increase the Roughness value to 1.
- Click Preview and you will see your name embossed on the sphere. Experiment with different values of Roughness.
- Select Ok to confirm the texture map settings.
- Add a light with Ray Traced shadows (**Light** → **Define**).
- Create a short animation of the sphere turning and render a flipbook. You will notice that the embossing effect of bump mapping is a rendering trick only: it does not modify the actual surface of the underlying object's geometry.

Depth of Field

mental ray

Currently, the F-Stop values don't correspond exactly to a real 35mm camera. However, the three automatic values are all combined to determine the depth of field "look."

As with real lenses, the shorter the focal length, the greater the depth of field, and vice versa. Smaller F-Stop values yield a more pronounced out-of-focus effect. The default of 5.6 would be fine for a real lens, but for our purposes, try starting with 1.0 or 0.5 instead.

The mental ray rendered result is based on a traditional pinhole camera, as opposed to the SOFTIMAGE renderer which uses a post-processing type of effect.

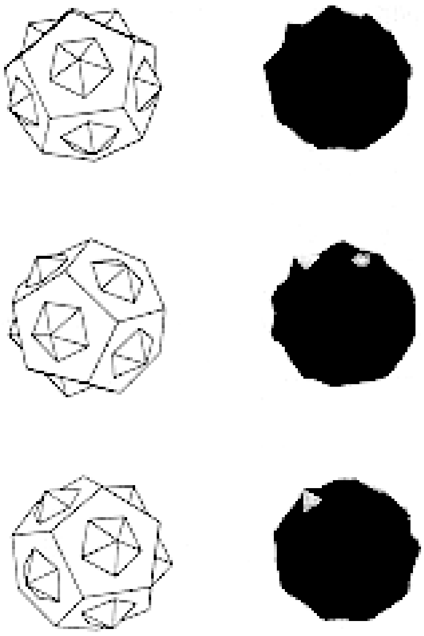
- Create a simple scene, or get a previous scene that seems appropriate such as Jojo the Happy Fish, Part 3.
- Select the camera and choose Camera → Settings. In the dialogue box, set the focal length to 400 and the F-Stop to 0.25.
- Make sure the camera is visible and choose Info → Distance.
- Click on the camera (left mouse button), and then a mid-point in the scene (middle mouse button).
- Enter this value in the Distance text box of the Camera → Settings dialogue box (the value is displayed in the status line).
- In the Render Setup dialogue box, change the Rendering type from SOFTIMAGE Renderer to mental ray.
- Change the Antialiasing values to Max Sample of 3.
- Render a few frames from the sequence to see the effect at different "depths."

Note The custom values for the camera lens should be used only for the SOFTIMAGE renderer, and the automatic values by mental ray.

Tip Modify the .rayhosts file to render on multiple machines/CPUs, and increase the Max samples value to at least 4 or 5 (preferably 6 or higher) when you have some pleasing distance and F-Stop values.

Filtering: The system will automatically set the Min Sample to a value of at least a difference of 2 with respect to the Max sample, so the minimum Min sample in this case would be 1 (Max at 3). The command line will reflect that fact.

Motion Blur



mental ray

You need to make a few modifications to any model on which you want to have motion blur. Each model has a motion blur flag that is set in the **Info → Selection** dialogue box. Inside that dialogue box, click the Render Setup button. There are three check boxes in the dialogue box that appears, and by default every new object is set to None. This needs to be changed to Linear or Exact.

- Get two primitives: a default Dodecahedron and an Icosahedron.
- Select the Dodecahedron and choose **Boolean → Static**. Click Ok in the dialogue box to confirm the default parameters, which will create a union between these two objects.
- Choose **Display → Hide → Hide Unselected**.
- Choose **Polygon → Automatic Colourize** in the Matter module.
- Modify the individual material values to your liking – at least change each color to Lambert shading instead of Phong.
- Select the jewel and choose the **Info → Selection** command to open the Polygon Info dialogue box. Change the Auto Discontinuity value to 44, then click the Render Setup button and change the Motion Blur option to Exact instead of None.
- In the Render Setup dialogue box (choose the **Render** menu cell), activate the Motion Blur option. In the Motion Blur dialogue box, click Active, and set the Shutter Speed value to 1. Zero will deactivate the blur effect. Mid-range values might be desired if the blur is too dramatic.
- Change the Start frame to zero, and the End frame to 30.
- Spin the object: save a Rotation keyframe at frame 0, then go to frame 30 and rotate the object 0, 720, 180.
- Render the sequence with a resolution of at least 200 pixels.
- Set the Antialiasing Max Samples to at least 3. Values of 2 or even 1 will work, but the result is quite coarse and probably won't look very realistic.

Tip

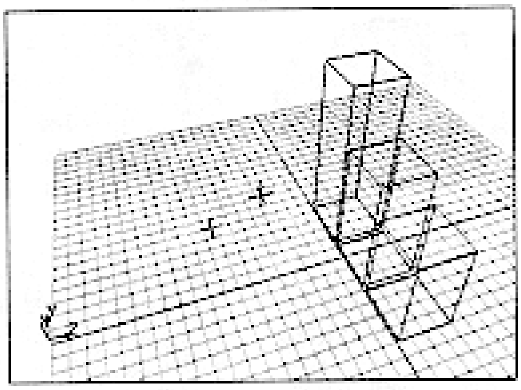
The first frame is never blurred.

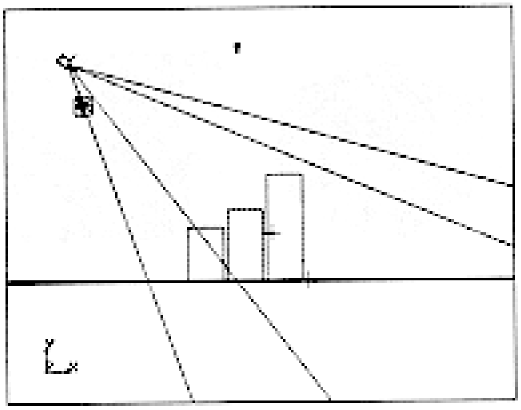
The shutter speed is always 1/frame rate, or by default 1/30th of a second when the shutter value is set to 1.

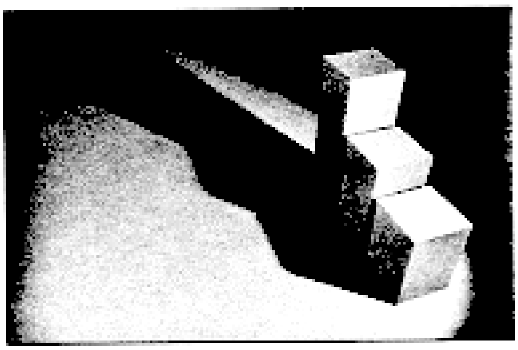
The SOFTIMAGE motion blur uses a geometry replication and transparency method, which doesn't always give desireable results.

Soft Shadows

mental ray







To obtain nice soft edge shadows, you will use area light sources that can only be point or spot-type lights (presently).

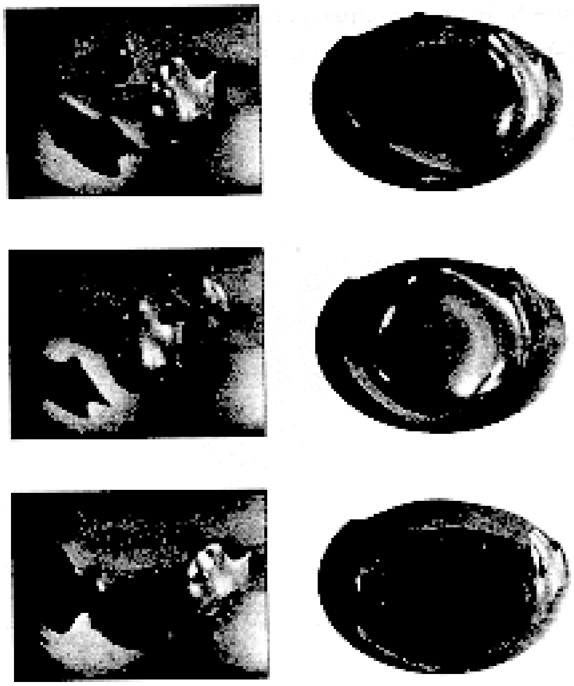
- Build a few cubes as seen in the first illustration on the left.
- Define a regular point light and accept the defaults (no shadows).
- Define another light, but make this one a spot light, and select the Area Light check box. Select Raytraced as the Shadows Type, and then set a low Umbra Intensity value such as 0.1.
- For the first few tests, you can leave the Area Sampling at the default of 3. If you're feeling a bit impatient, drop that down to 1 or 2 and/or decrease the preview size.
- Move the spot interest to the location in the illustration, but try to have an oblique angle to exemplify the effect of the soft edges.
- Orient the regular point light off to the left – opposite the spot light to give some ambient light to the rest of the scene.

The nice thing about the area light sources is the separate sampling values, so the sampling level of the whole scene doesn't need to be as high for high-quality renders. The example image only has a Max filter of 2, but has 6 for the light.

Tip Try rendering the same scene with the various filter effects (box/triangle/Gaussian) and compare the results.

A low filter light sampling value might be desired even for final rendering, which creates an interesting stippled look.

Render the same scene with the SOFTIMAGE renderer and the mental ray renderer and compare the results for fun!



Fish Eye

mental ray

Get a previously defined scene such as Jojo the Happy Fish, Part 3. This isn't an effect you would use every day, but fun to experiment with.

- In the Camera → Settings dialogue box, add the fisheye lens shader to the list.
  - In the Lens Shader area, click on the Select button.
  - Go up one directory level, choose the SI_Shader_Lib database, and then pick the "fisheye" shader.

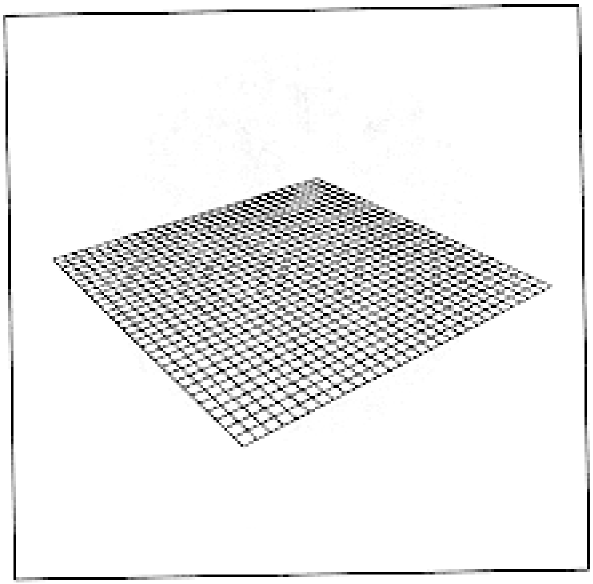
The fisheye shader should appear in the list and be active.

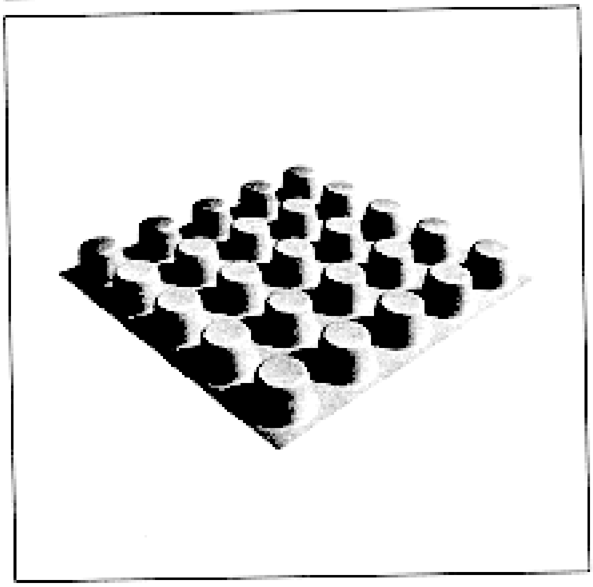
- Set the preview to mental ray, and preview the effect.

Tip Create a landscape horizon line and have objects move toward the camera, or across the field of view (above and below the horizon) to see the distortion effects.

You could look at the Edit dialogue box, and read about the effect (Info button), but there isn't much point in modifying the factor value. The Factor number just acts like a zoom or magnification to the fisheye effect, so leave it at the default 1.0.

Displacement Mapping





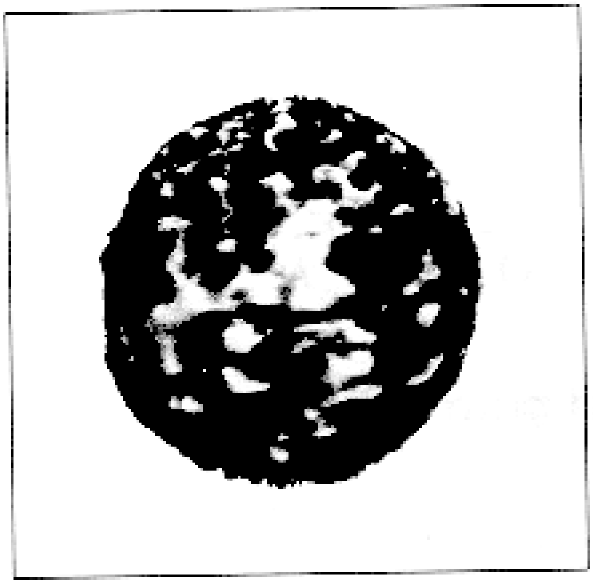
mental ray

The original idea behind displacement mapping was to "easily" create topographical information in 3D. Since we don't have a cool topographical map to show you, how about some bubble wrap?

- Get a primitive NURBS or Patch grid.
- Apply a Lambert-shaded material.
- Assign a global 2D texture "bump1" which can be found in the SI_MATERIALS system database under BUMPS.
- Set Alpha Channel Mask as the Blending choice.
- Use zero for both the Ambient and Diffuse values so that only the alpha information will be derived from the current map.
- Select XZ Coordinates as the mapping method.
- Set the Roughness slider value to approximately 1 and select the Displacement (mr) check box immediately above it. Note that in mental ray, this value is how many "units" the object will be displaced.
- Increase the map repetitions.
- Set the preview to mental ray, and preview the effect.
- This looks a bit too crude, so change the values within Info → Selection. Inside the Render Setup dialogue box, change the Adaptive setting from the default 5 to 2, and select pixels as the units to be used.
- Preview again.
- Add a shadow casting light and render to see that the geometry really has been modified. Increase the Displacement value quite a bit higher to 5 or 10, and watch the craziness!

Tip Depending on the quality level you want, mental ray provides numerous ways to determine surface resolution on patch objects. This might also be translated to polygon mesh objects in future versions.

The Asteroid



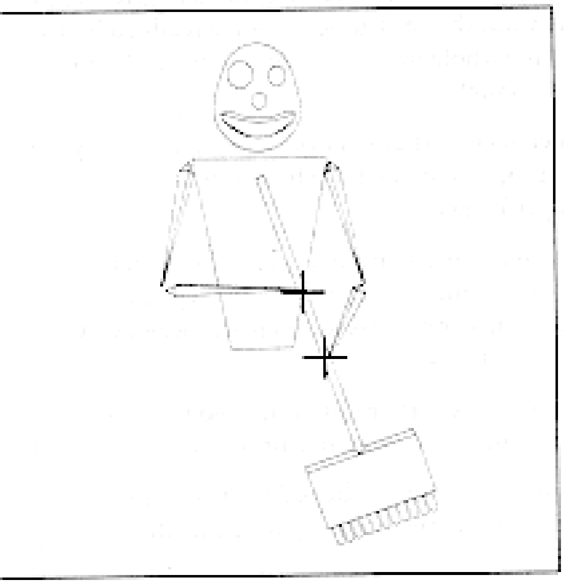
mental ray

- Get a patch sphere and make it 4 steps by 4 steps.
- In the **Info → Selection** dialogue box, click the Render Setup button. Change the Surface Approximation to Spatial, keep the default value of 5, and select Pixel length to define the units. Click Ok in both dialogue boxes.
- Give your asteroid a Lambert-shaded material.
- Open the 2D texture global dialogue box. In the Picture library, under the SURFACES directory, select the moon picture.
- Make the mapping method UV instead of XY Coordinates.
- Select the Displacement (mr) option above the Roughness slider. Adjust the roughness to 0.5, and accept the texture.
- Open the Render Setup dialogue box. Select the mental ray renderer type and render frame 1.

Tip Try to play with the roughness.

Add an area light.

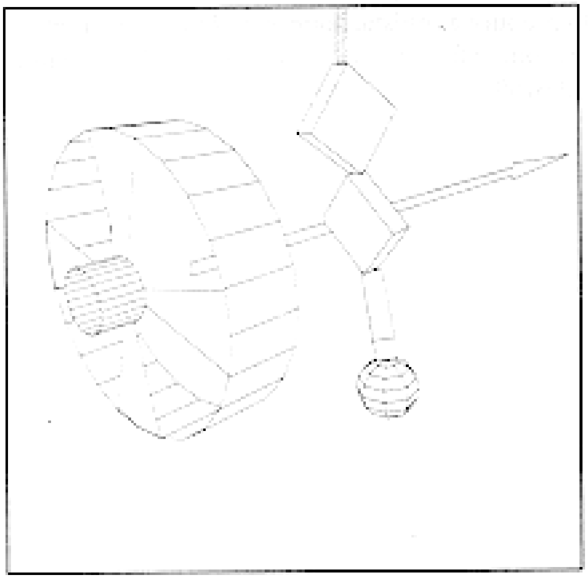
Happy Sweeper

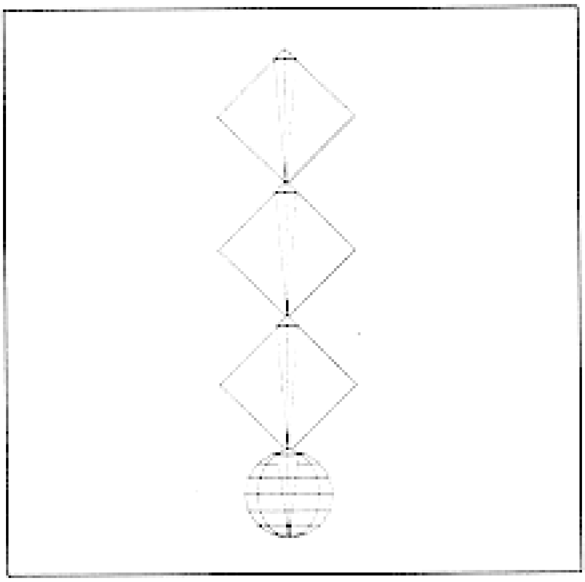


Constraints, Inverse Kinematics

- Create a simple character and a broom by using primitive objects.
- Choose Skeleton → Draw 2D Chain in the Actor module to make two arms. Click the right mouse button to end the chain drawing operation.
- Make the arms children of the body by using the Parent menu cell.
- Choose Get → Primitive → Null and add two nulls on the handle of the broom. The two nulls should be children of the broom. The nulls will define the position of the hands on the broom.
- Select the effector of one of the arms. The effector is the small cross icon (like a null) at the end of an articulated chain. Press the space bar and use the left mouse button to select it.
- Use Constraint → Position to constrain the effector of the arm to one of the nulls on the broom. Repeat this procedure with the other effector.
- Now select the handle of the broom with the middle mouse button and translate it. You will notice that the arms always hold the broom or try to reach for it if it moves too far away.
- Create an animation by saving keyframes for the broom. Use SaveKey → Object → Explicit Translation in the Motion module to do this.
- Play back the animation.
- Reset the broom's animation.

Tip Create an animation using channels. Connect the rotation and the explicit translation function curves of the broom to the mouse.





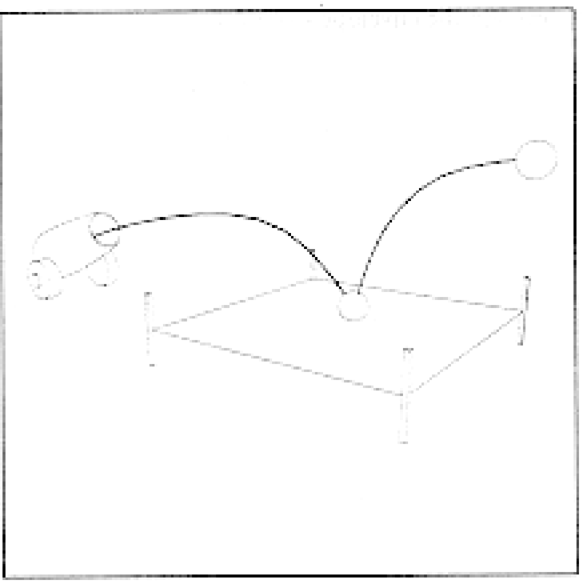
Wind Chime

Skeletons, Special Controls, Simulation

- Choose **Skeleton → Draw 2D Chain** in the Actor module and create a chain of four joints in the Front view.
- Get a primitive cube using the default values. Scale, translate, and rotate the cube to position it over the first joint of the chain.
- Duplicate the cube twice and move each copy over a joint.
- Get a primitive sphere as a polygon mesh. Scale and move the sphere over the fourth joint.
- Make every joint parent of their respective object.
- Select the chain with the middle mouse button and apply a default gravity factor by using **Dynamics → Physical Properties**. Confirm by clicking the Ok All button.
- Choose **Control → Get Special Control → Fan** and a fan icon will appear in the centre of the windows.
- Select the fan and position it to the front and left of the wind chime. Rotate the fan toward the wind chime. Scale up the icon about five times the current size using the (UNI) mode.
- Select the entire wind chime hierarchy by using the right mouse button. Choose **Control → Select** and pick the fan to assign it as a special control.
- Move the time line pointer to frame 1.
- Choose **Simulate → Save Start/End** to initialize the simulation. Choose **Simulate → Simulate (automatic)** to create the animation.
- Play the animation.
- To get a more dynamic animation, scale the fan larger to increase its force.
- Animate the fan by rotating it on the y-axis and setting keyframes. Make the animation of the fan a cycle. When a simulation is created, a normal function curve for the rotation is automatically created and can be edited at any time.
- Recreate the simulation and play the animation.

Tip To create a cycle motion of the fan, give three keyframes of rotation on the y-axis. The first and last keyframe should have the same values. Select the fan's y-rotation function curve in the function curve editor and choose **FcrvEdit → Extrap mode → Cycle**. The function curve should now be cyclical for the entire length of the animation.

Cannon Ball and Trampoline



Simulations and Collisions

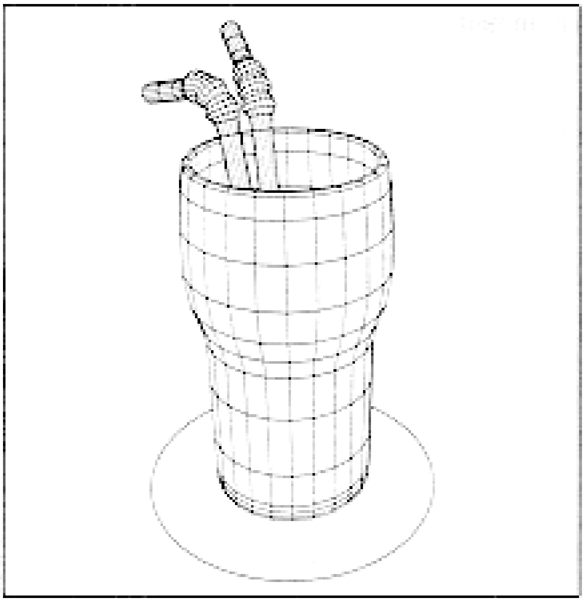
- Draw half the profile of the cannon using a Bezier spline (refer to the image). Use the **Surface → Revolution** command to give it volume.
- Add the wheels (refer to the image).
- Use a primitive grid and a primitive cube to build the trampoline (again, refer to the image).
- Copy, scale, and move the grid to create a floor.
- Position the cannon away from the trampoline on the x-axis.
- Get a primitive sphere (patch object). Scale the sphere until it fits in the mouth of the cannon.
- Set a keyframe for the sphere using **SaveKey → Object → Translation** in the Motion module with the sphere at the bottom of the cannon. Move the time line to frame 10, and translate the sphere about 20 units from the mouth of the cannon along the trajectory. Set a second keyframe.
- In the Actor module, assign a default physical property to the sphere by choosing **Dynamics → Physical Properties**.
- Move the time line pointer to frame 7 and save a starting frame for the simulation by choosing **Simulate → Save Start/End**.
- Create the first simulation by using **Simulate → Simulate (automatic)**. Play the animation.
- To adjust the trajectory of the cannon ball, simply scale the gravity vector and run the simulation again. Repeat this process until the sphere hits the trampoline.
- Use **Collisions → Select** to assign the trampoline as a Bbox Obstacle and the floor as a Bplane Obstacle.
- Create the simulation again.

Note

Choose **Dynamics → Physical Properties** and make sure the sphere is seen as a bounding sphere object.

Select the sphere and choose **FcrvSelect → Dynamics → Transition Curve** in the Motion module. As you can see, this curve varies between 0 and 1, with 0 representing keyframed animation and 1 the simulated animation, respectively.

Cheers!



Articulated Chains, Flexible Envelope

- Draw the profile of a straw using a Bezier spline. Refer to Figure 1 for the positioning of the control points.
- Make a B-Spline Patch object using **Surface → Revolution** in the Model module. Refer to Figure 1 to check the result.
- Activate the Grid Lock in the Front window's Layout dialogue box.
- Draw an articulated chain inside the straw using three joints by choosing **Skeleton → Draw 2D Chain** in the Actor module. Refer to Figure 2 for the position and direction of the chain.
- Select the straw object and make a global assignment by choosing Skin → **Global Envelope** and clicking on the chain. In the Envelopes Initial Assignment dialogue box, click Ok.
- Choose Skin → **Envelope Assignment → Show** Vertices and tag all rows of points on the straw object below the root of the articulated chain.
- Choose Skin → **Envelope Assignment → Reassign** Manually and click once in one of the windows with the middle mouse button to remove the tag assignments from the joints. Untag the points using the middle mouse button.
- Open a Schematic window and select the chain effector. Move it around by using Translate or the Supra Key v.
- You will notice that the straw will deform according to the chain's orientation.
- Build a glass and duplicate the straw with its chain to finish your scene.

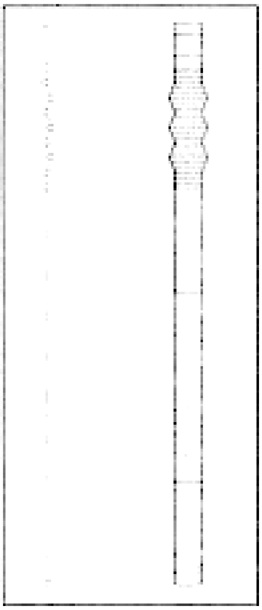


Figure 1

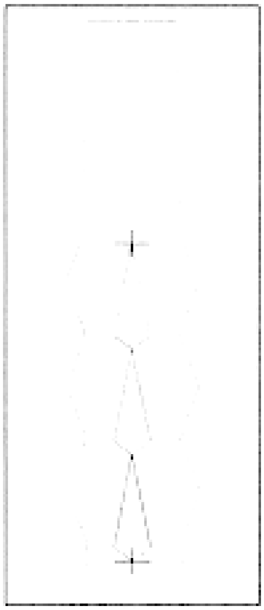
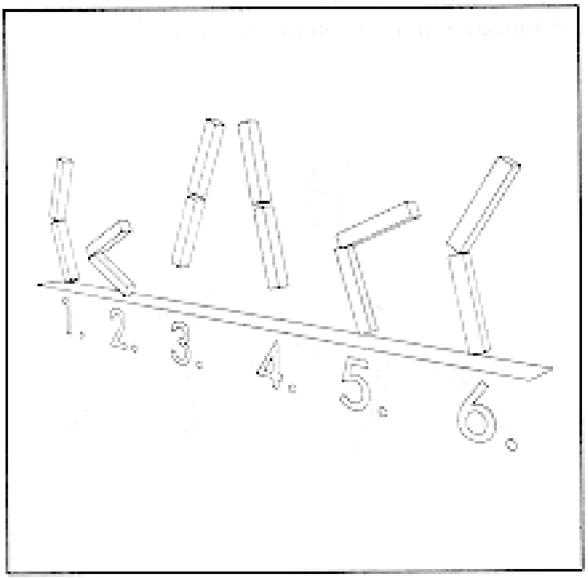


Figure 2

Jumping Cube



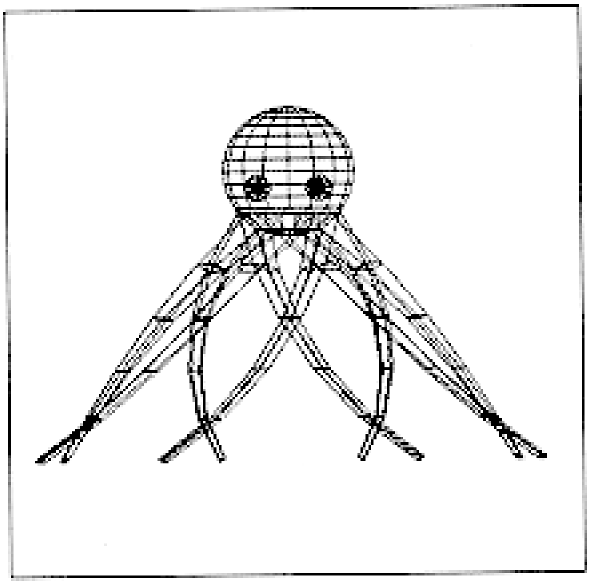
Articulated Chains, Explicit Translation

- Select the Layout icon in the Front view window and activate the Grid Lock.
- Enlarge the Front view window and choose Skeleton → Draw 2D Chain in the Actor module to create a chain using only two joints:

Root location:	X = 0	Y = 0	Z = 0
First Joint location:	X = -1	Y = 2	Z = 0
Effector location:	X = 0	Y = 4	Z = 0

- Click the right mouse button to end the chain drawing operation.
- Deactivate the Grid Lock.
- Get a primitive cube, transform and duplicate it to corresponding to model 6 in the illustration. Make each joint the parent of the appropriate cube.
- Select the whole chain and save six positions using SaveKey → Object → Explicit Translation in the Motion module. Refer to the illustration for the positions of the model at each keyframe. Timing for the root should be the following keyframes: 1, 8, 12, 16, 25, 30.
- Play the animation.
- You are now ready to animate the effector in the same way you animated the root of the chain. Timing for the effector should be the same keyframes: 1, 8, 12, 16, 25, 30.
- Play the animation.

Octopus, Part 2



Quick Stretch

- Choose Get → Scene and select the Octopus scene you created as a Model project.
- Go to the Actor module by pressing the F3 supra key.
- Select only the body of the octopus.
- Choose QStretch → **Setup**. In the Quick Stretch dialogue box, click on Flx and Str for velocity in the Modes: overview area. Then click Ok.
- Select the whole octopus hierarchy.
- Over 100 frames, set keyframes for rotation and translation.