Student Notes:

CATIA V5 Training

Foils

Photo Studio

Version 5 Release 19
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1

Photo Studio

Objectives of the course

Upon completion of this course you will be able to:

- Create photo realistic images using the Photo Studio workbench

- Create and apply stickers to your models

- Create animations using different techniques

Targeted audience

Industrial Stylists and Designers

Prerequisites

CATIA V5 Fundamentals

0.5 day

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Introduction to Photo Studio

In this lesson you will see the CATIA V5 Photo Studio user interface and compute your first basic realistic image.
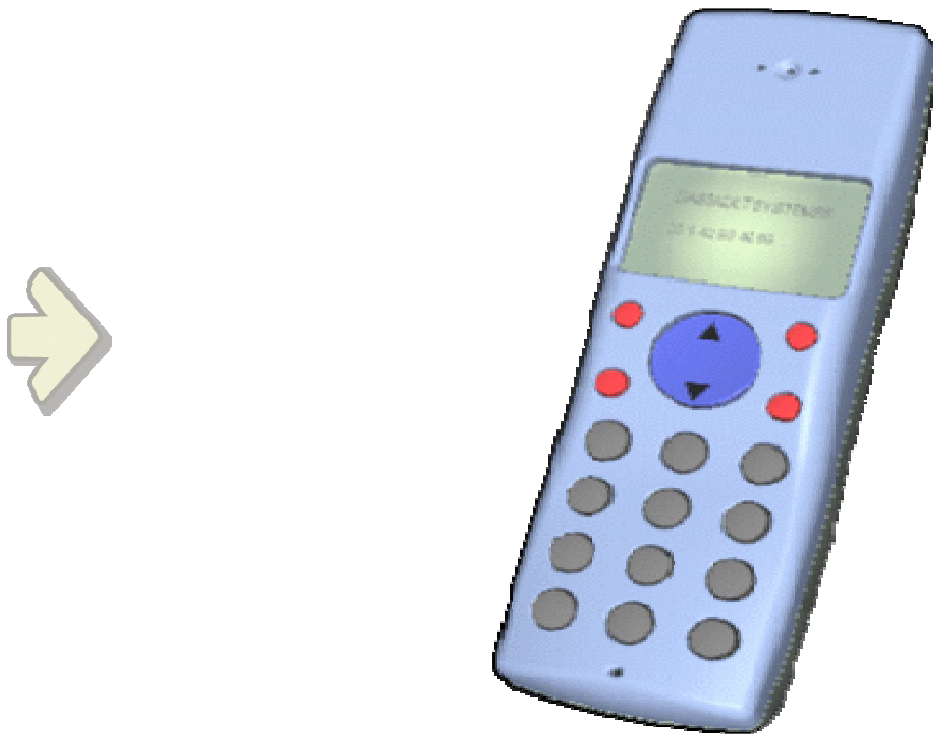
Photo Studio Workbench Presentation

You will learn about the Photo Studio Workbench by

◆ **Accessing the Workbench**

◆ **Exploring the User Interface**

◆ **Understanding the General Process**

Accessing the Workbench

Click on 'Start > Infrastructure > Photo Studio' menu to launch the workbench.

Copyright DASSAULT SYSTEMES
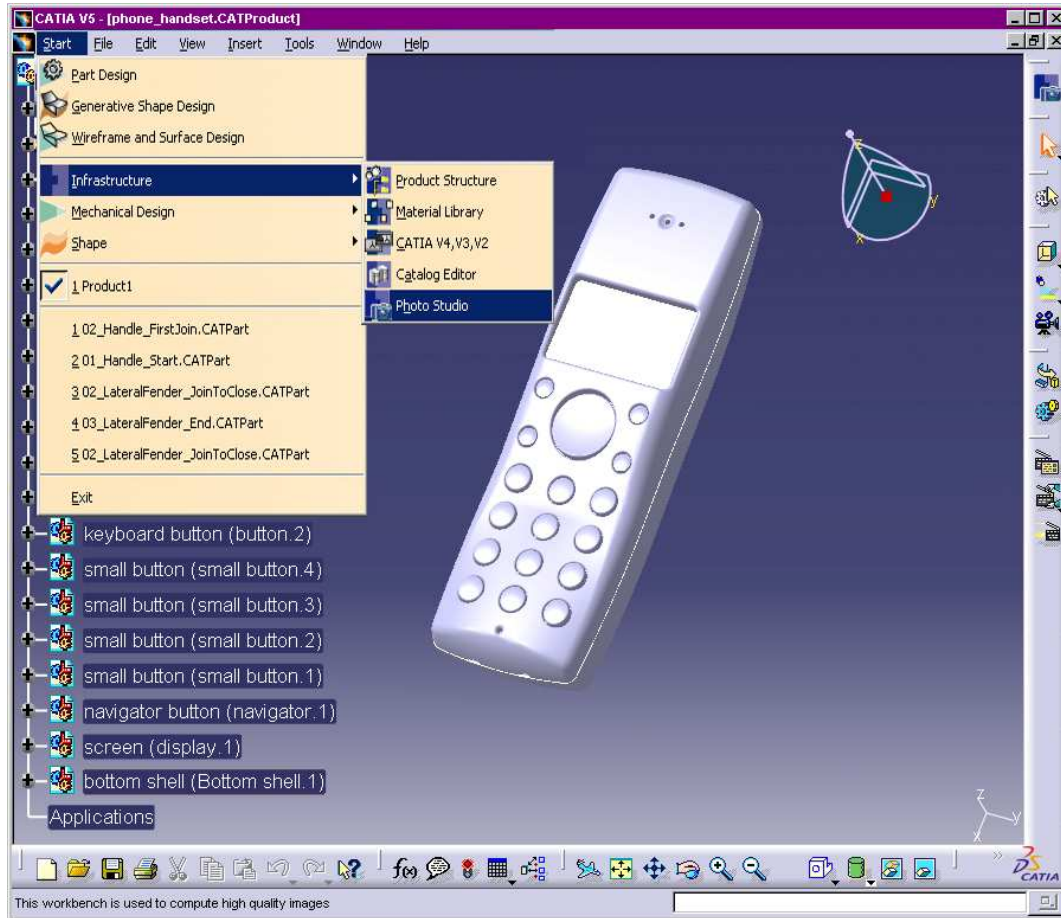
User Interface: Photo Studio General Presentation
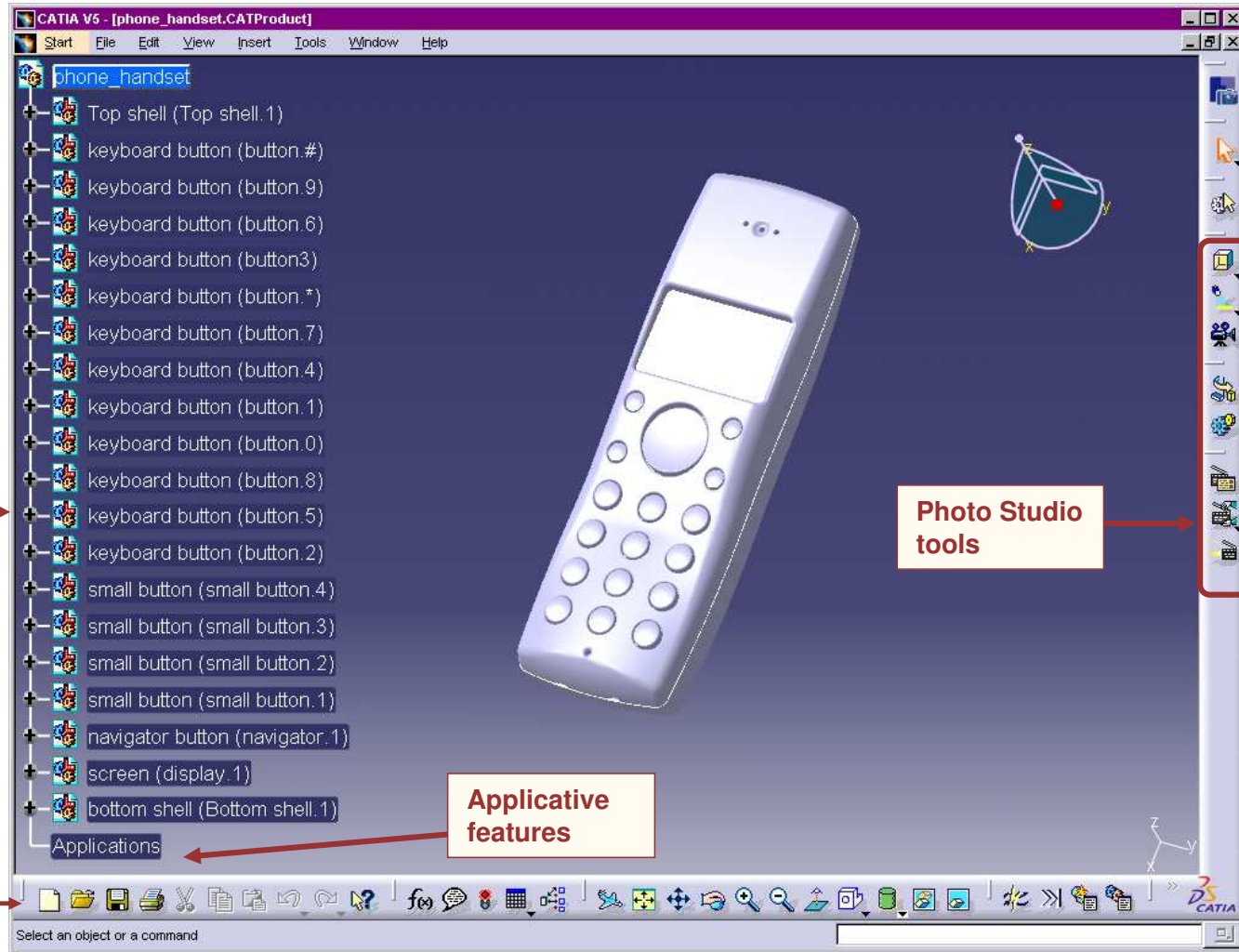
Product tree

Photo Studio tools

Applicative features

Standard tools

User Interface: Photo Studio Tools
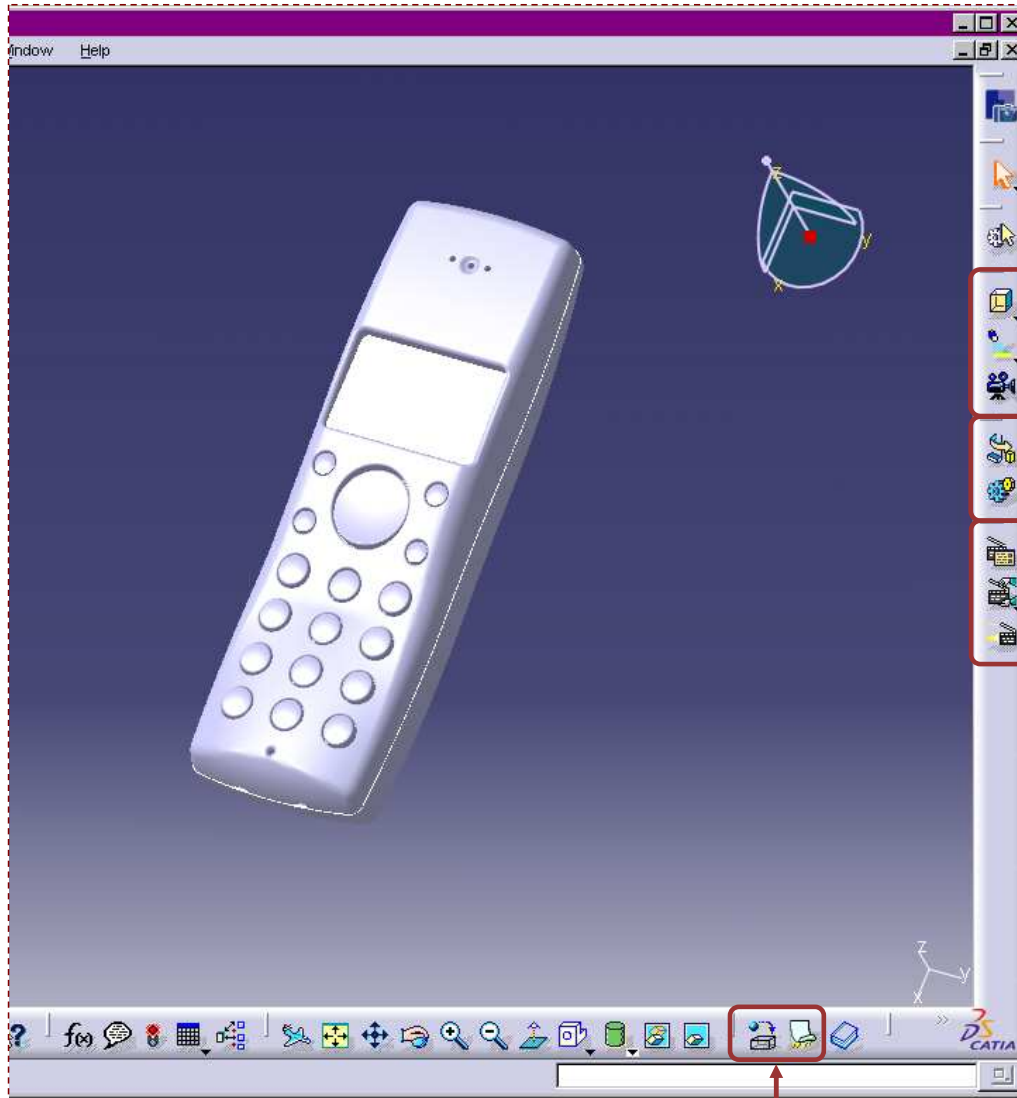
Scene editor:
- **Environment**
- **Light sources**
- **Camera**

Animation tools

Rendering:
- **Image parameters**
- **Computation**

Apply material and stickers

User Settings: Photo Studio (1/3)

Click on 'Tools > Options > Infrastructure > Photo Studio > Display'
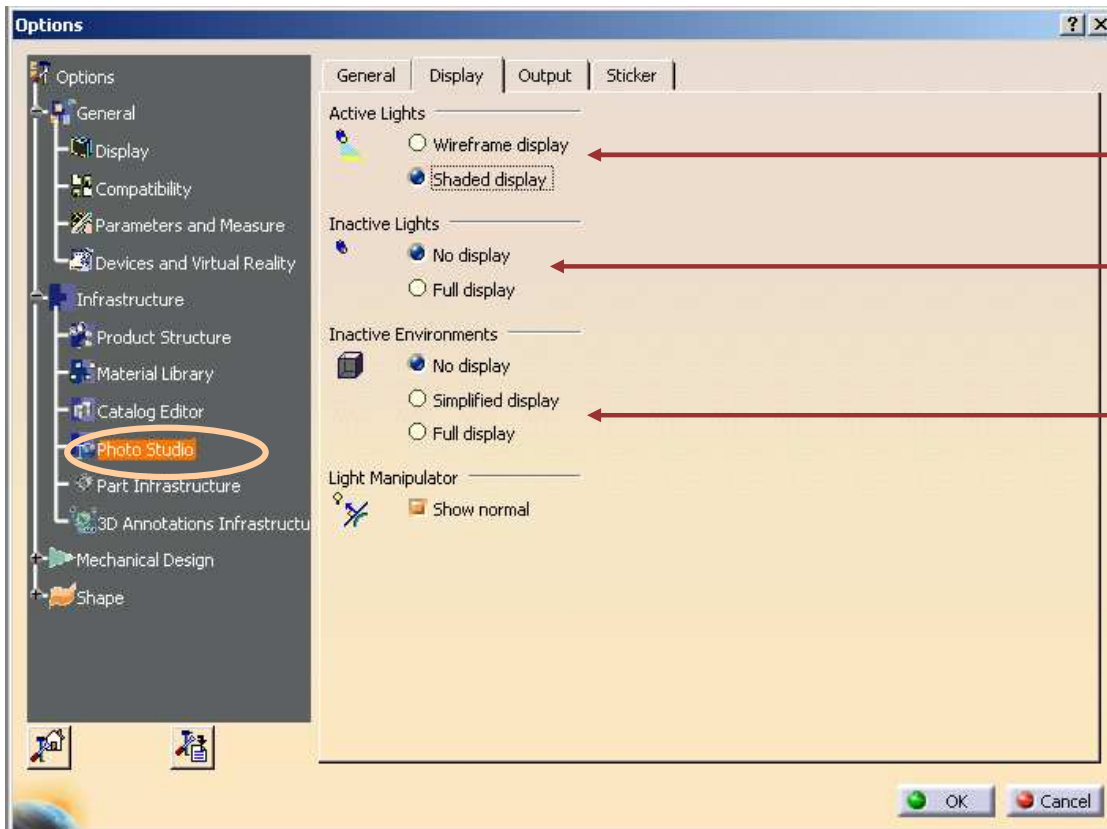
Define the light graphic representation

Define the light display mode when inactive

Define the environment display mode when inactive

Wireframe display   **Shaded display**

Active light representation
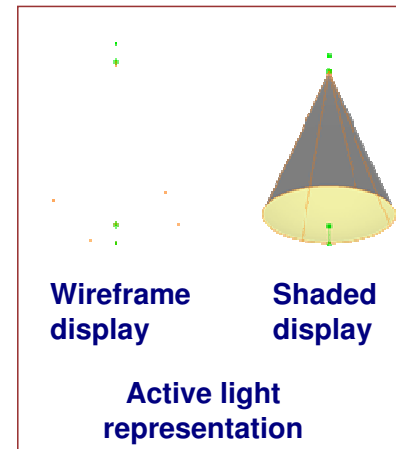
User Settings: Photo Studio (2/3)

Click on 'Tools > Options > Infrastructure > Photo Studio > General'
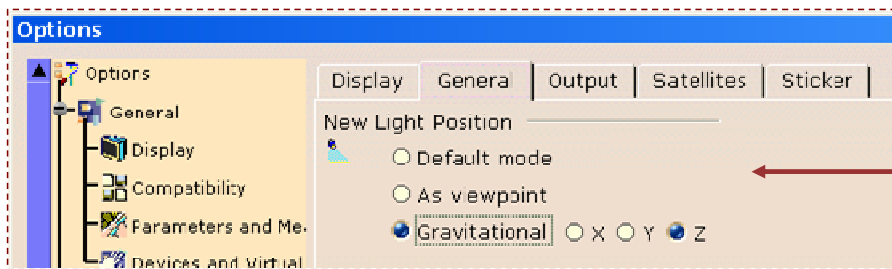
Define the orientation of the light at its creation
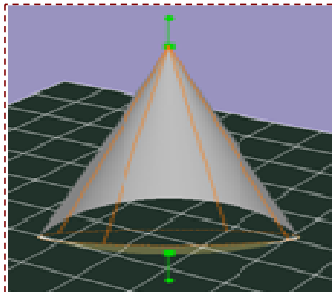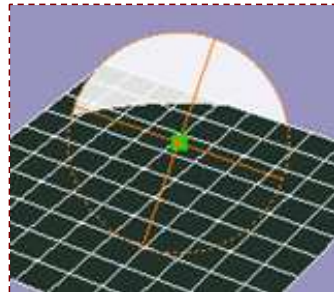
| **Default** | **As Viewpoint** | **Gravitational** |
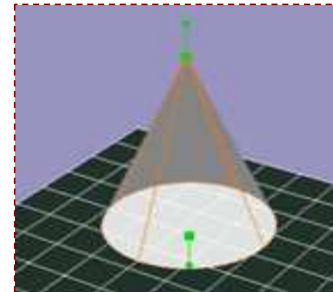
User Settings: Photo Studio (3/3)

Click on 'Tools > Options > Infrastructure > Photo Studio > Output'
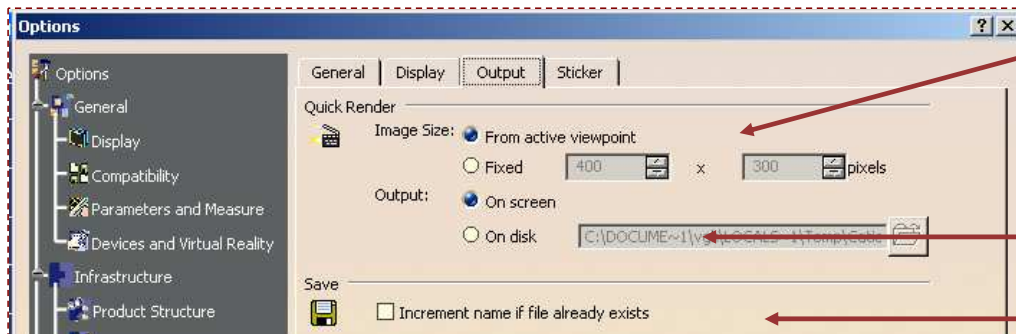
Define the size (resolution) of the image computed <u>by the Quick Render</u> (weight and height in pixels)

Define the output location of the rendered image : only displayed on screen, or saved as a bitmap file

Add a suffix to the file name if the file already exists (for example : catiarender_1.tif, catiarender_2.tif…)

Click on 'Tools > Options > Infrastructure > Photo Studio > Sticker'
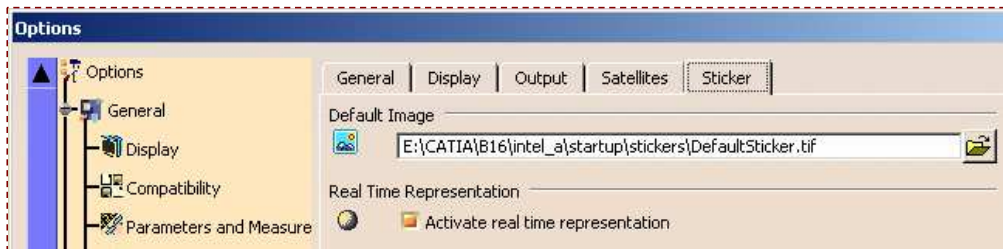
Define the default sticker image

General Process

From a Product

1 **Create an environment**

2 **Create a camera**

4 **Create light sources**

3 **Define the component textures and stickers**

5 **Create a shooting**

6 **Launch the computation**

And iterate
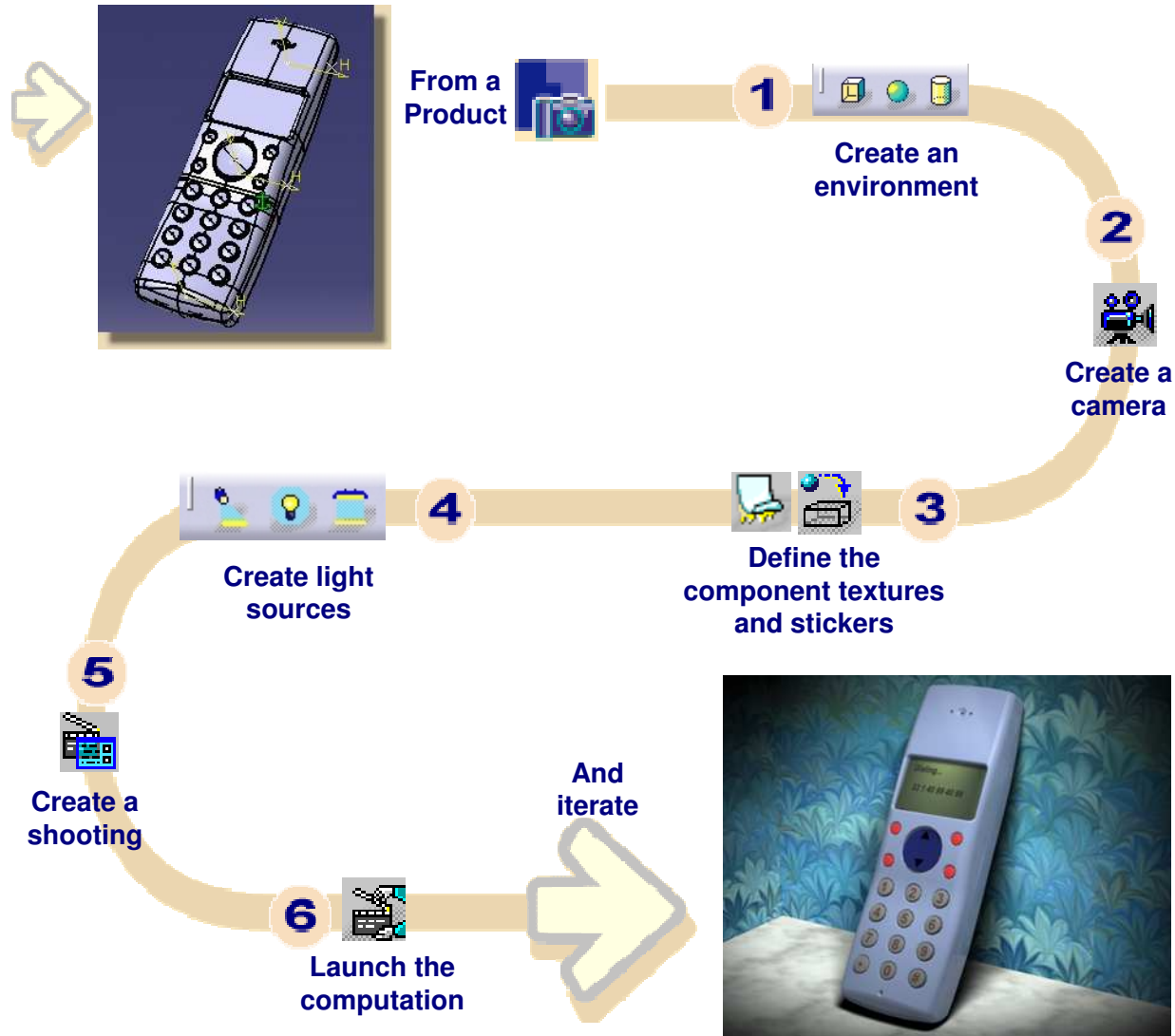
Quick Start: Using the Quick Render

In this Quick Start you will discover, in a simple demonstration, the basis of the creation of a photo realistic image using the Quick Render. The objective is not to control all the parameters of the image but to quickly create a realistic image from the 3D viewer display.
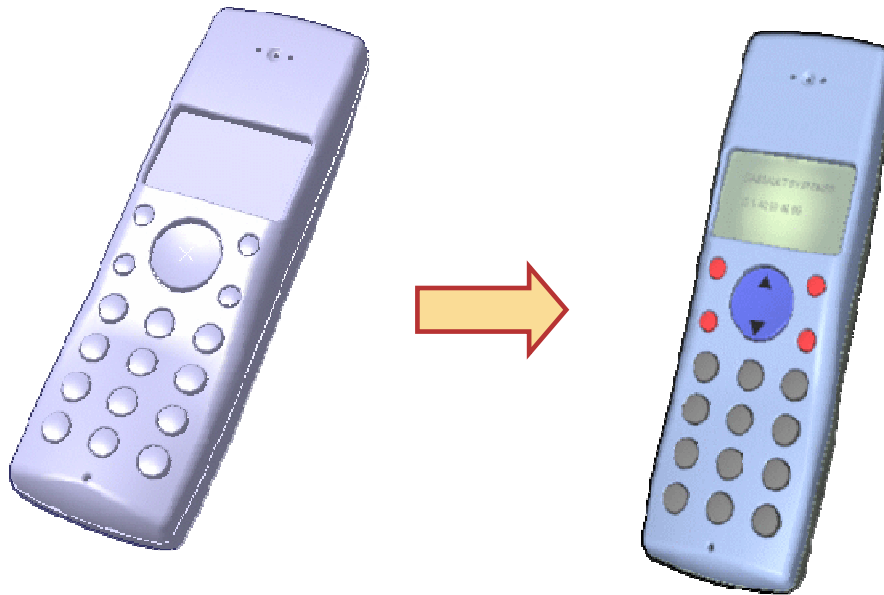
Environment Management

In this lesson you will learn how to manage the scene environment.
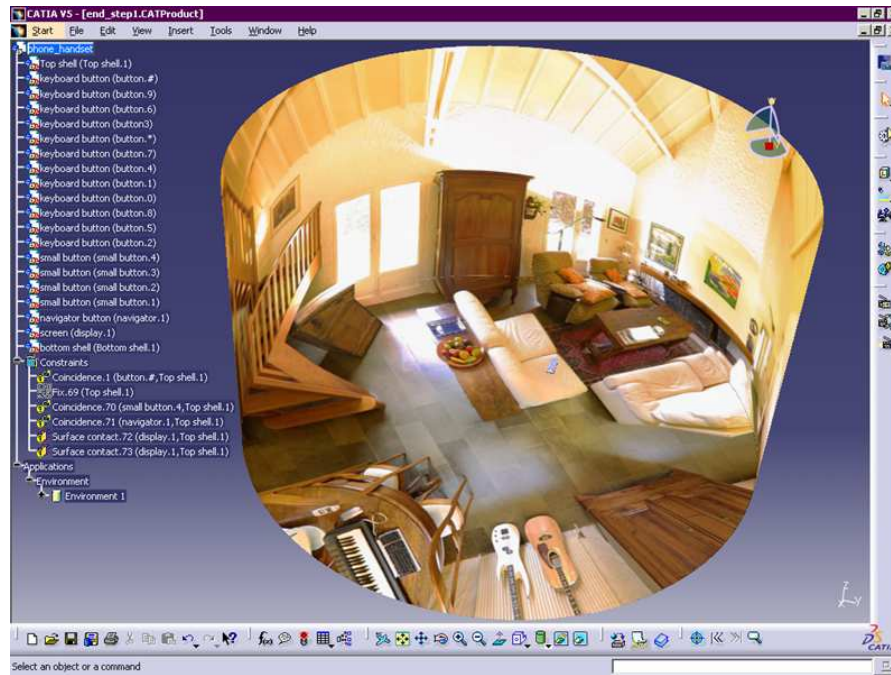
What about Environment?

What is an environment?

- ◆ **An environment is a simplified simulation of a landscape surrounding the model. It will give your image a more realistic look.**
- ◆ **The environment is a geometry which will surround your object.**
- ◆ **You can then apply texture to create a context surrounding the model.**

Which environments can I use?

- ◆ **CATIA Photo Studio provides 4 different types of environment:**
  - ▪ **A box**
  - ▪ **A sphere**
  - ▪ **A cylinder**
  - ▪ **A predefined environment using Realviz software Stitcher**
- ◆ **Depending on the context you want to create, you will use one shape or another.**
- ◆ **For example, a spherical environment can be used to render a plane flying in the sky.**

Creating a Box Environment

1 Click the 'Create Box Environment' icon

2 A new feature is added to the tree

Faces located between the view point and the product are automatically made transparent for the eye, but they will be reflected by reflective objects.
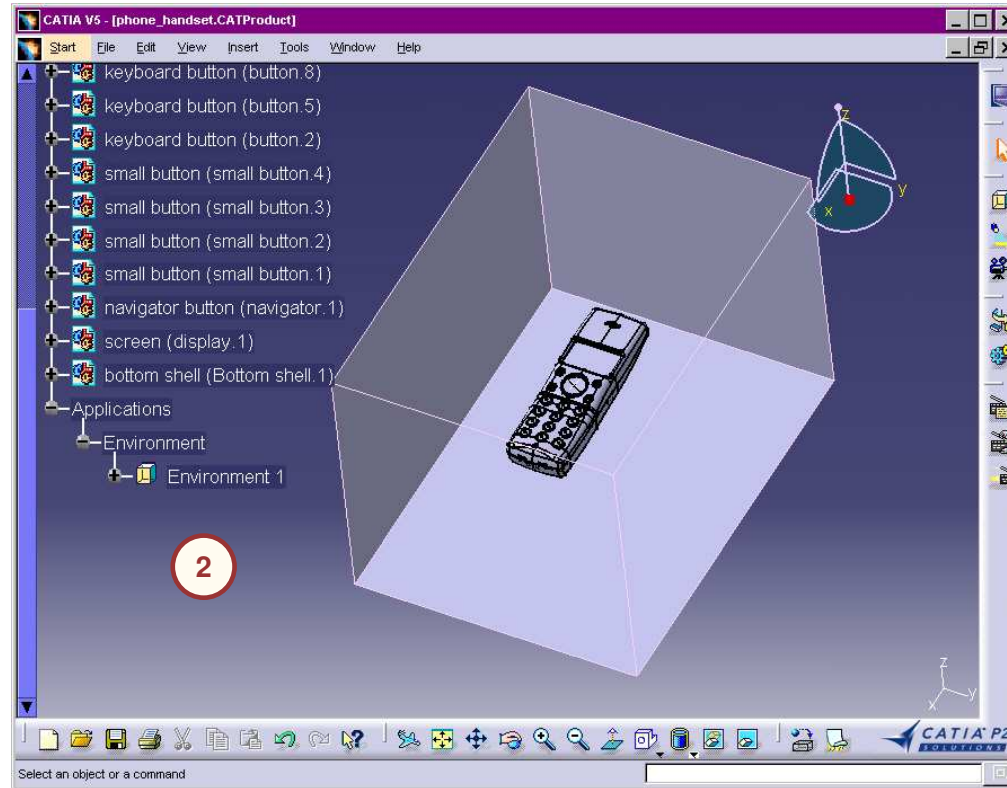
A default box environment is created around the product

Positioning a Box Environment using the Compass

1   **Position the compass on the environment**

2   **Modify the position of the environment using the compass**
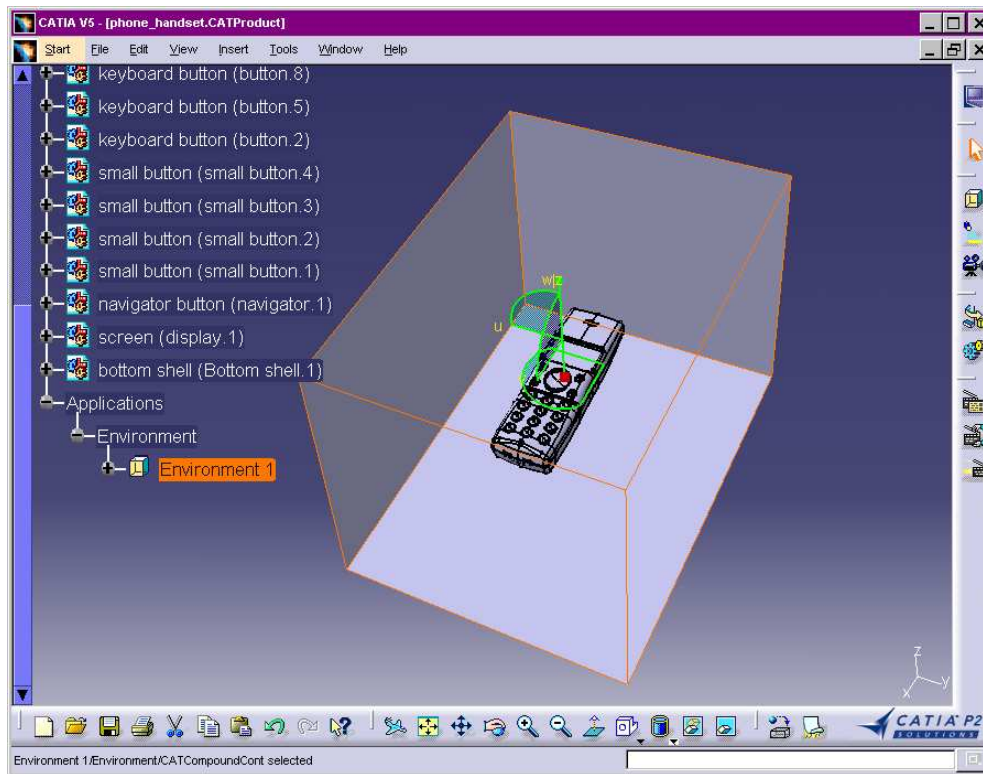
Positioning the box dynamically

Positioning a Box Environment using Dimensions

1 Select 'Properties' in the environment contextual menu or double-click it

2 Select 'Dimensions' tab and edit the box dimensions

3 Select 'Position' tab and define the coordinates of the box origin

4 Define the orientation

Properties

Current selection : Environment 1

Dimensions | Position | Feature Properties | Graphic

Dimensions
Length 800 mm
Width 500 mm **2**
Height 300 mm
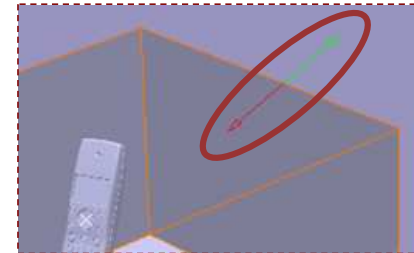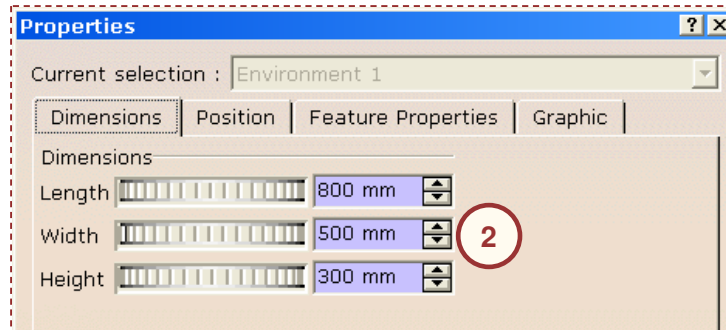
Global scaling : Select an edge of the box and drag it. This will apply a scaling centered on the box center

Properties

Current selection : Environment 1

Dimensions | Position | Feature Properties | Graphic

Origin
X -31.95 mr
Y -28.58 mr **3**
Z -10.09 mr

Axis
X 0.185 mm
Y 0.01681 n **4**
Z 0.815 mm
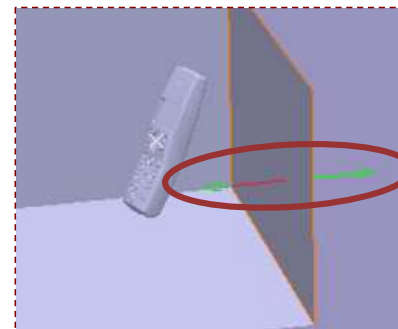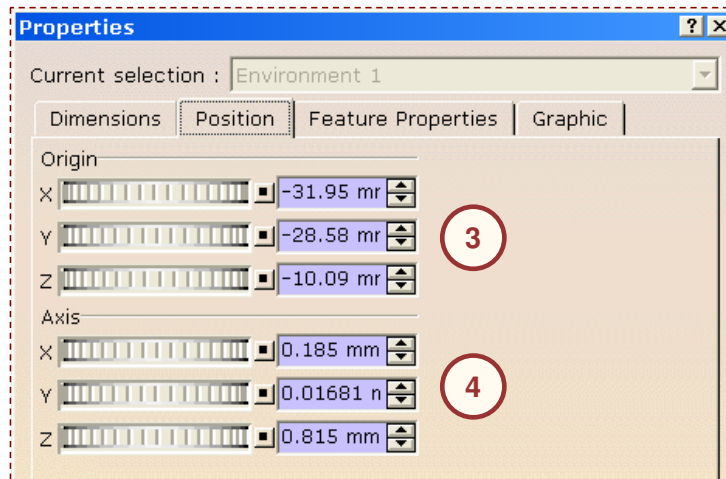
Wall positioning : Select a wall of the box and drag it. This will translate the wall

Importing Realviz® Stitcher® Environment

1 Select the 'Import Environment' icon

2 Select a .cam file (which is linked to picture files)

A new feature is added to the tree

R E A L V I Z

S T I T C H E R ®
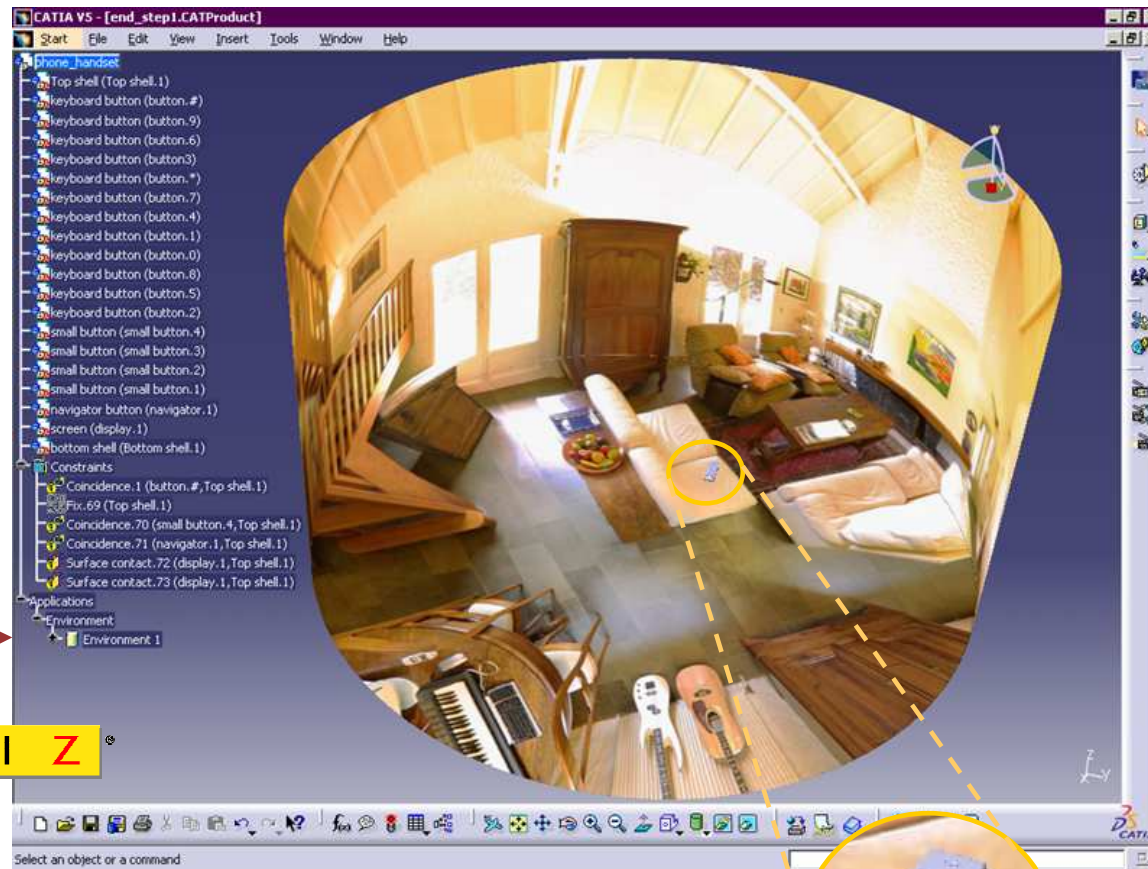
The mapped environment is created around the product

Camera Management

In this lesson you will learn how to manage cameras.
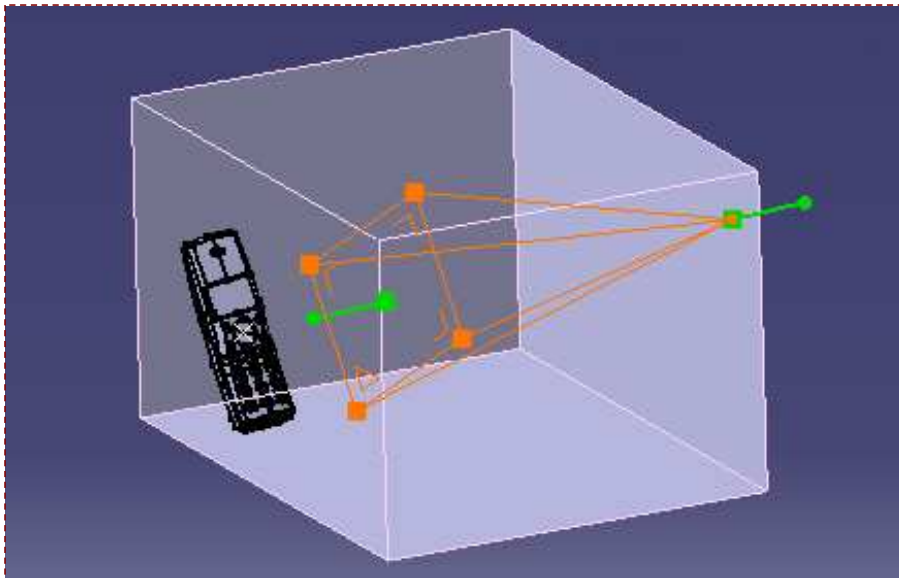
Modifying the Scene View Angle

1 **Click the menu 'View > Commands List…'**
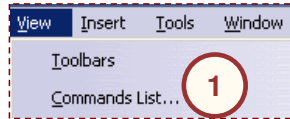
2 **Choose 'View Angle' from the list**
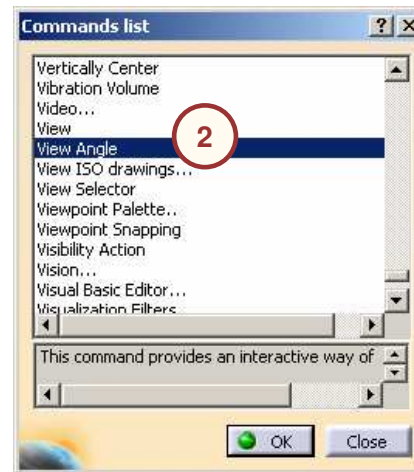
3 **Choose the 'Perspective' view**
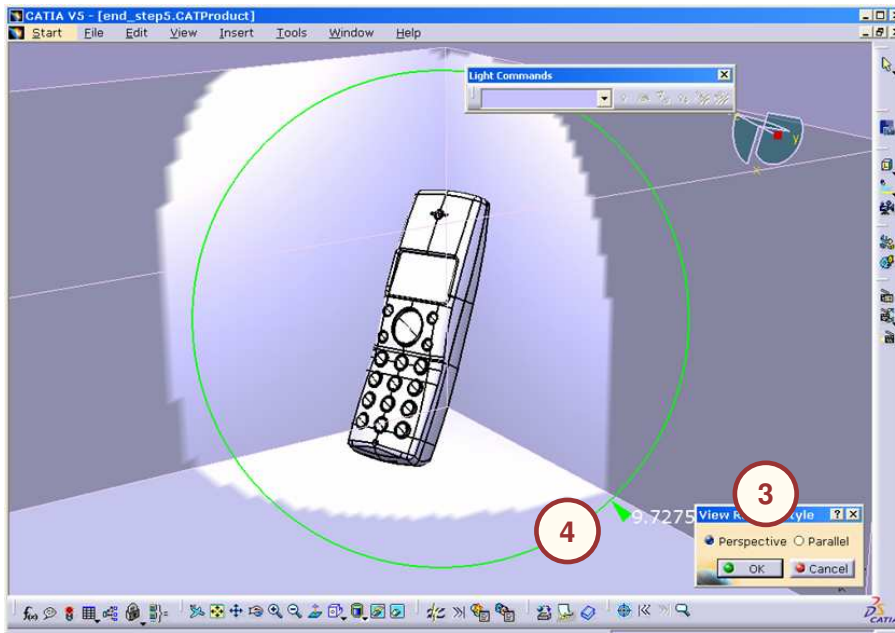
4 **Manipulate the arrow around the green circle**

Creating a Camera

1   **With the mouse manipulation, define the viewpoint that will be used to position the camera**

2   **Select the 'Create Camera' icon**

Camera display when selected
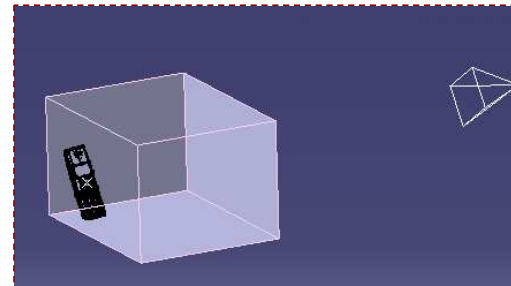
Standard Camera display

A new feature is added to the tree

A camera is defined so that the resulting image corresponds to the current viewer view point

Positioning a Camera using the Handlers

The green square translates the origin point

The green point moves the origin point in the screen plane

The green point moves the target point in the screen plane

The green square translates the target point
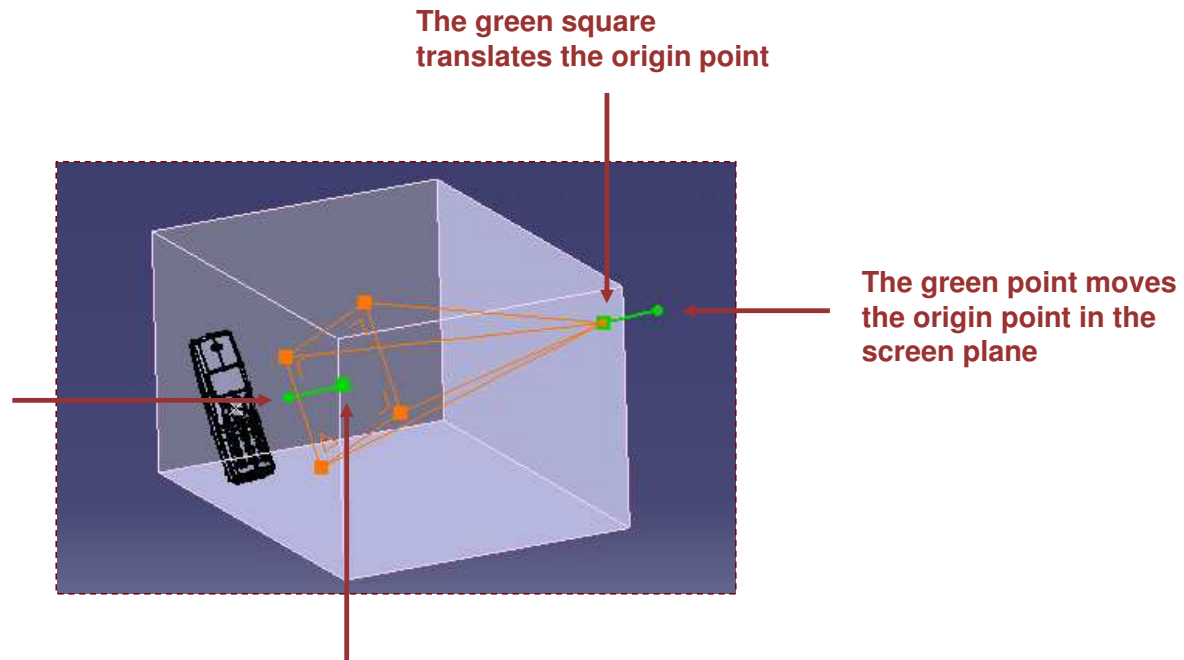
Positioning a Camera using Dimensions

1 Select 'Properties' in the environment contextual menu

2 Select 'Position'

3 Define the coordinates of the camera origin

4 Define the coordinates of the camera target
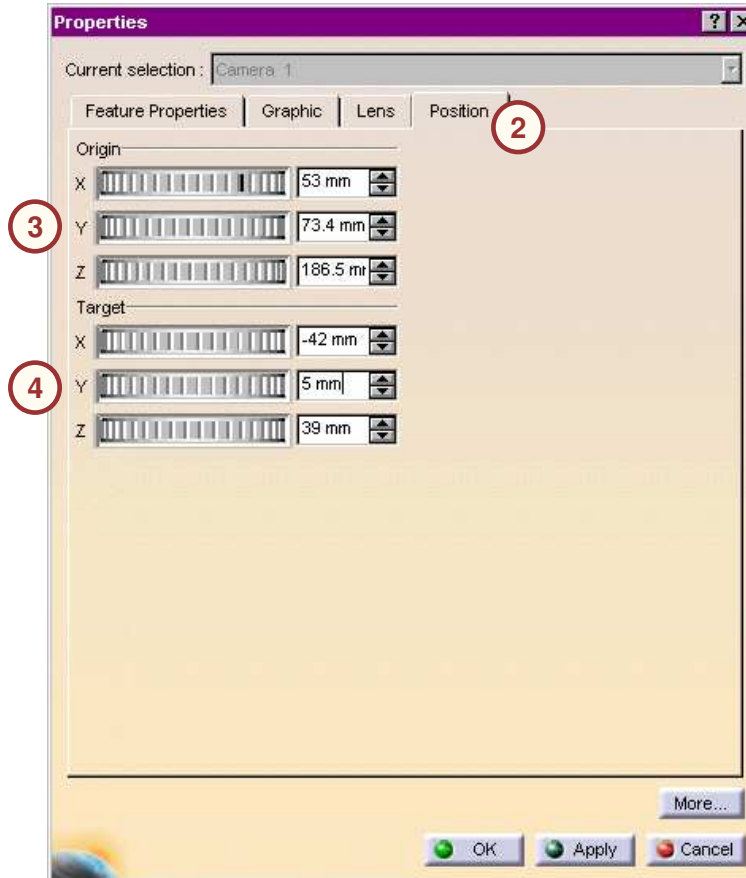
Defining the Camera Lens

1   **Select 'Properties' in the camera contextual menu**

2   **Select 'Lens'**

3   **Define the projection type. Perspective projection provides more realistic results.**

4   **Define the focal length. You should avoid small values as it will deform the object on the image. You should better take the camera away from the object.**
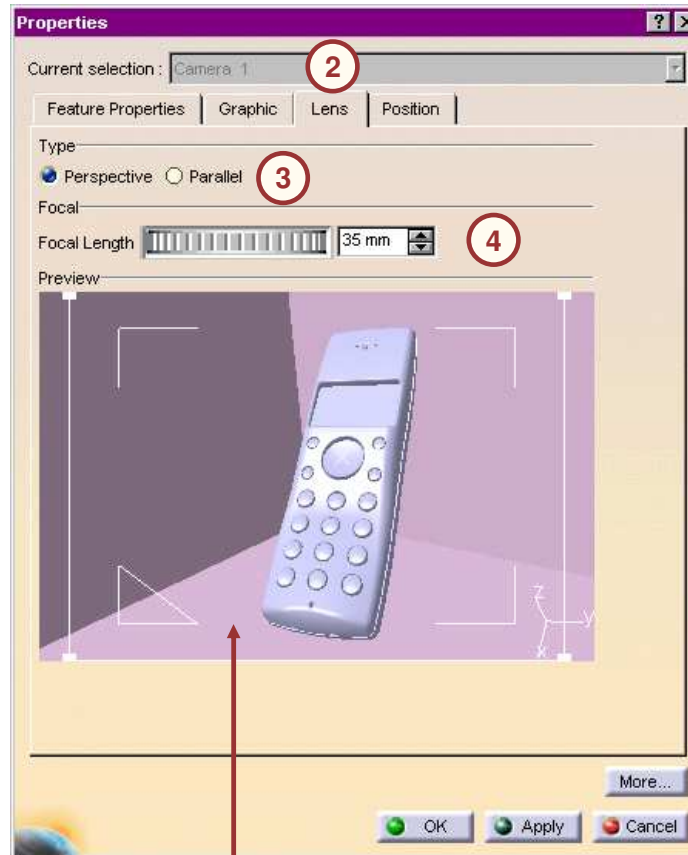
This viewer can be used to define the position of the camera with the mouse manipulation tools. You can get the same view in the 3D viewer by double-clicking the camera in the tree or in the viewer.

Light Sources Management

In this lesson you will learn how to handle light sources.

What about Light Sources?

**Light sources are not just used to light up the environment and make objects visible.
By generating shadows and illumination variations on the object surface, they give
the image its effect of relief and make it more realistic.**

Different types of light sources available in Photo Studio

- **Punctual light sources:**
  - **A Spot light:**
    **It projects a cone of light from a given point to a given direction. It is the only type
    of light source which concentrates light rays on a specific part of the scene. It is
    thus very useful to highlight details.**
  - **A Point light:**
    It scatters light in all directions from a given point like an electric lamp.
  - **A Directional light:**
    **The light reaches the scene in the form of parallel rays as if it had been emitted by
    a plane. It simulates light emitted by a very distant source such as the sun.**
- **Surfacic light sources, creating more realistic images by generating soft shadows:**
  - **A disk area light to simulate a spot light**
  - **A sphere area light to simulate a light bulb**
  - **A rectangular area light that can simulate a distant light source**
  - **A cylinder area light to simulate a neon ramp**

Creating a Spot Light

Click the 'Create Spot Light' icon

Spot light selected   **Spot light not selected**

The spot light effect is visualized in the 3D viewer

A new feature is added to the tree

In 'Tools >Options > Photo Studio > Display', Lights can be displayed either in wireframe or in shading mode.
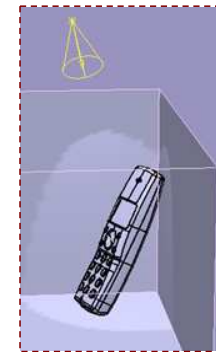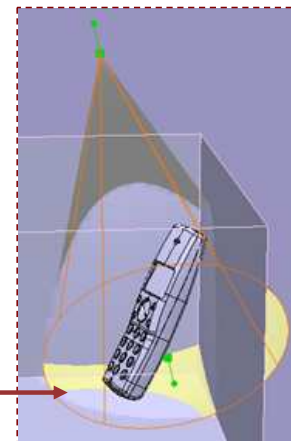
Positioning a Spot Light Using Dimensions

1 Select 'Properties' in the contextual menu or double-click it

2 Select the 'Position' tab

3 Define the coordinates of the spot origin

4 Define the coordinates of the spot target

After the target point, the spot intensity is null
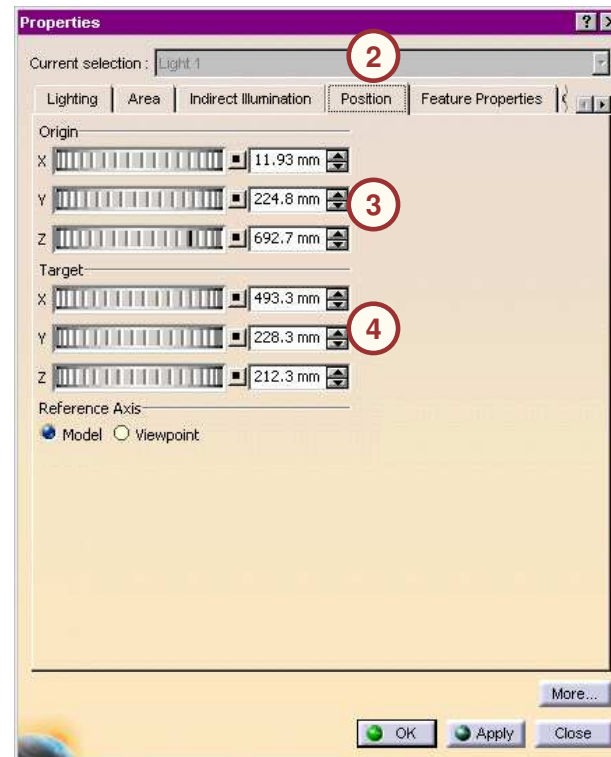
Positioning a Spot Light Using Handler

Like for a camera, use the green point or square to move the origin point or target point

Select one solid edge of the spot light cone and drag it to define the cone angle
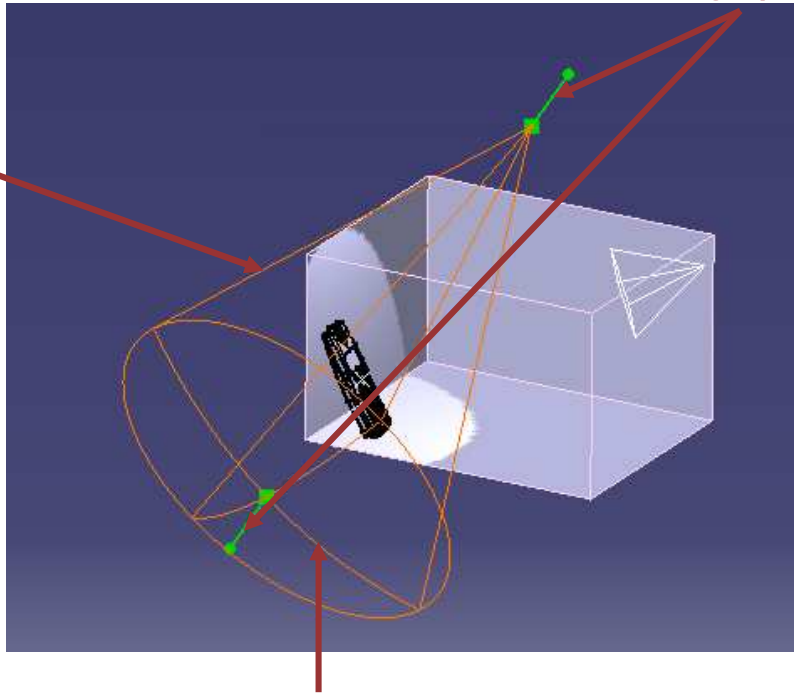
Select one solid edge of the spot light extremity and drag it to define the cone end. Outside the cone, no light is diffused.

Positioning a Spot Light Using Light Commands

The light commands toolbar allows to :

- **Turn on/off the light**
- **See the light viewpoint**
- **Orientate the light like the viewpoint**
- **Attach the light to the viewpoint (the light does not move when the viewpoint is modified)**
- **Position the light along a perpendicular to a point on the geometry**
- **Position the light so that the specular effect is the best from the viewpoint**
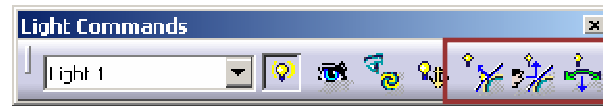
For positioning the light according to the surface normal or specular reflection, hold down the left-mouse button and keep moving the cursor on the geometry to find the best position

Contextual menu :

- **Activate or deactivate the light**
- **Move the viewpoint superposed to the light**
- **'Update from view' is very useful to position and orientate the light according to the current viewpoint (like a camera)**

Defining the Parameters of a Spot Light (1/2)

1 Select 'Properties' in the contextual menu or double-click it

2 Select the 'Lighting' tab

3 Define the type of "punctual" light source

4 Define the angle of the spot light

5 Define the intensity and the color of the spot light. Beyond 1, the intensity becomes saturated

6 Define the length of the spot light ray

7 Define the linear attenuation

8 Define the angular attenuation
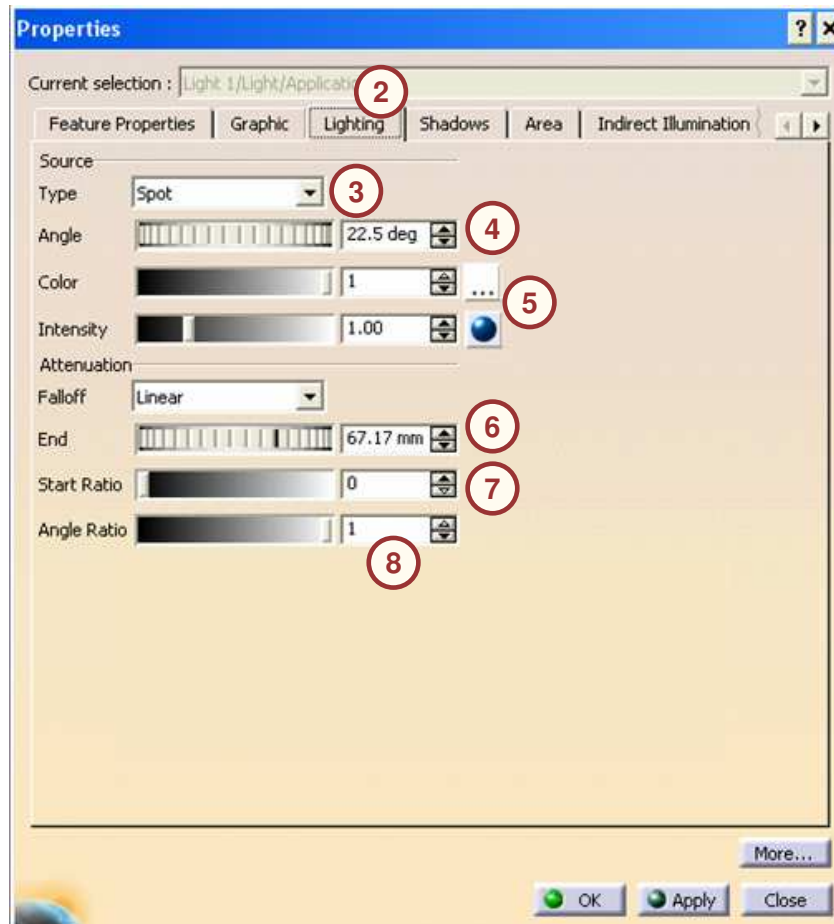
Defining the Parameters of a Spot Light (2/2)

9 **Select 'Shadows'**

10 **Activate the shadow generation from this light for the rendering computation**
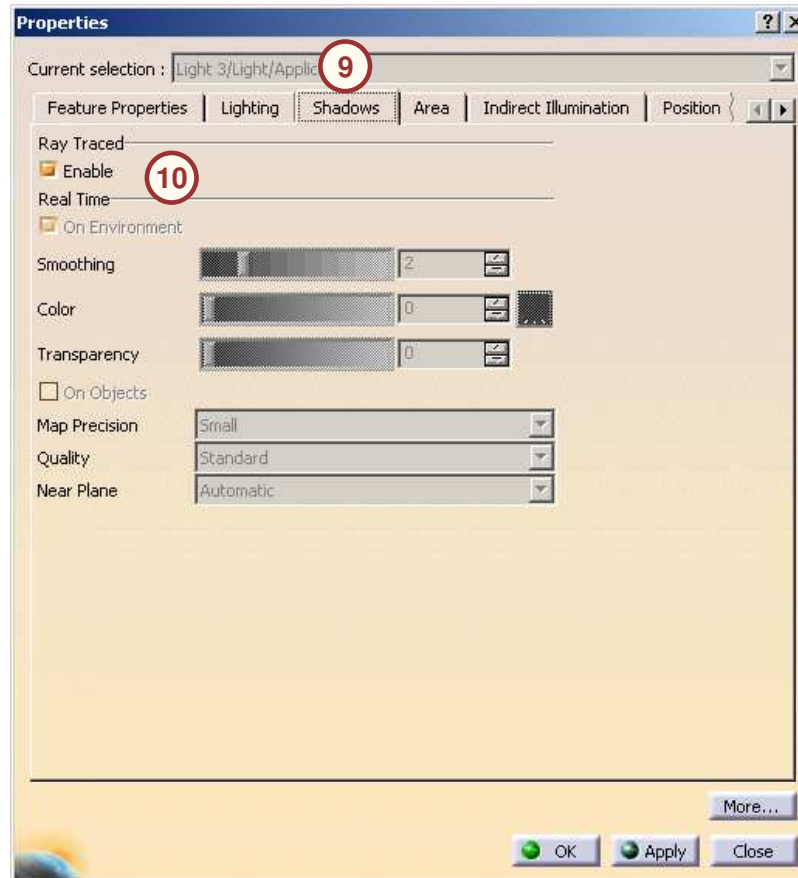
Defining a Surfacic Light (1/2)

Surfacic lights create soft and more realistic shadows

1 Select 'Properties' in the contextual menu of light in the specification tree or double-click it

2 Select the 'Area' tab

3 Define the type of surfacic light source

4 Define the light source surface dimensions

5 Define the U and V samples
The higher the values are, the less grainy the lighting will be. Computation time increases with the samples values.

Properties

Current selection : Light 3/Light/Applications

| Feature Properties | Lighting | Shadows | Area | Indirect Illumination | Position |

Geometry

Type Disk **3**

Radius 50 mm **4**

Samples U 11 **5**

Samples V 11

Show Area

More...

OK   Apply   Close
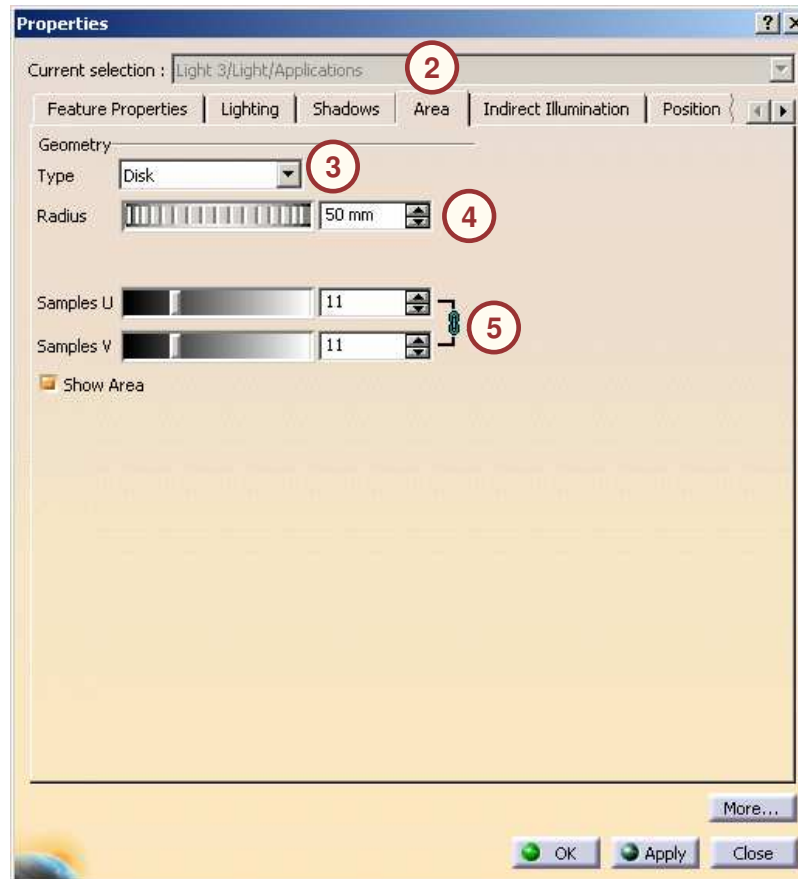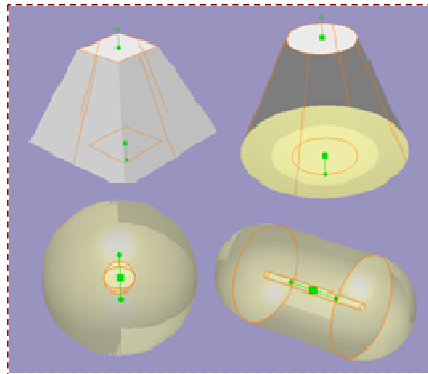
Defining a Surfacic Light (2/2)

**Computation result with a
"punctual" spot light**

**Computation result with a surfacic
disk area light**

Shooting Management

In this lesson you will learn how to define all the image parameters.
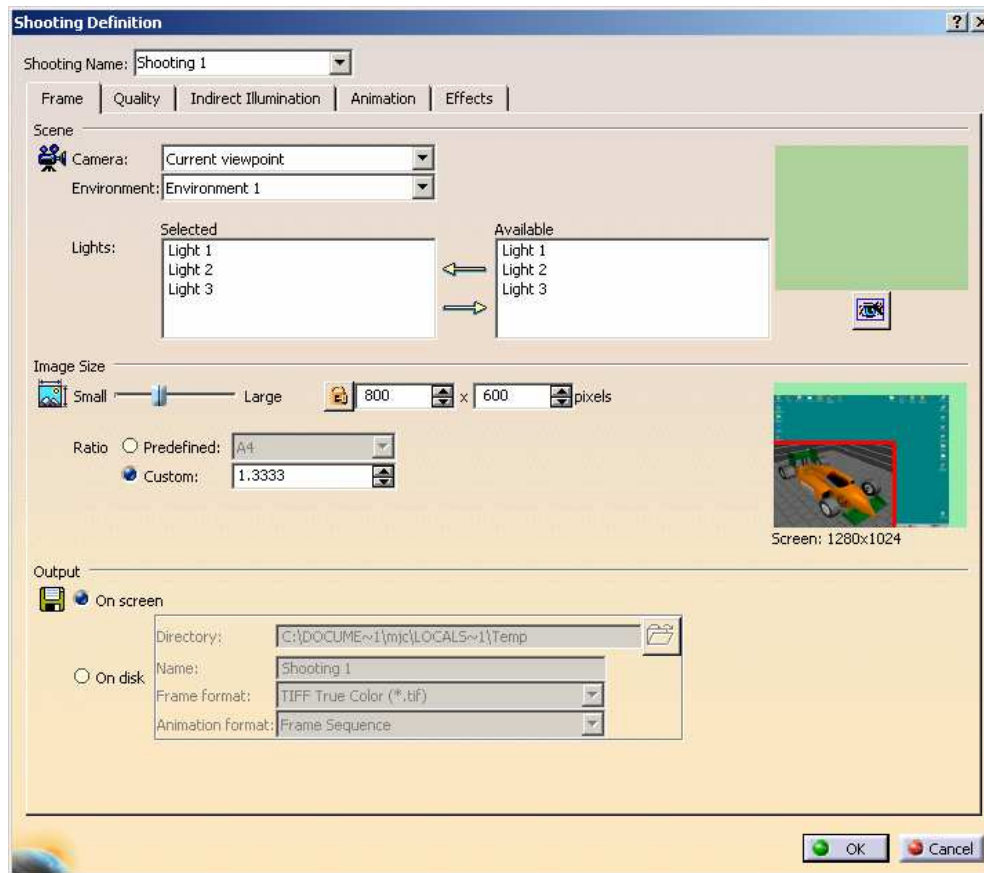
What about Shooting?

CATIA Photo Studio shooting defines all the parameters that will be used for the computation of a specific image from a given product.

The parameters are sorted in four categories:

- **The Frame parameters: You will define the scene (which environment, which camera, which light sources), the resulting image size and location.**

- **The Quality parameters: You will define the rendering quality parameters. These parameters will have a great influence on the computation time required for your image.**

- **The Indirect Illumination parameters: You will activate the use of the final gathering algorithm and define its parameters.**

- **The Animation parameters: You will define the number of images you want to use for the animation.**

Creating a Shooting

Click the 'Create shooting' icon
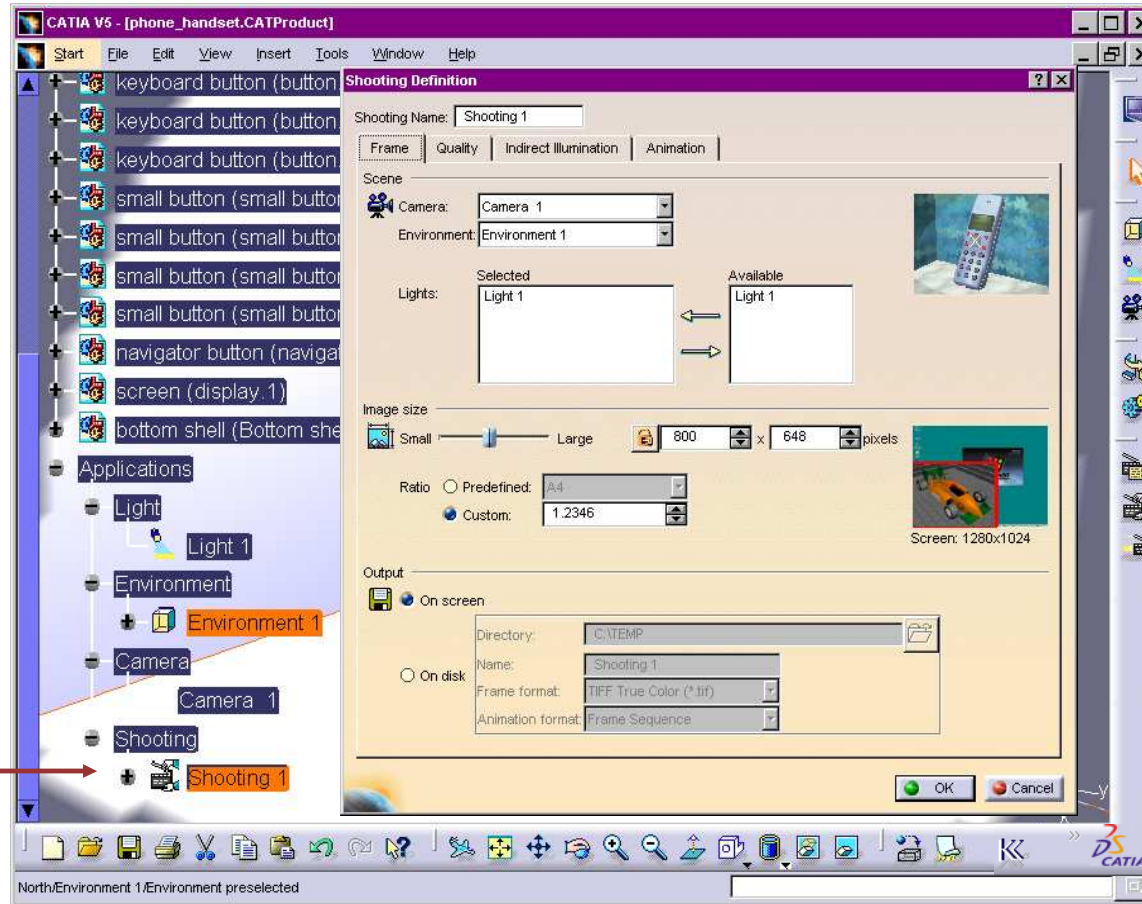
A new feature is added to the tree

Defining the Frame

1 **From the Shooting Definition Dialog box, select the 'Frame' tab**

2 **Define the camera you want to use for the image computation. You can use the current view point of 3D viewer**

3 **Define the environment you want to see on the image**

4 **Define the light sources you want to be taken into account for the rendering computation**

5 **Define the image resolution**
The image is computed using the 3D viewer ratio. It is then deformed to fit into the defined size. To avoid this deformation, define the ratio of the image size equal to the 3D viewer ratio.

6 **Define the destination (screen only or file) and the format of the computed image**

Shooting Definition

Shooting Name: Shooting 1

Frame | Quality | Indirect Illumination | Animation | Effects

Scene

Camera: Current viewpoint **2**

Environment: Environment 1 **3**

Lights:

Selected
Light 1
Light 2
Light 3

4

Available
Light 1
Light 2
Light 3

Image Size

Small ——————— Large   800 x 600 pixels **5**

Ratio   ○ Predefined: A4
        ● Custom: 1.3333

Screen: 1280x1024

Output

● On screen **6**

○ On disk
Directory: C:\DOCUME~1\mjc\LOCALS~1\Temp
Name: Shooting 1
Frame format: TIFF True Color (*.tif)
Animation format: Frame Sequence

OK   Cancel

Ray Tracing

Ray tracing is a standard imagery mode. It is used by CATIA Photo Studio to create realistic images.

- **The image is divided into squares of pixels. The size of the squares is defined by the user.**

- **Ray tracing consists of calculating the color at each corner of each square of the image, considering a light ray from that corner in the direction in which the objects are viewed (camera viewing direction), following that ray until it hits an object.**

- **If that object is reflective, the reflected ray is traced until it hits another object, and so on. The maximum number of reflections for a ray is one of the quality parameters.**

- **If the object is transparent, the ray is traced as it crosses the object.**

- **Each time the ray meets an object, the characteristics of the object are read at the point of incidence (color, reflection mode, transparency, etc.) in order to deduce the color of the corner of the pixel where the ray comes from.**
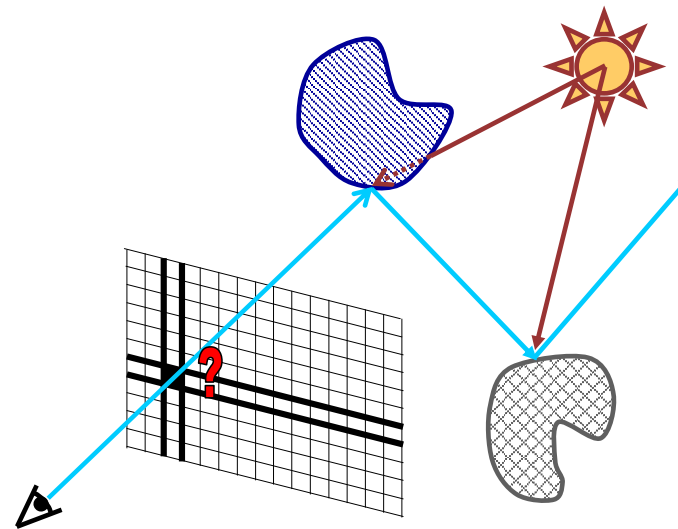
Defining the Quality Parameters

1 Select the 'Quality' tab

2 Define the Maximum number of reflections and refractions for a ray.

3 Take into account the textures for the rendering computation

4 Take into account the shadows for the rendering computation

5 Define the over sampling accuracy using predefined sets of values

6 Activate the anti-aliasing

7 Define a customized division of the image

8 Define a criteria for automatic subdivision of the squares

9 Define the maximum number of subdivisions

Shooting Definition

Shooting Name: Shooting 1

Frame | Quality | Indirect Illumination | Animation

Rendering
Reflections: 1 **2**
Refractions: 2
Rebounds: 3
☐ Show textures **3**

Increasing this parameter will increase the computation time.
1 <= nb rebounds <= nb reflections + nb refractions

Shadows
☐ Show shadows
4

At early stage of rendering, textures and/or shadows can be turned off to speed up the process

Accuracy **5**
◉ Predefined: Low ⎯⎯⎯ High ☐ Anti-aliasing **6**

Cast 1 ray at each corner of a 16 pixels square
If the corresponding colors differ more than 10 % **8**
for each RGB components, then subdivide the square in 4
up to a maximum number of 4 rays per pixel **9**

○ Custom:
7

OK   Cancel

Final Gathering (1/2)

Final Gathering helps you create very realistic images by generating very soft shadows. The general principle is that the light striking the object is not only computed from the light sources but also from the other elements composing the scene, as in real life!

How does it work?

- **Light rays are sent from the object points and, as the light bounces from one object to another, the light energy is computed on any surface surrounding the object. This is what is called 'indirect illumination'.**

- **The user has to define the number of rays that will be sent at random from each pixel to calculate the indirect illumination factor. It will be multiplied by the material diffuse parameter coefficient.**
  As a consequence, no indirect illumination will be computed for materials with a null diffuse value.

- **To improve performances, the user can use an interpolation algorithm from one pixel to another instead of computing real final gathering for each point.**
  The maximum radius parameter defines the maximum distance between a point having a real final gathering computation result and an interpolated one.
  The minimum radius parameter defines the minimum distance between two points having a real final gathering computation. Increasing the maximum radius reduces the computation time, but can create artefacts due to the interpolation process.
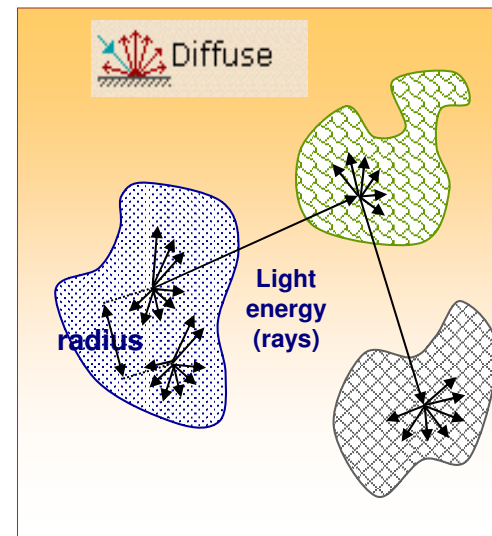
Final Gathering (2/2)

**Computation result without activating
the final gathering**

**Computation result with activation of
the final gathering**

Defining the Indirect Illumination Parameters

1 Select 'Indirect Illumination'

2 Activate the use of the final gathering for the image computation

3 Define the number of rays emitted by each object point.

4 Define the maximum radius value.
If set to 0, this value is automatically computed according to the scene size.

5 Do not take into account object ambient coefficient for rendering computation
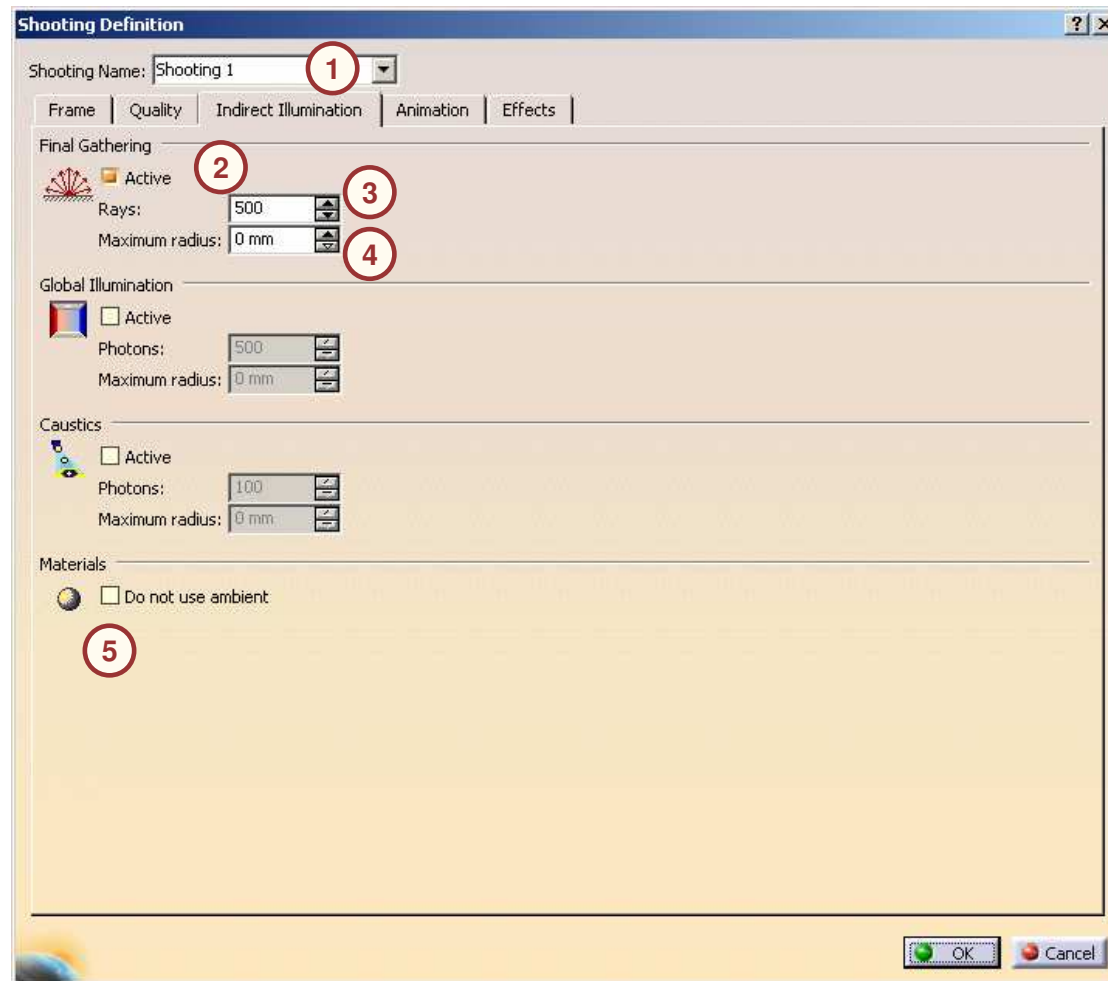
Computing the Image
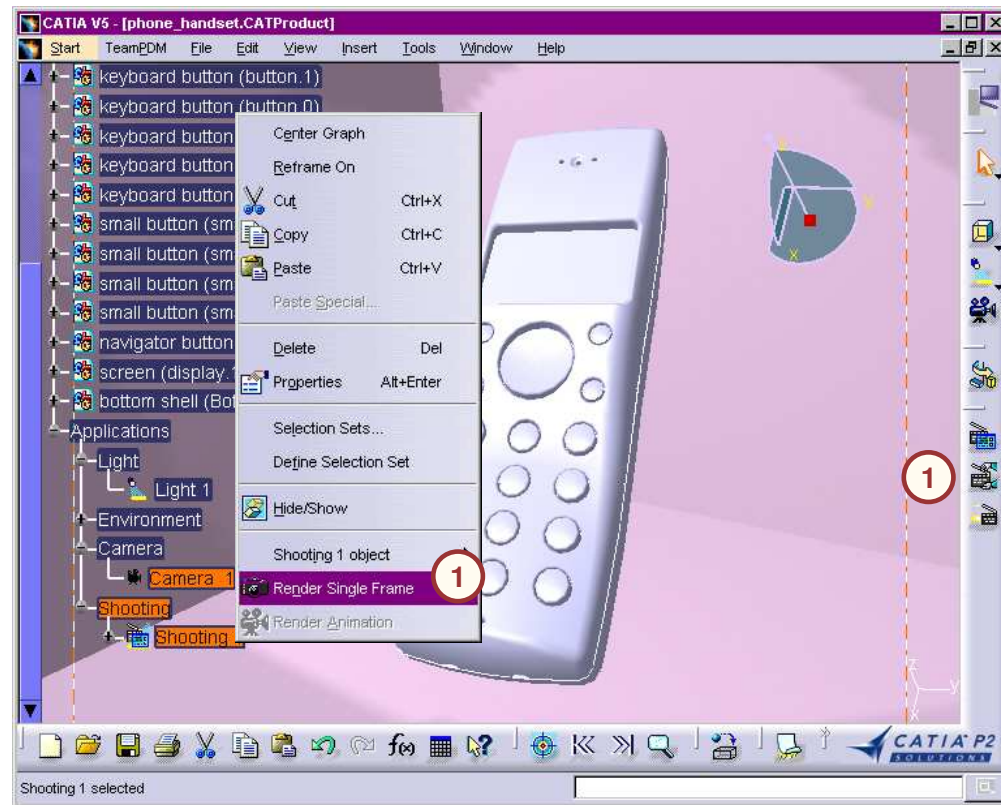
Using the computation icon

1 Select the Shooting to render in the tree

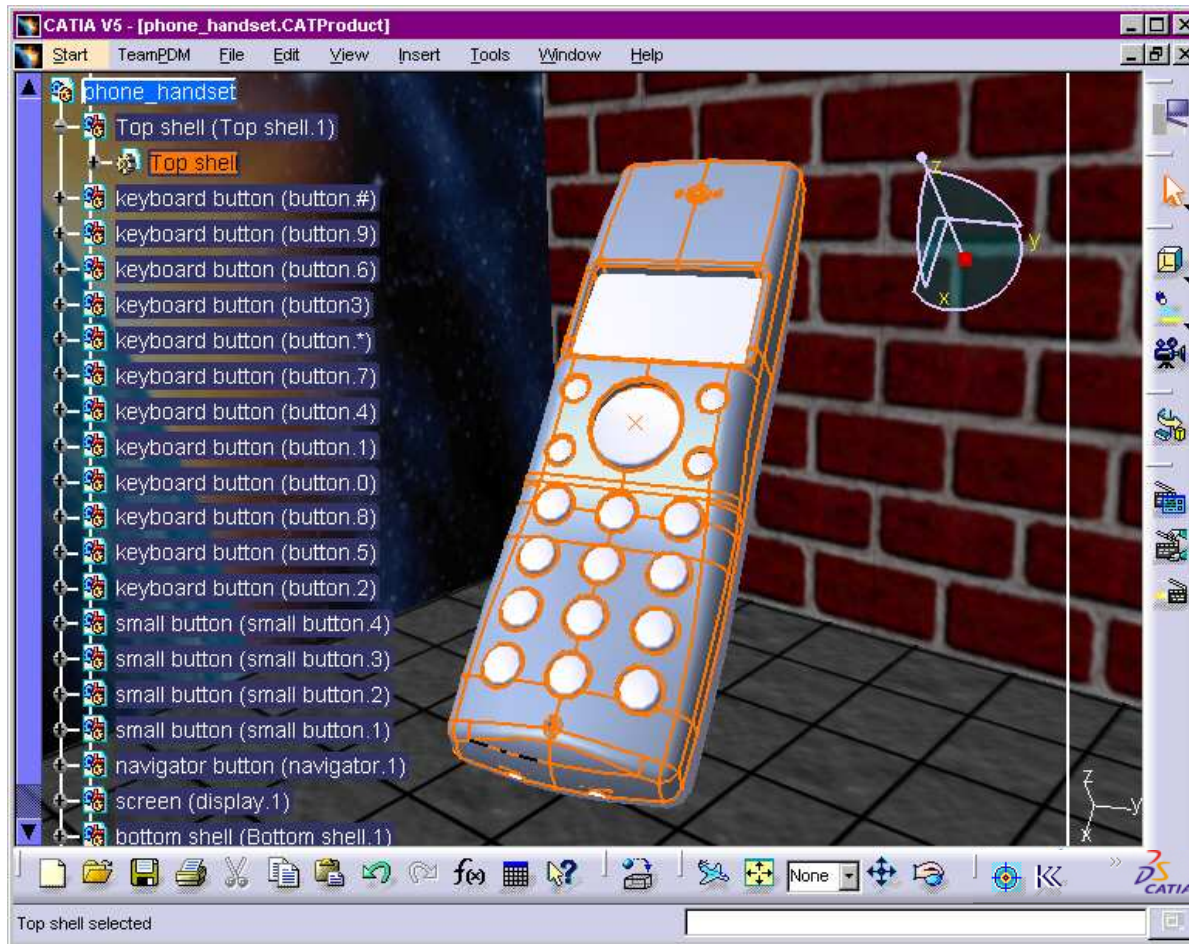OR

Select the 'Render Shooting' icon
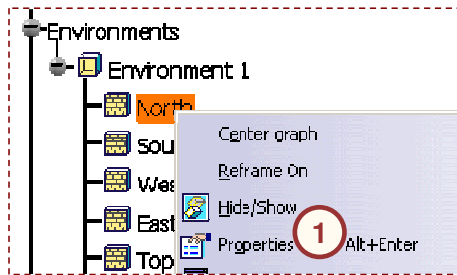
2 Launch the computation

Textures Management

In this lesson you will learn how to handle textures.

Applying Texture to the Environment Using External File

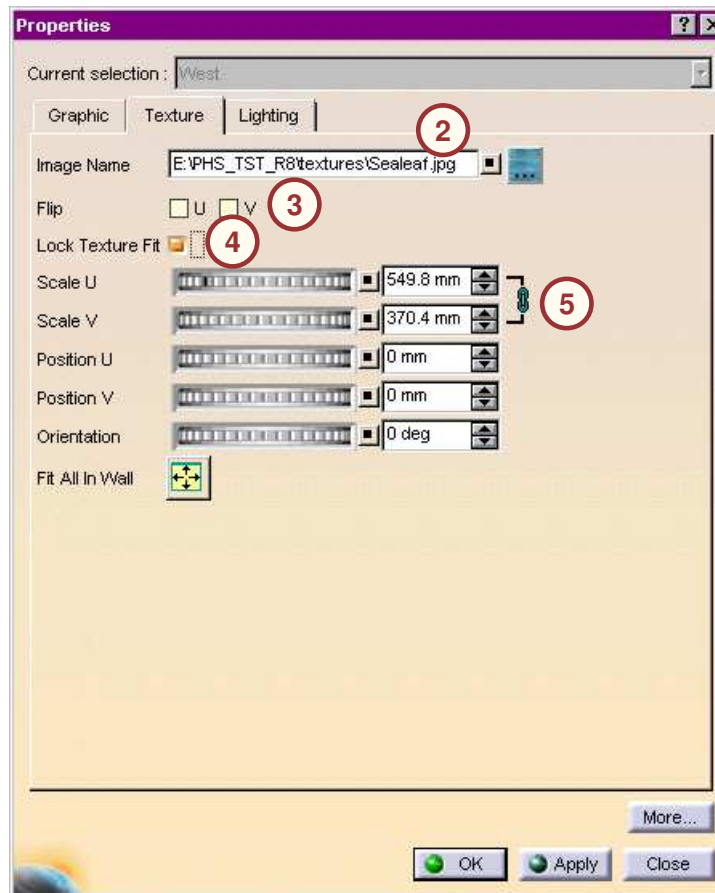**1** **Click on the Properties from the contextual menu of the wall in the tree**

2 **Select a texture file**

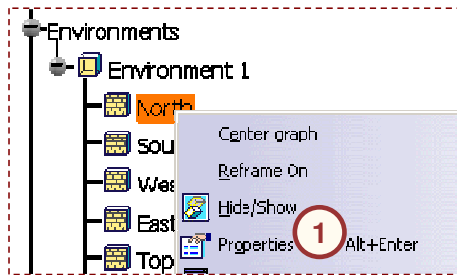**3** **Flip the texture image in the U and V directions if necessary**

4 **Lock the texture size during the modification of the environment dimensions**

5 **Scale the image so that it does fit on the entire wall**

Applying Texture to the Environment Using Material

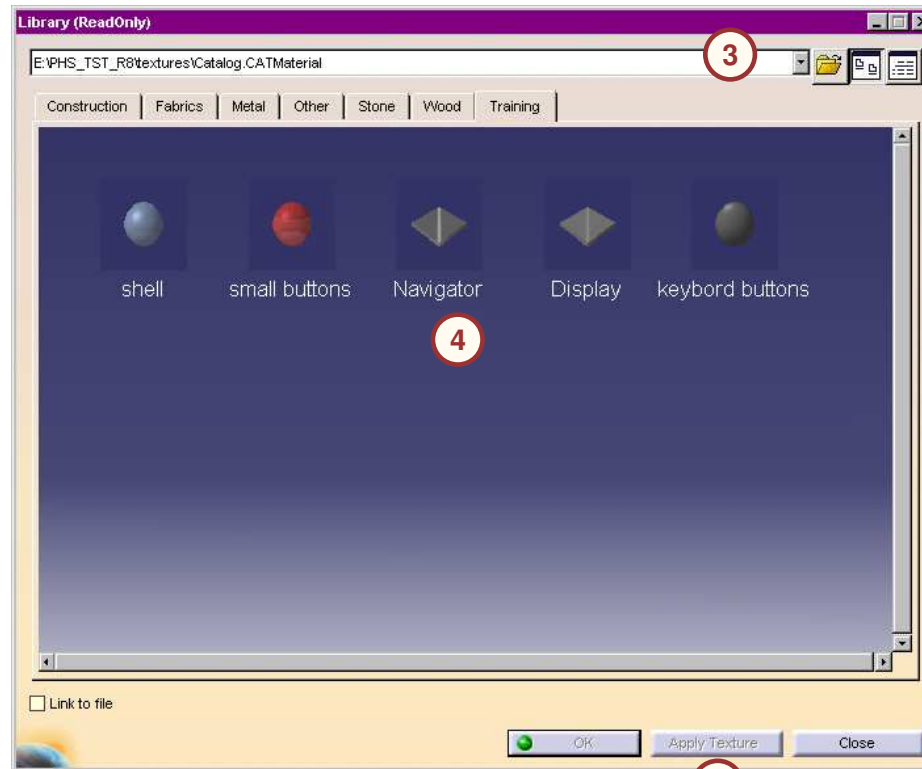**1**   **Click on the Properties from the contextual menu of the wall in the tree**

2   **Select the 'Apply Material' icon**

3   **Select a material library**

4   **Select a material**

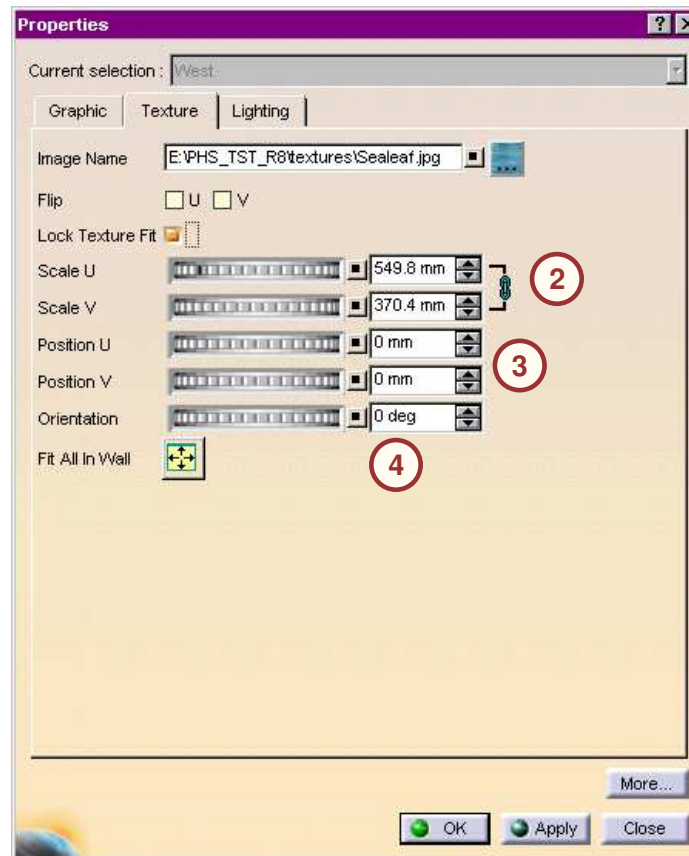**5**   **Click 'Apply Texture'**

Editing the Environment Textures

1 Click on the Properties from the contextual menu of the wall in the tree

2 Define a scale factor for the texture in both directions. The ratio between the two values can be maintained constant.

3 Translate the texture in both directions

4 Rotate the texture

Applying a Material to a Component (1/2)

1 Select the component in the tree
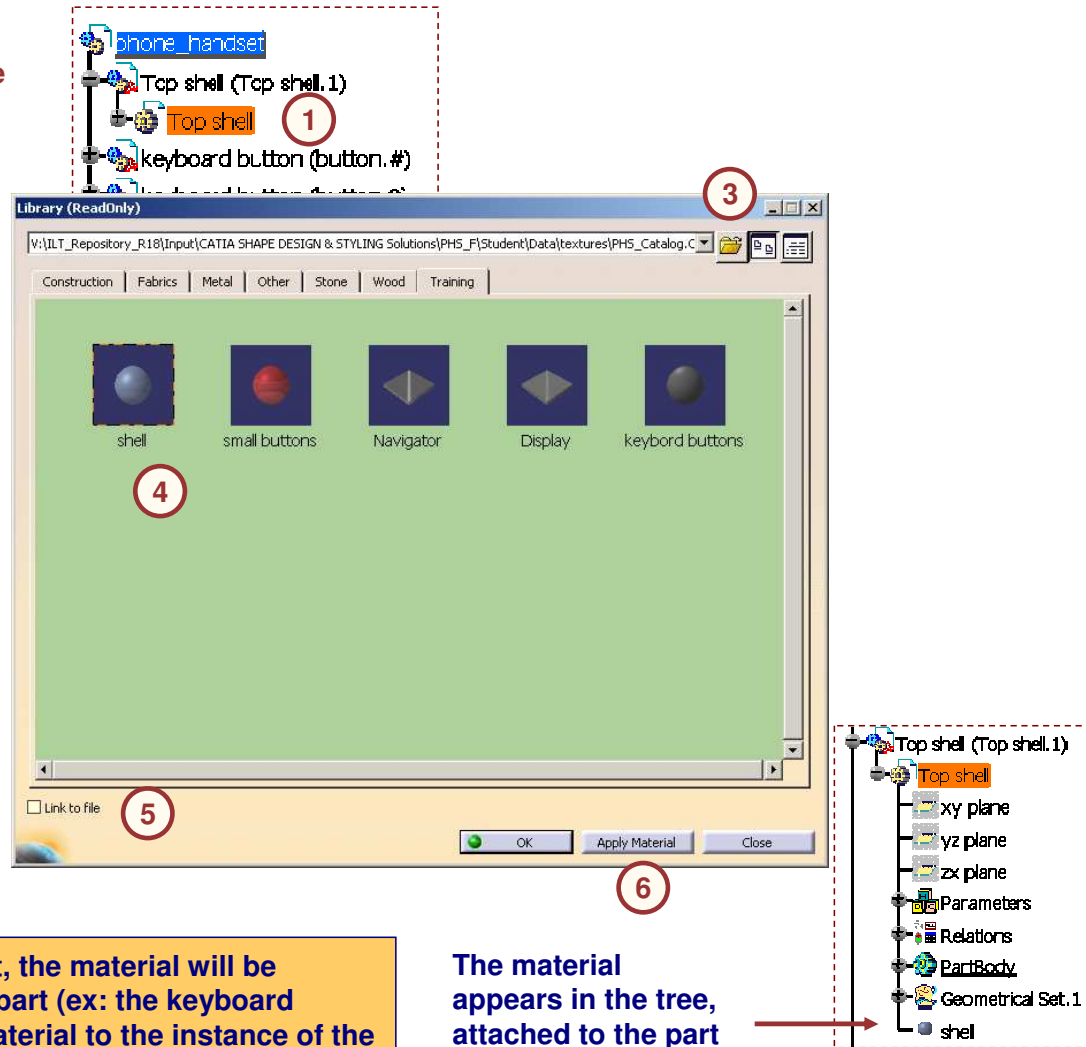
2 Select 'Apply material' icon

3 Select a family of material

4 Select a material

5 Check / uncheck the check box 'Link to file'. The mapped material is linked to the texture file. If the file is modified, the mapping will be automatically updated

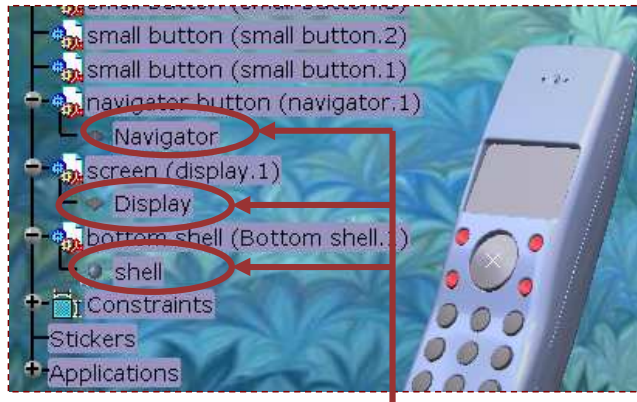**6** Click 'Apply Material'

If you apply the material to the part, the material will be applied to all the instances of this part (ex: the keyboard buttons) You can also apply the material to the instance of the part to create different effects on each instance.
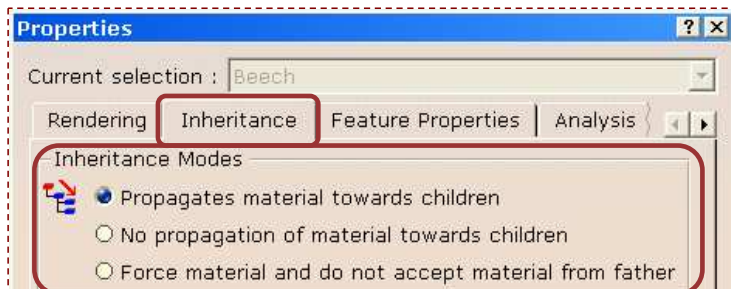
The material appears in the tree, attached to the part
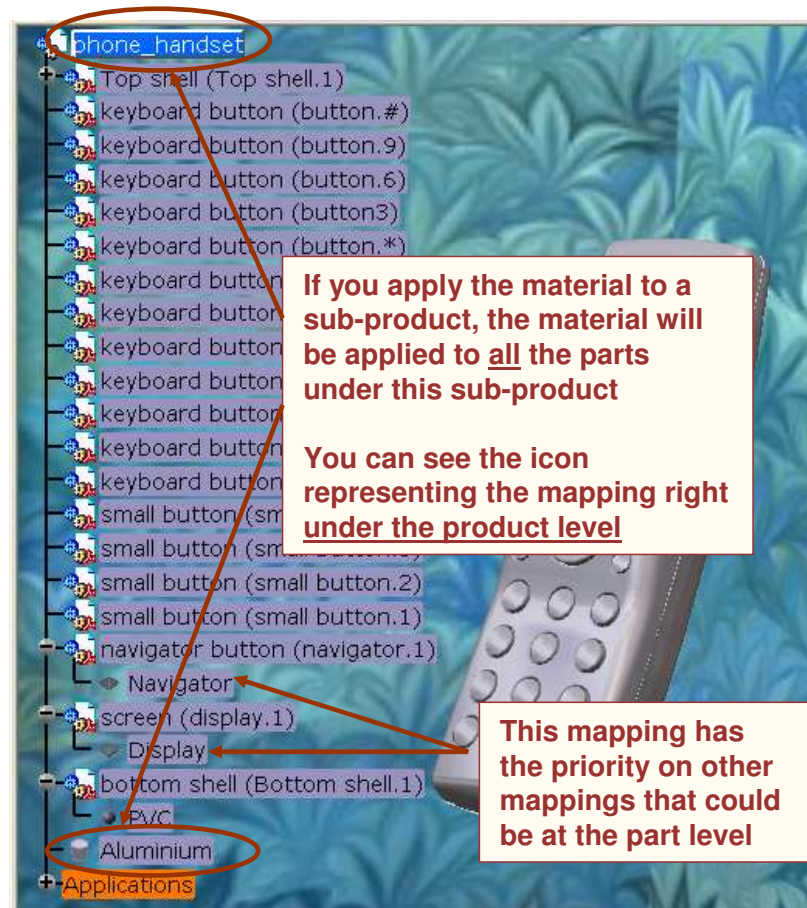
Applying a Material to a Component (2/2)

The material is applied to what you have selected in the tree. It can be either a part or a component/sub-product

If you apply the material to the part, you can see the icon (in the specification tree) representing the mapping right under the part node. The material will be also applied to all the instances of this part


The material inheritance mode can be changed through its properties

If you apply the material to a sub-product, the material will be applied to all the parts under this sub-product

You can see the icon representing the mapping right under the product level

This mapping has the priority on other mappings that could be at the part level
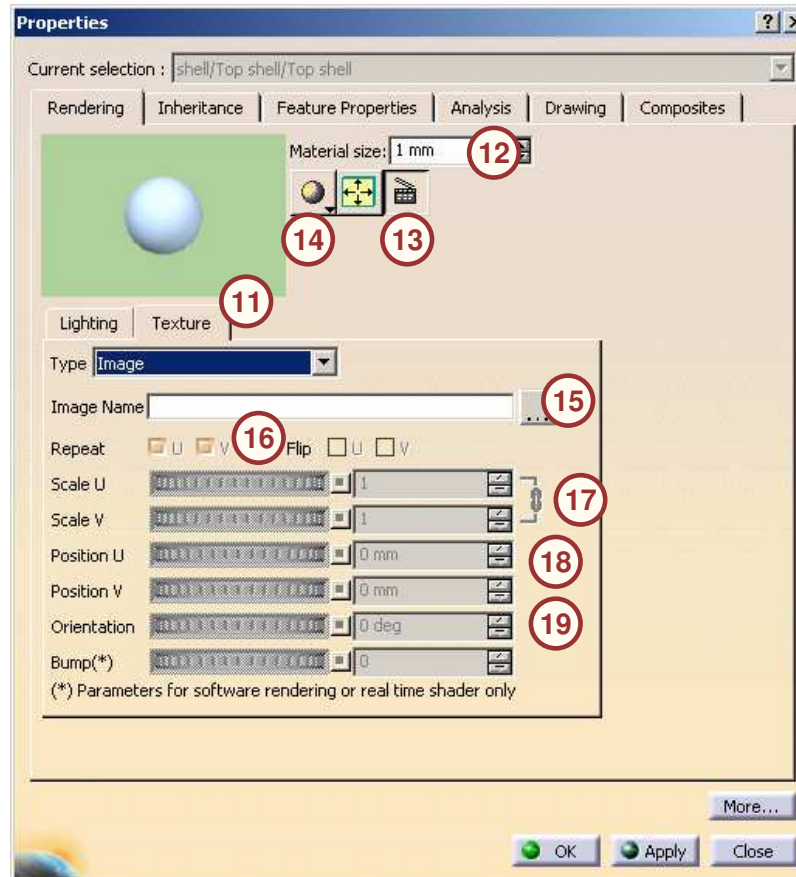
Editing the Properties of a Material (1/3)

1 Select the material in the tree, and 'Properties' from contextual menu

2 Select the 'Rendering' tab

3 Select the 'Lighting' tab

4 Define the ambient intensity and color of the material

5 Define the diffuse intensity and color of the material. Shiny material will need low value.

6 Define the specular intensity and color of the material. Shiny material will need high value.

7 Define the dullness of the material. High value will create large specular spots on the part.

8 Define the transparency intensity and color of the material. This parameter should be defined at the end.

9 Define the refraction parameter of a transparent material (no real time effect)

10 Define the reflectivity of the material.

Preview of the result
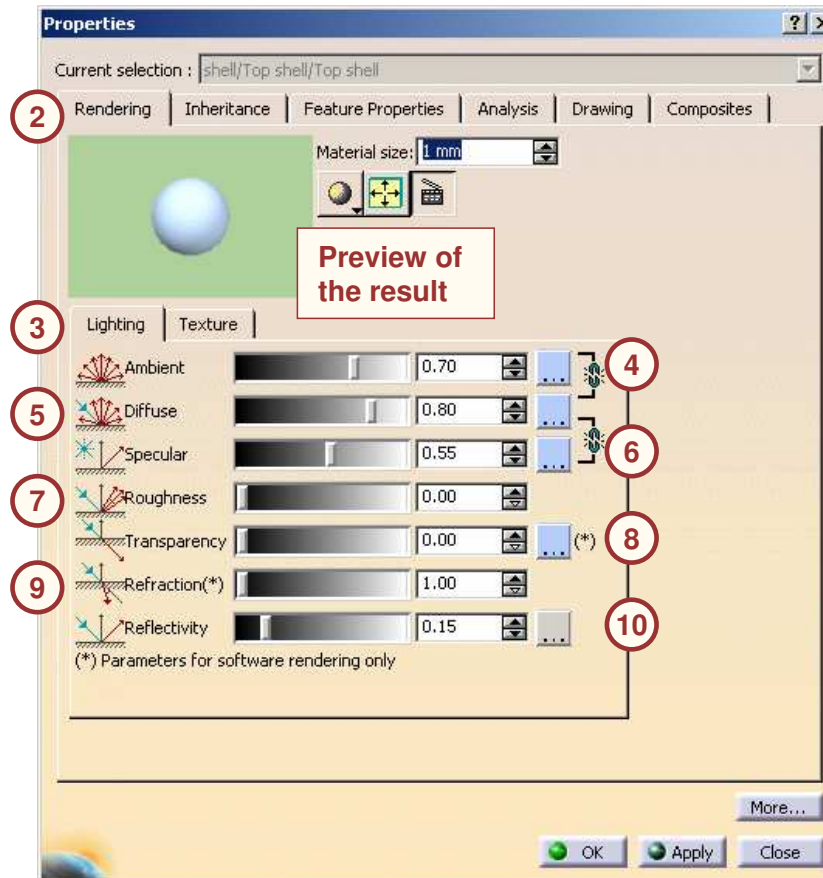
Editing the Properties of a Material (2/3)

(11) Select 'Texture'

(12) Define the material size.
It helps to make a global scaling of the texture. It is combined with the Scale U and Scale V parameters.

(13) Activate ray traced preview of the material

(14) Define the way the texture will be projected on the component.
5 modes are available: Planar, Spherical, Cylindrical, Cubical, Adaptive

(15) Select the texture file.

(16) By default, the texture is repeated until it covers the full component.
You can decide to use the texture only on time in one or both directions.

(17) Scale the texture in both directions

(18) Translate the texture in both directions

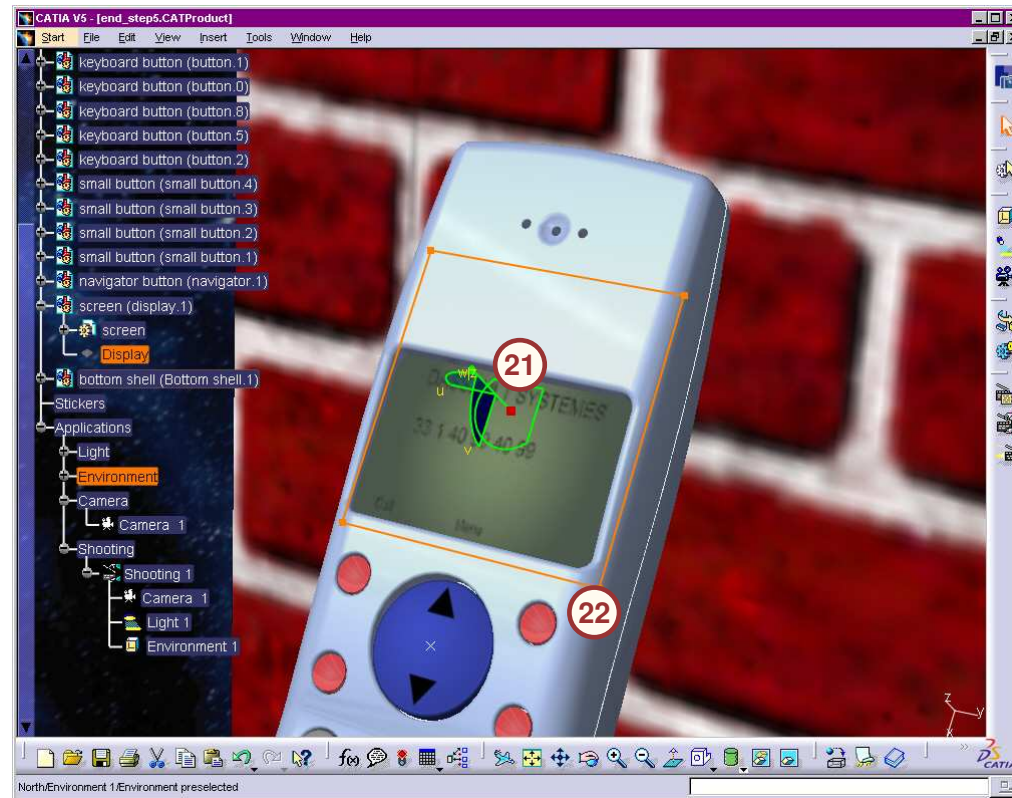**(19)** Define the orientation of the texture

Editing the Properties of a Material (3/3)

20 Select the material in the tree

21 Modify the position of the texture using the compass

**22** Modify the texture scale using the corners

Stickers Management
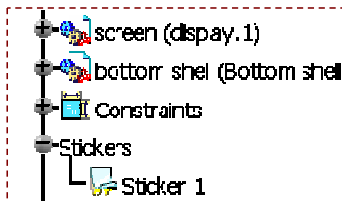
In this lesson you will learn how to handle stickers.

Creating a Sticker

1   **Click the 'Sticker creation' icon**

2   **Select the geometry to use for the sticker mapping. Multi-selection process is available**

3   **Select the mapping according to the surface type (planar, spherical, cylindrical)**

4   **Define the texture file**

5   **Define the sticker texture scale**

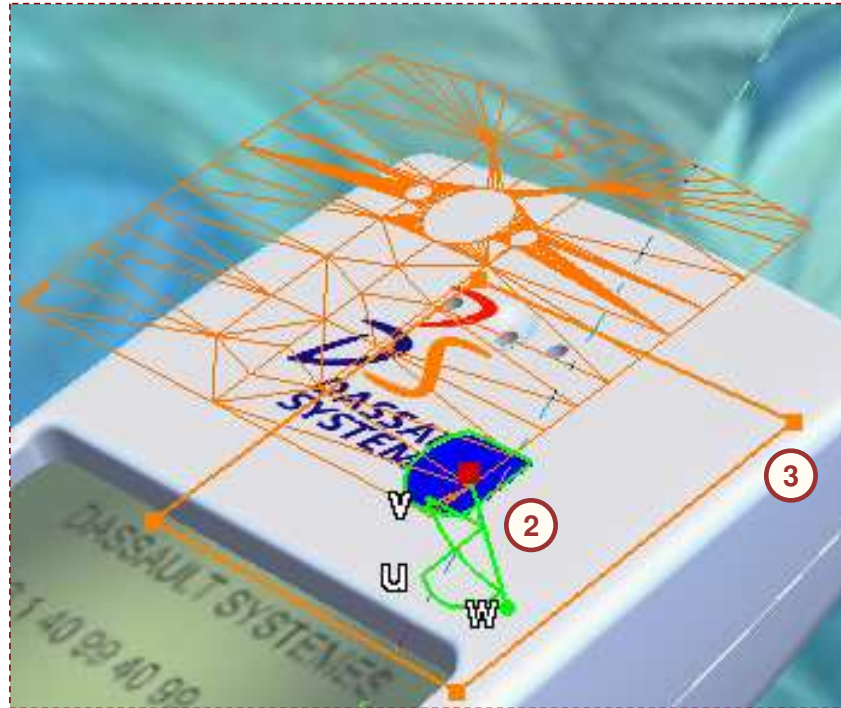**6**   **Define the sticker texture position**

The sticker appears in the product tree
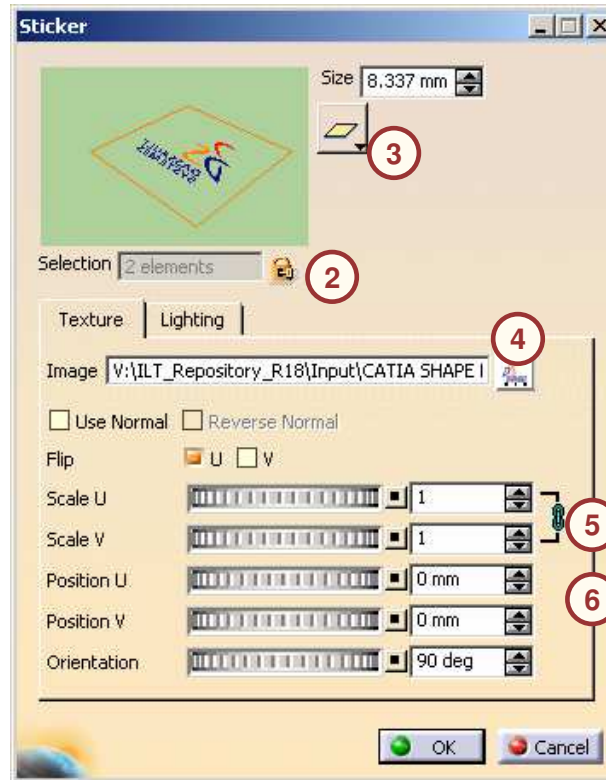
**The sticker appears in the graphics area**

Adjusting a Sticker

1   **Select the sticker in the tree**

2   **Position the sticker using the compass**

3   **Define the sticker scale using the corners**

Defining the Lighting Parameters of a Sticker

1 **Click on Properties from the contextual menu of the sticker in the tree**

2 **Select 'Lighting'**

3 **Define a transparency color if needed**

4 **Define the lighting parameters as for any other material**
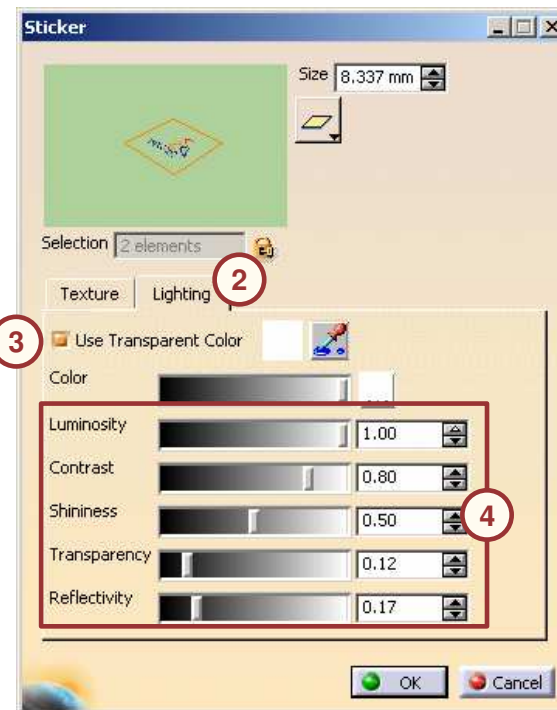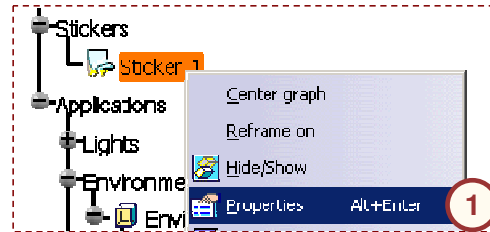
Animation: Turntable Management

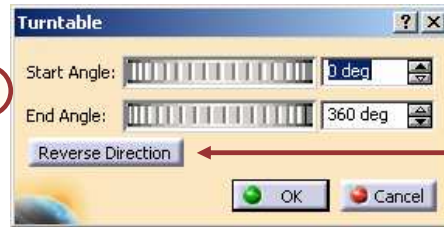*In this lesson you will learn how to create a simple animation by using a turntable.*

Creating a Turntable

1 **Click on the 'Create Turntable' icon**

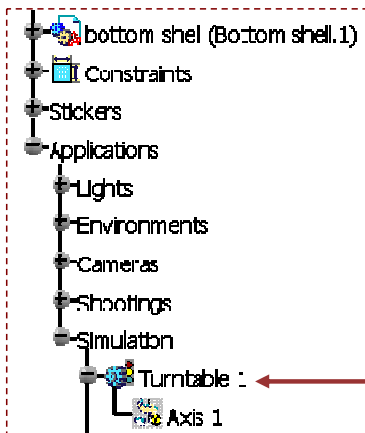**2** **Define the start and end rotation angle.**

Start angle to 0 means that the animation starts at the position the object has in the 3D viewer

3 **Position the rotation axis using the standard tools of the compass**

2

Reverse the rotation direction if necessary

The turntable is represented in the 3D viewer by an arc.

3

A new feature is added to the tree

You can define the turntable parameters at its creation or by double-clicking its axis in the tree.

Simulating the Animation

1 **Double-Click on the turntable in the tree**
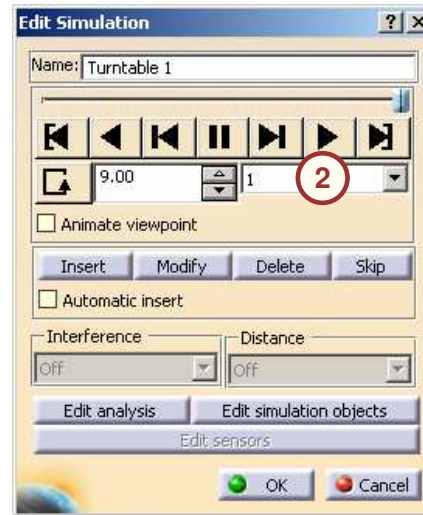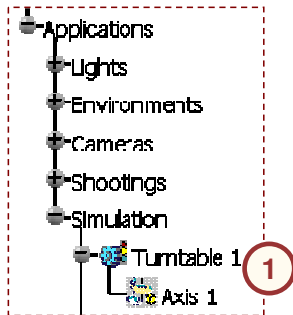
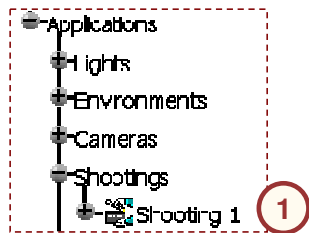**2** **Play the simulation**

3 **Rewind the simulation to its beginning**


Various positions of the product in simulation

Computing the Animation (1/2)

1   **Edit the shooting parameters by double-clicking it**

2   **Select 'Animation'**

3   **Select the turntable you want to render with this shooting**

4   **Define the number of frames you want in your animation**

5   **Define the frames you want to compute**

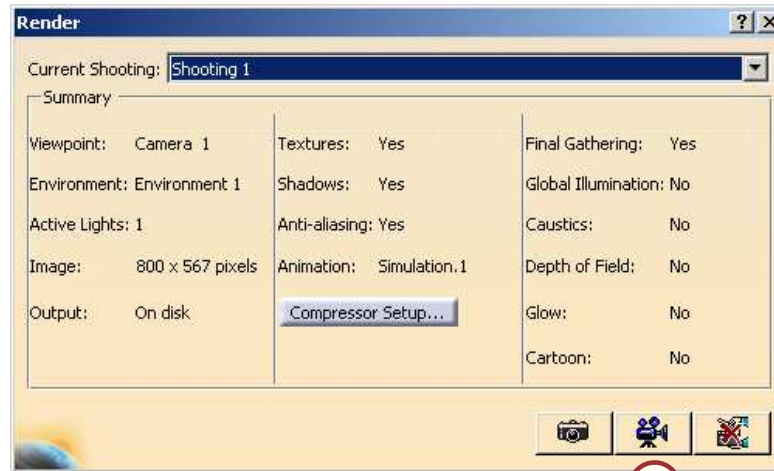**6**   **The output format for the animation is defined in the Frame tab of the dialog box**
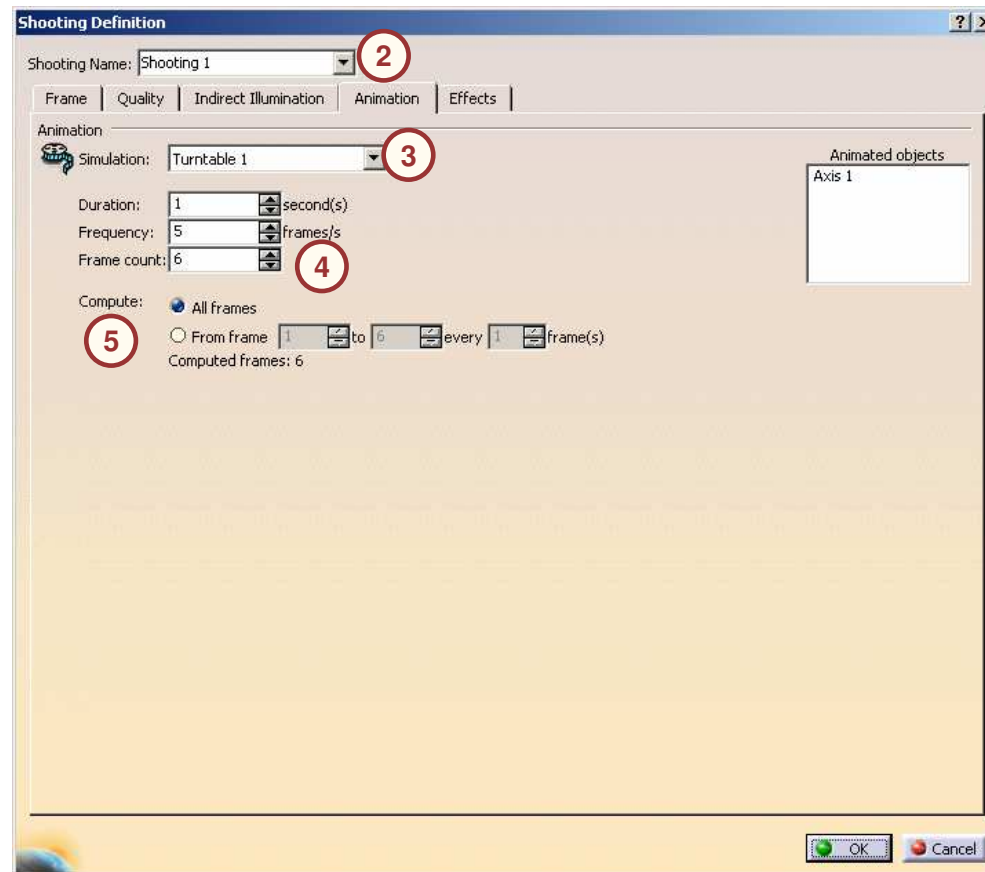
Computing the Animation (2/2)

7 Select the 'Render Shooting' icon

8 Select the 'Render Animation' option

Render

Current Shooting: Shooting 1

Summary

Viewpoint: Camera 1	Textures: Yes	Final Gathering: Yes
Environment: Environment 1	Shadows: Yes	Global Illumination: No
Active Lights: 1	Anti-aliasing: Yes	Caustics: No
Image: 800 x 567 pixels	Animation: Simulation.1	Depth of Field: No
Output: On disk	Compressor Setup...	Glow: No
		Cartoon: No

8

Animation: Animating Scene Elements

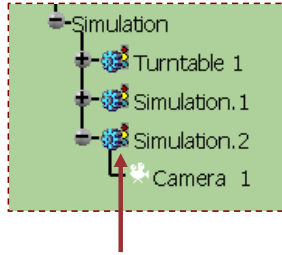*In this lesson you will learn how to create a simple animation of elements of your scene, for example a light.*
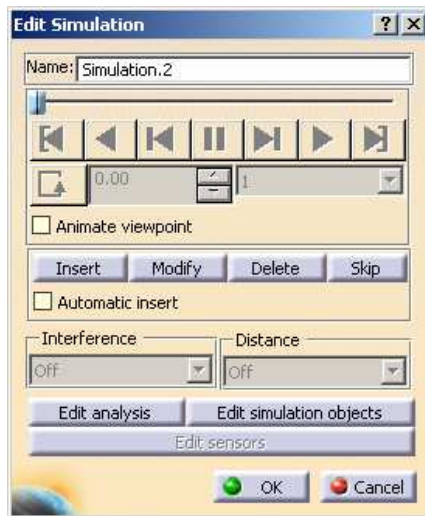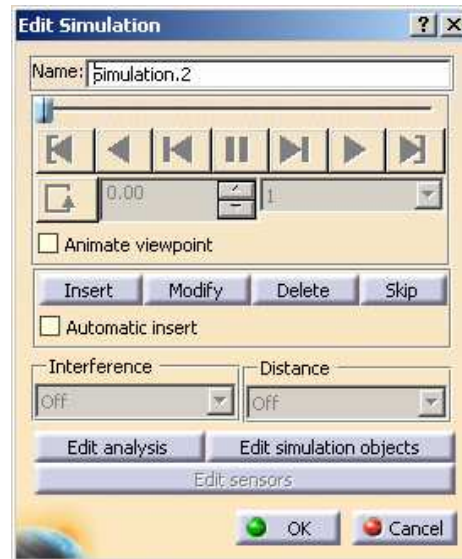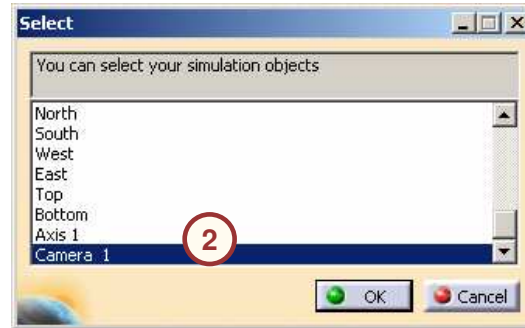
Creating an Animation

1   **Select the animation creation icon**

2   **Select the element to animate in the tree**

**3**   **Define the element parameters at the beginning of the animation**

Select

You can select your simulation objects

North
South
West
East
Top
Bottom
Axis 1
Camera 1   **2**

OK   Cancel

Edit Simulation

Name: Simulation.2

☐ Animate viewpoint

Insert   Modify   Delete   Skip

☐ Automatic insert

Interference   Distance

Off   Off

Edit analysis   Edit simulation objects

Edit sensors

OK   Cancel

Simulation
 ├ Turntable 1
 ├ Simulation.1
 └ Simulation.2
   └ Camera 1

A new feature is added to the tree

Adding Elements to an Animation

1   **Edit the animation by double clicking it in the tree**

2   **Click the 'Edit simulation objects' button**

3   **Click the 'Add' button**

4   **Select the object to add in the list of available elements**
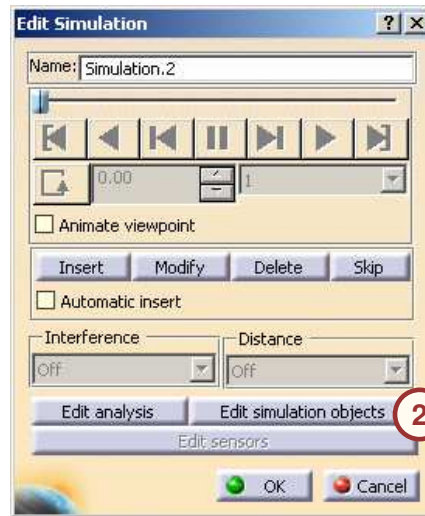
Defining the Parameters of Animated Elements

1 **Dynamically define the object parameters if the element offers this possibility**

2 **Select the edition button of the animation object if the element can be defined through dialog boxes only**

3 **Select the object to edit in the list of animated elements**

4 **Select the 'Edit' button**
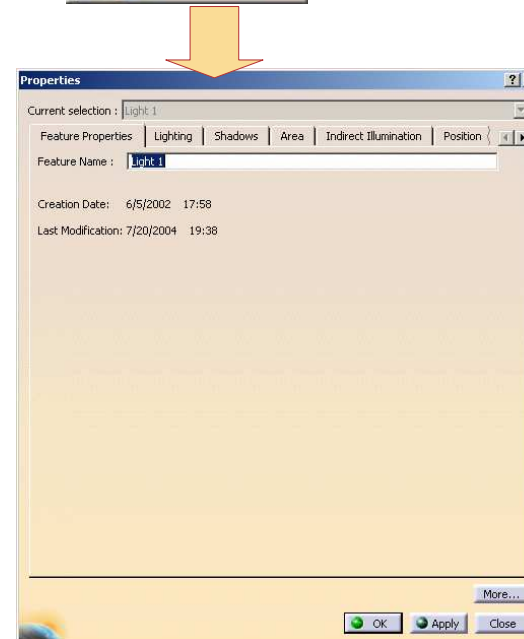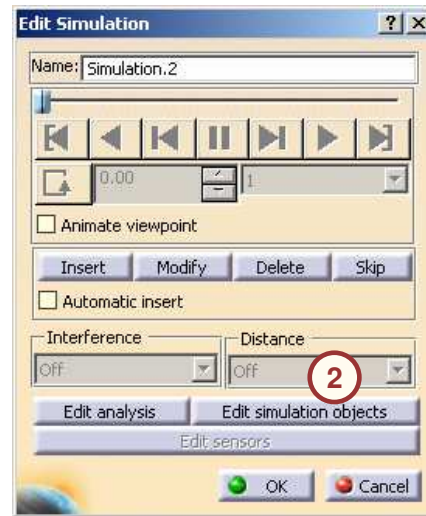
From the properties panel, you can edit the parameters of the element

Creating and Modifying a Shot

1 Define the element parameters at the shot position as mentioned previously

2 Select the 'Insert' button to create a new shot in the animation

3 Select the 'Modify' button to take into account the new element parameters in the current shot

Current shot number
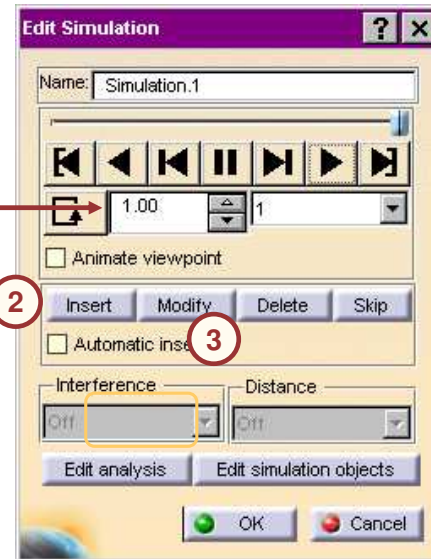
Catalogs

In this lesson you will learn how to use catalogs to import components in the scene.

Using Scene Catalogs

You have the possibility to use predefined elements stored in catalogs (environments, cameras, lights, etc.)

1   **Select the 'Catalog' icon**

2   **Browse the scene catalog (…/startup/components/rendering/ Scene.catalog)**

3   **Select a family, and then a component to apply**

4   **Double-click or select 'Instantiate component' to add it to the scene. It appears in the specification tree**

To Sum Up ...

In this course you have seen:

- **How to create a photo realistic image**

- **How to create an animation by rotating the object**

- **How to create an animation by modifying the scene elements**