

MODELING AND MATERIALS

RECOLLECTION

OBJECT REPRESENTATION

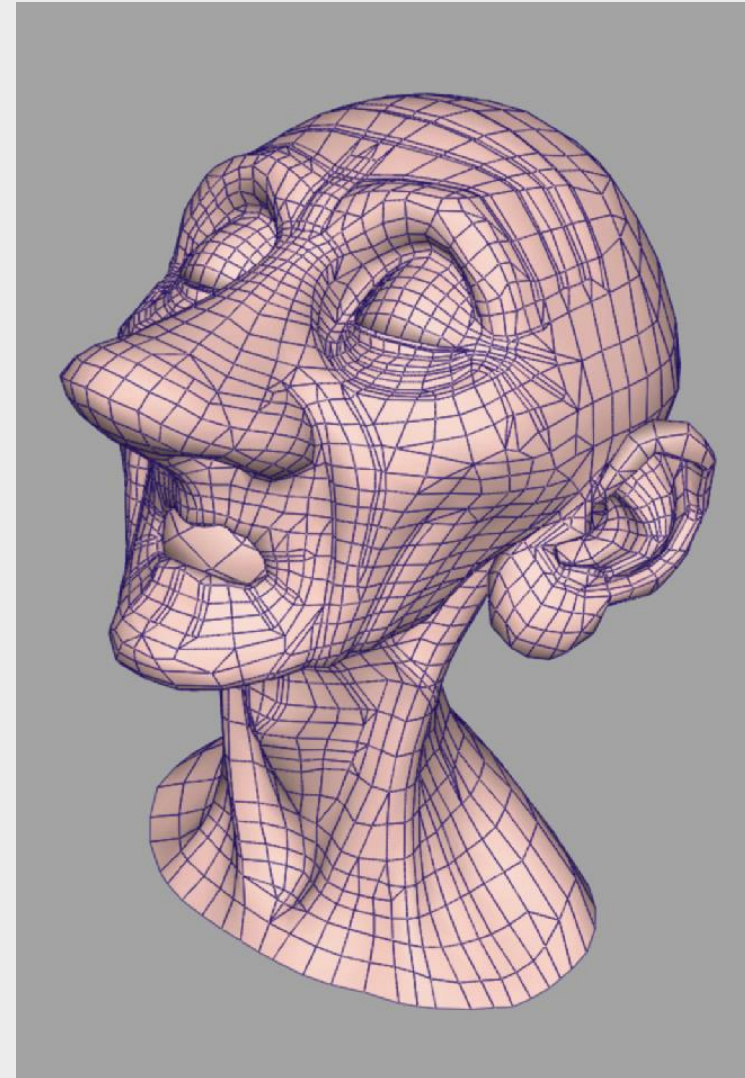
BOUNDARY (SHELL)

REPRESENTATION

VOLUME REPRESENTATION

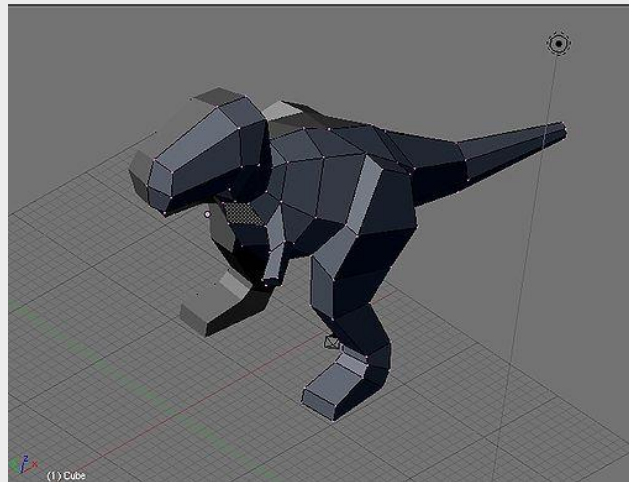
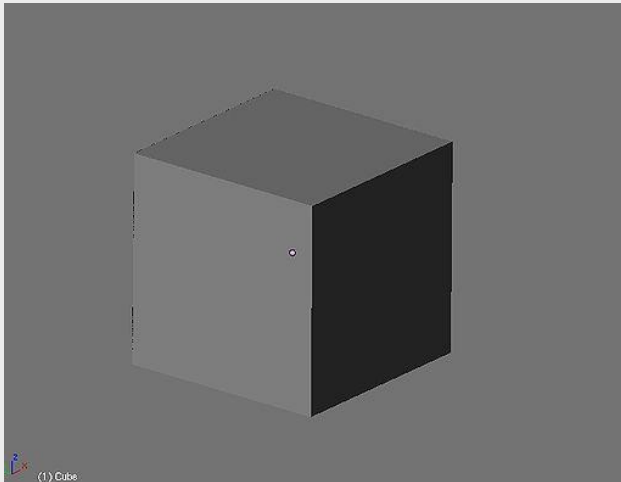
PARAMETRIC & POLYGONAL

Conversion to polygonal



MODELING

FILLING THE PARTICULAR REPRESENTATION WITH DATA

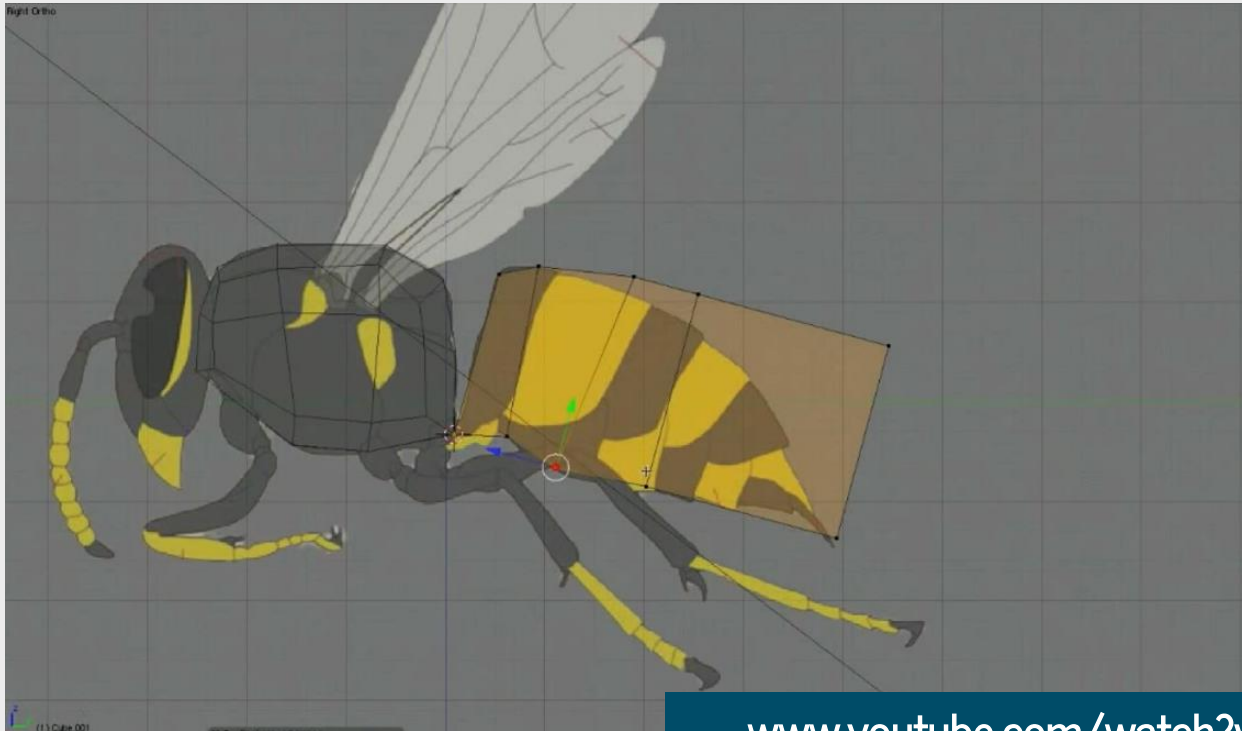


MANUAL
PROCEDURAL
ACQUISITION

BOX MODELING

ADD NEW VERTICES, MOVE VERTICES, REPEAT

...
POLYGONAL



www.youtube.com/watch?v=iBgtB-yQtsY

SCULPTING

PUSH/PULL/PINCH SURFACE AREAS AS CLAY

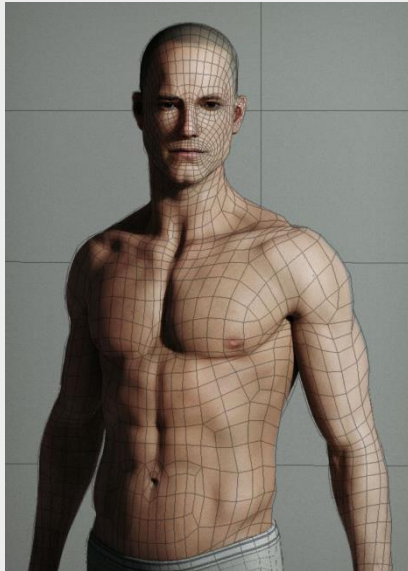
POLYGONAL



www.youtube.com/watch?v=8rznwQt_jcU

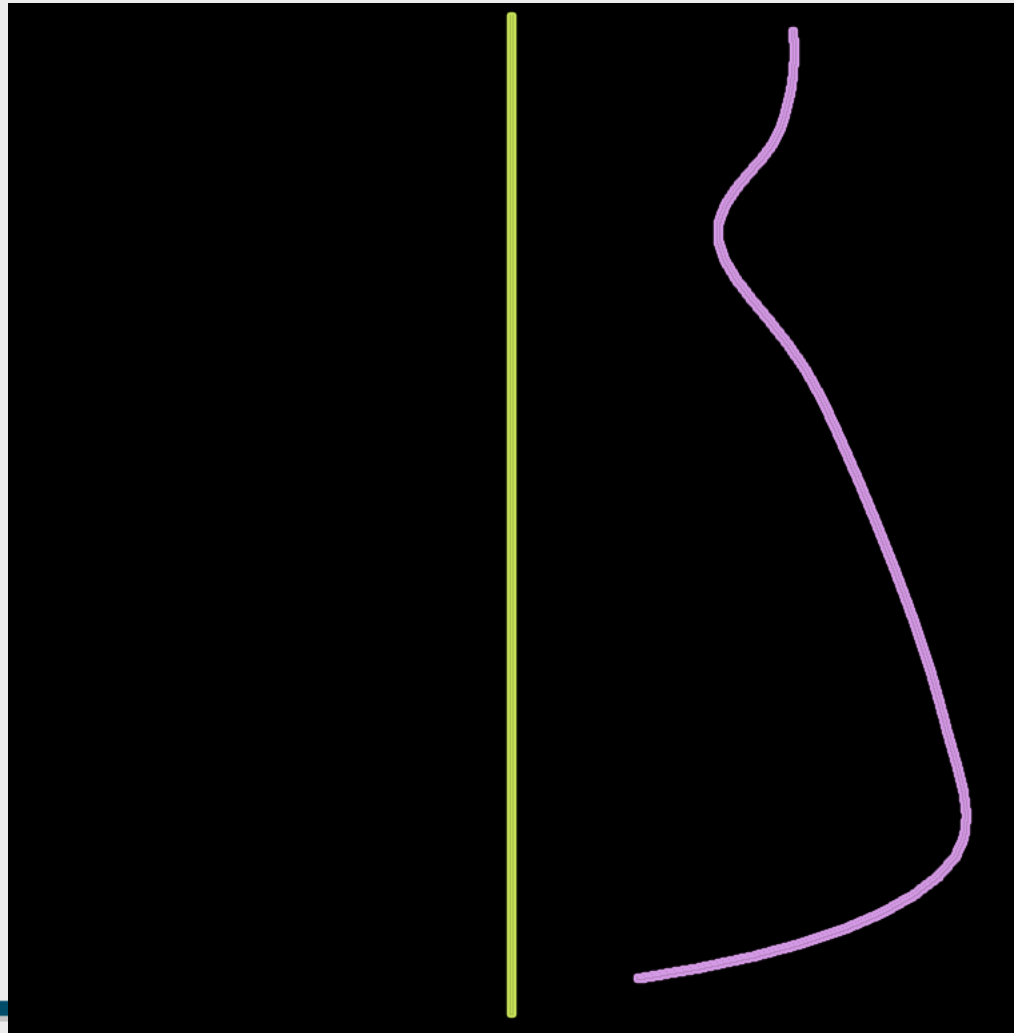
EXAMPLE

WWW.TEN24.INFO



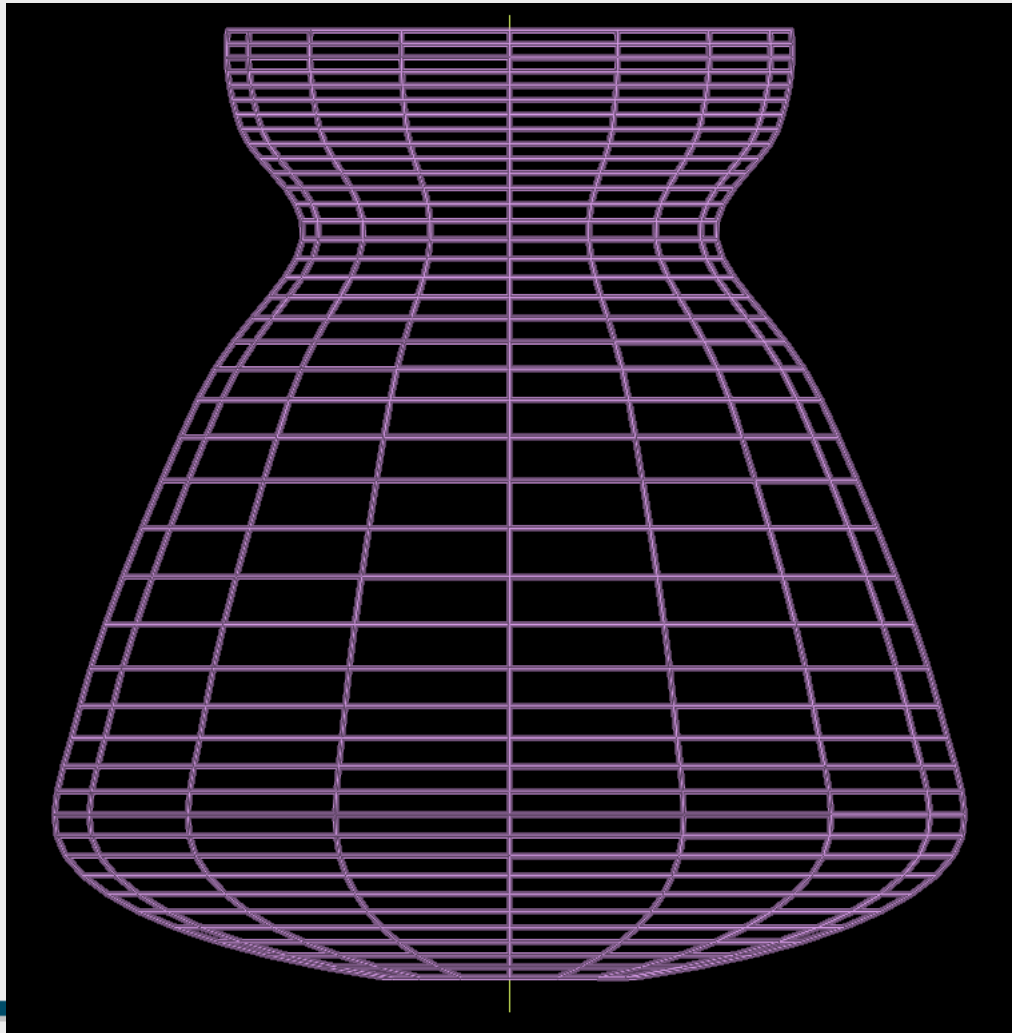
PARAMETRIC MODELING - LATHE

ROTATE CURVE AROUND AN AXIS



SURFACES - LATHE

ROTATE CURVE AROUND AN AXIS



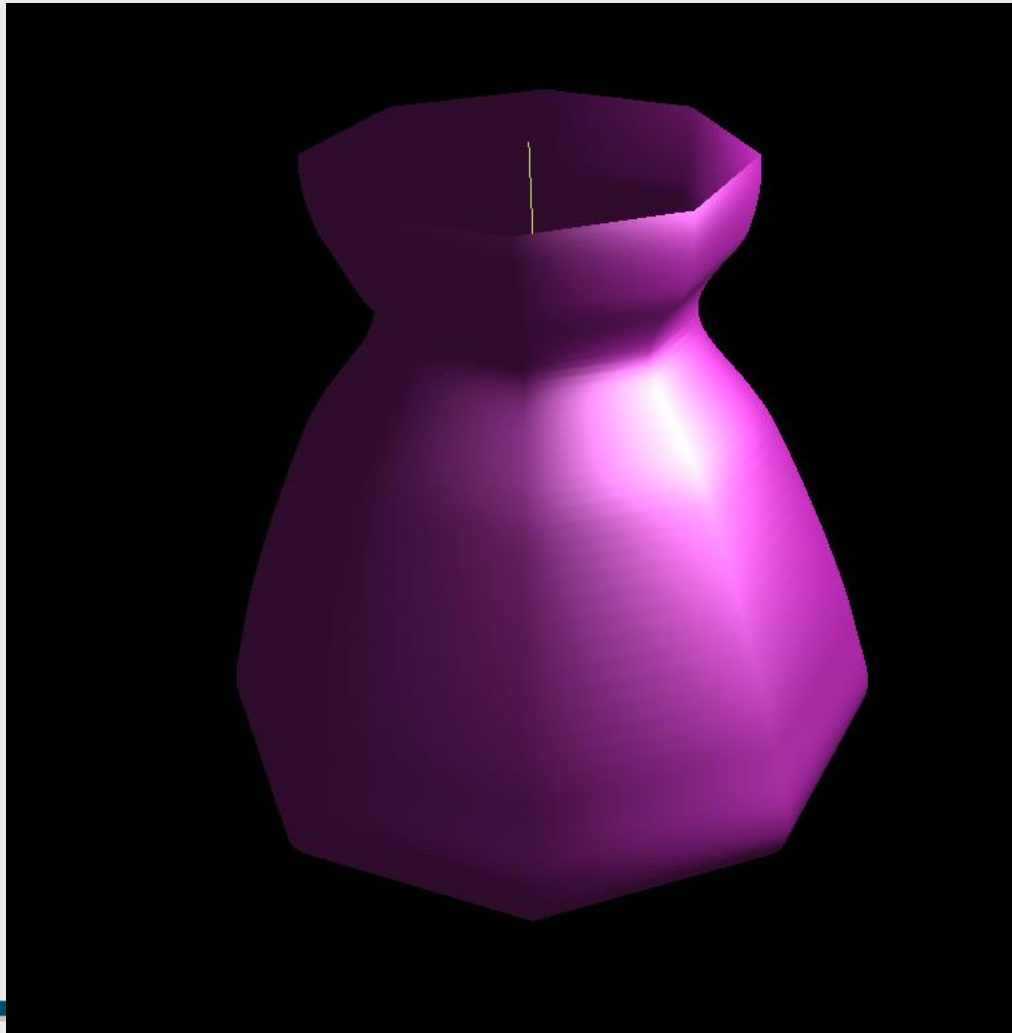
SURFACES - LATHE

ROTATE CURVE AROUND AN AXIS



SURFACES - LATHE

VARIABLE NUMBER OF STEPS - SMOOTHNESS



SURFACES - LATHE

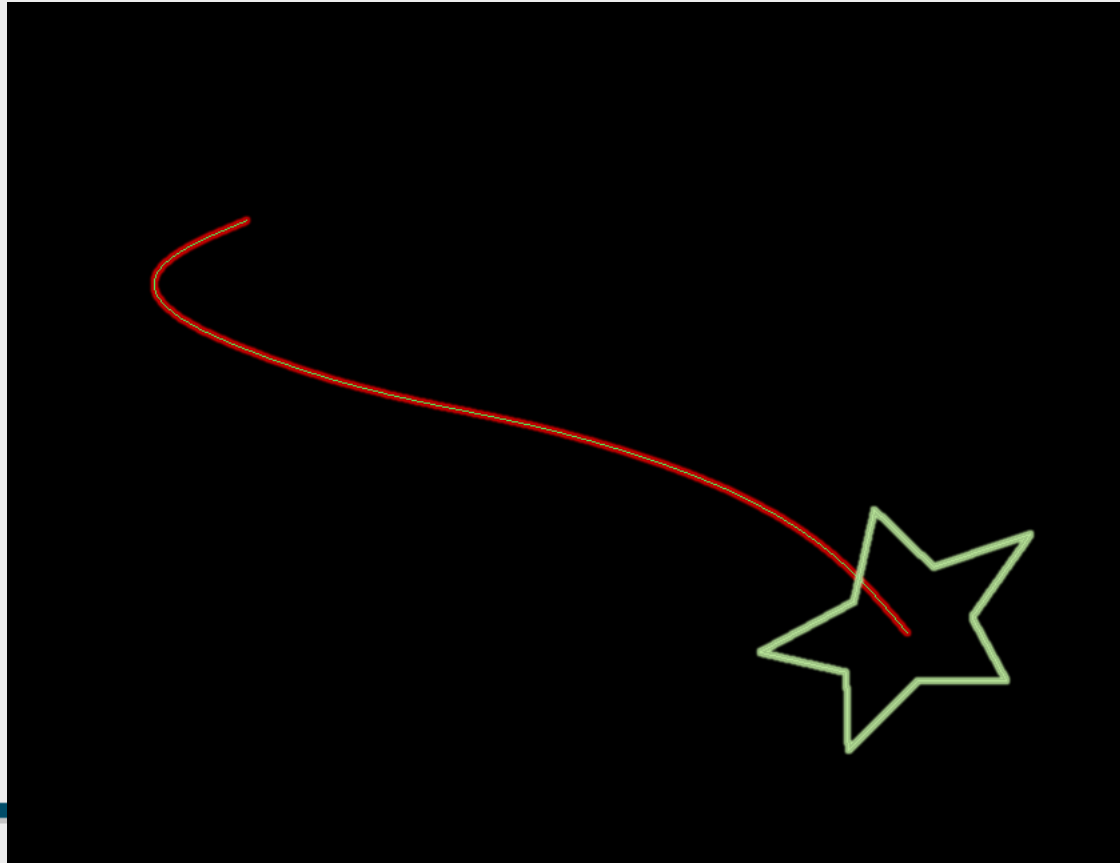
VARIABLE NUMBER OF STEPS - SMOOTHNESS



SURFACES - LOFT

TRANSLATE CURVE ALONG ANOTHER CURVE

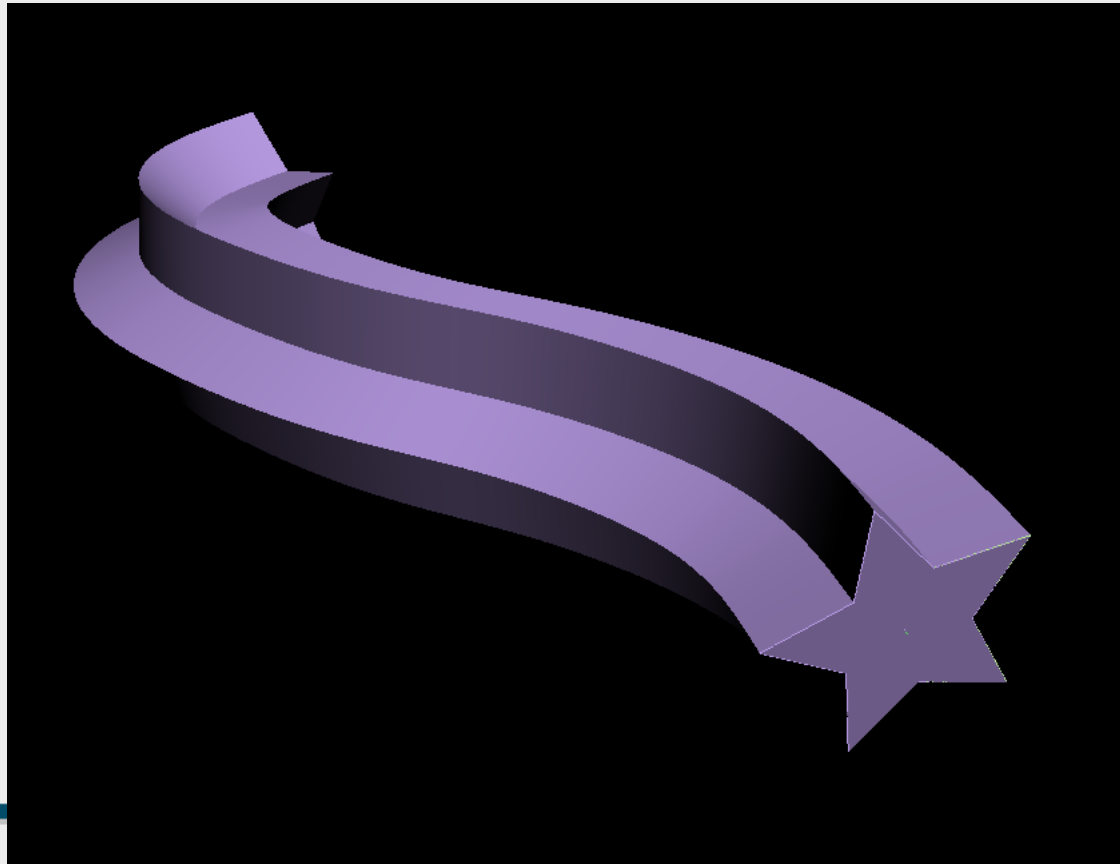
ROTATE OR SCALE DURING TRANSLATION



SURFACES - LOFT

TRANSLATE CURVE ALONG ANOTHER CURVE

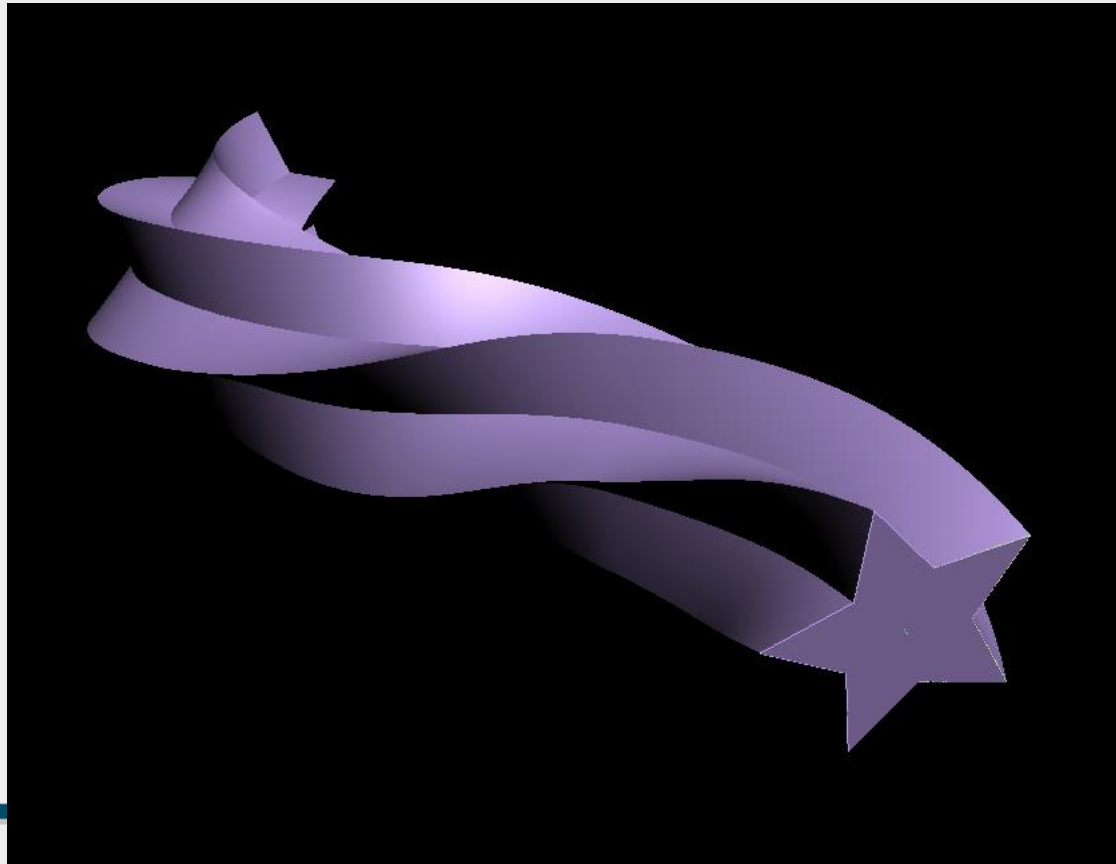
ROTATE OR SCALE DURING TRANSLATION



SURFACES - LOFT

TRANSLATE CURVE ALONG ANOTHER CURVE

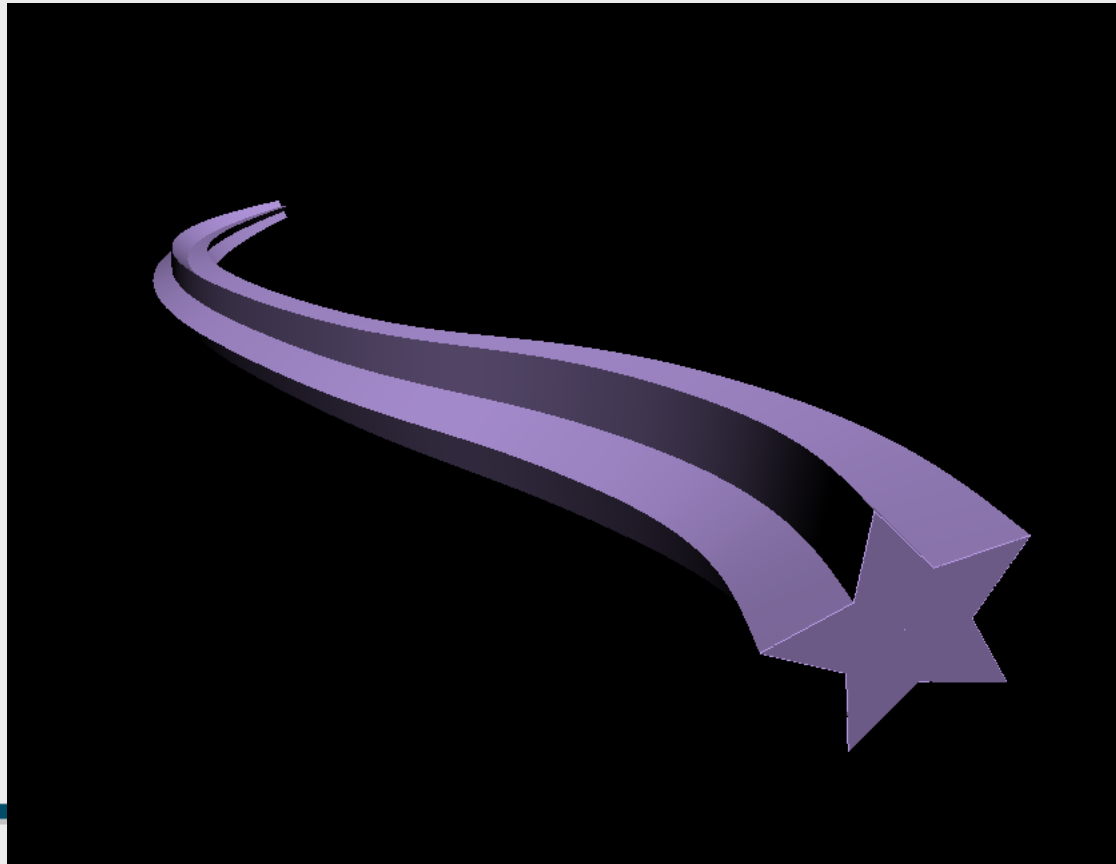
ROTATE OR SCALE DURING TRANSLATION



SURFACES - LOFT

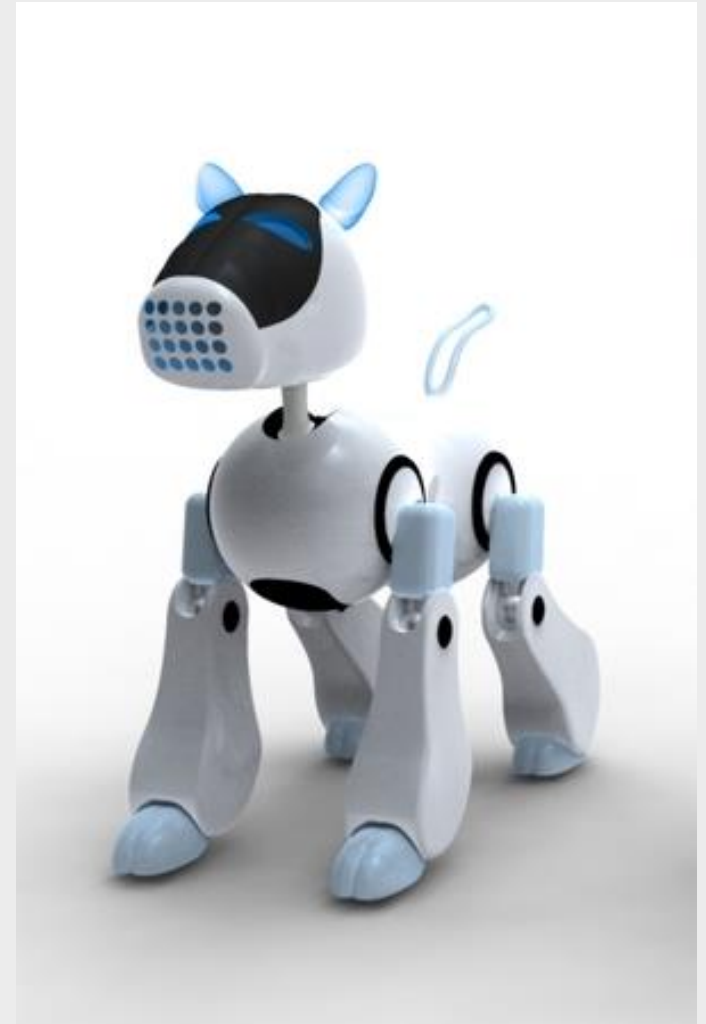
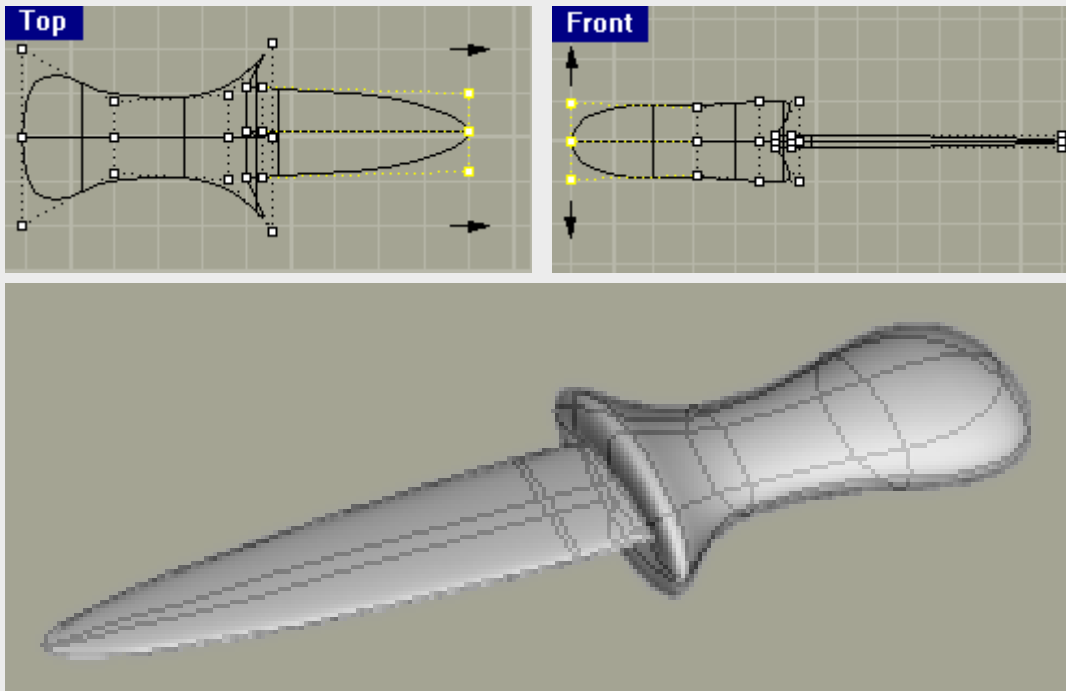
TRANSLATE CURVE ALONG ANOTHER CURVE

ROTATE OR SCALE DURING TRANSLATION

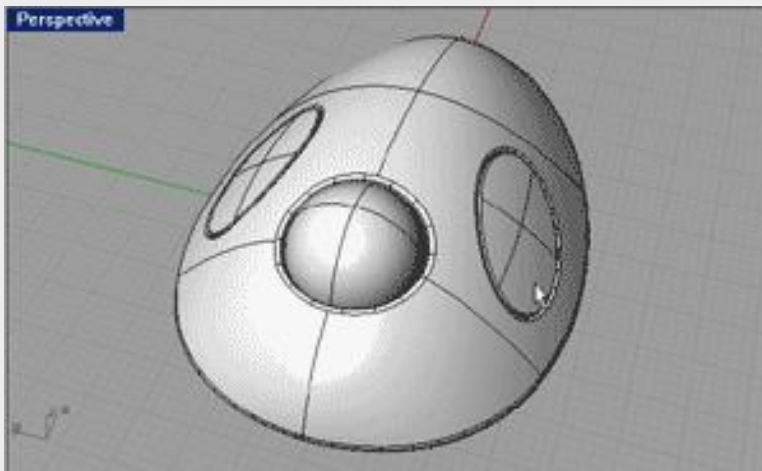
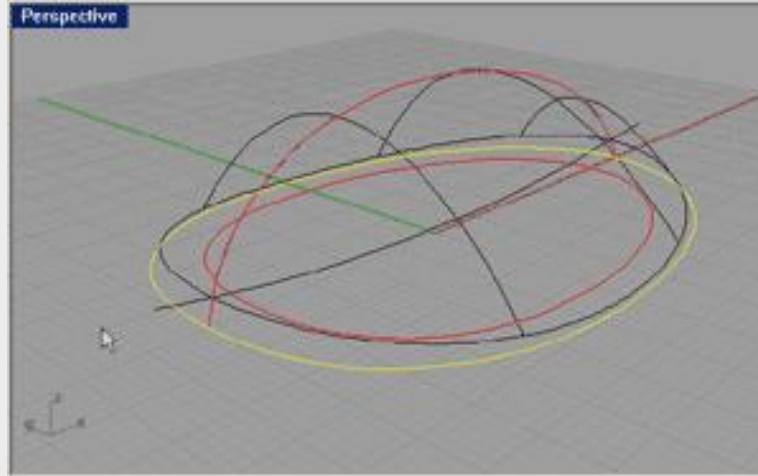
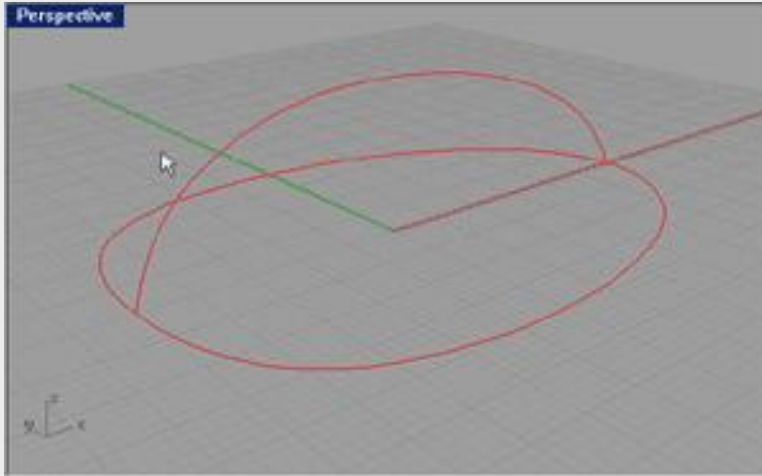


NURBS MODELING

PARAMETRIC SURFACE CONTROLLED BY POINTS AND CURVES



RHINO 3D



http://www.aversis.be/tutorials/rhinoceros/rhino_trackball_01.htm

MODELING REAL WORLD PHENOMENA

PLANTS, TREES

L-SYSTEMS
PARAMETRIC
PROCEDURAL
TREE ROOT
BRANCHING RULES



www.vf.utwente.nl/~schooten/povray/

www.sccg.sk/~smolenova/groimp/groimp.htm

EXAMPLE

GROWFX, SPEEDTREE

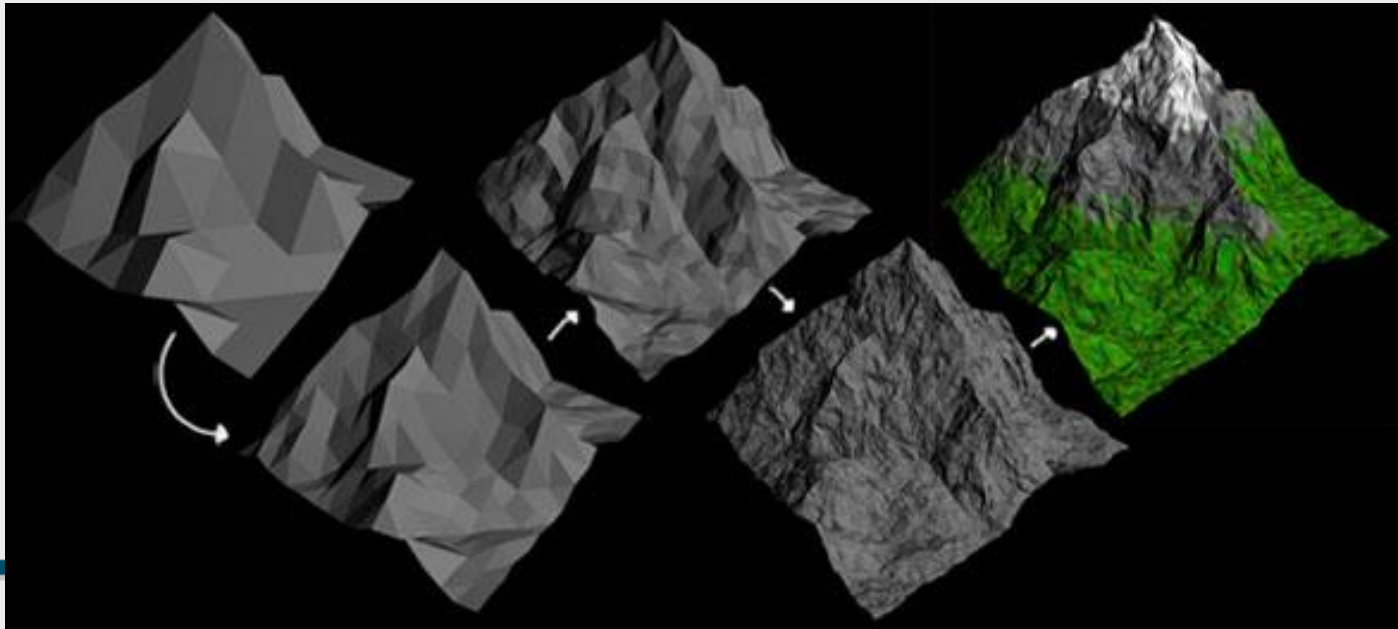
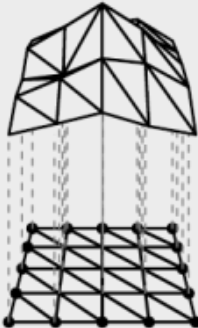
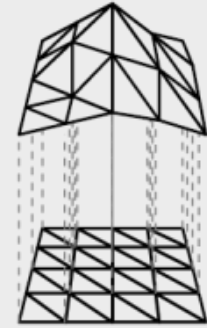
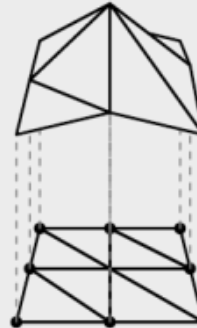
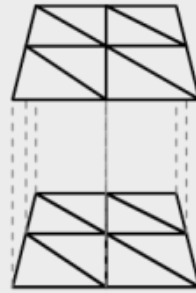
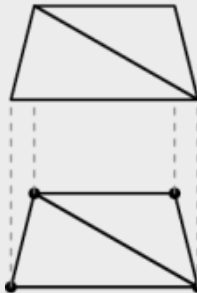
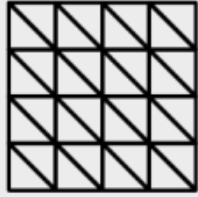
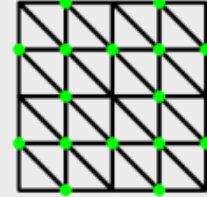
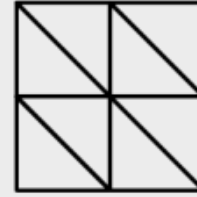
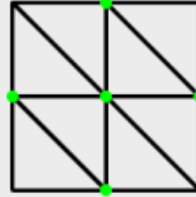
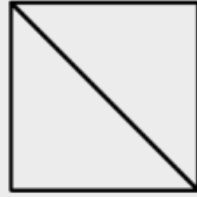


FRACTAL MOUNTAINS

MIDPOINT
DISPLACEMENT

+

NOISE



LANDSCAPE GENERATION



OTHER PHENOMENA

WATER, LIQUIDS
SAND, DUST, POWDER
EROSION, MELTING
GROWTH
FABRIC
HAIR, FUR

...

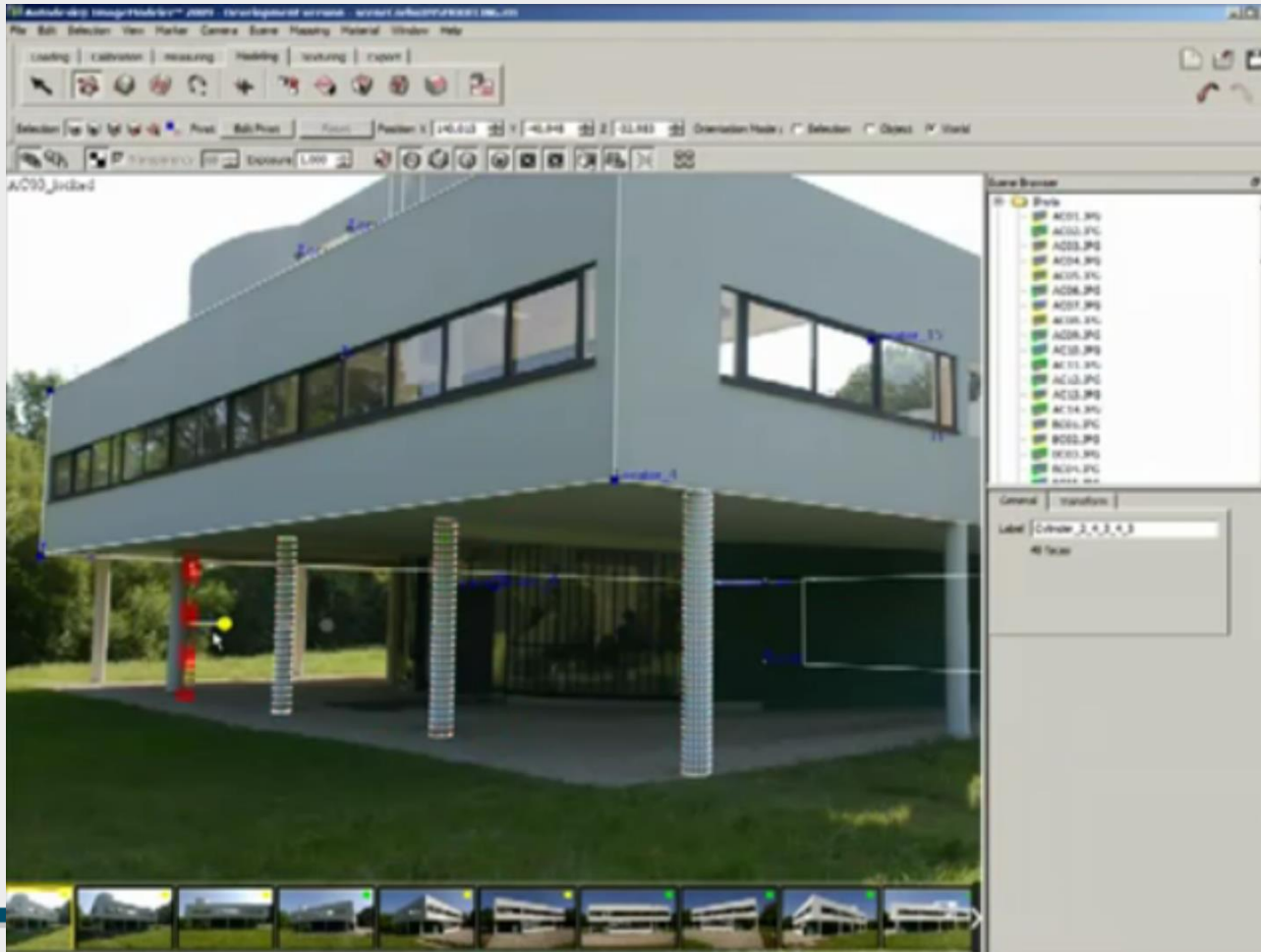
USUALLY COMBINED
WITH ANIMATION



3D DATA ACQUISITION

PHOTOGRAMMETRY

RECONSTRUCT 3D MODEL FROM
PHOTOGRAPHS (AT LEAST 2 REQUIRED)



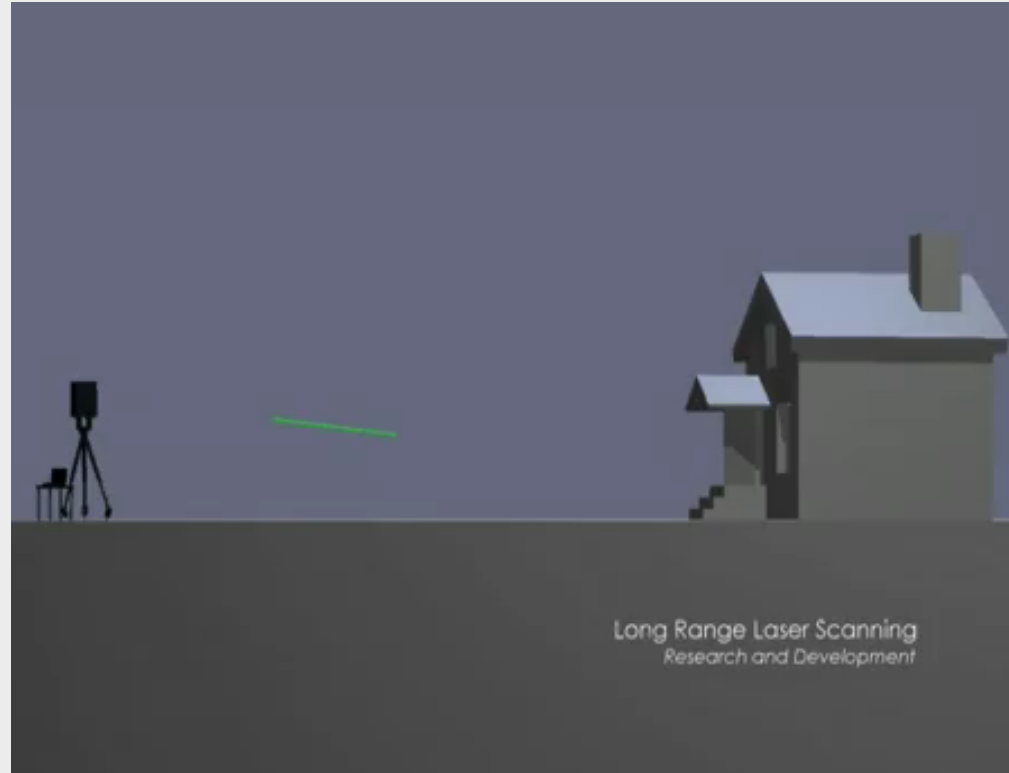
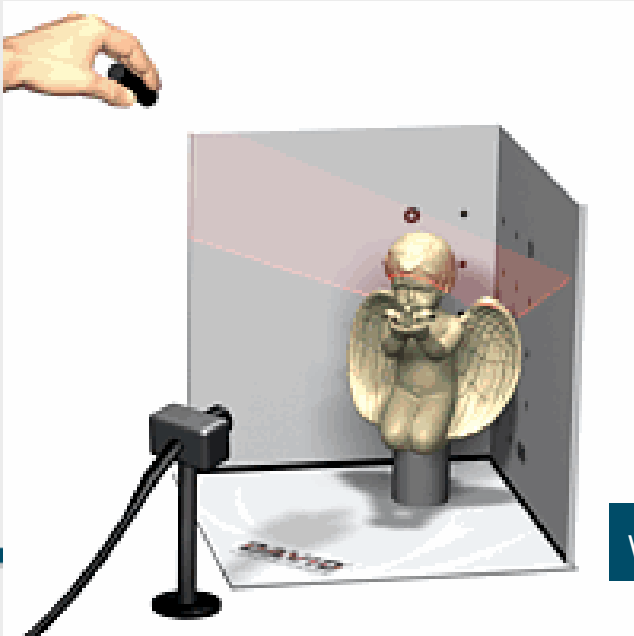
SCANNING

LASER SCANNING

Point cloud, contours

3D PROBES

LASER STRIPING



www.youtube.com/watch?v=_NxCfYkPYBI

www.david-laserscanner.com/

MEDICAL DATA SCANNING

CT, MRI -> SET OF 2D PICTURES

Pixels

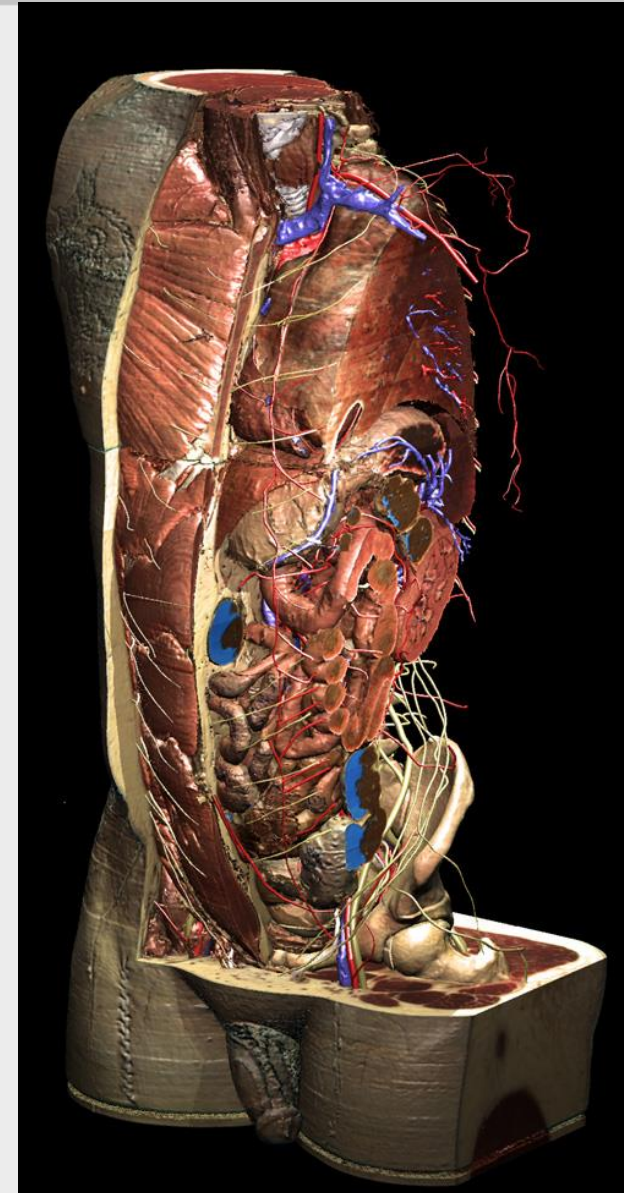
REGISTRATION (ALIGN IMAGES)

Voxels

SEGMENTATION

Which voxels = which organ?

(OPTIONAL) CONVERSION
TO POLYGONAL MODEL



MEDICAL DATA

ORIGINAL DATA
CONTAINS DENSITY INFO

DENSITY $\rightarrow$ GRAY VALUE

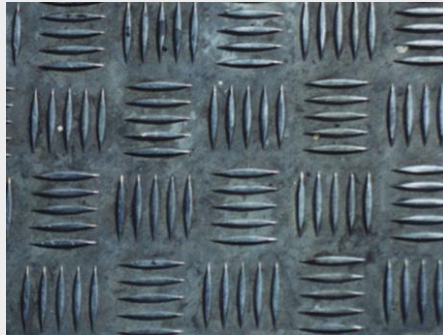


MATERIALS

TEXTURE

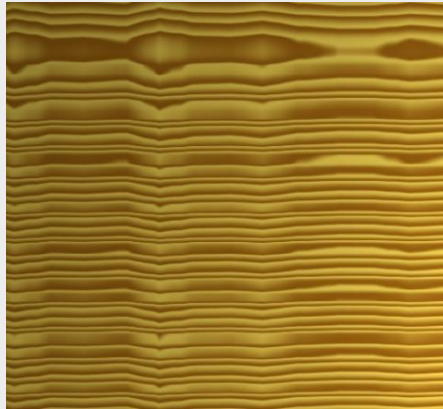
USED TO DEFINE
OBJECT COLOR

IMAGE
TEXTURE

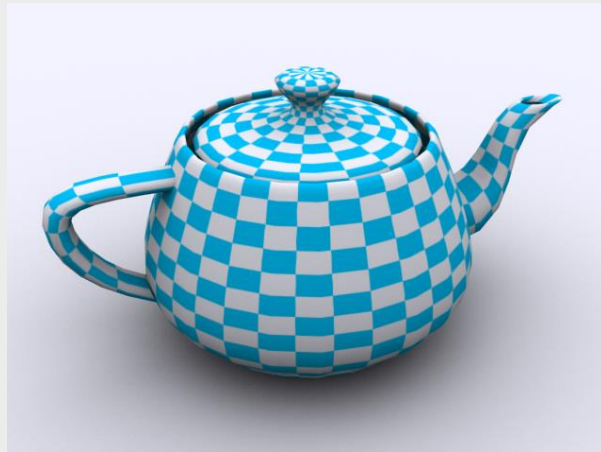


PROCEDURAL
TEXTURE

i.e. formula,
algorithm



DIFFERENT UV MAPPINGS



TEXTURE USAGE

OBJECT DIFFUSE COLOR
patterns, decals

MODULATE SURFACE PROPERTIES
bumps, displacements

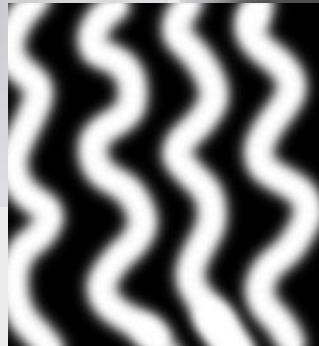
MODULATE LIGHTING PROPERTIES
e.g. shininess

SIMULATE PHYSICAL PHENOMENA
reflection, refraction, global illumination

MULTITEXTURING

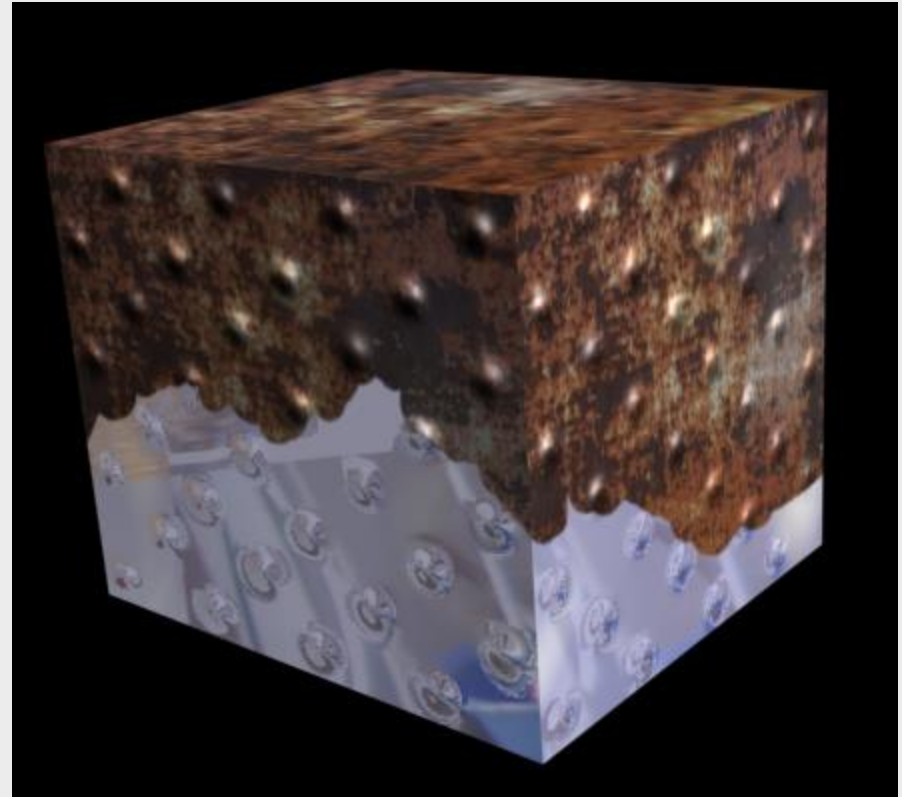
BUMP MAPPING EXAMPLE

COLOR INTENSITY = DIFFERENCE BETWEEN
COMPLEX SURFACE AND SIMPLE MODEL



MULTITEXTURING

COMBINE MULTIPLE TEXTURES



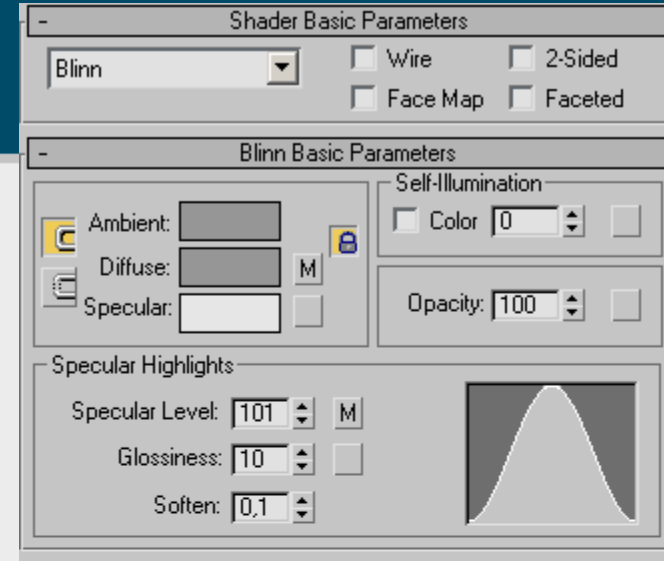
MATERIAL

TEXTURES

SHADERS

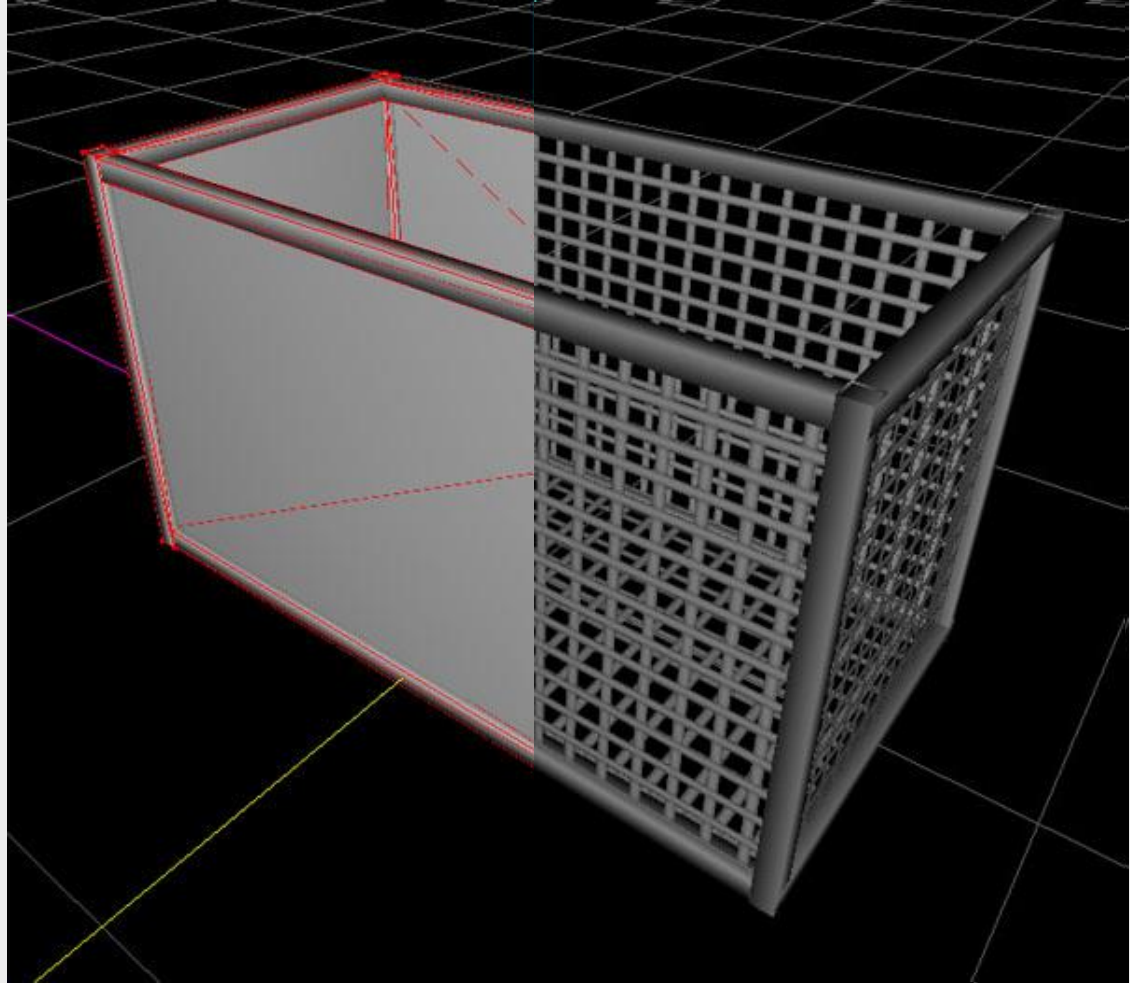
LIGHTING PARAMETERS

depend on light model
e.g. ambient, diffuse,
specular, shininess,
translucency,
reflectivity,
index of refraction ...



ALPHA CHANNEL

WHICH PARTS
OF THE
OBJECTS
ARE
TRANSPARENT
(SEE-THROUGH)



TRANSPARENT MATERIALS

GLASS, PLASTIC
FAKE FINE GEOMETRY DETAILS OF
VEGETATION, GRIDS, WIRES, FENCES, ...



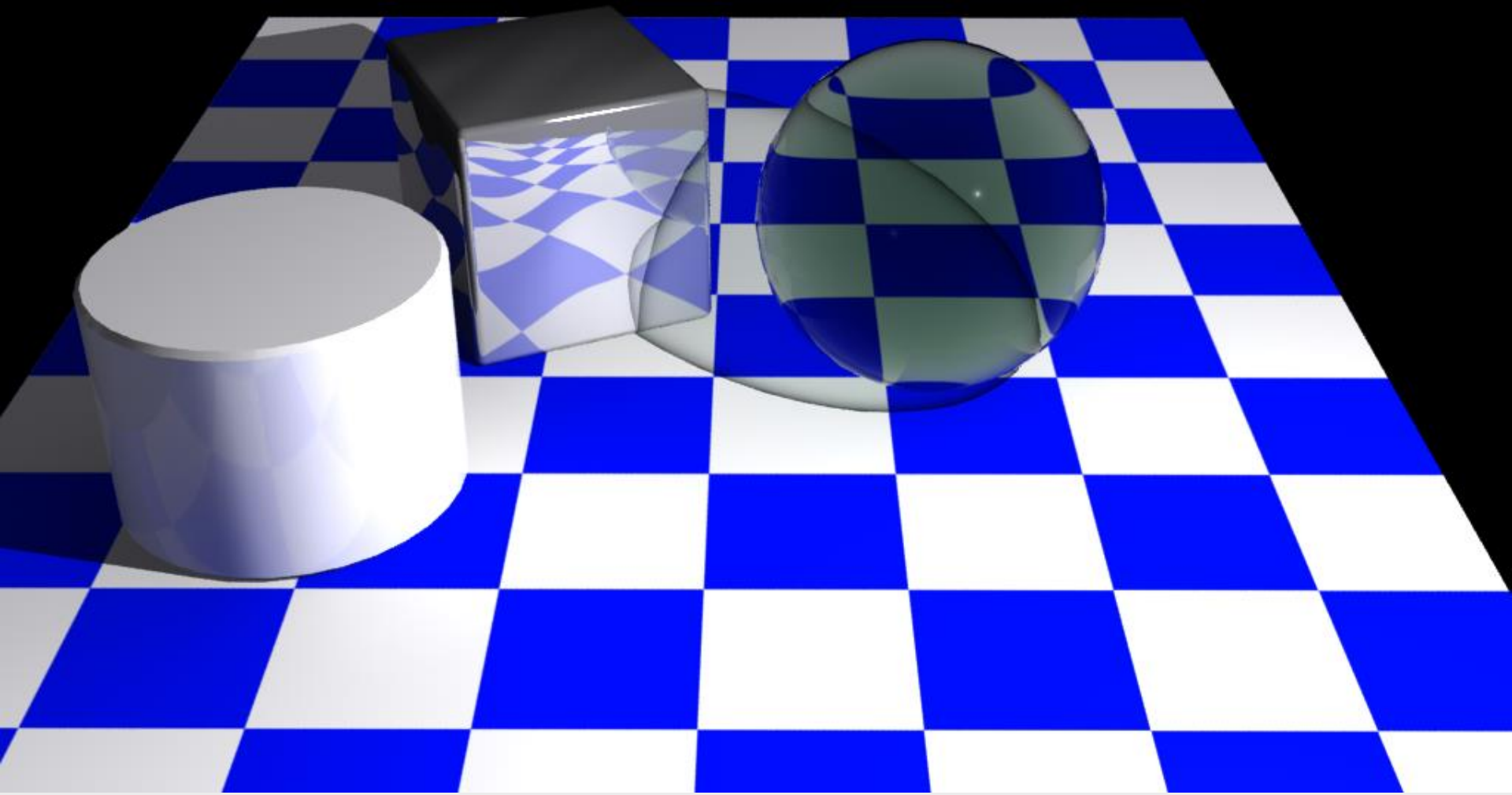
+



=



EXAMPLES OF MATERIALS



EXAMPLES OF MATERIALS



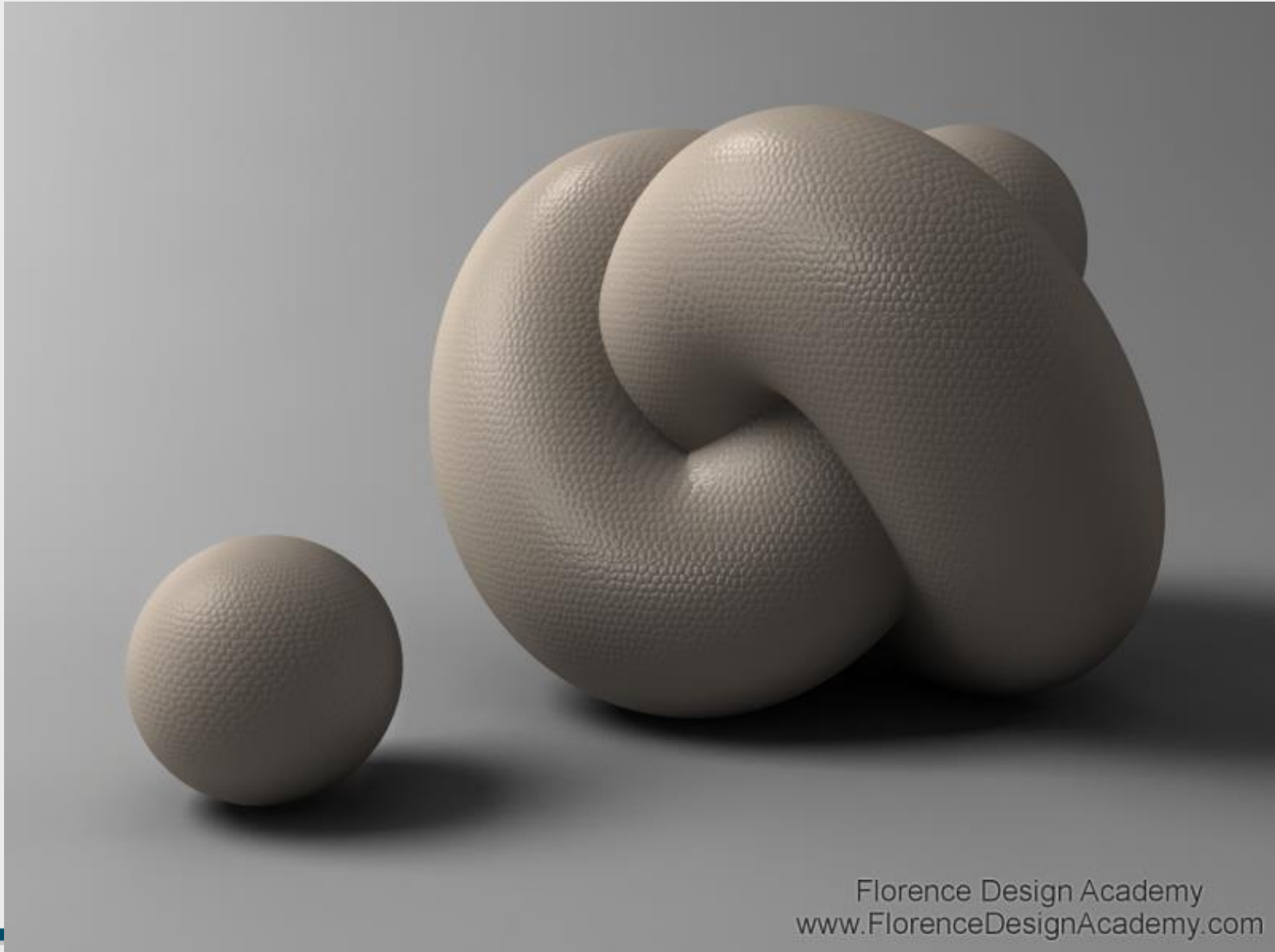
Florence Design Academy
www.FlorenceDesignAcademy.com

EXAMPLES OF MATERIALS

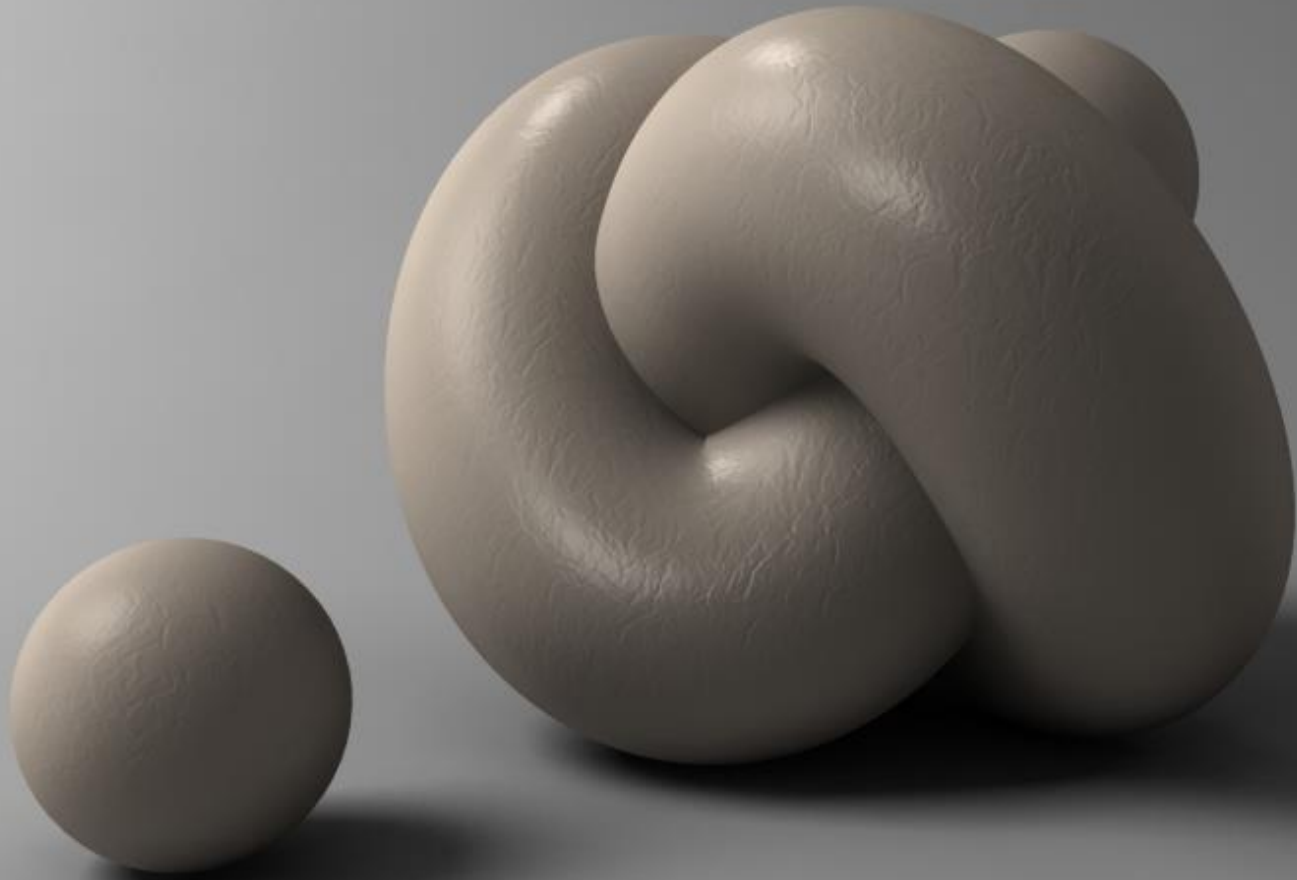


Florence Design Academy
www.FlorenceDesignAcademy.com

EXAMPLES OF MATERIALS



EXAMPLES OF MATERIALS



Florence Design Academy
www.FlorenceDesignAcademy.com

PHOTOREALISM

MULTITEXTURING

BUMP MAPPING

DISPLACEMENT
MAPPING

SUBSURFACE
SCATTERING



<http://blenderartists.org/forum/showthread.php?t=137000&page=5>

DEMO SESSION OF A 3D ARTIST

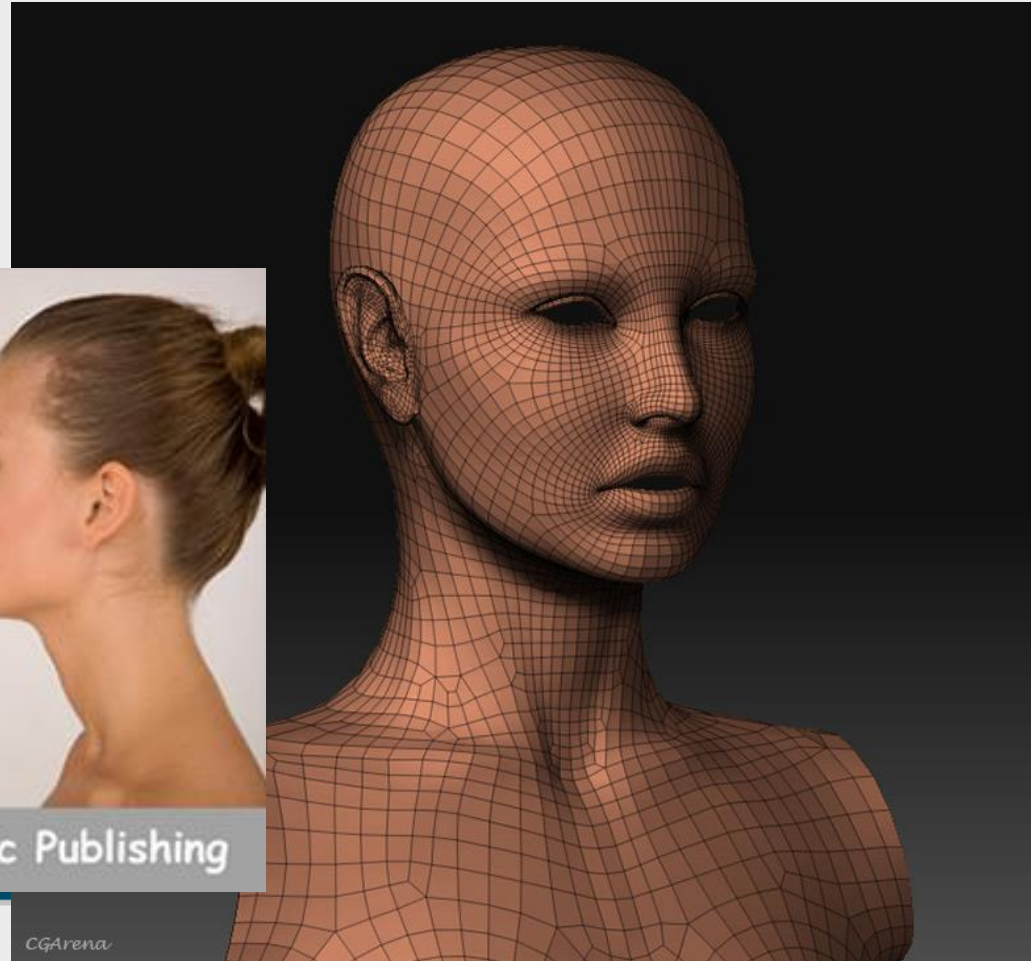
MAKING OF CLOSE-UP PORTRAITS

www.davidmoratilla.com

NURBS MODEL REAL PHOTOS

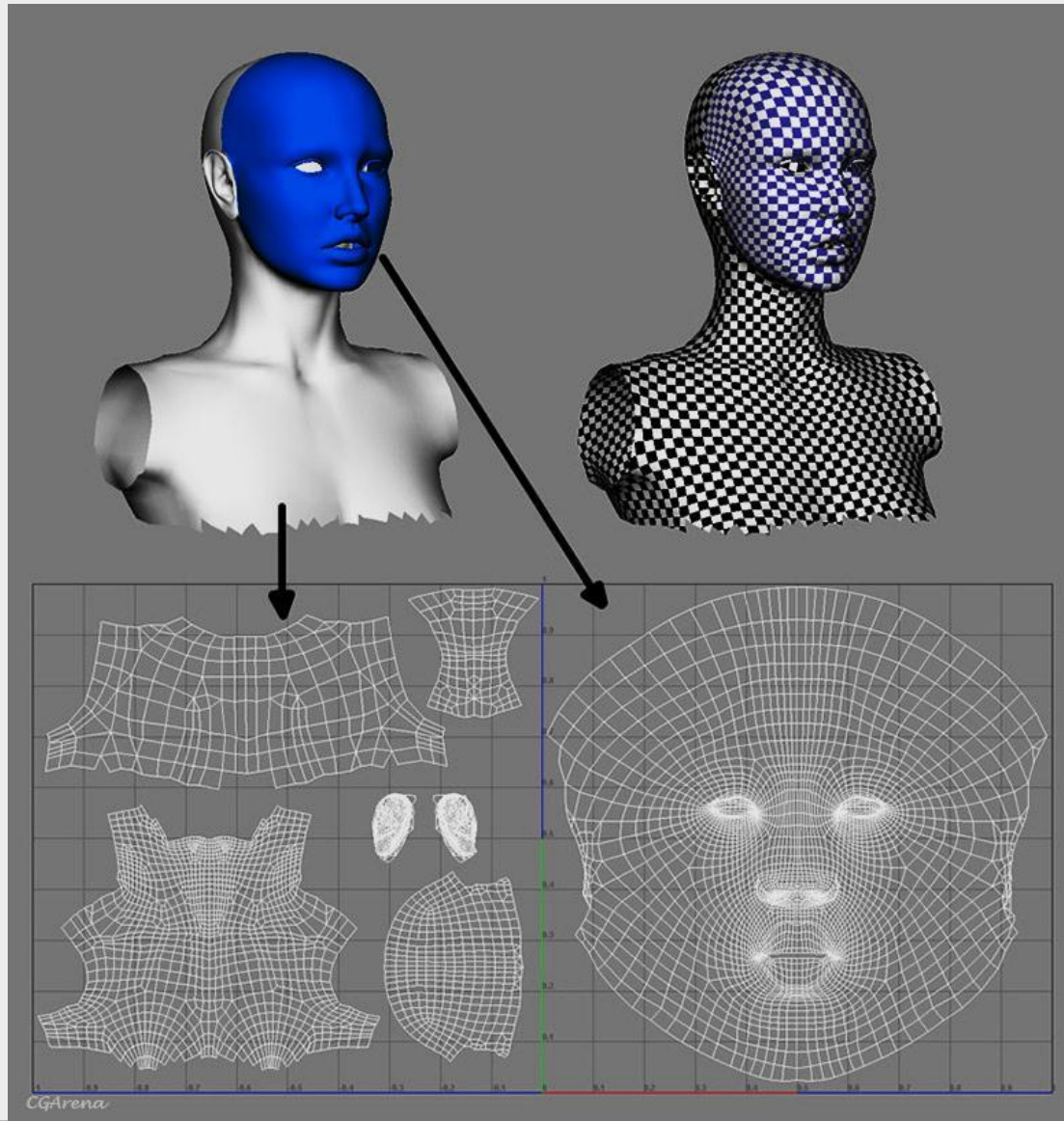


images © Ballistic Publishing

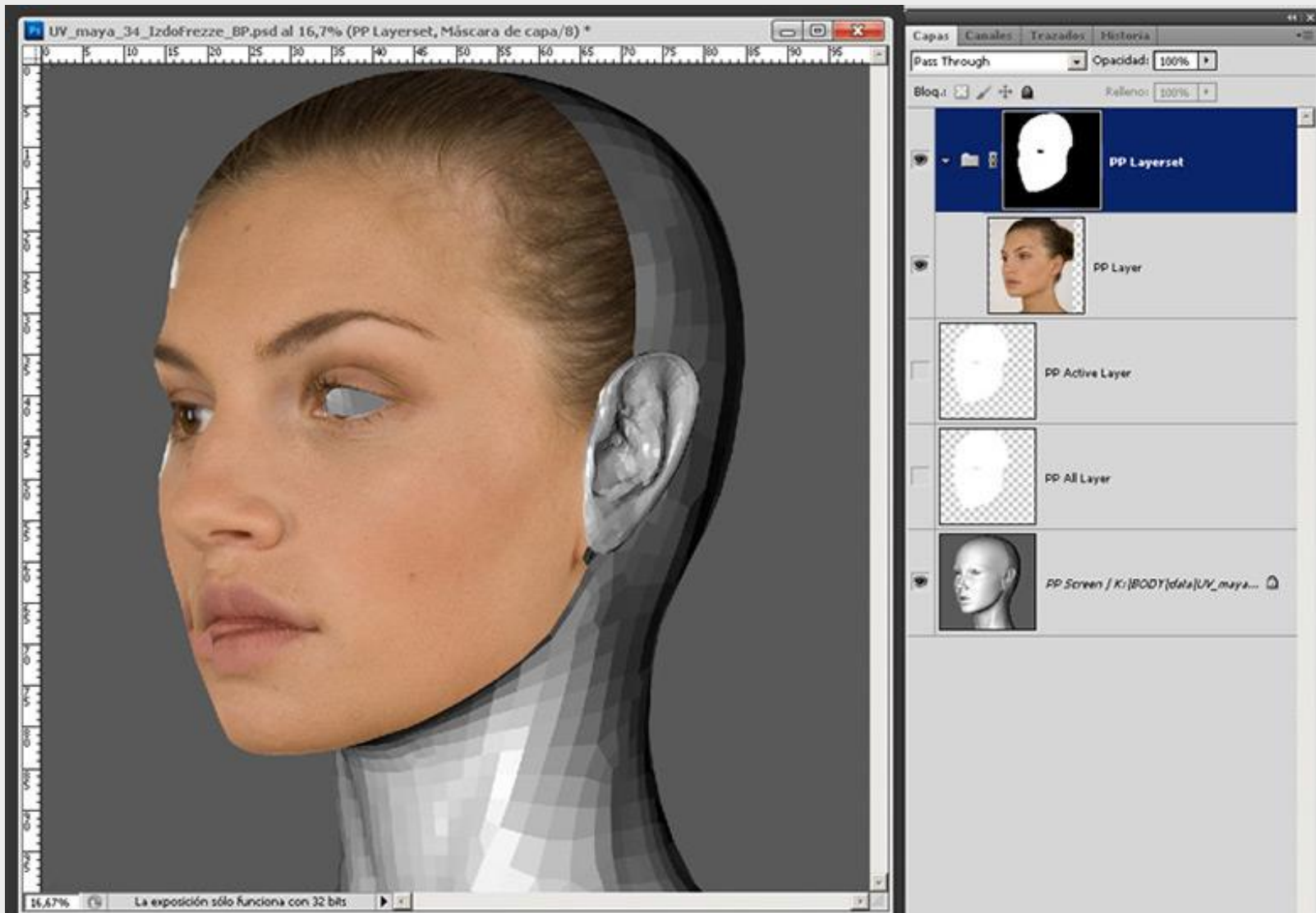


CGArena

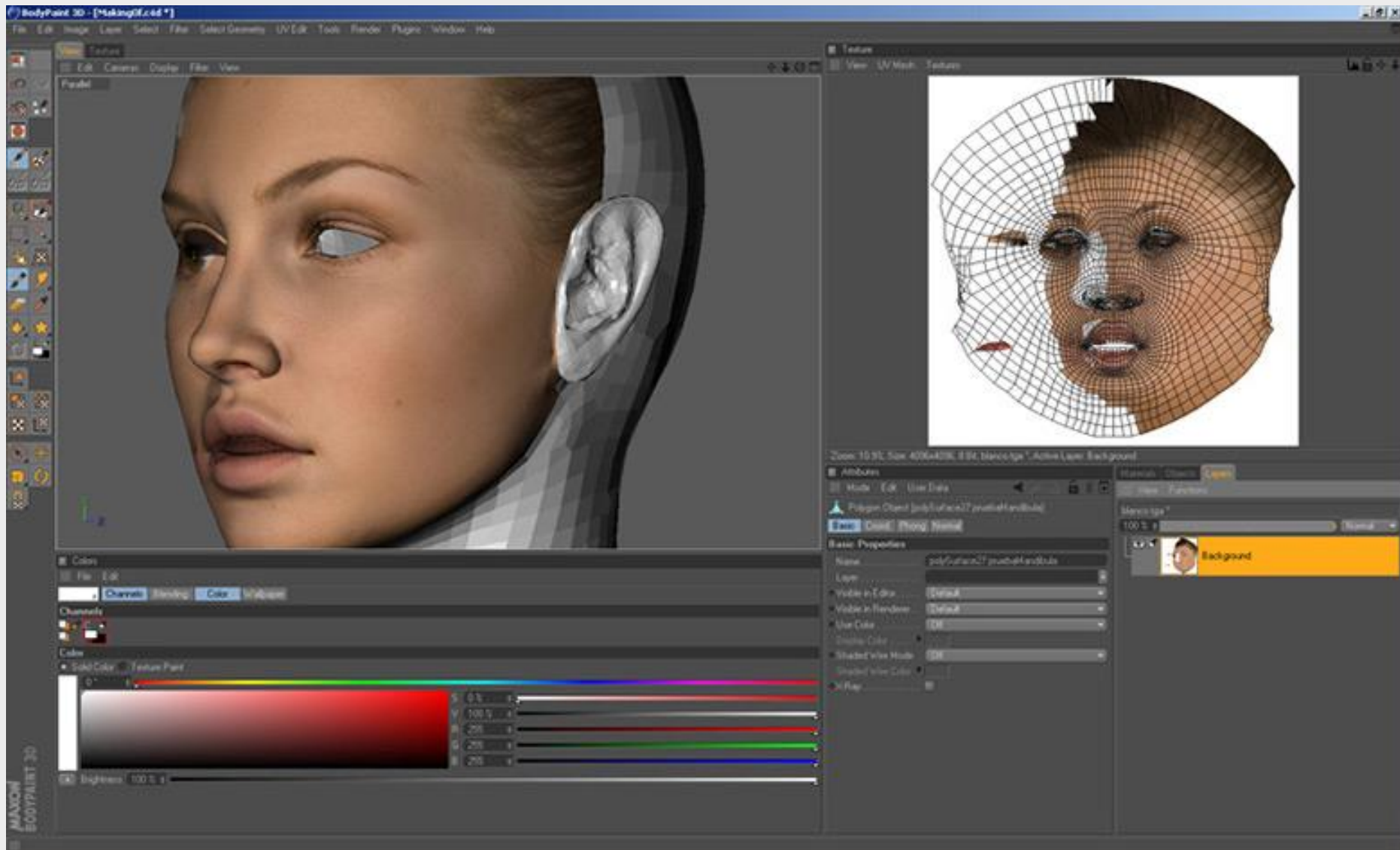
UNWRAP MODEL FOR TEXTURING



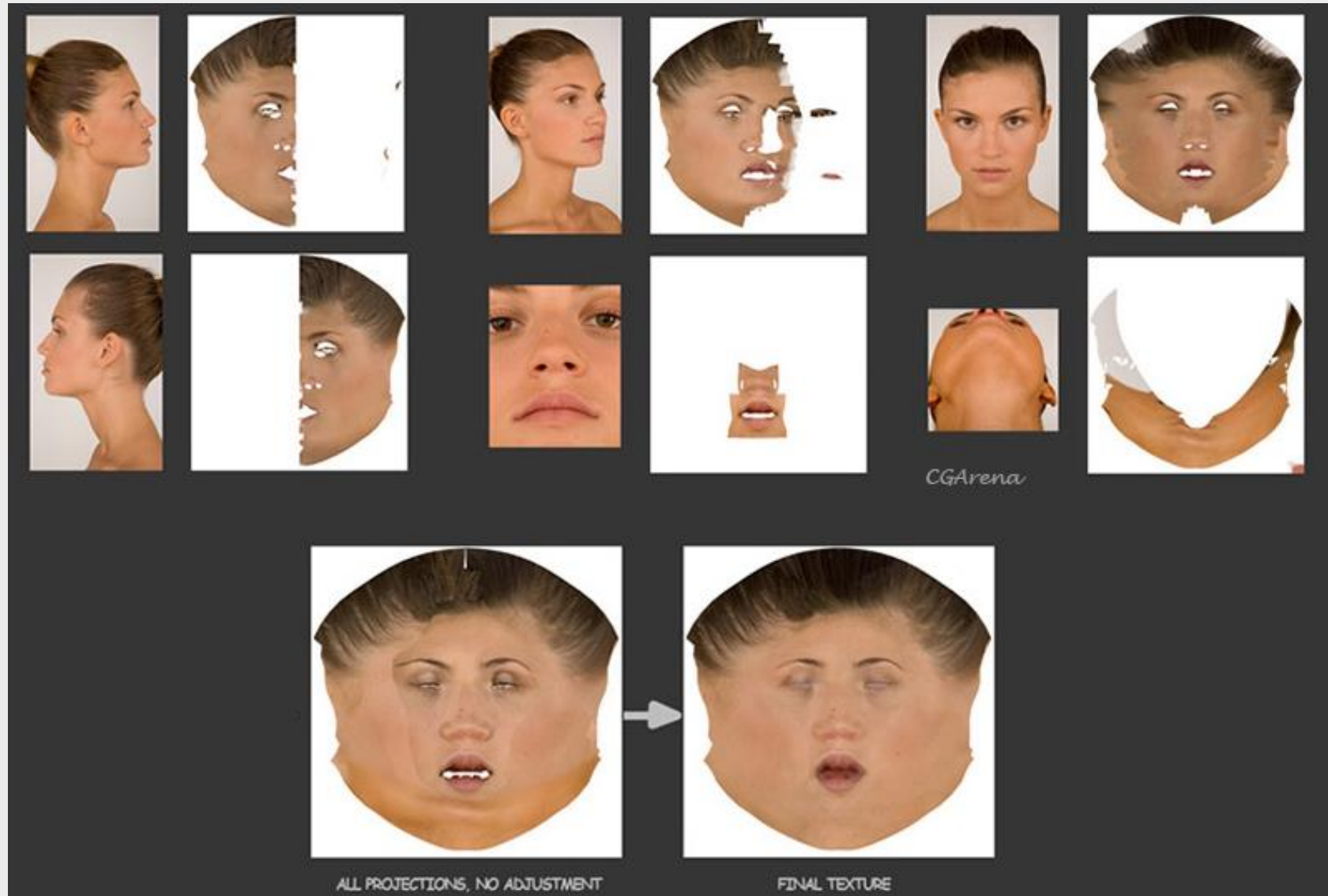
ALIGN MODEL WITH PHOTOS



PROJECT THE PHOTO TO TEXTURE



REPEAT FOR ALL SIDES OF MODEL



SUBDIVIDE MESH TO SMOOTH IT



Original mesh

CGArena



Hi-res mesh

ADD DETAILS TO BUMP MAP

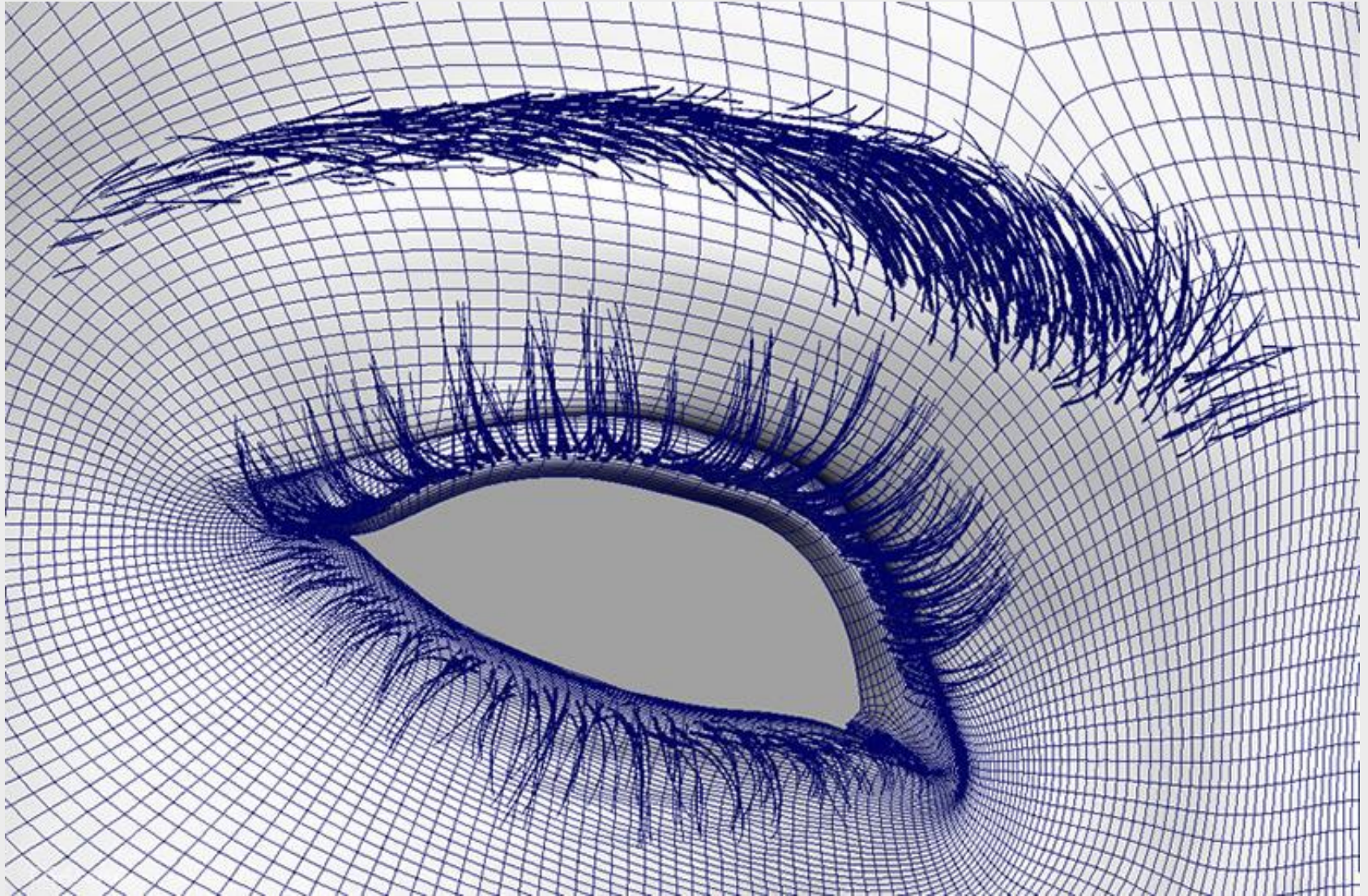


Intensity mask

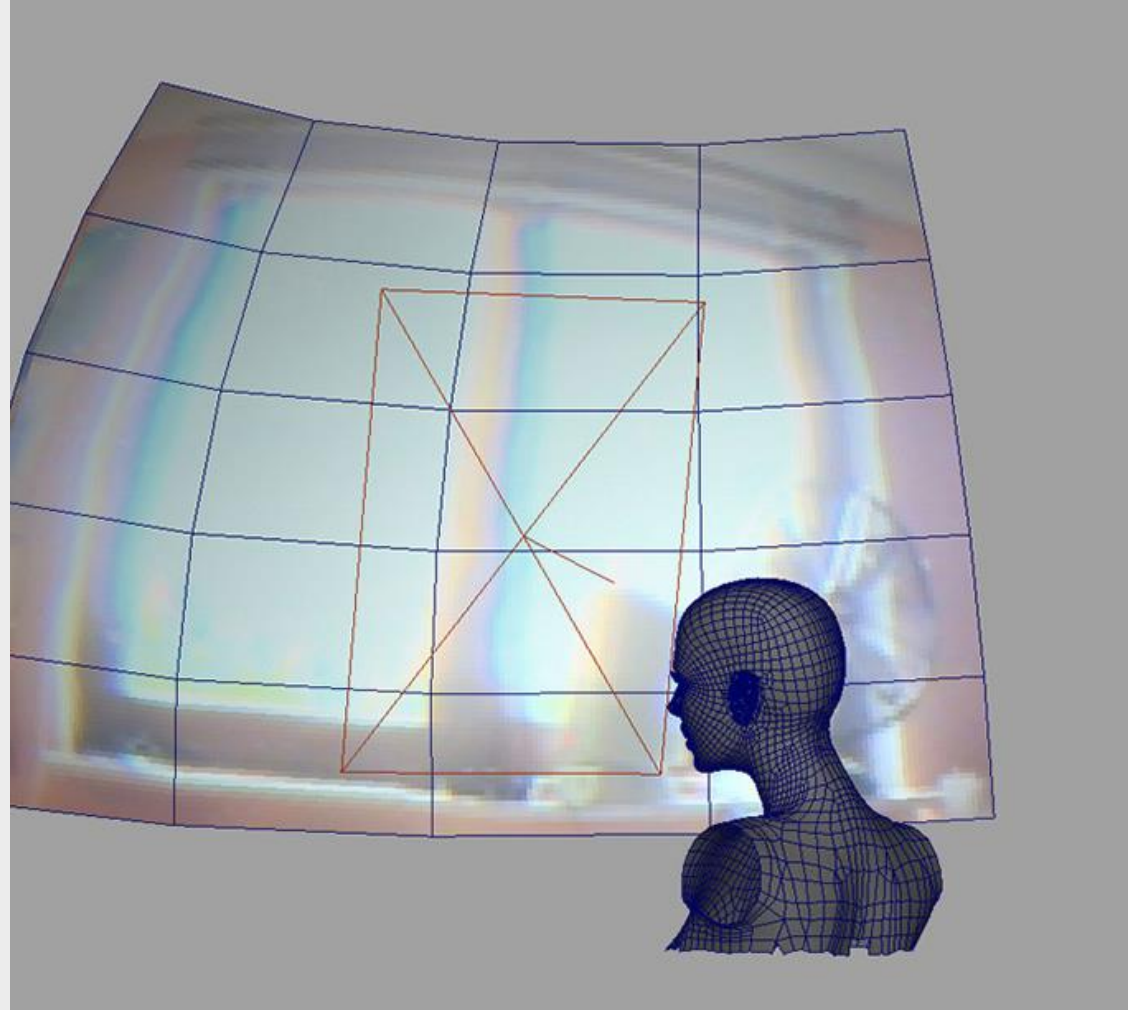
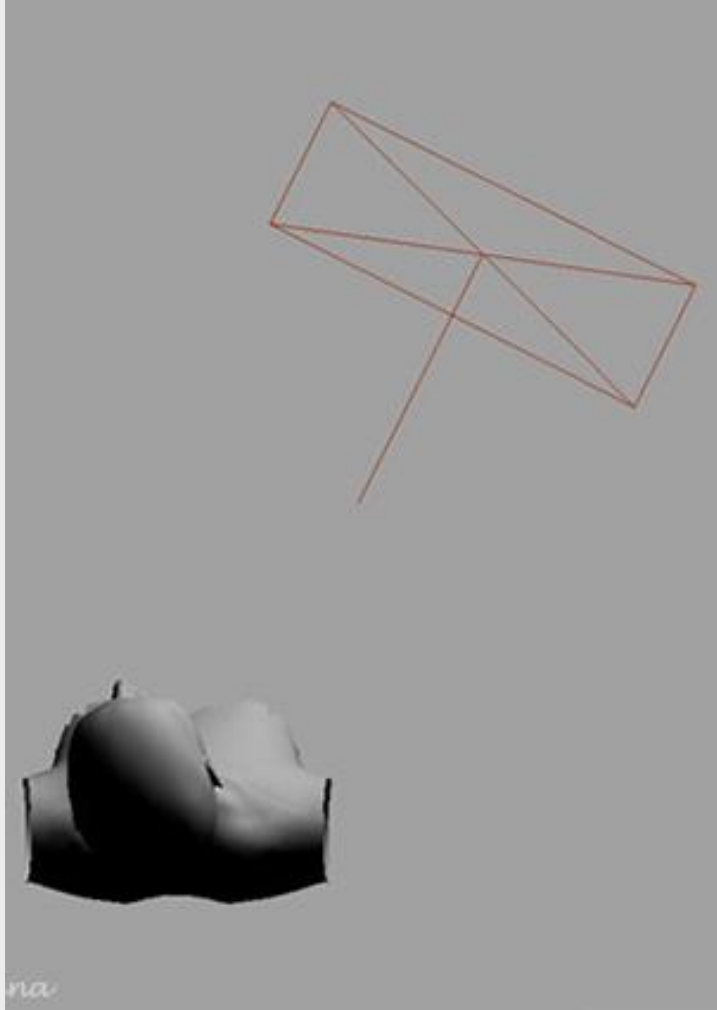


Mesh with details

ADD DETAILS TO GEOMETRY



SET UP LIGHTING



CREATE A COMPLEX MATERIAL

Attribute Editor: TOTAL

List Selected Focus Attributes Show Help

TOTAL | mentalRayTexture3 | PSD_lambert24_color5 | PSD_lambert24_color4 | bu |

miss_last_skin_maya: TOTAL

Sample

Diffuse Layer

Ambient Overall Color Diffuse Color Diffuse Weight 0.300

Subsurface Scattering Layer

Epidermal Scatter Color Epidermal Scatter Weight 0.700 Epidermal Scatter Radius 5.000

Subdermal Scatter Color Subdermal Scatter Weight 1.000 Subdermal Scatter Radius 30.000

Back Scatter Color Back Scatter Weight 1.000 Back Scatter Radius 5.000 Back Scatter Depth 25.000

Specularity

Overall Weight 0.600 Edge Factor 1.500

Primary Specular Color Primary Weight 0.250 Primary Edge Weight 0.400 Primary Shininess 1.000

Secondary Specular Color Secondary Weight 0.500 Secondary Edge Weight 0.400 Secondary Shininess 20.000

Reflect Weight 0.000 Reflect Edge Weight 0.000 Reflect Environment Only Reflect Shininess 2.000

Bump Shader

Bump file44

Lightmap

Algorithm control

Zbrush cavity map

Zbrush normal map

CGArena

The image displays a screenshot of the Autodesk Maya Attribute Editor for a material named 'TOTAL'. The editor is configured for a 'mentalRayTexture3' and shows various shader parameters. On the left, two Zbrush maps are shown: a 'cavity map' (a grayscale image of a face with highlighted recessed areas) and a 'normal map' (a blue image of a face with a normal vector field). Red arrows point from these maps to the 'Diffuse Layer' and 'Subsurface Scattering Layer' parameters in the Attribute Editor. On the right, three circular images show the final rendered material applied to a face, demonstrating the effect of the subsurface scattering and specularity settings. The top image shows the material with default settings, the middle image shows the material with the 'cavity map' applied, and the bottom image shows the material with the 'normal map' applied.

DIFFERENT MATERIAL LAYERS



CREATE HAIR SYSTEM



RENDERING + COMPOSITION

