Geometry

Geometry

“The branch of mathematics concerned with the properties and relations of points, lines, surfaces, solids, and higher dimensional analogues.”

Oxford Dictionaries

Geometry

There are three methods to generate geometry in a digital environment.

Geometry

There are three methods to generate geometry in a digital environment.

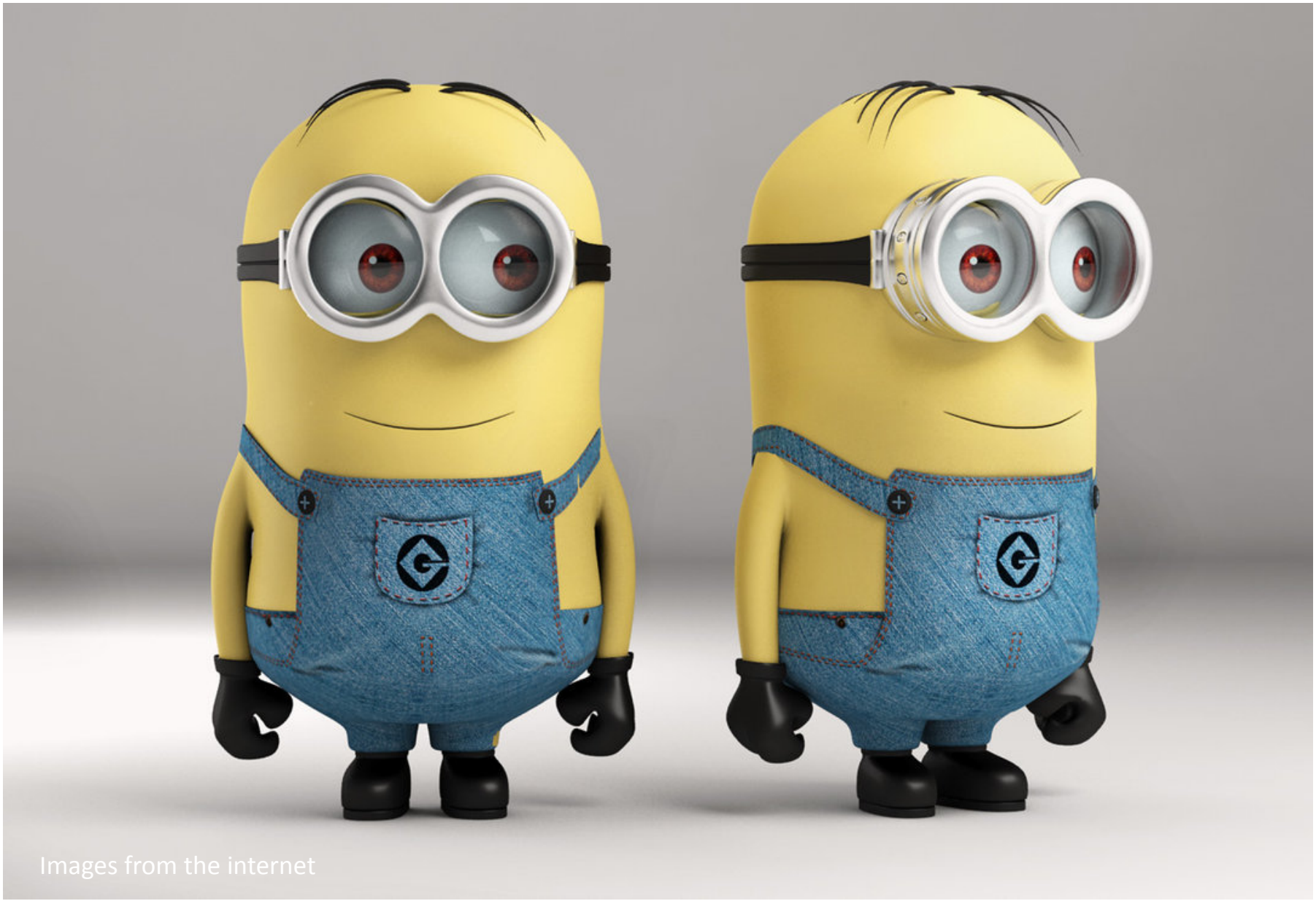
- Scanning an existing object

- Generate a mathematical description of the design constraints and goals in order to generate geometry

- Modelling

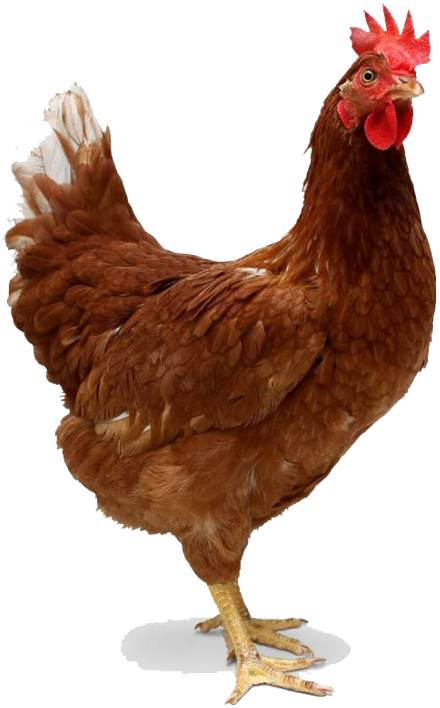
Images from the internet

Images from the internet


Images from the internet

Lets look at our chicken

?



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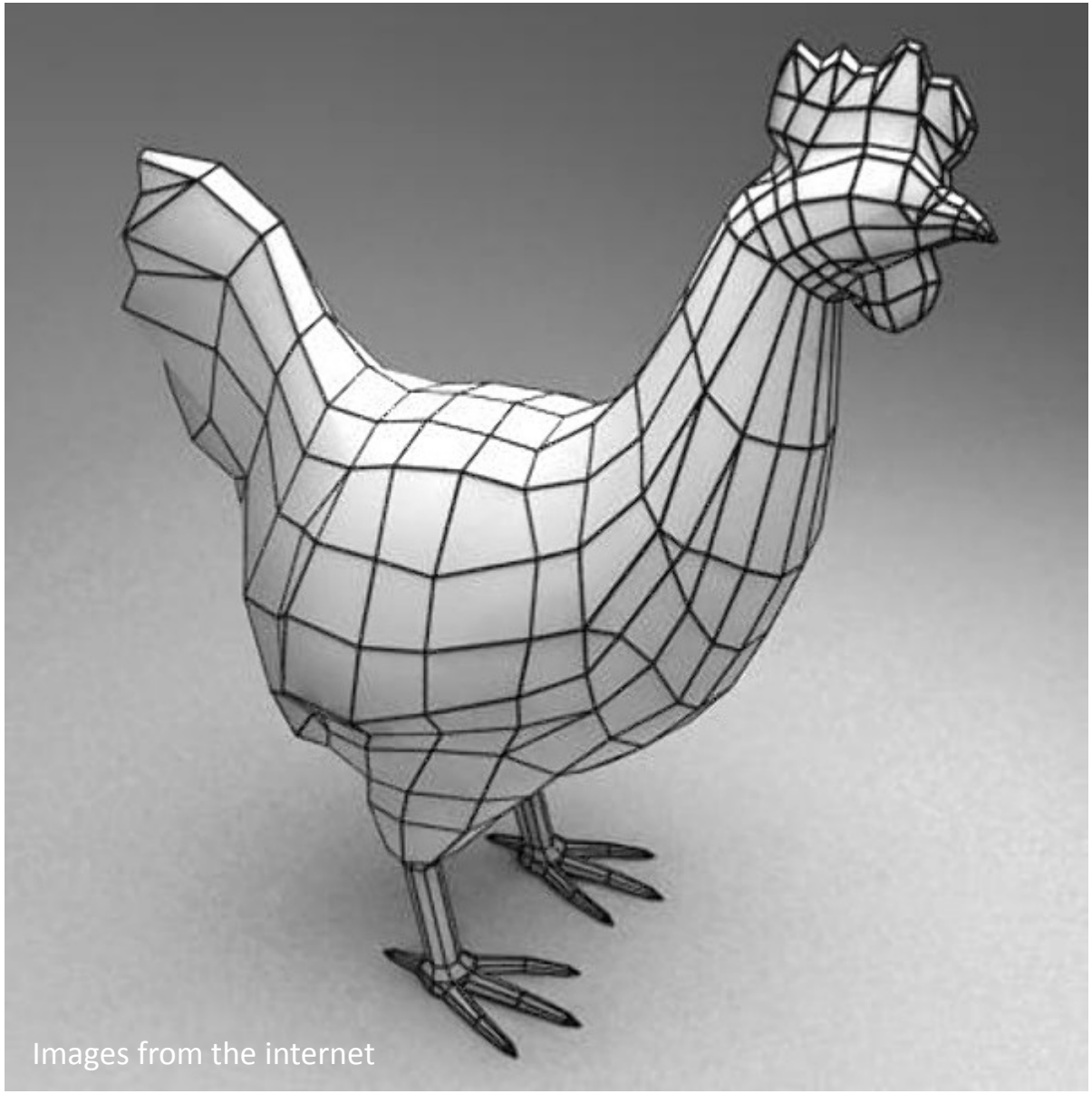
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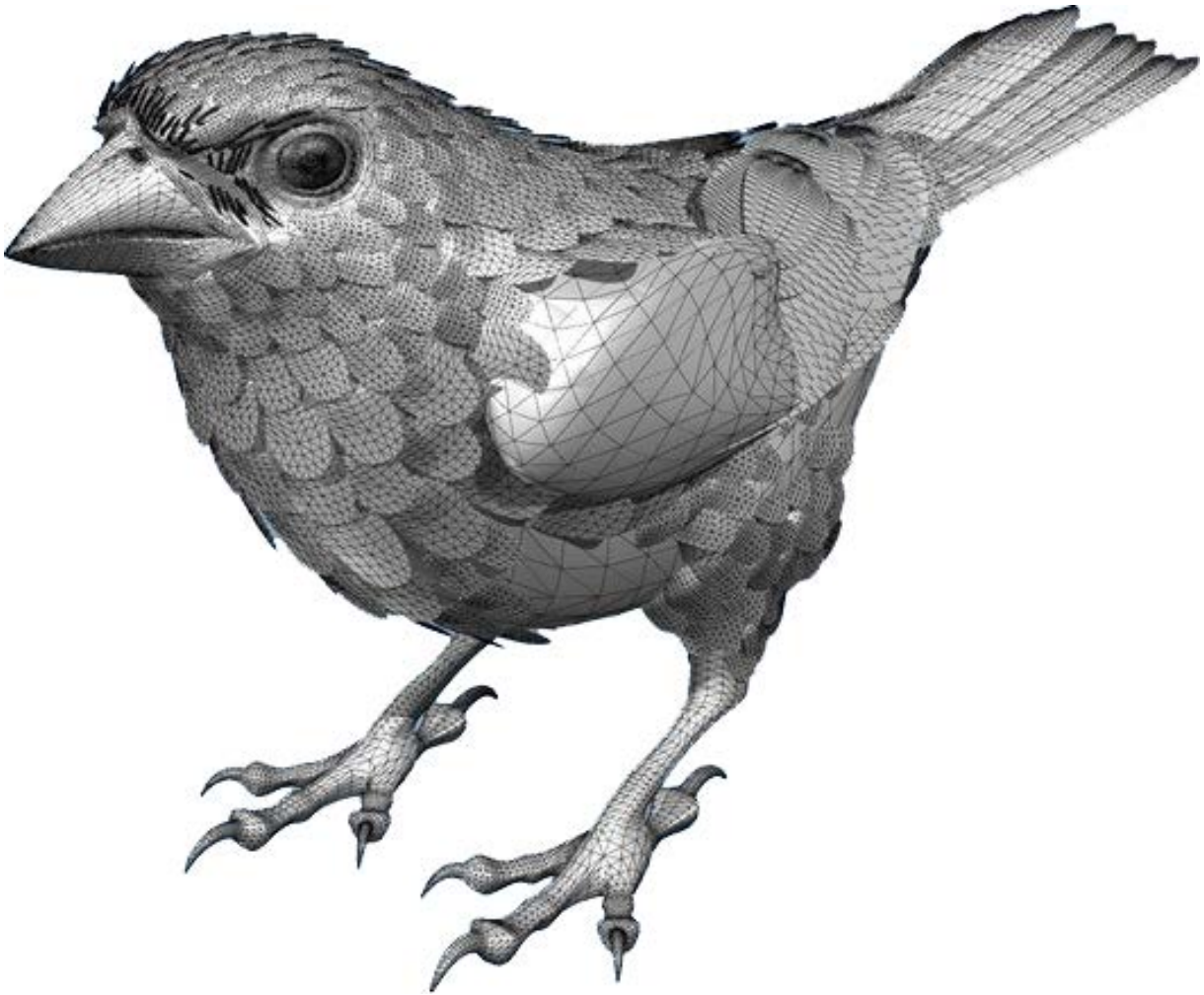
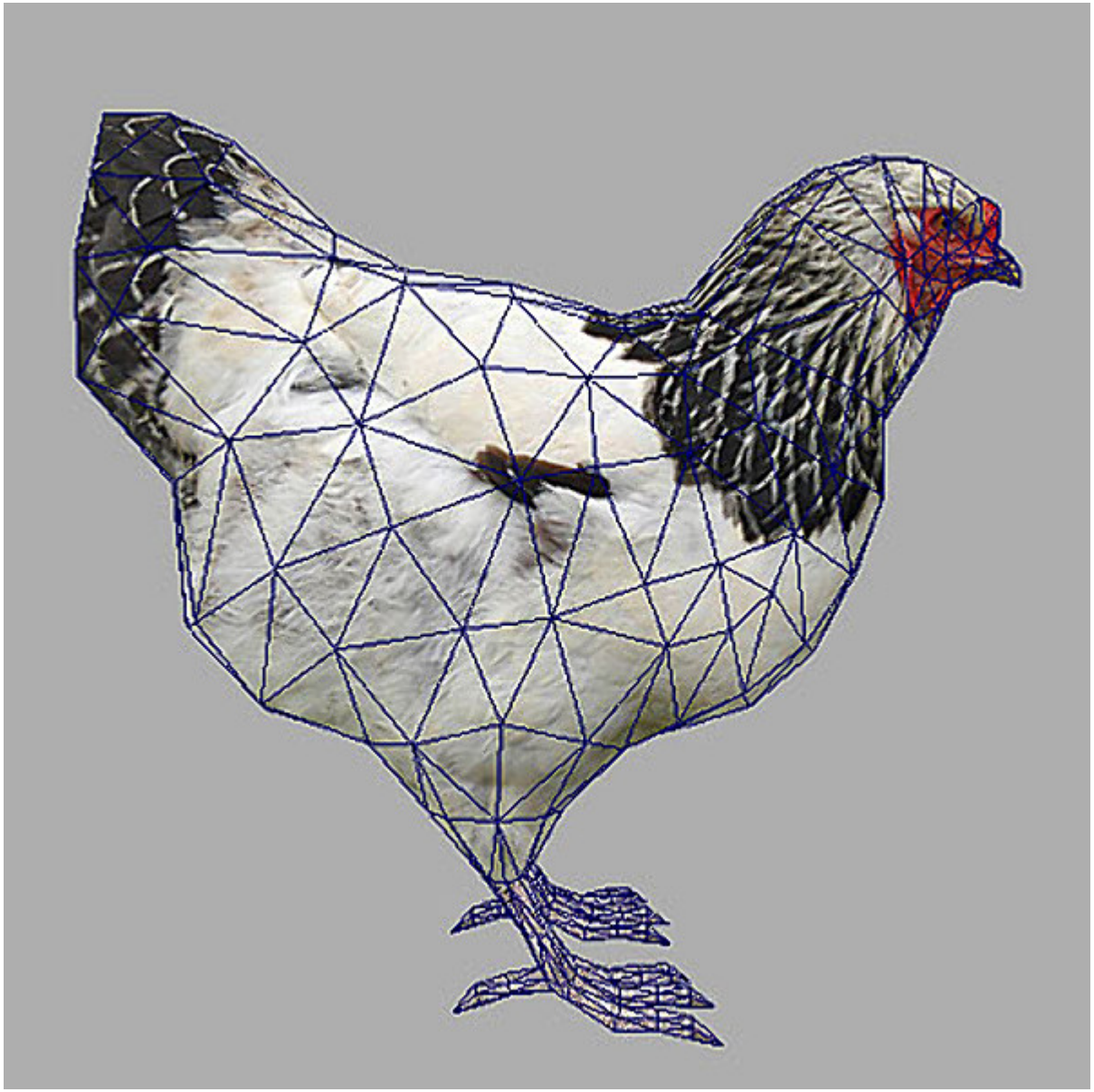
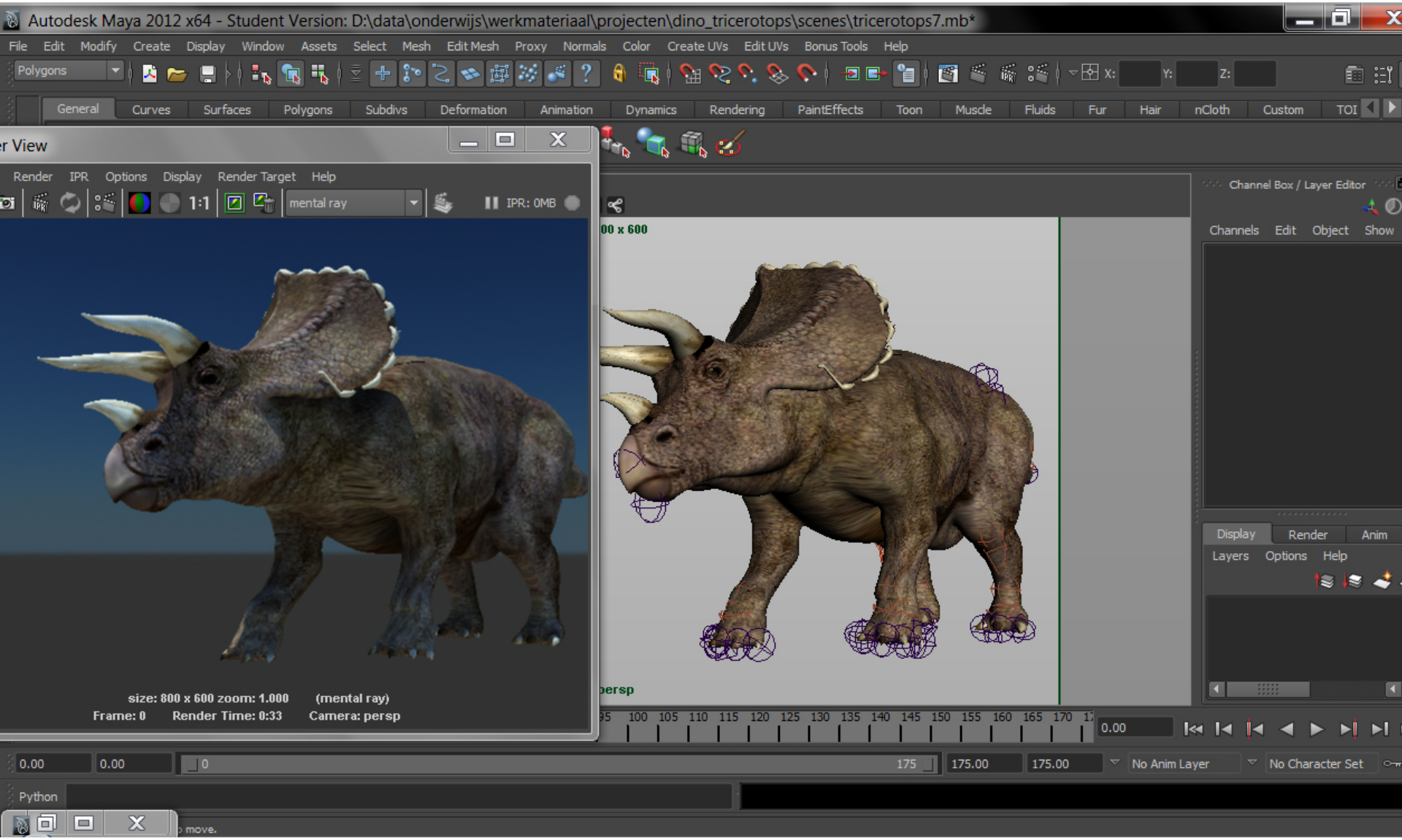


This is not a chicken

Images from the internet

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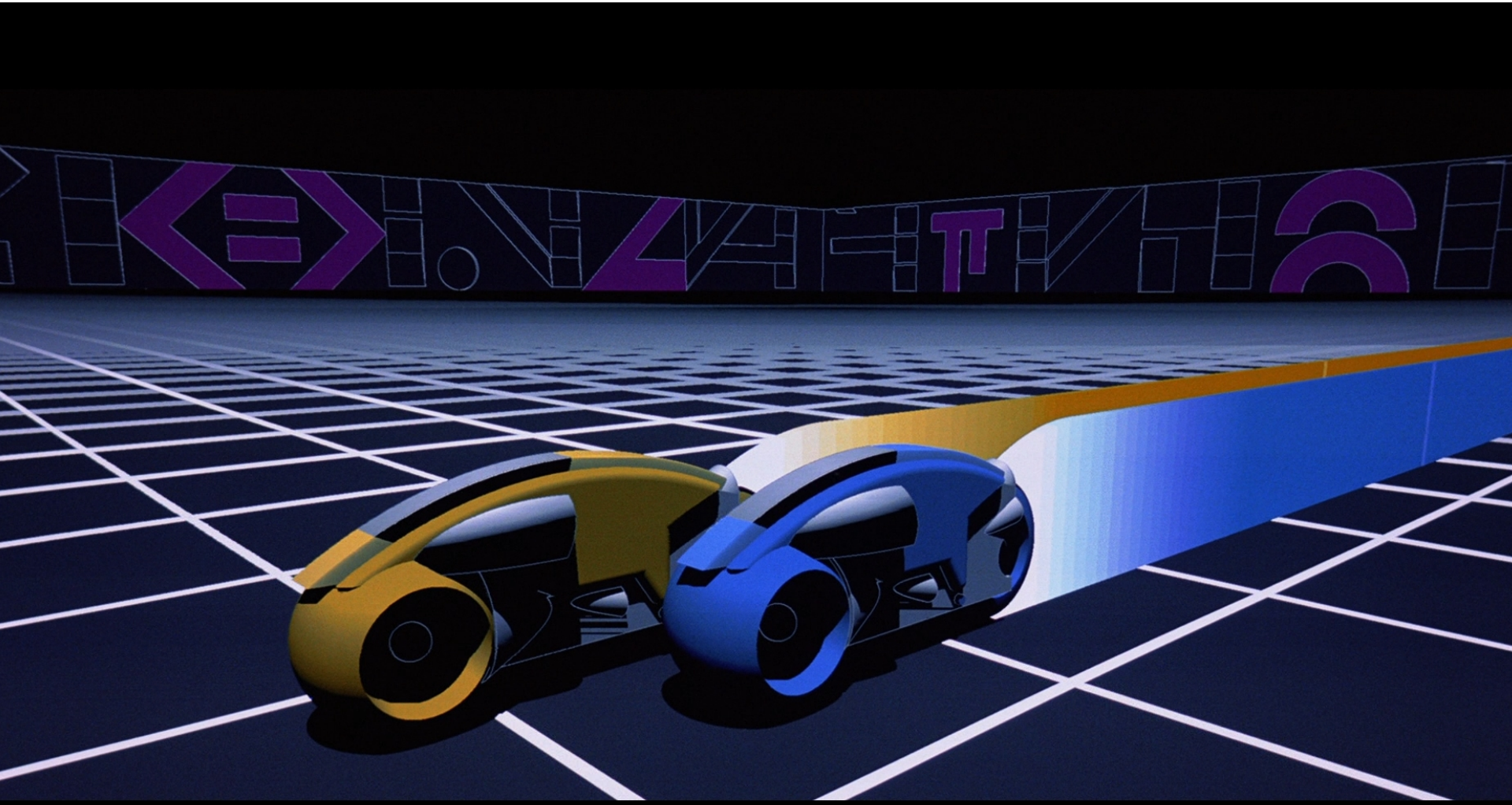
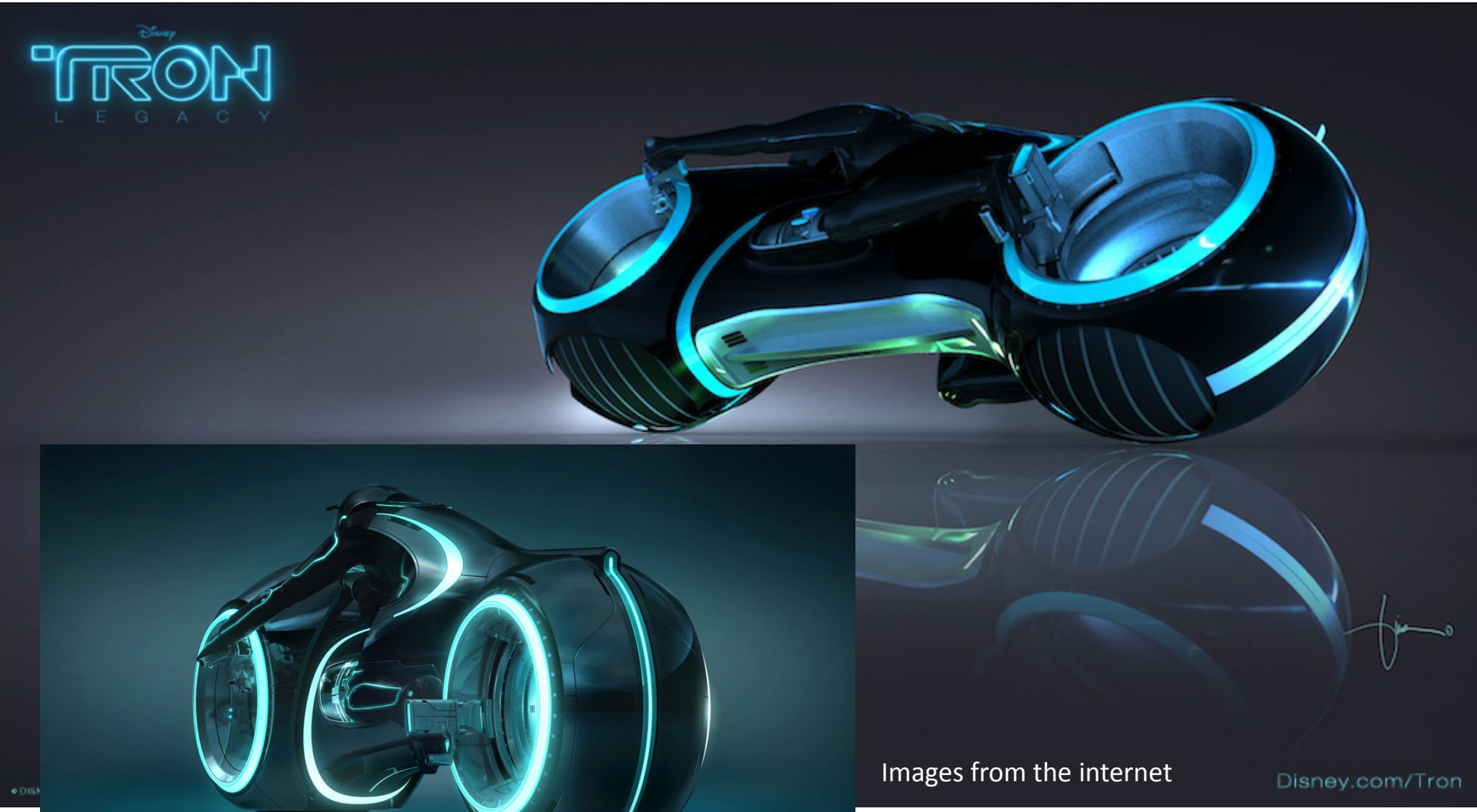
No Character Set
Python
move.

Geometry

quick nostalgic look in the past



Tron 1982 Images from the internet


Disney
TRON
LEGACY
Images from the internet
Disney.com/Tron

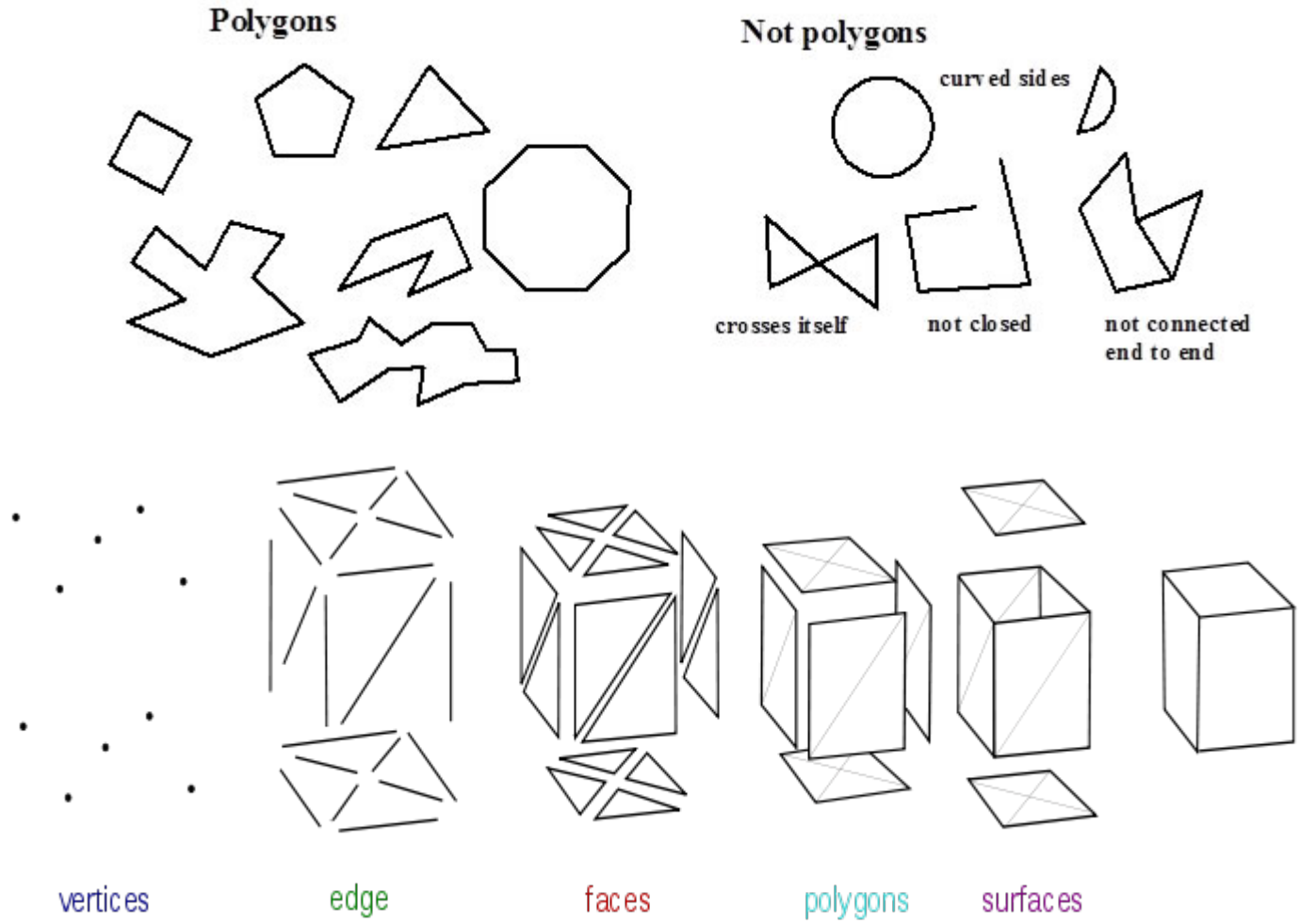
Kinds of Geometry ?

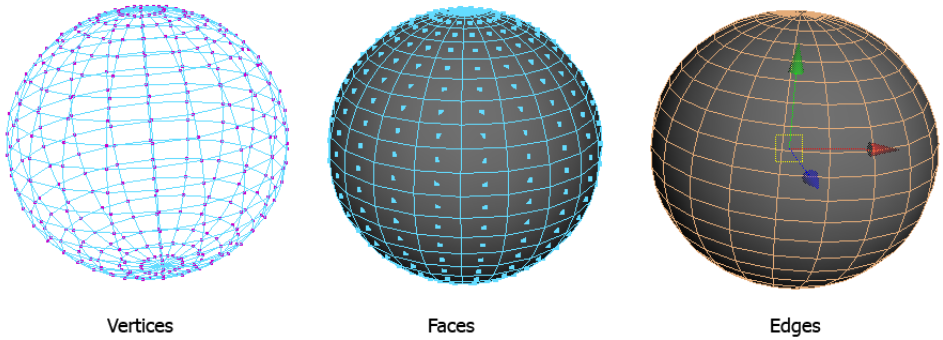
- Polygons
- NURBS
- Solids (CSG)
- T Splines
- Sub Division Surfaces
- Voxels
- Particles

Images from the internet

Polygons

Polygons


Polygons
Not polygons
curved sides
crosses itself
not closed
not connected
end to end
vertices
edge
faces
polygons
surfaces



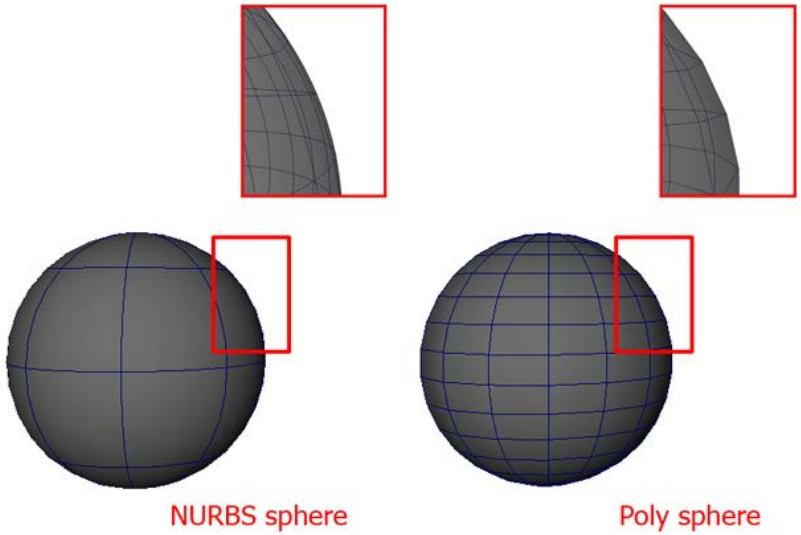
Polygons

Polygon is a straight forward description of geometry in 3D.

- The shape is defined by its coordinate point or vertices.
  The vertices will define the shape of the geometry

- The surface of the geometry is defined by the planar triangular faces
  The faces will define the surface of the geometry

- The edges of the geometry are the edges of the faces.
  The edge is always a straight line



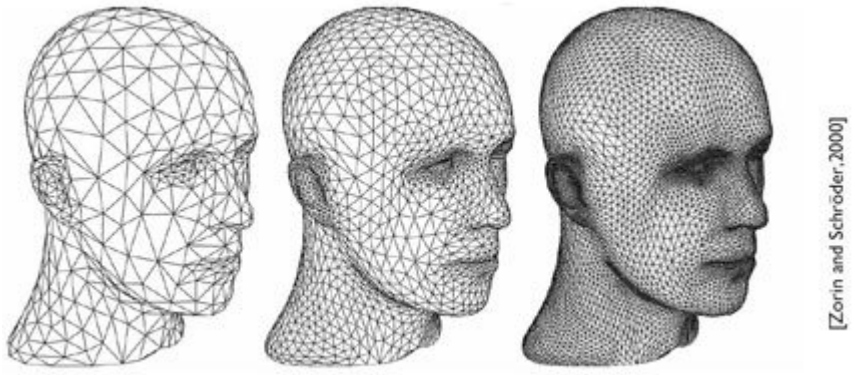
Polygons

Advantages:

- Possibility of describing volumes
- Less memory intensive
- Straight forward mathematical description
- Commonly used geometry type

Disadvantage:

- The curvature is only approximated by the face between the vertices
- High poly count necessary for curved shapes



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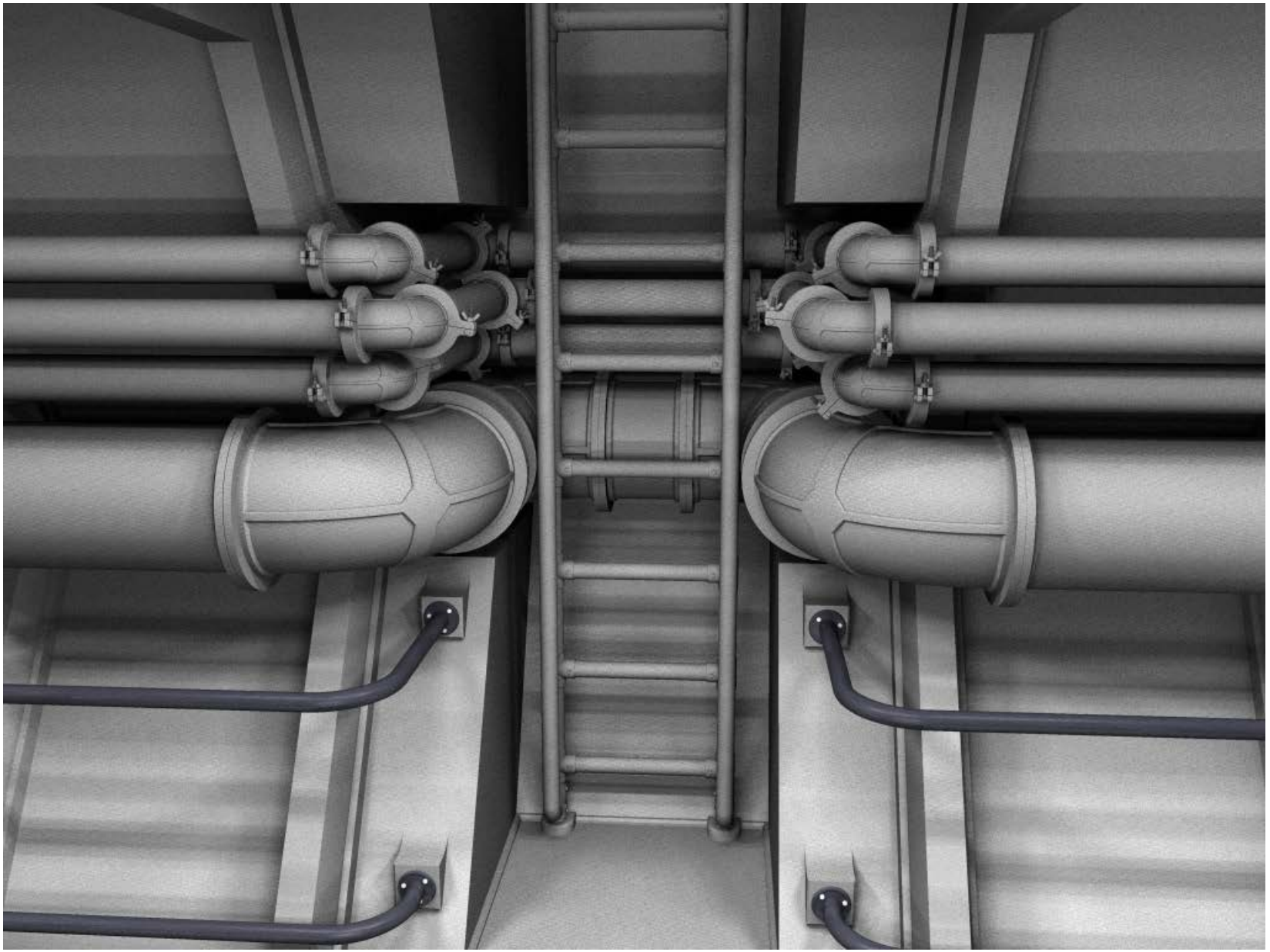
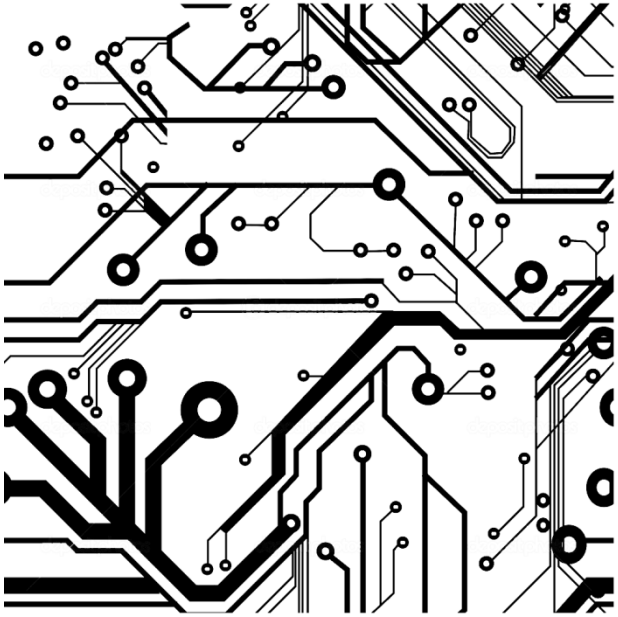
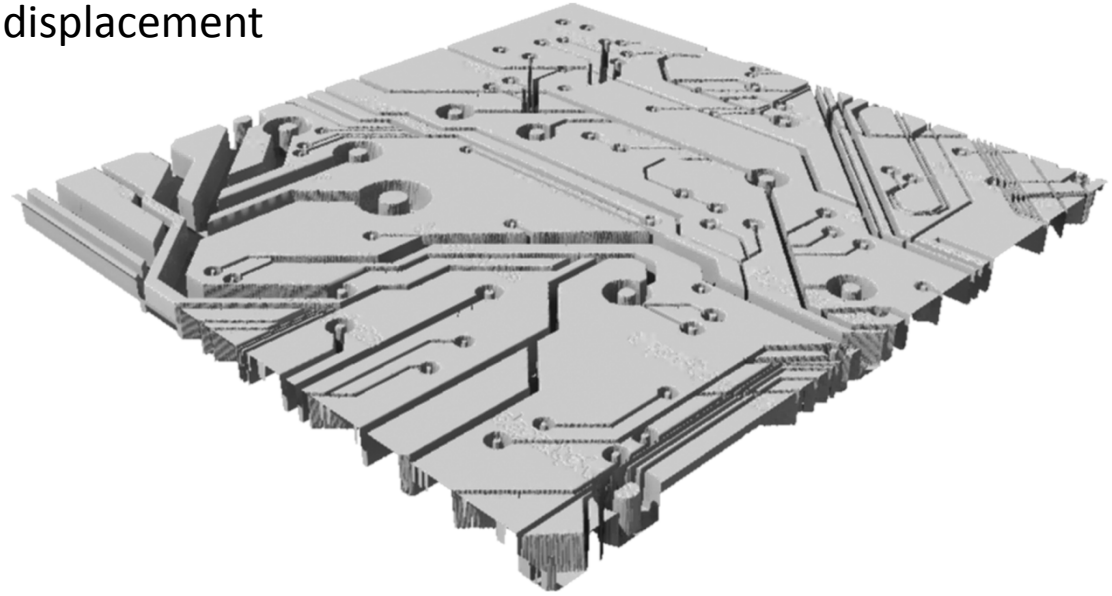


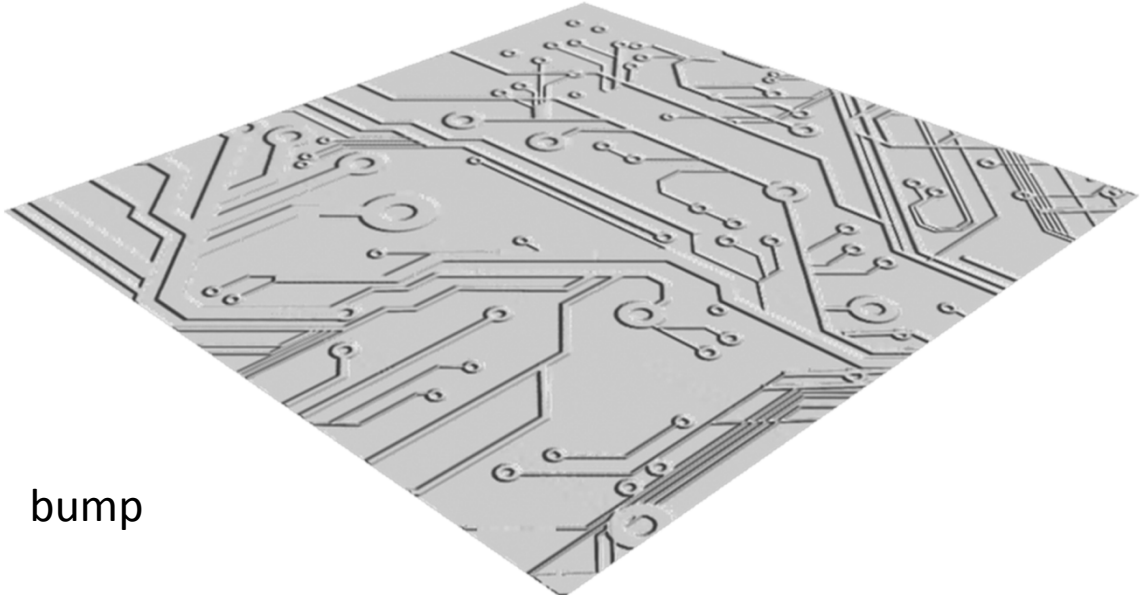
Images from the internet

Images from the internet

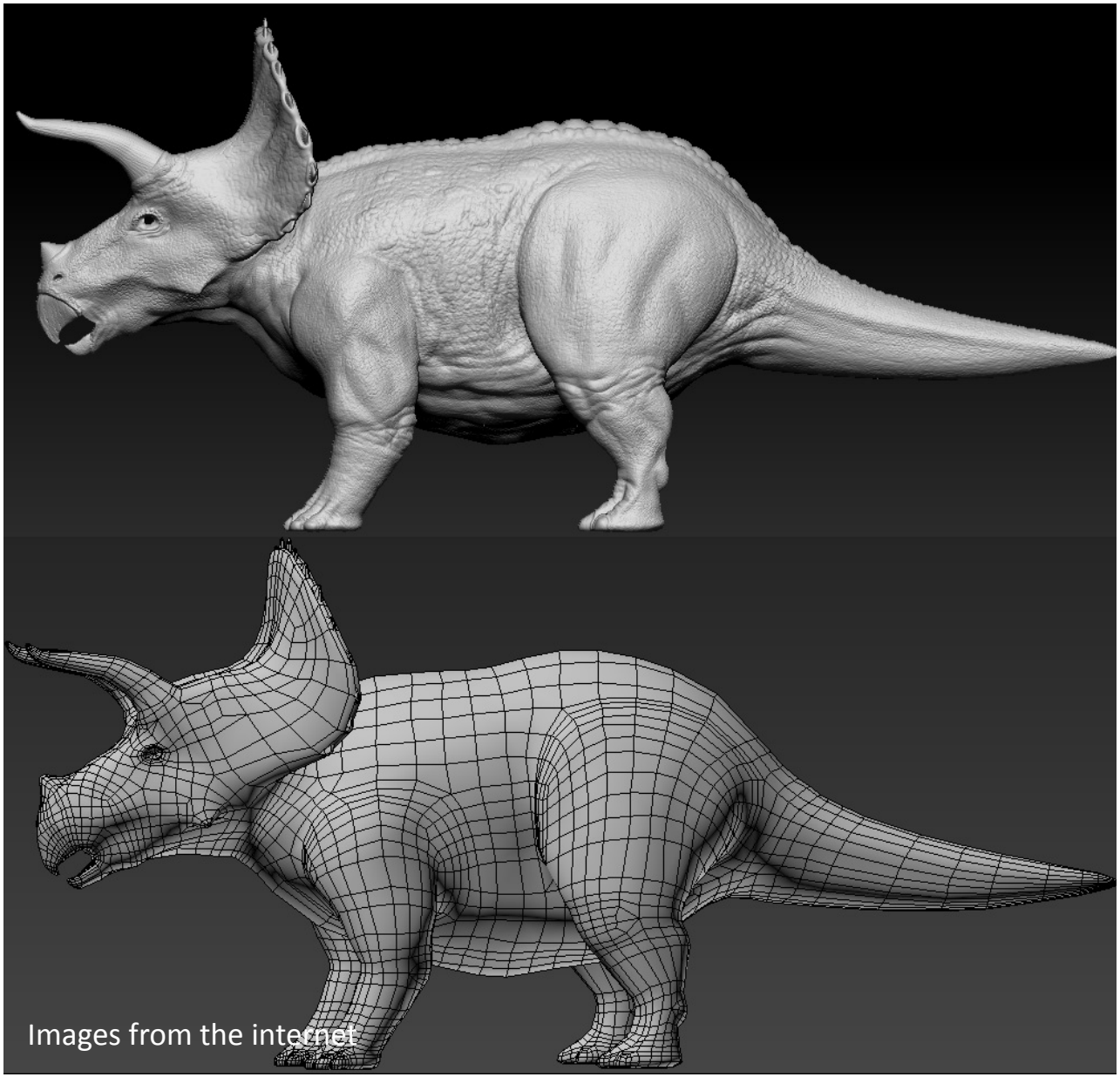


displacement





bump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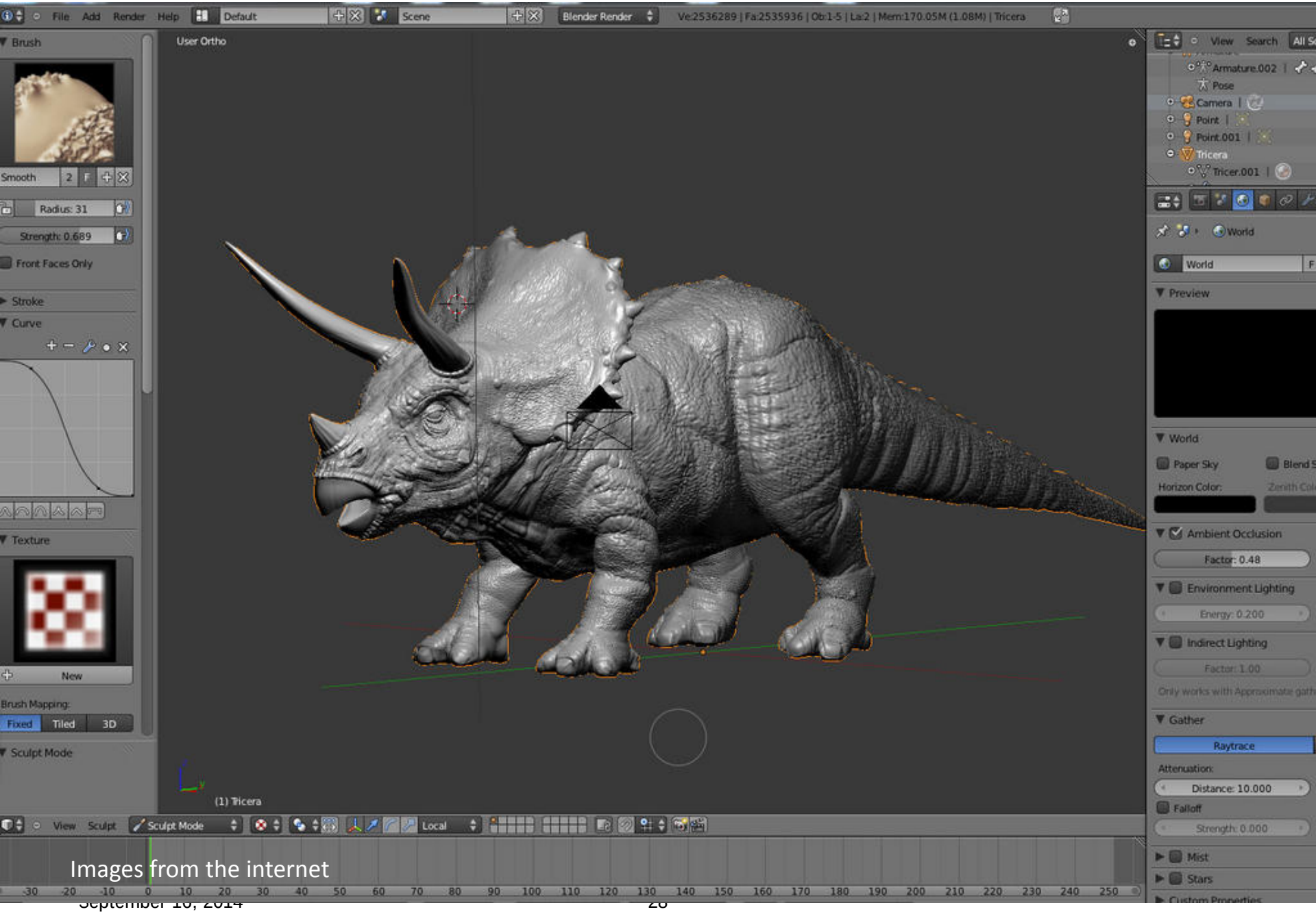

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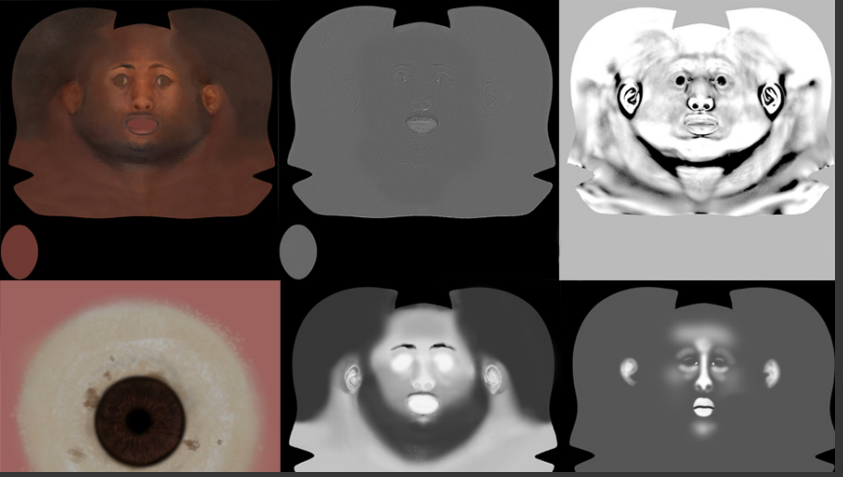
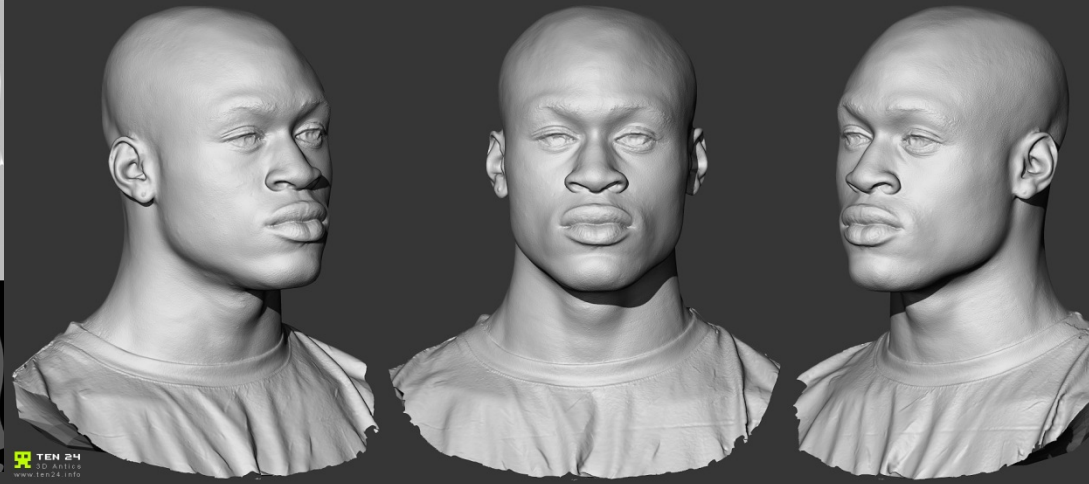
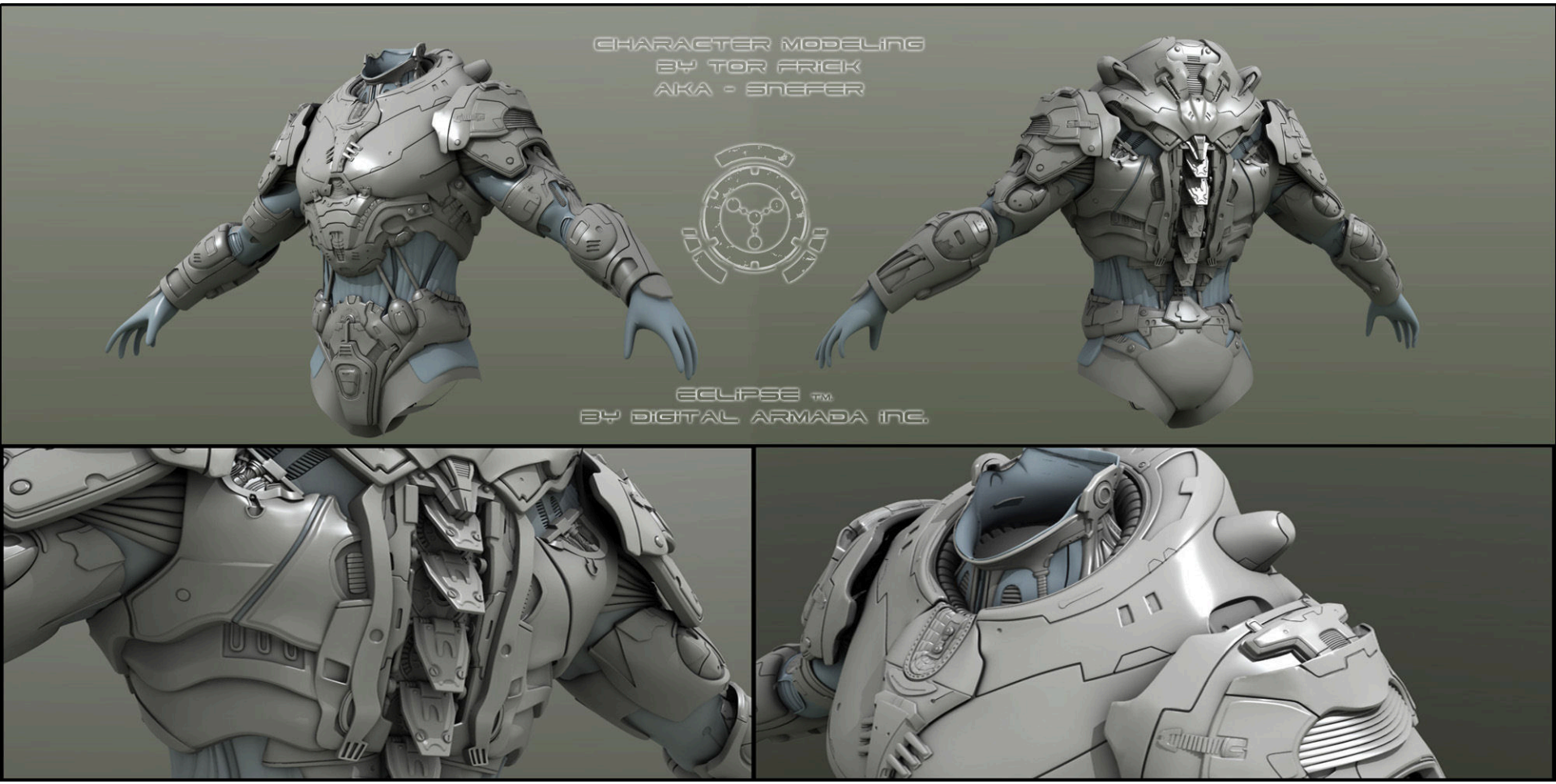




TEN 24
3D Antics
www.ten24.info
Images from the internet



Images from the internet

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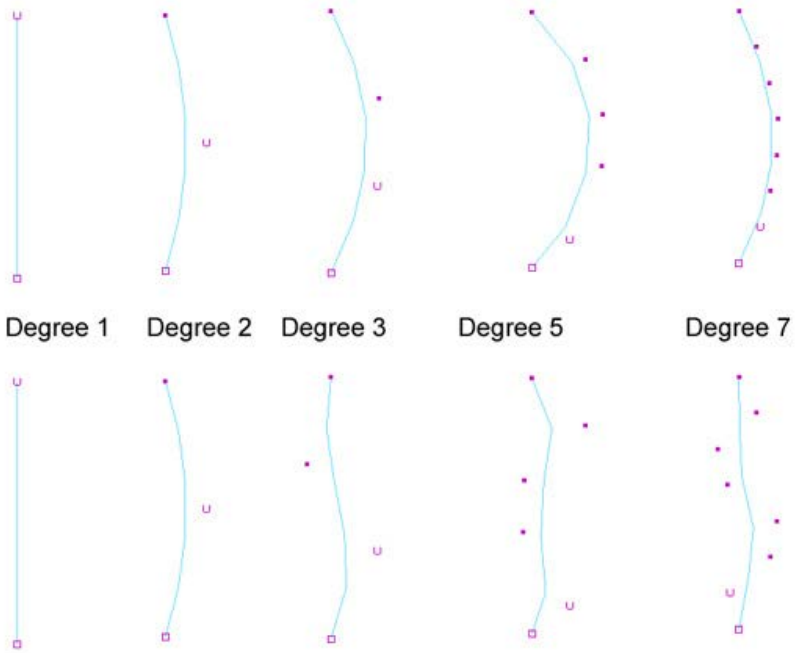
Images from the internet

NURBS



NURBS – Non Uniform Rational Bezier Spline

Curves are defined by the beginning and ending of the line and the weights in between.
The position of the weights will affect the curvature of the curve.
The amount of weights between the beginning and ending of the line defines the degree of the curve

NURBS

NURBS – Non Uniform Rational Bezier Spline

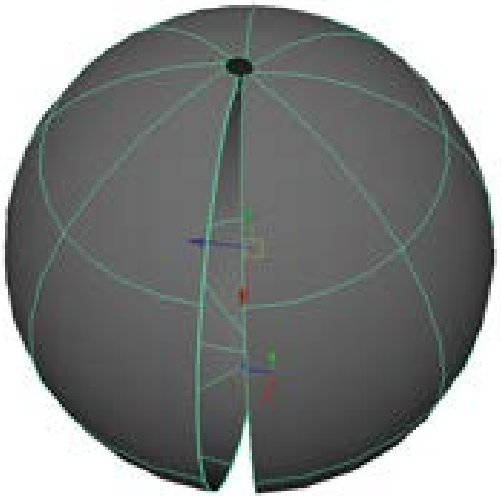
The curves are used as a basis for generating 3d geometry
The properties of the curve makes it especially suitable for curved surfaces
Standard geometry for many industries

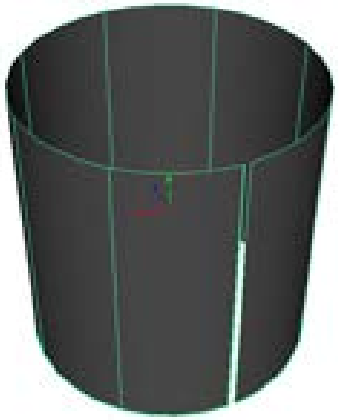
NURBS

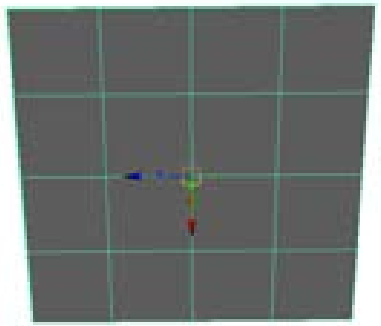
The surface:

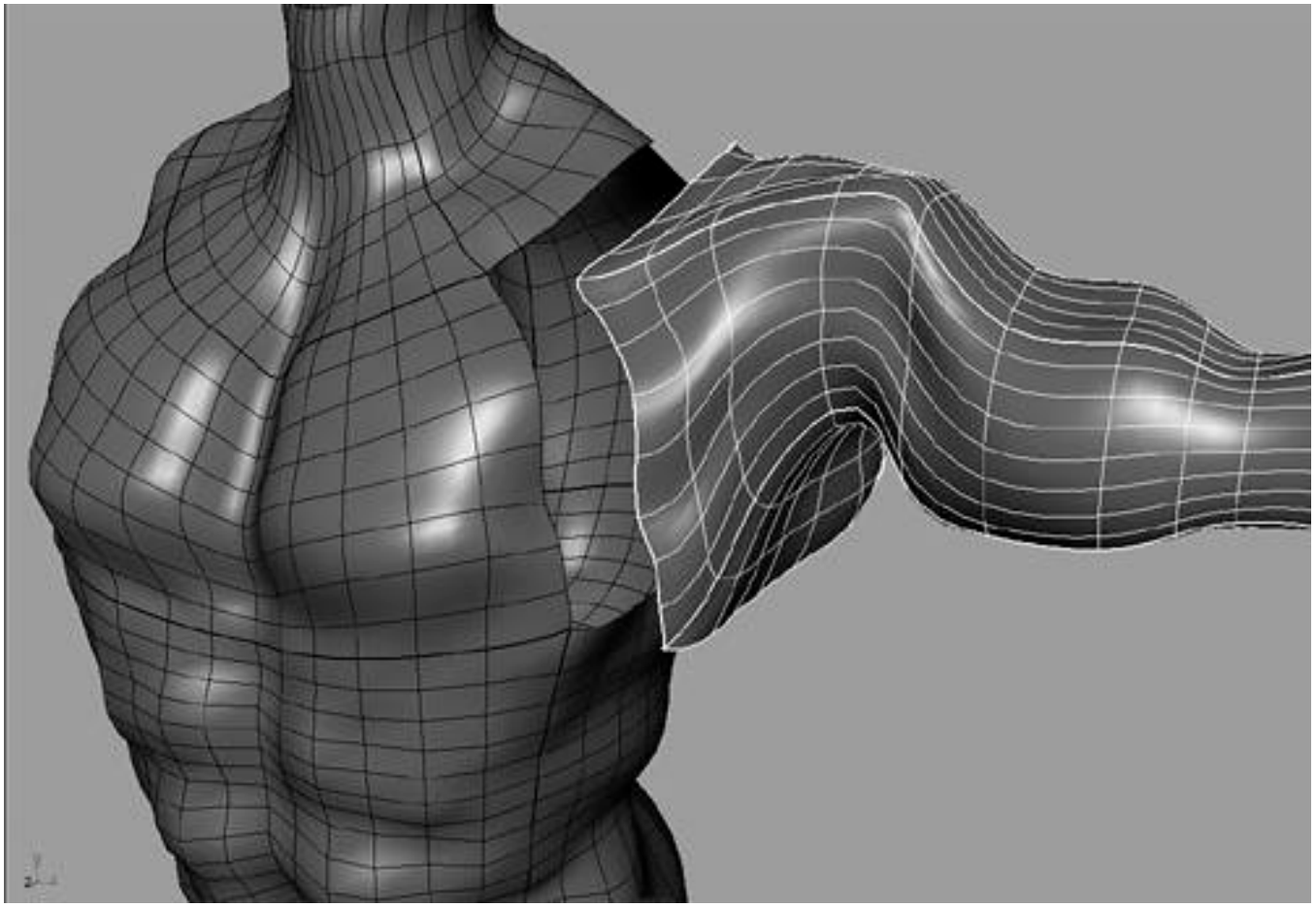
The shape of the NURBS surface is defined by the *cross wise angled* isoparms of the surface.

This means that a Nurbs surface is basically always a “rectangular” surface and never a volume









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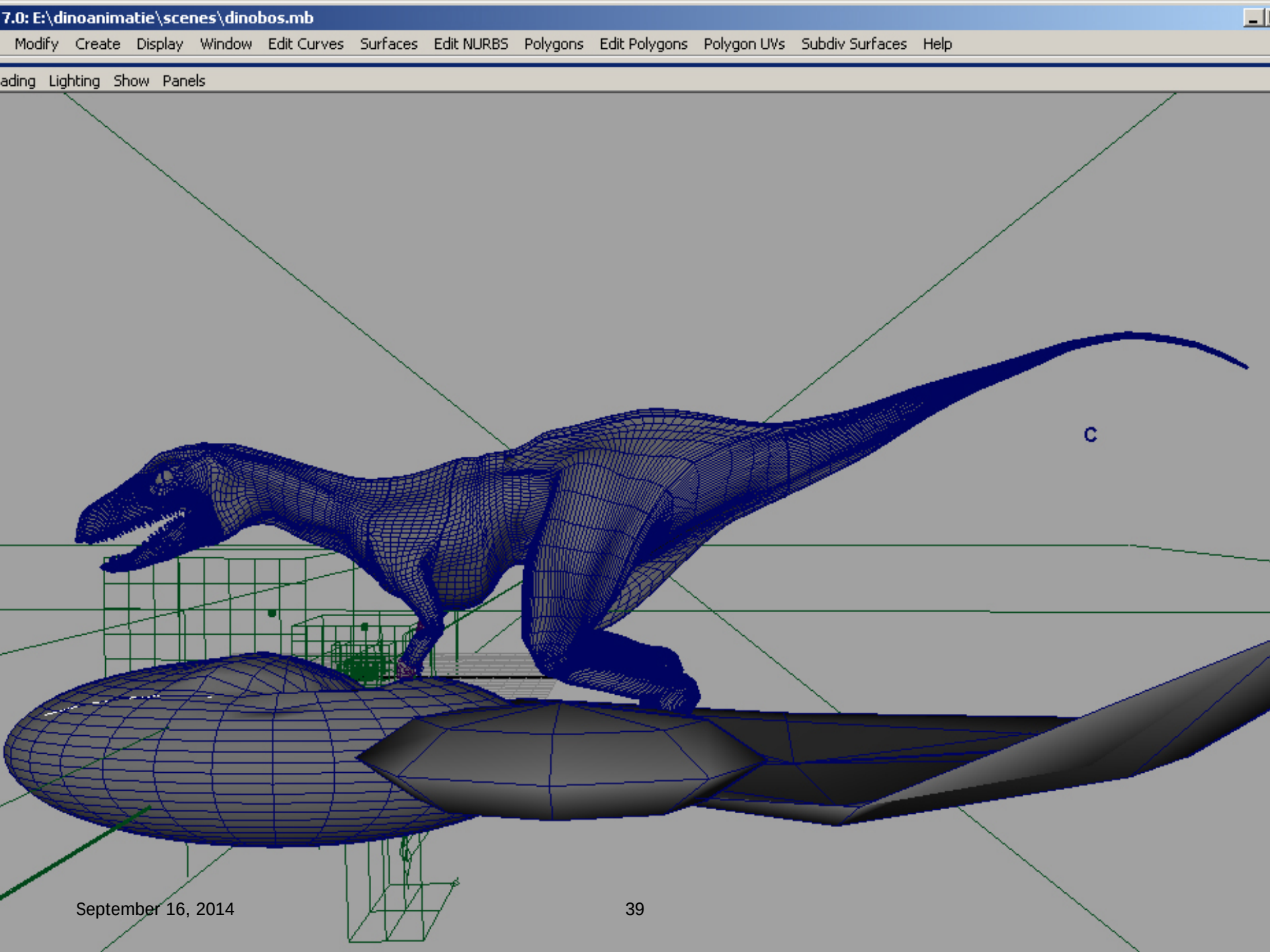
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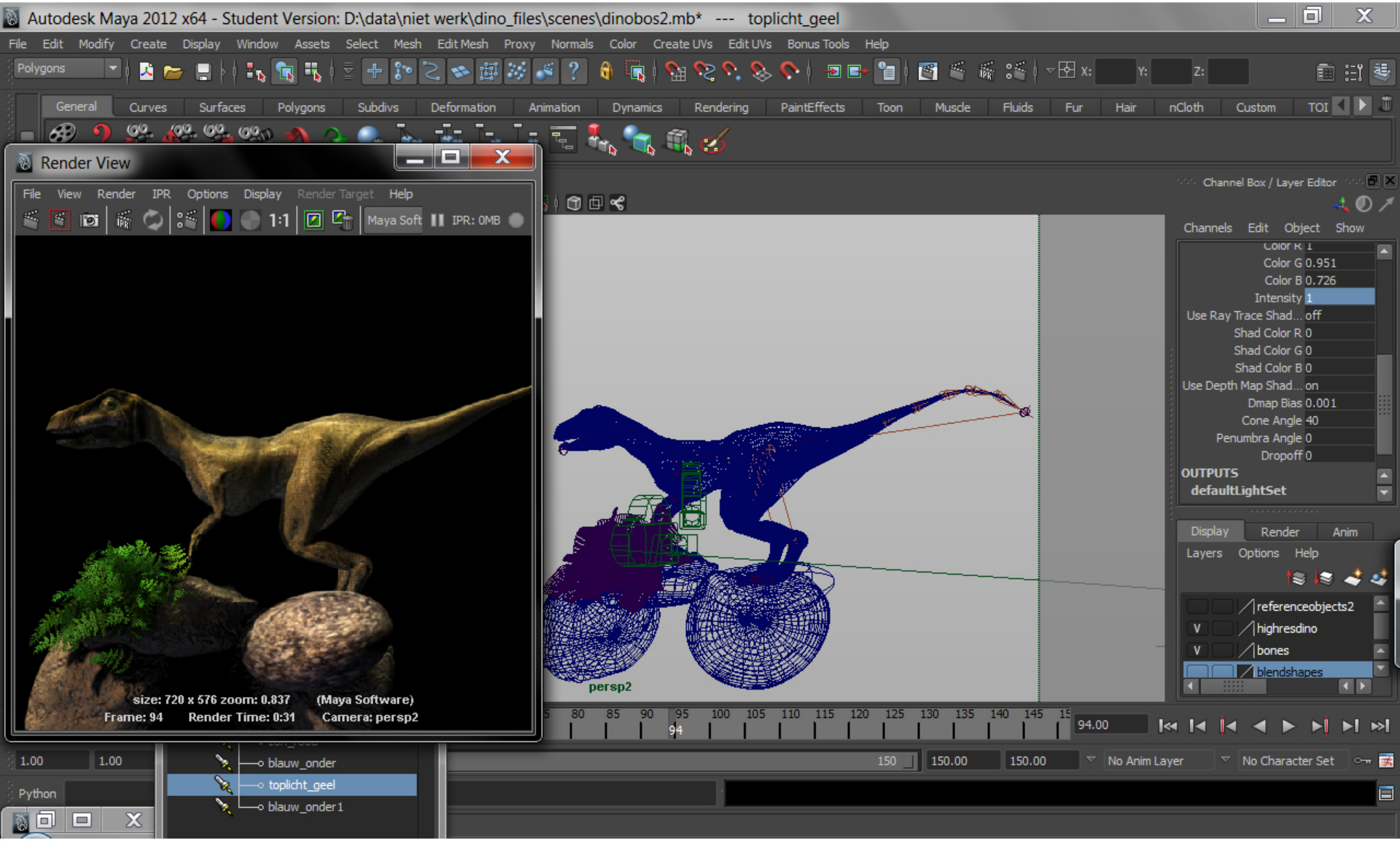
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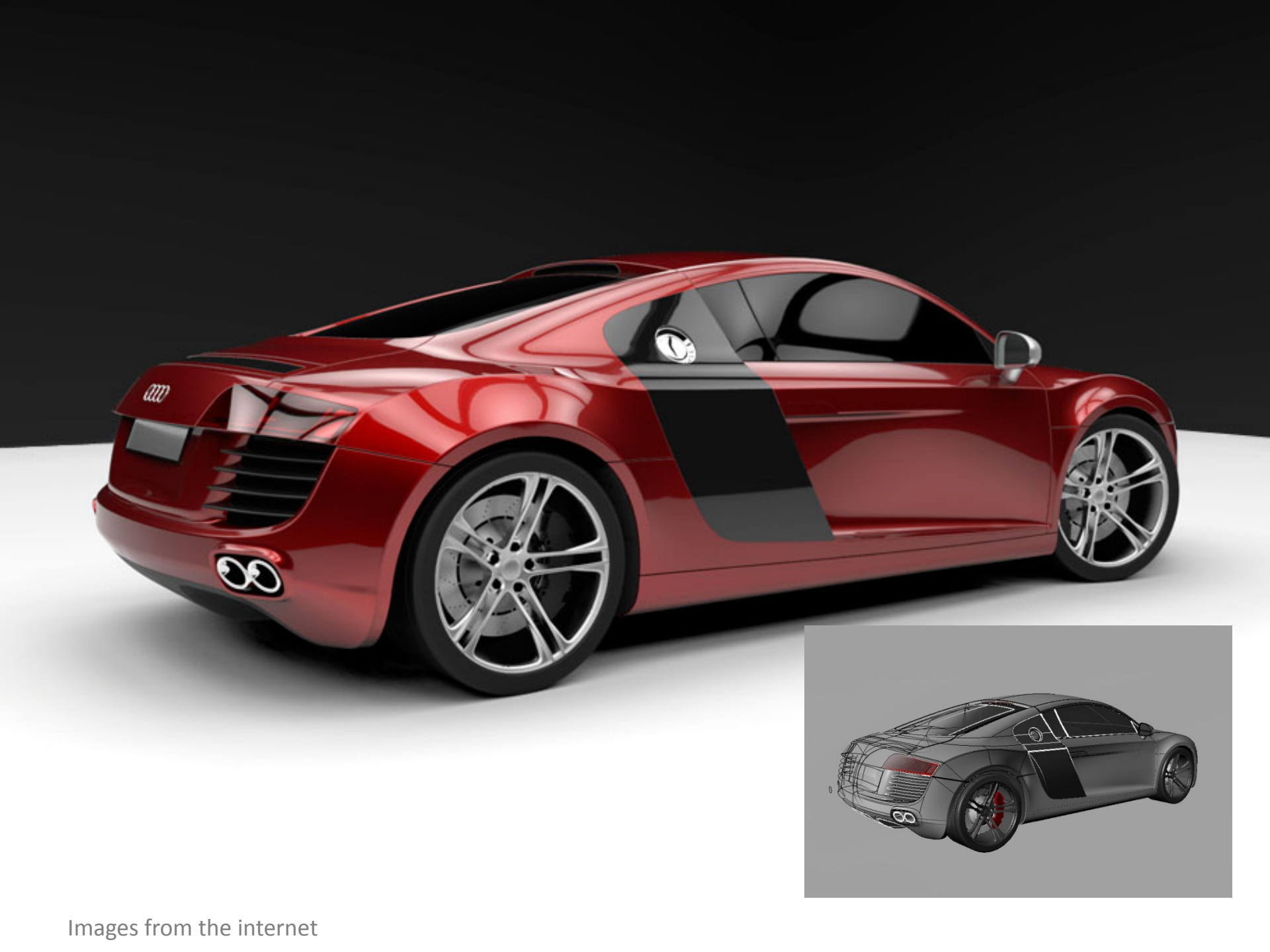

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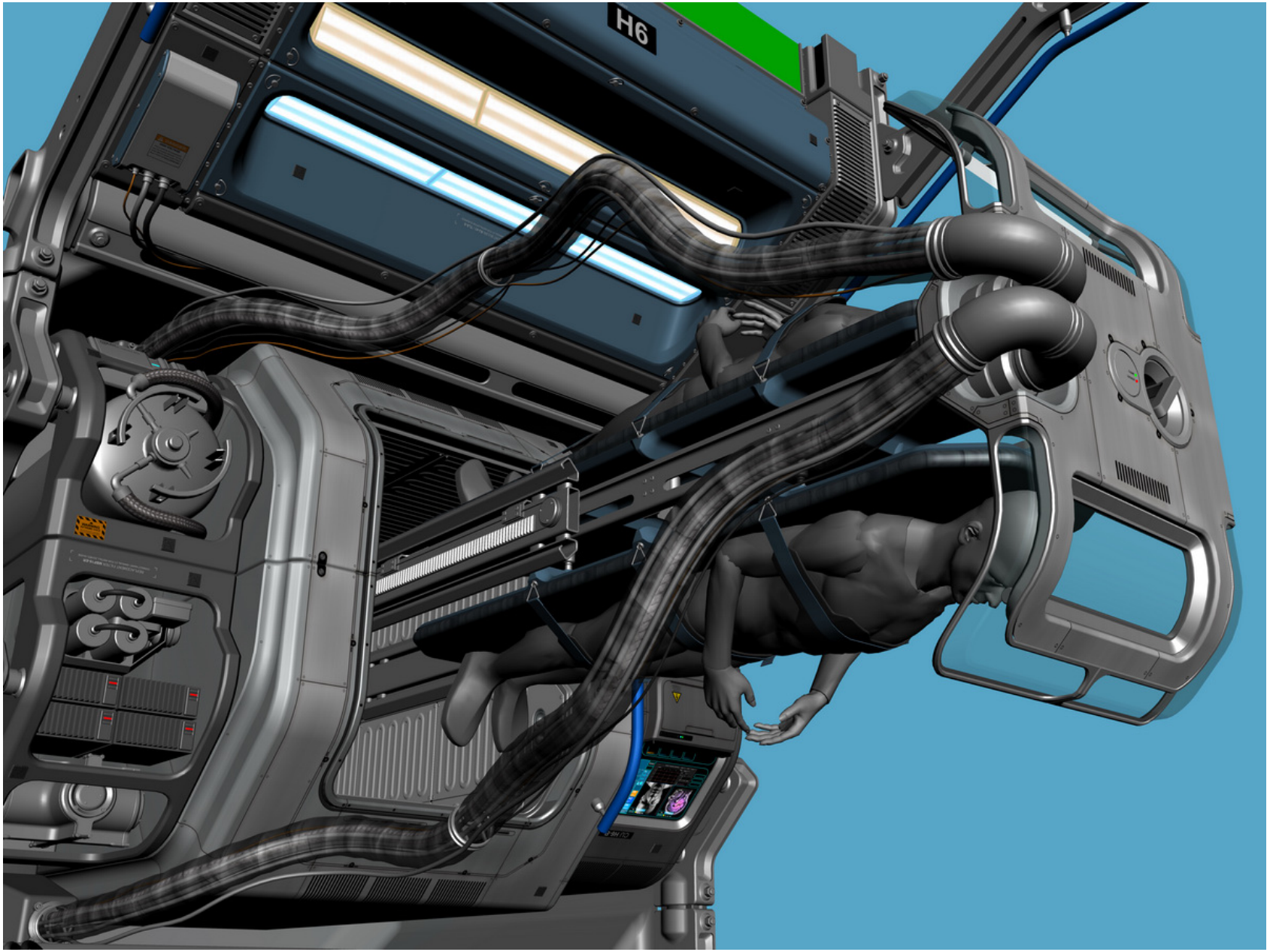

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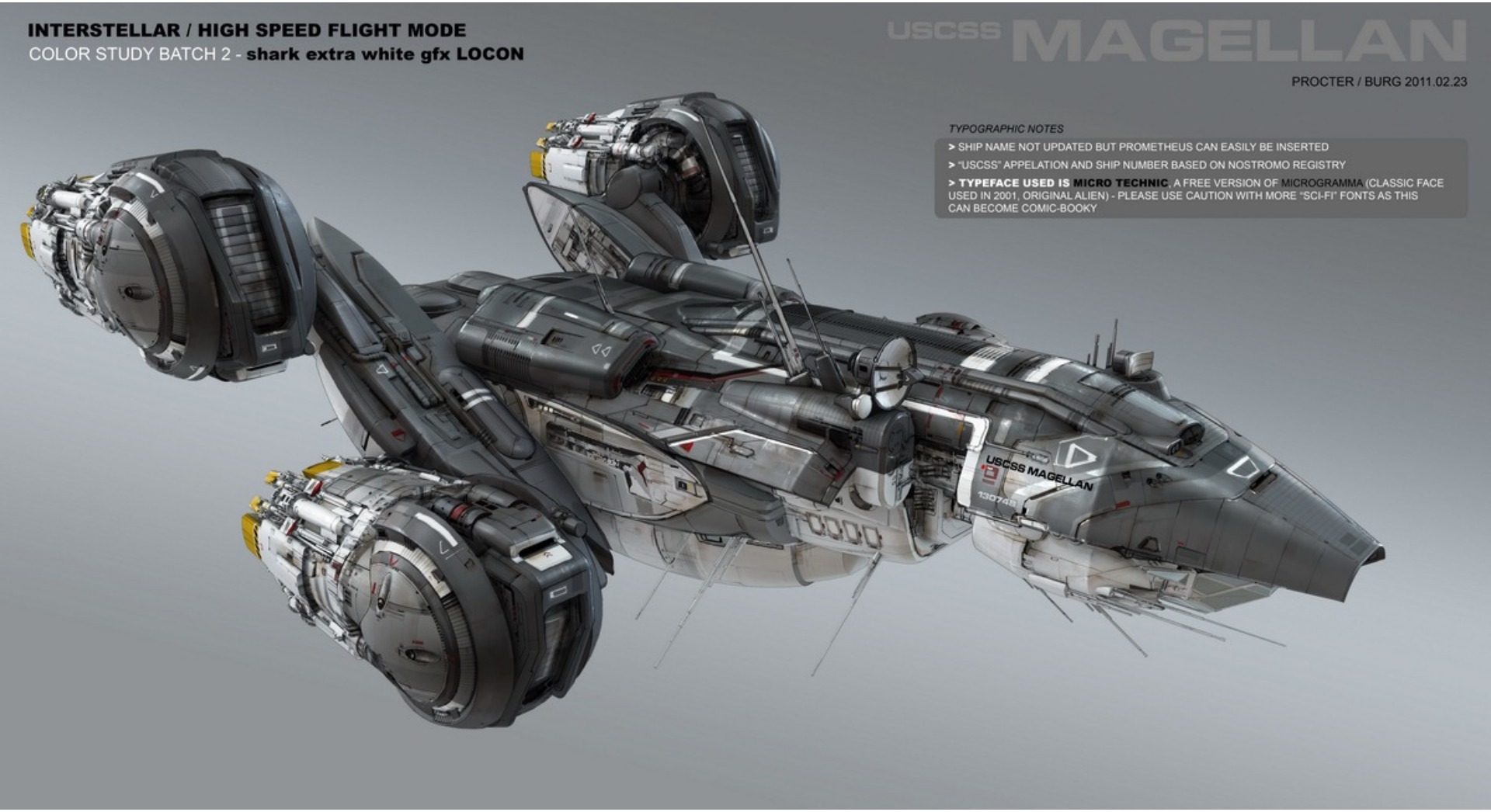
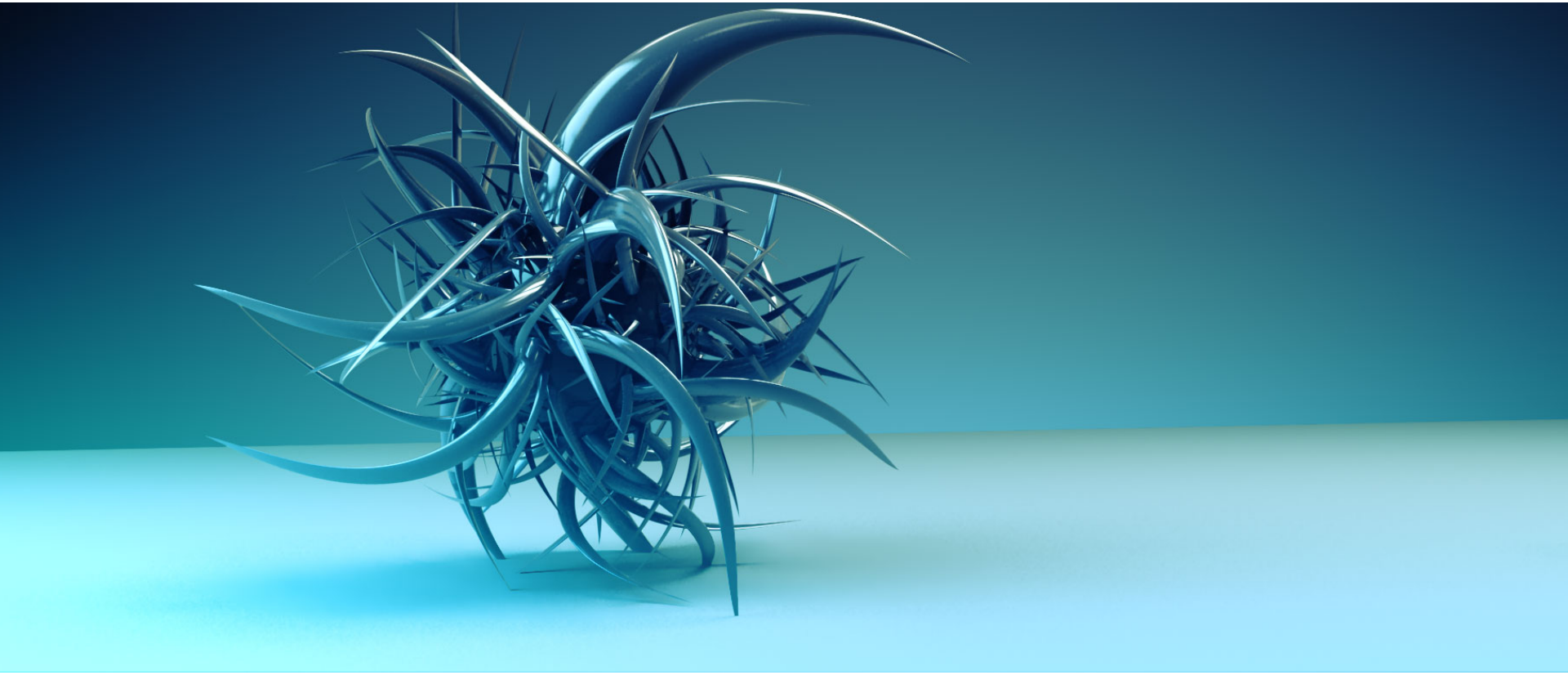


Images from the internet

Other types of geometry

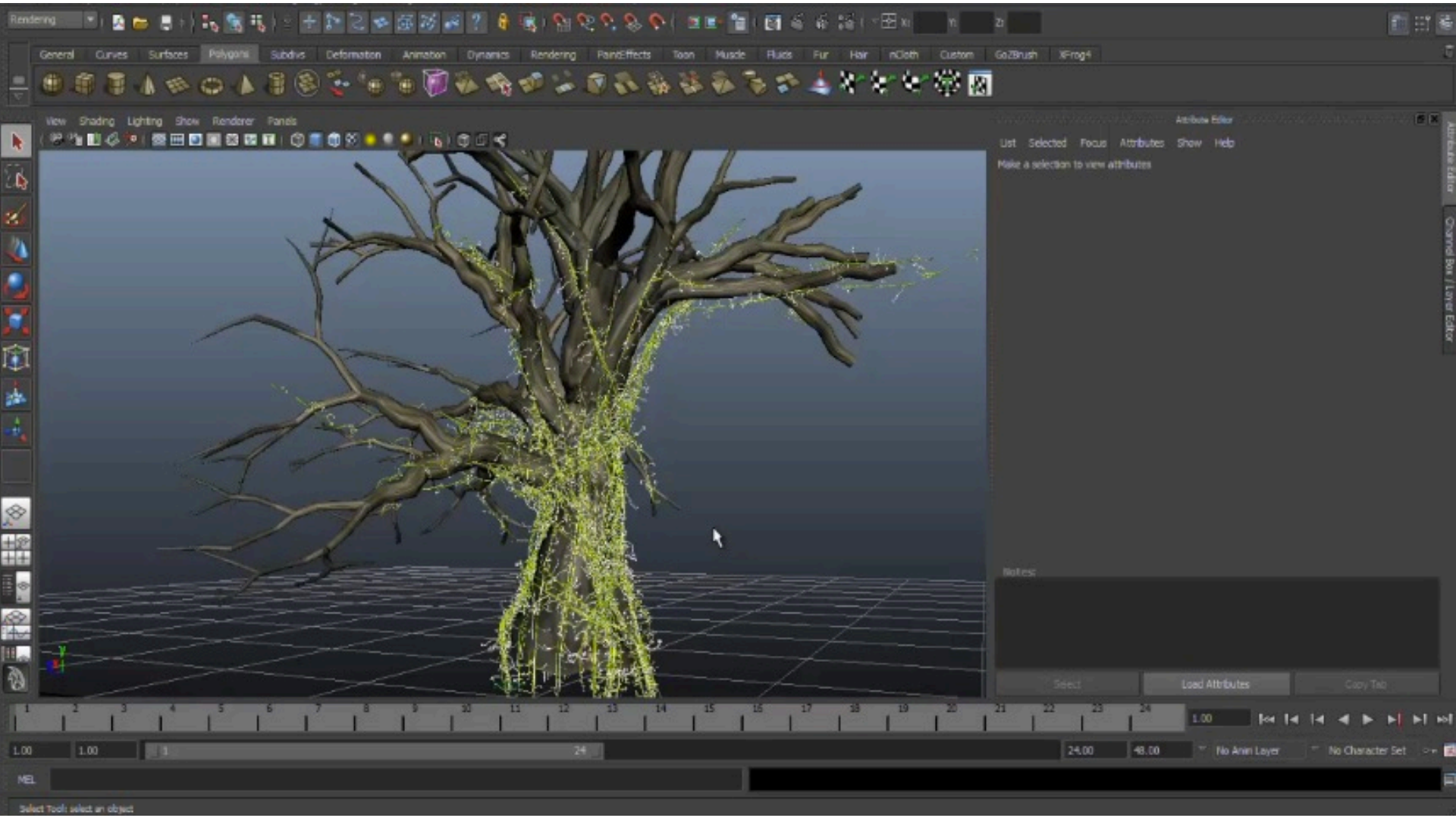
Particles



Images from the internet

Images from the internet

Paint effects

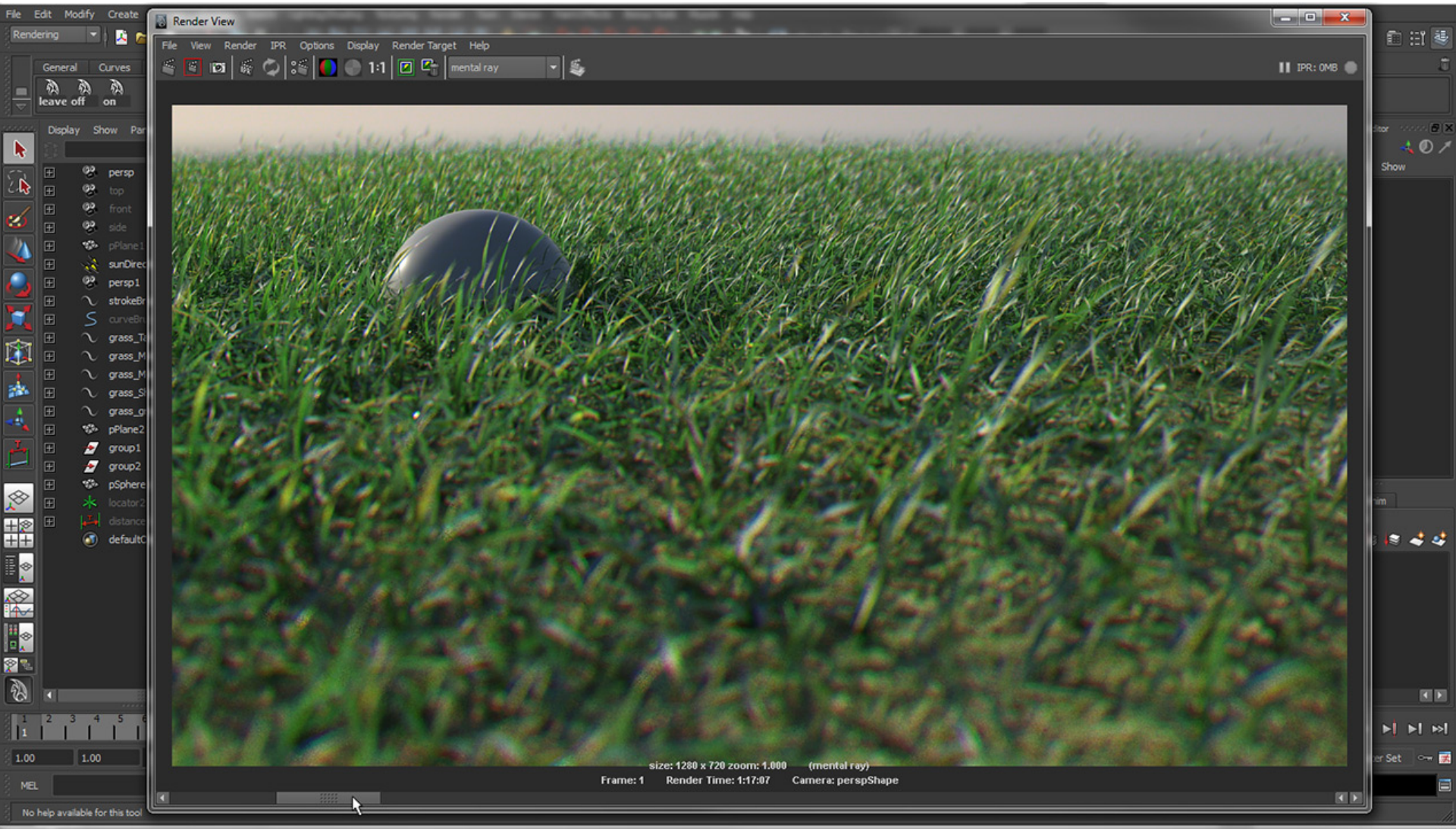


Images from the internet

Paint effects

Images from the internet

Paint effects

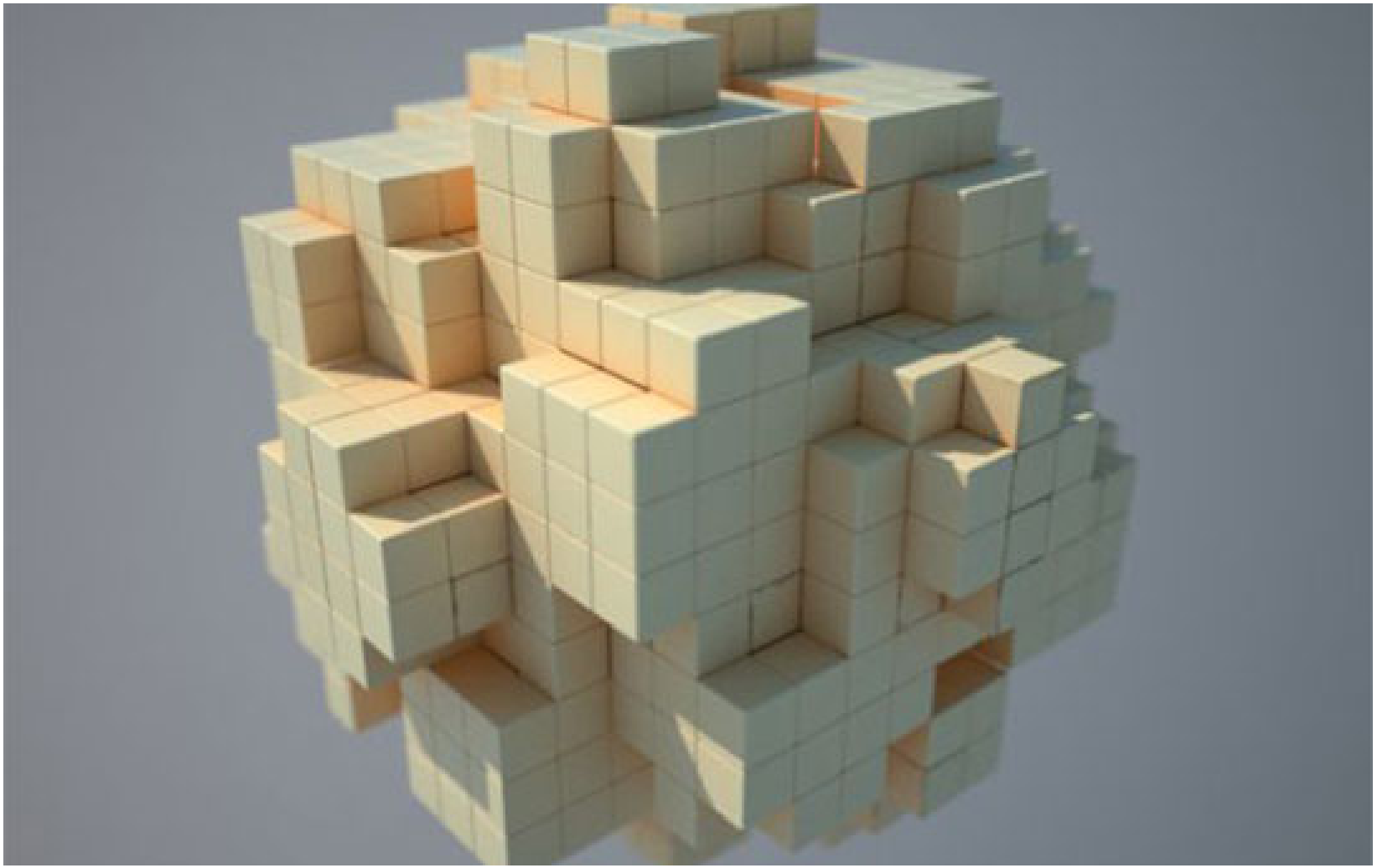


Images from the internet

Paint effects

Images from the internet

Voxels



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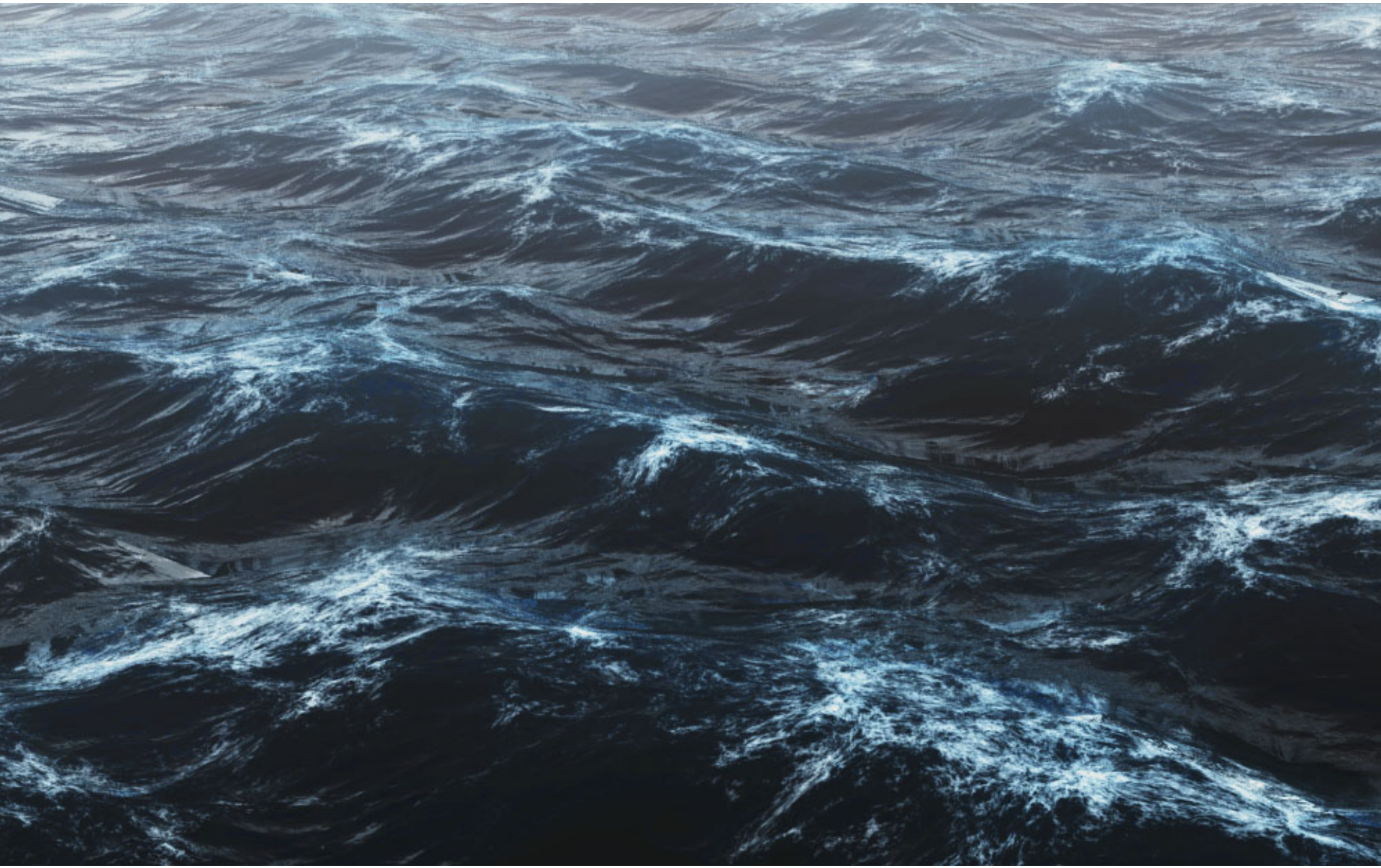
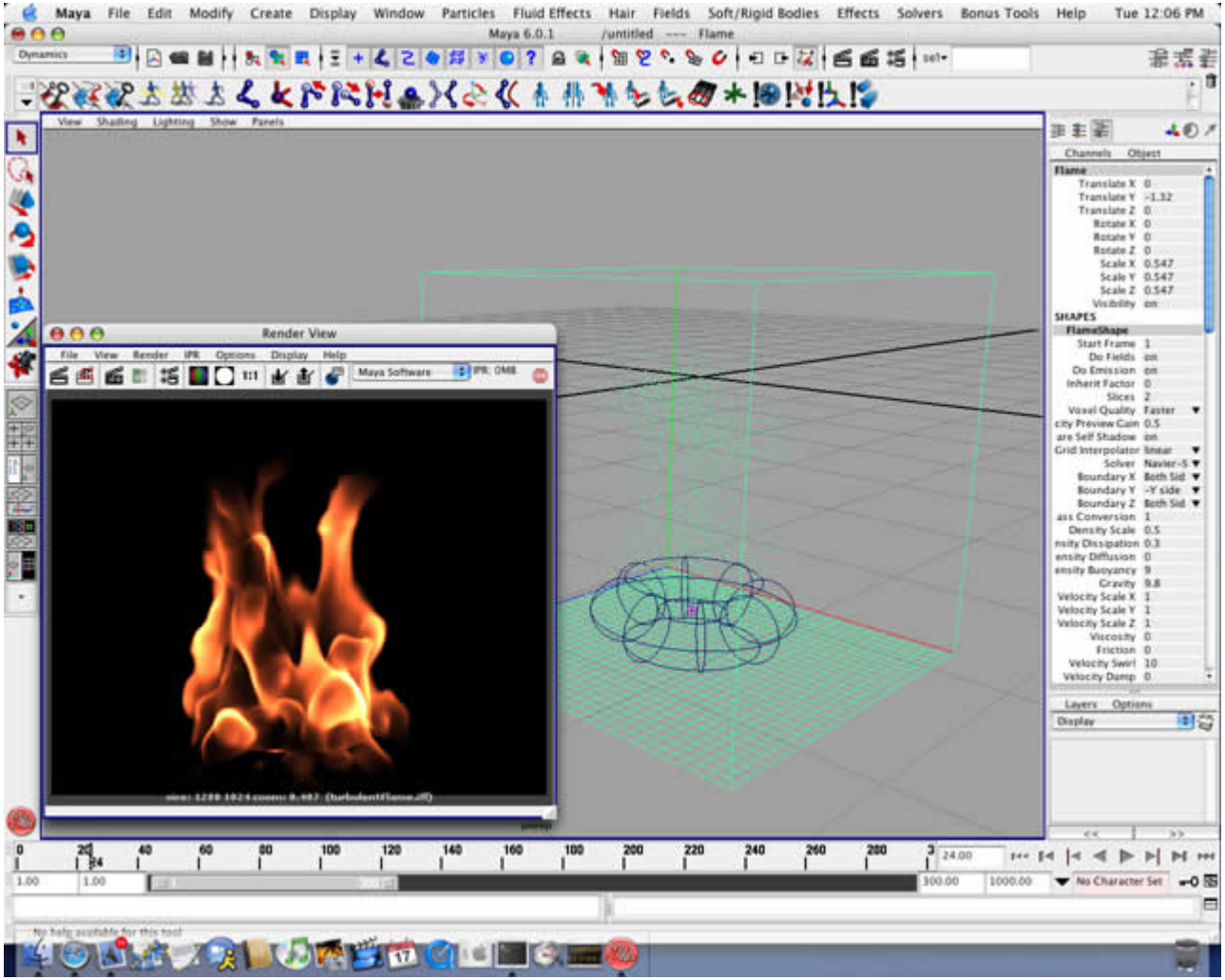


Images from the internet

Fluid effects



Images from the internet

Fluid effects

Images from the internet

Fluid effects

Images from the internet

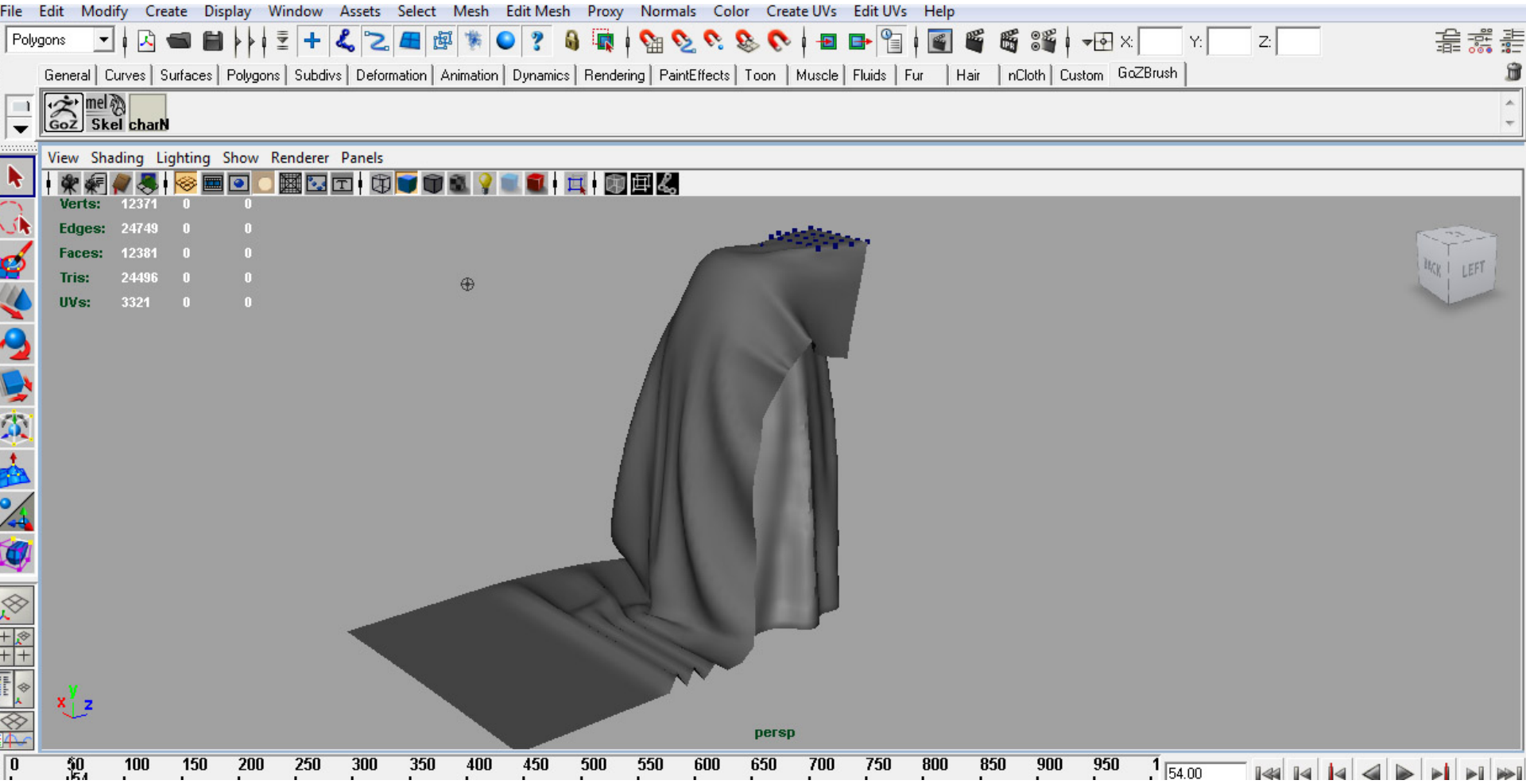
Fluid effects

Images from the internet

Fluid effects

Images from the internet

nCloth



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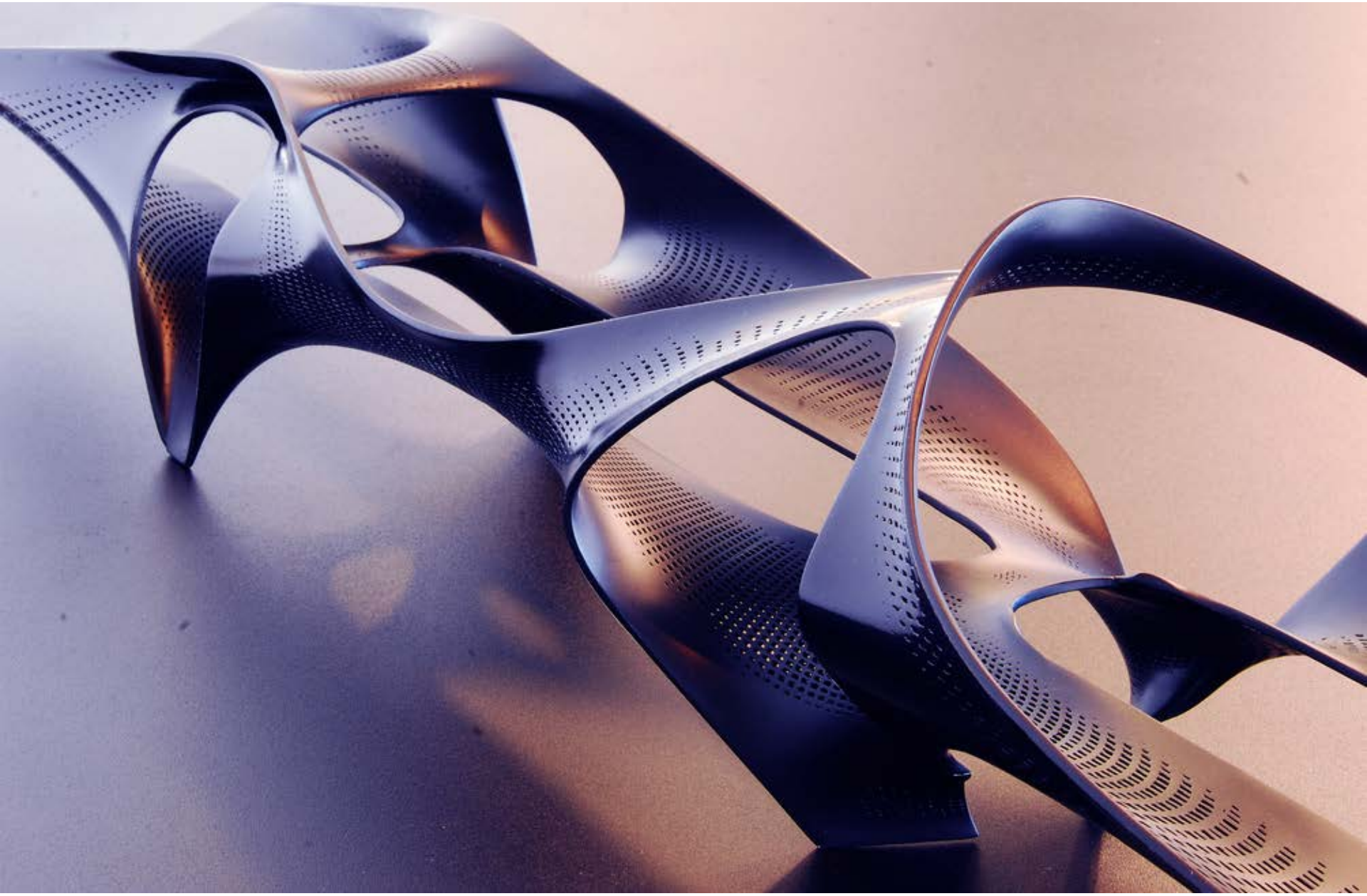


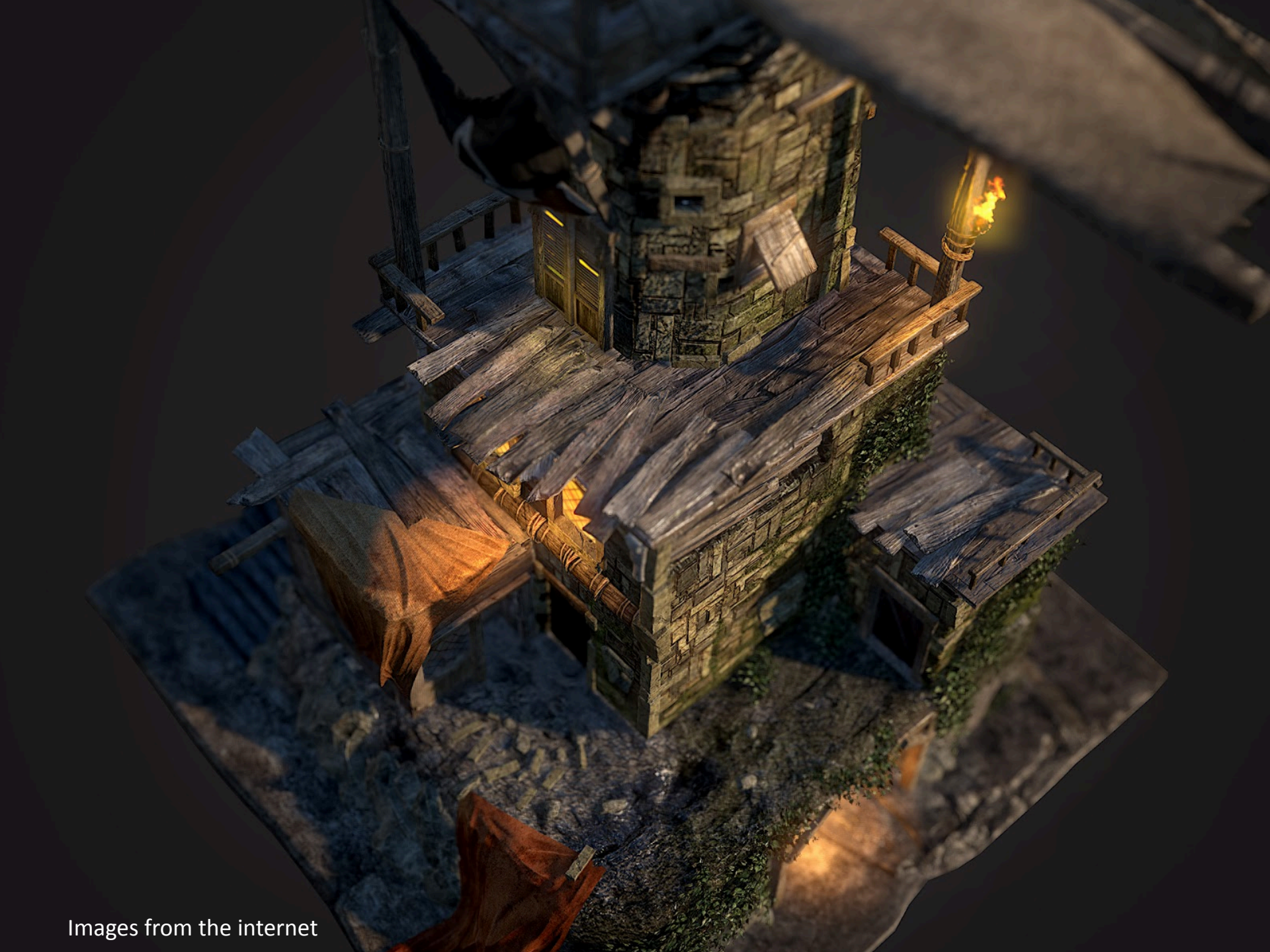
Images from the internet

nCloth

Images from the internet

nCloth

Images from the internet



Images from the internet

Combined

Images from the internet

Images from the internet

Images from the internet

Images from the internet

Images from the internet