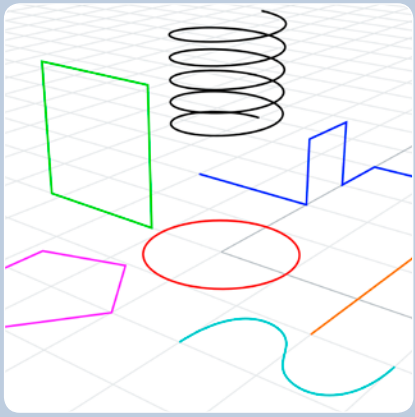
3D MODELING IN MOI

CONCEPTS, USER INTERFACE AND TOOLS

TERMINOLOGY / OBJECTS

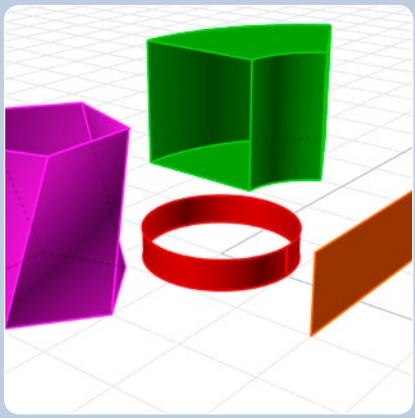
CURVES

- created from points
- lines, polylines, splines
- multiple segments
- can be 3D like wires
- cannot be 3D printed



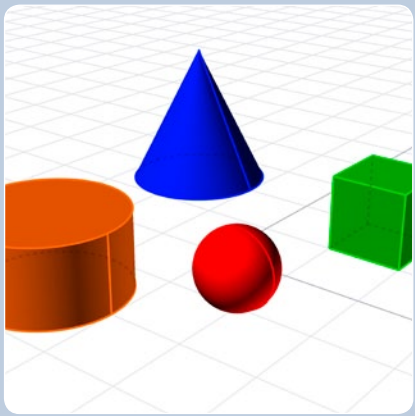
SURFACES

- created from curves
- within edges/boundaries
- open and without thickness
- cannot be 3D printed

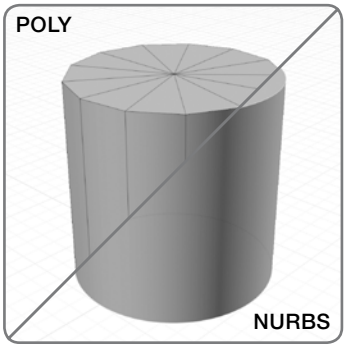


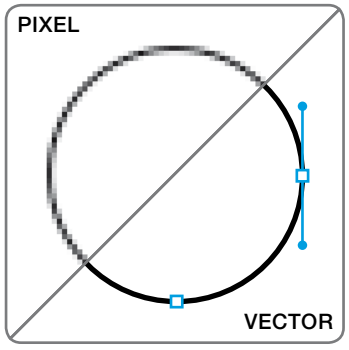
SOLIDS

- created from surfaces
- enclosed by multiple faces
- closed and with volume
- 3D printable

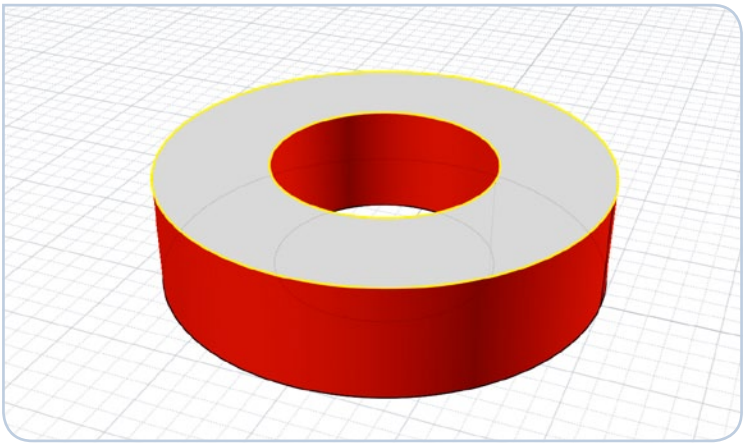


NURBS / POLYGONS - VECTOR / PIXEL



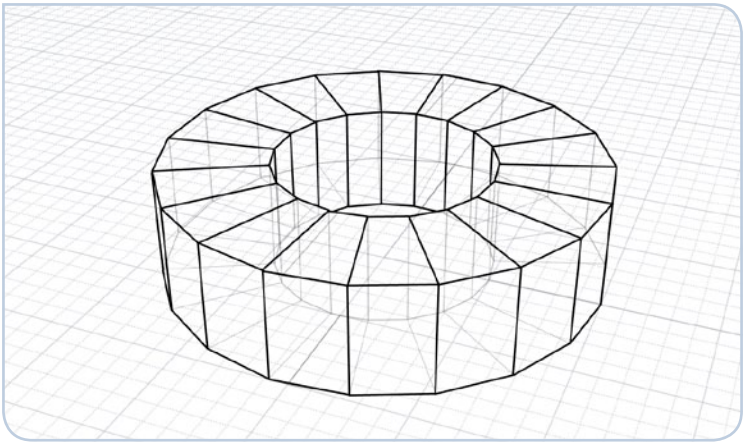


NURBS / Moi 3D / Rhino / Solidworks ...



- analytic/mathematical model: built from points, curves and surfaces
- constructive, geometrical, consistent, editable/measurable
- exact editing through points, curves and defined parameters
- applications: industrial processes / CAD / CAM / CNC turning, milling, lasercutting... [via export: 3D printing]
- variable resolution - adjustable to needs and output format/size
- can be translated into polygon geometry/file format
- *analogous to vector graphics*

POLYGON / SketchUP! / DXF / STL ...



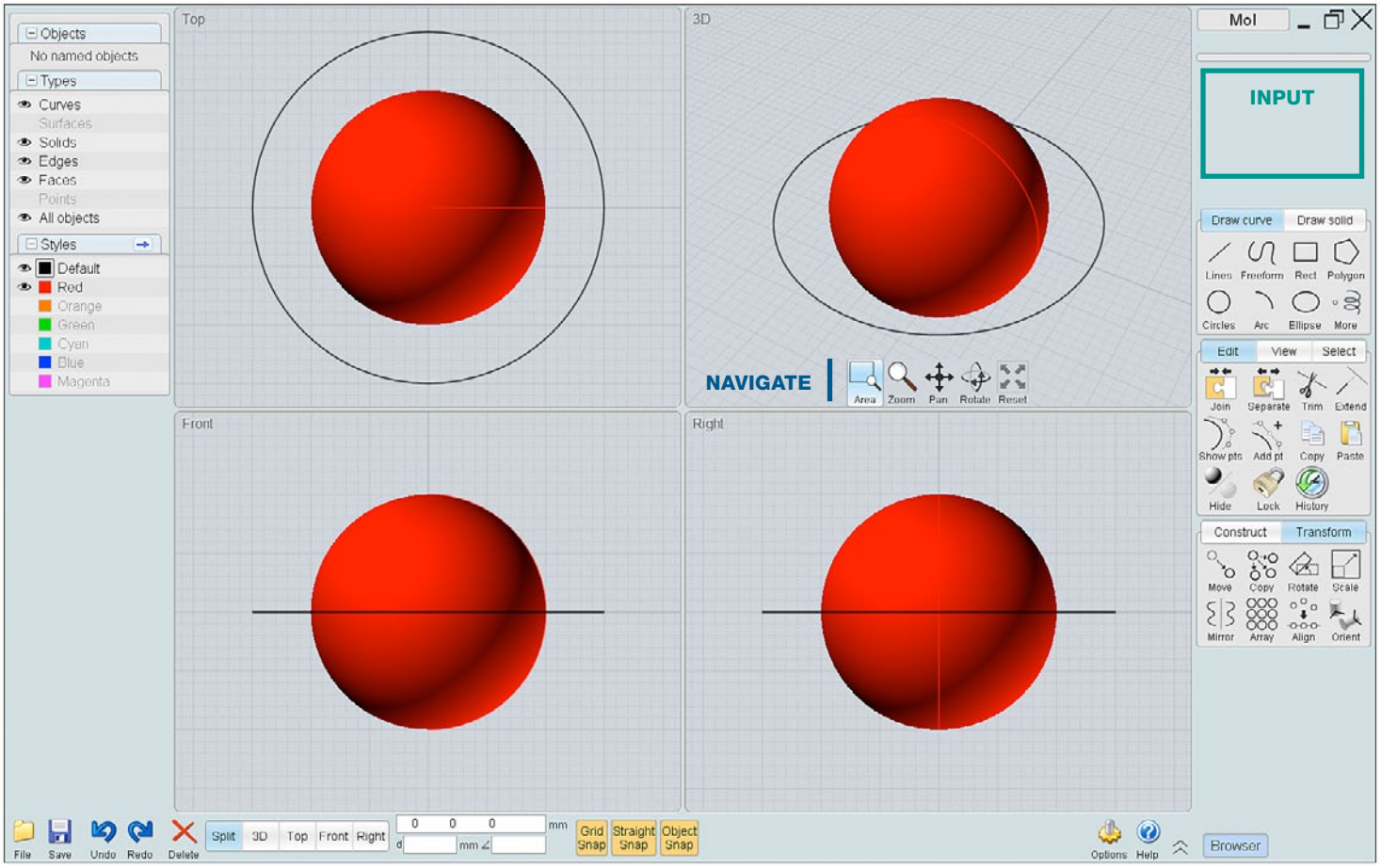
- wireframe model: connected faces/polygons (3, 4, N-sided)
- can be detailed, organic, moldable, but hard to modify accurately
- created by polygon, subdivision surface or 3D scanning techniques
- editing of (individual) surfaces / wires / edges / cornerpoints
- applications: rendering / visualisation / entertainment / 3D printing
- fixed resolution - set in relation to use and output technique
- cannot be translated into NURBS geometry/file formats easily
- *analogous to pixel (bitmap) graphics*

MOI 3D / INTERFACE

ORGANIZE

WORKSPACE

EDIT



FILE

VIEW

INPUT

SNAPPING

WORKSPACE / VIEW / NAVIGATE / SELECT

DRAW / CONSTRUCT / EDIT / INPUT / SNAPPING

ORGANIZE / OBJECTS / SELECTION / STYLES

FILE / OPEN / SAVE / IMPORT / EXPORT

OTHER / UNDO + REDO / COPY + PASTE / HISTORY

1. DRAW / EDIT

DRAW / CURVE

- LINE
- FREEFORM
- RECTANGLE
- POLYGON
- CIRCLE
- ARC
- ELLIPSE
- MORE ...

DRAW / SOLID

- PLANE
- BOX
- SPHERE
- CYLINDER
- CONE
- TEXT

EDIT

- JOIN
- TRIM
- SHOW POINTS
- HIDE
- SEPARATE
- EXTEND
- ADD POINT
- LOCK

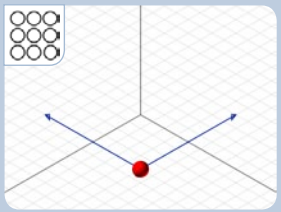
2. TRANSFORM

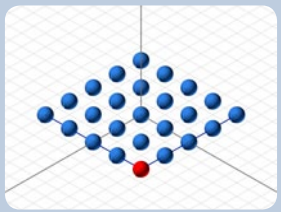
TRANSFORM

- MOVE
- ROTATE
- SCALE / 3D
- MIRROR
- COPY
- ROTATE / AXIS
- SCALE / 1D
- ALIGN
- ARRAY
- SCALE / 2D
- ORIENT

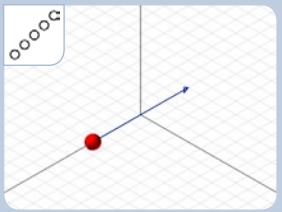
TRANSFORM / ARRAY

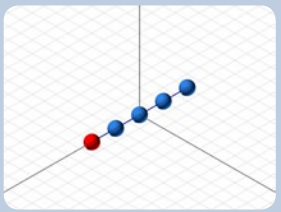
GRID



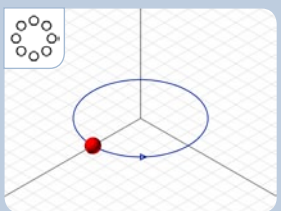


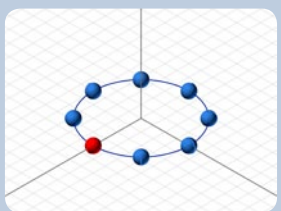
DIRECTION



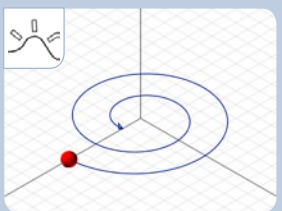


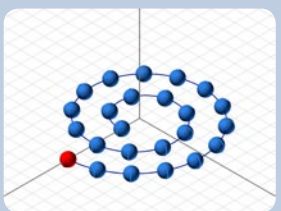
CIRCULAR





CURVE



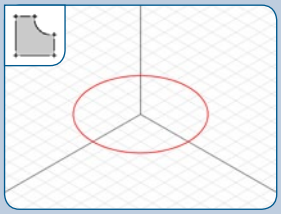


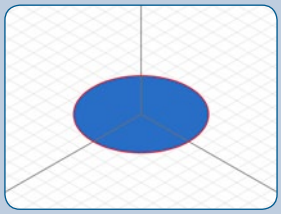
3. CONSTRUCT

PLANAR SURFACE

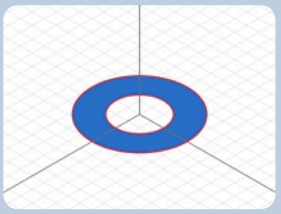
construct a flat surface from one or more curves

BASIC

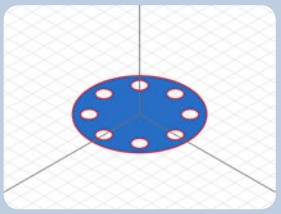




COMPOUND



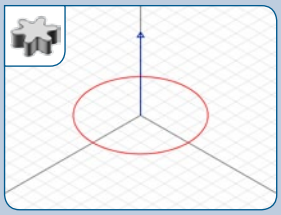
COMPLEX

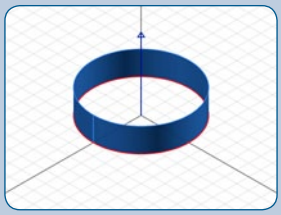


EXTRUDE

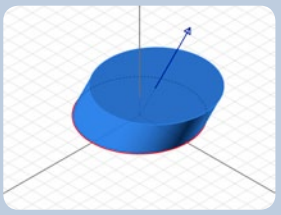
construct a surface or solid from a cross-section

BASIC

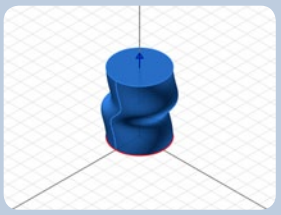




SET DIRECTION



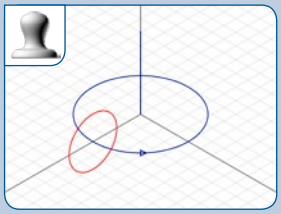
SET PATH

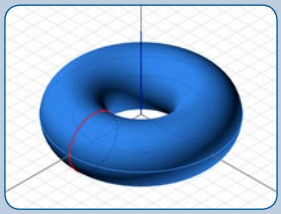


REVOLVE

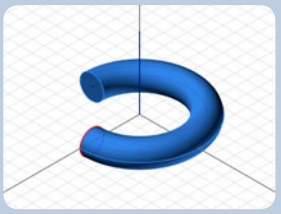
construct a surface or solid from a profile around an axis

BASIC

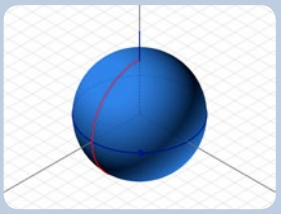




270° ANGLE



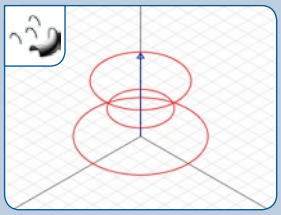
CLOSED PROFILE

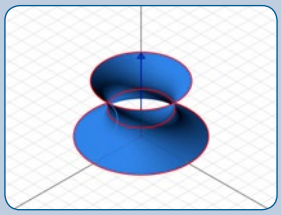


LOFT

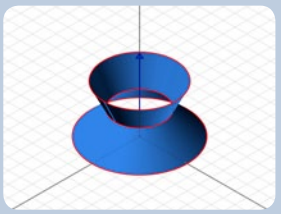
construct a surface or solid by connecting multiple cross-section profiles

BASIC

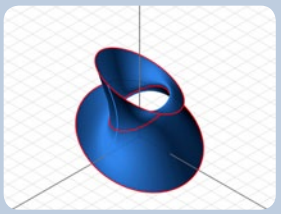




STRAIGHT



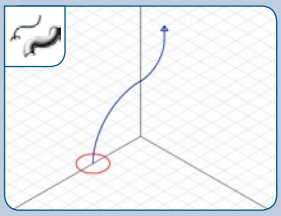
COMPLEX

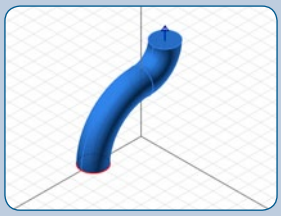


SWEEP

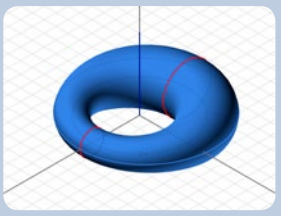
construct a surface or solid from one or more profiles along a guiding curve (or multiple rail curves)

BASIC

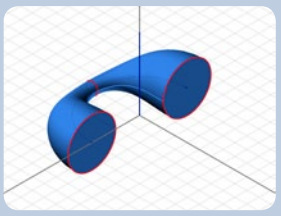




2 PROFILES



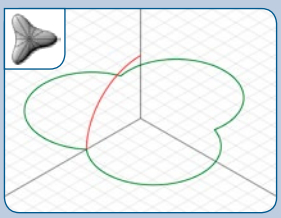
COMPLEX

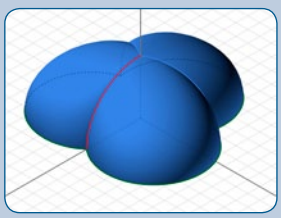


OTHER

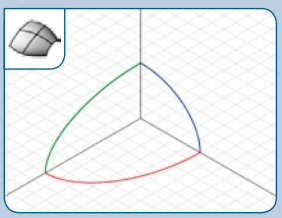
construct a complex surface from multiple curves

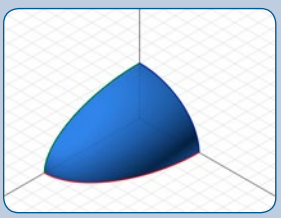
RAIL REVOLVE





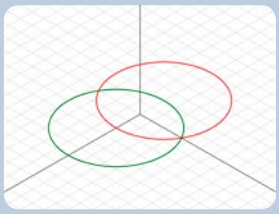
NETWORK



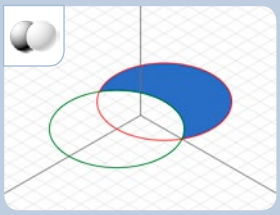


4. COMBINE

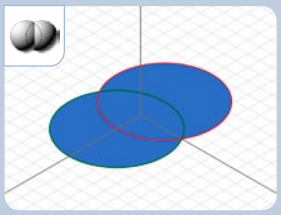
BOOLEAN / CURVES



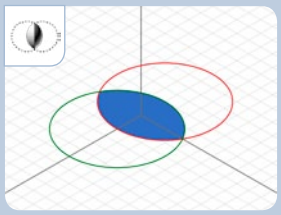
DIFFERENCE A - B



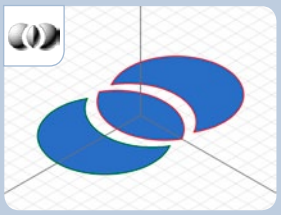
UNION A + B



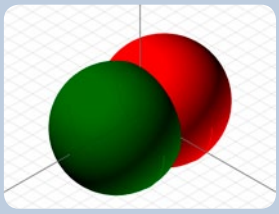
INTERSECT A / B



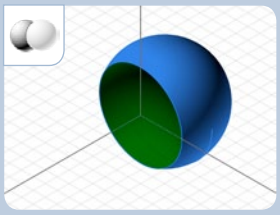
MERGE A , B, ...



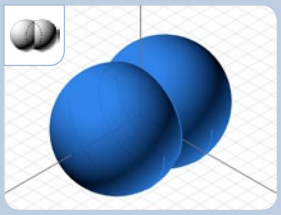
BOOLEAN / SOLIDS



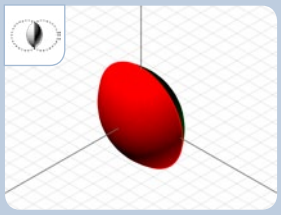
DIFFERENCE A - B



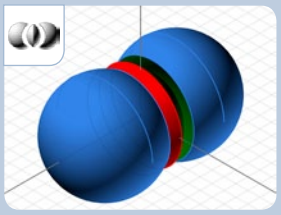
UNION A + B



INTERSECT A / B

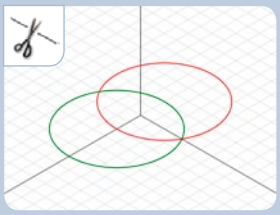


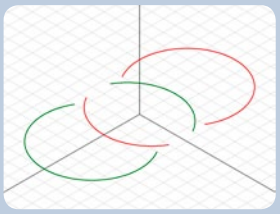
MERGE A , B, ...



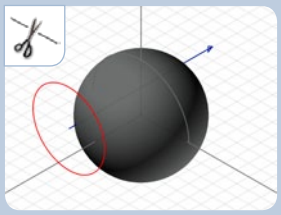
TRIM

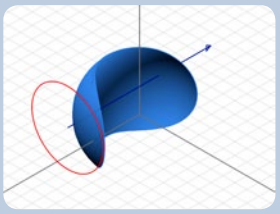
TRIM CURVES





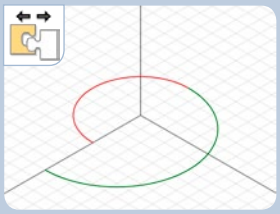
TRIM SOLID WITH CURVE



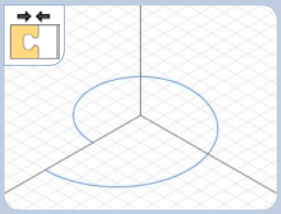


JOIN / SEPARATE

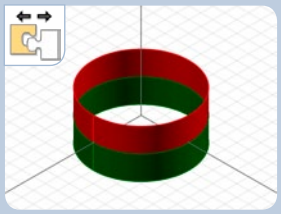
SEPARATE CURVES



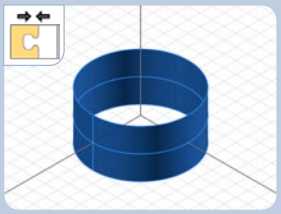
JOINED CURVES



SEPARATE SURFACES



JOINED SURFACES

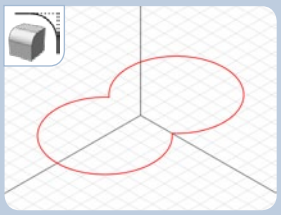


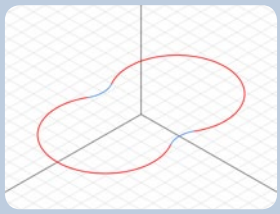
5. REFINE

FILLET

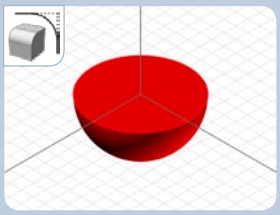
rounds of any sharp corners

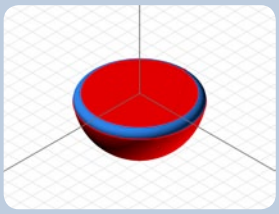
CURVES





SURFACES / SOLIDS

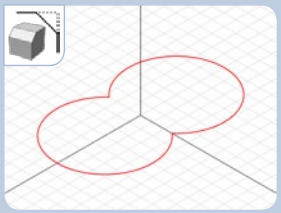


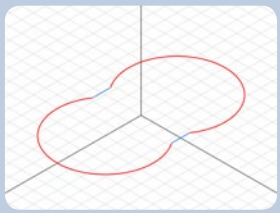


CHAMFER

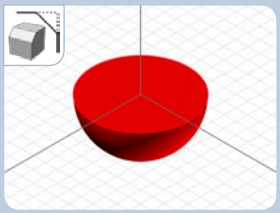
creates a bevelled edge

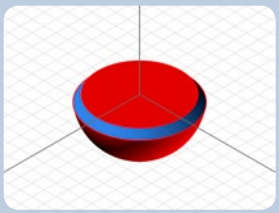
CURVES





SURFACES / SOLIDS

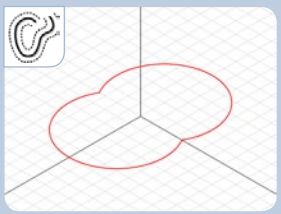


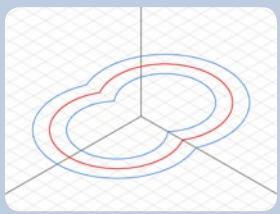


OFFSET

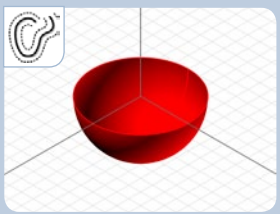
offsets a curve or surface; shrink/expand

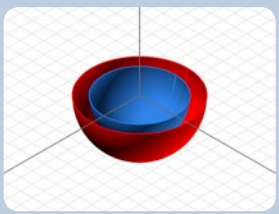
CURVES





SURFACES / SOLIDS

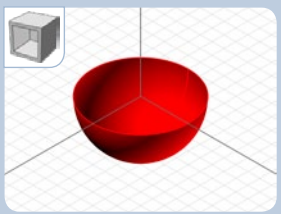


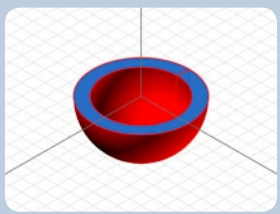


SHELL / INSET

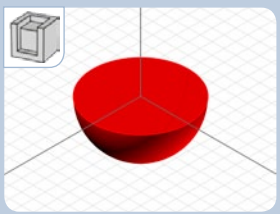
adds thickness to a surface

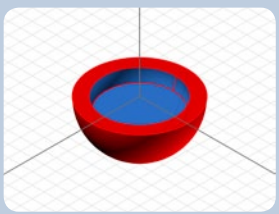
SHELL - INWARD





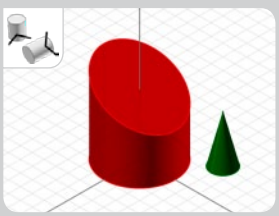
INSET - INWARD

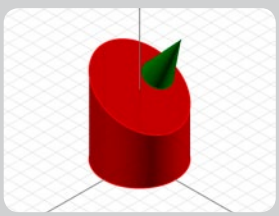




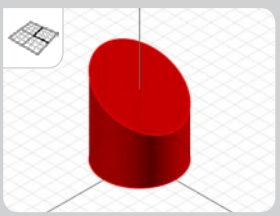
OTHER TOOLS

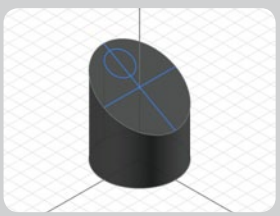
ORIENT



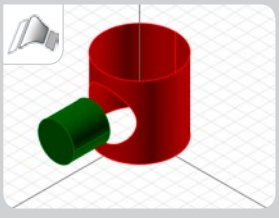


WORKING PLANE / MOVE AXIS





BLEND



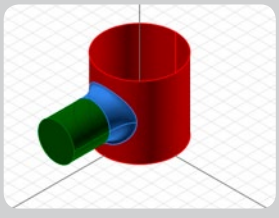
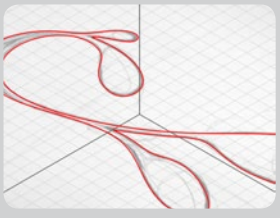


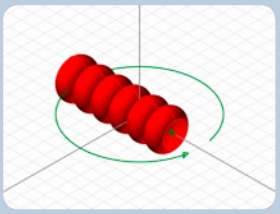
IMAGE / GUIDE / TEMPLATE

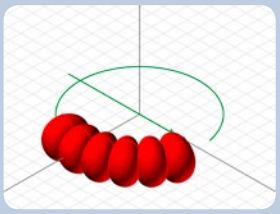


6. DEFORM / NEW / V3 / MAC V2.5

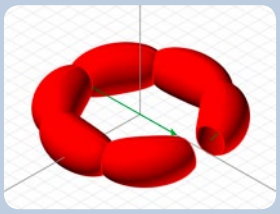
FLOW / CURVE
deform an object using
base and target curves

BASIC

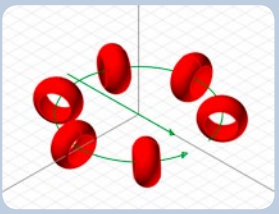




STRETCH

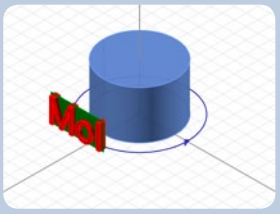


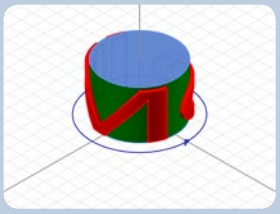
RIGID / STRETCH



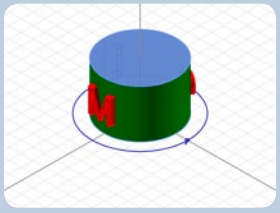
FLOW / SURFACE
deform an object using
base and target surfaces

BASIC / STRETCH

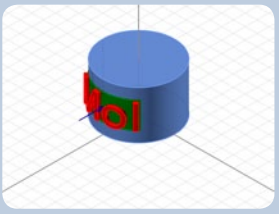




RIGID

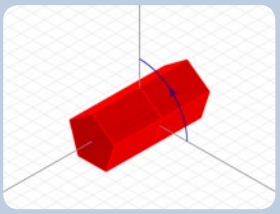


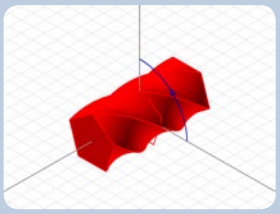
PROJECTIVE



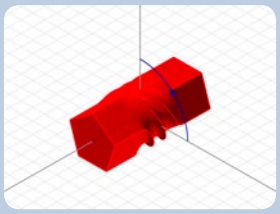
TWIST
rotational deformation on axis

BASIC 360°

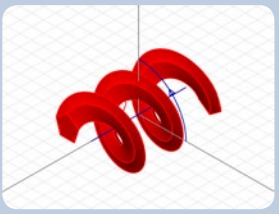




LIMIT AXIS / EASE



OFF-CENTER



MOI 3D
MOMENT OF INSPIRATION

Michael Gibson - http://moi3d.com/ - moi@moi3d.com

ARCHETYPES

Fabien Franzen - http://archetypes.be/ - info@archetypes.be

FILE / OPEN / IMPORT

3D NURBS

3DM / native format / OpenNURBS / Rhino 3D compatible
IGES / Initial Graphics Exchange Specification / General CAD format
SAT / Standard ACIS Text / ACIS Kernel CAD format
STEP / Standard for the Exchange of Product model data / ISO std.

2D VECTOR

ILLUSTRATOR / Adobe .ai .eps .pdf / graphics format / as .ai < v.8

FILE / SAVE / EXPORT

ALWAYS KEEP YOUR ORIGINAL FILE IN 3DM FORMAT

This ensures full editability and allows you to export your model into different formats and for specific uses later. Your options are:

3D NURBS > CAD / CAM / CNC MILLING

3DM / native format / OpenNURBS / Rhino 3D compatible
IGES / Initial Graphics Exchange Specification / General CAD format
SAT / Standard ACIS Text / ACIS Kernel CAD format
STEP / Standard for the Exchange of Product model data / ISO std.

2D VECTOR > GRAPHIC DESIGN / PRESENTATION / PRINTING

ILLUSTRATOR / Adobe .ai .eps .pdf / graphics format

3D POLYGONS > RENDERING / PRESENTATION / 3D PRINTING

STL / 3D printing / online service providers / home 3D printers
OBJ / AutoDesk Alias Wavefront / common format (Maya, C4D)
LWO / Newtek Lightwave / Luxology Modo
3DS / AutoDesk 3D Studio
FBX / AutoDesk exchange format
SKP / Google SketchUp

ABOUT / WORKSHOPS

This overview is part of the introductory courseware I developed for teaching MoI at Materialise Belgium and St. Lucas Antwerp's jewelry design department, amongst others.

As a professional designer and experienced 2D and 3D software user I can provide creative modeling workshops to individuals and groups of any experience level, both on site as well as at a dedicated location.

If you're interested in learning more, contact me at info@archetypes.be

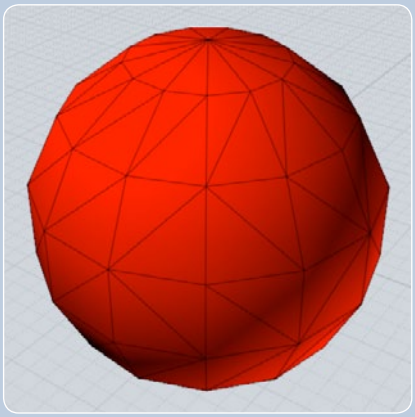
STL FORMAT EXPORT

STEREOLITHOGRAPHY FORMAT STANDARD IN 3D PRINTING

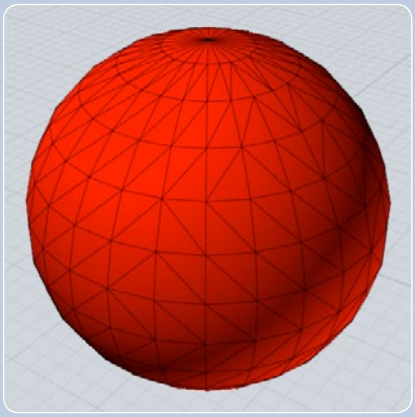
This format has evolved into the most commonly used format for 3D printing technologies. It is a polygon file format, containing thousands of small triangles that form solid (closed, *watertight*) objects.

Unlike Moi's internal NURBS structure, exported STL models are not resolution independent. During export an appropriate resolution has to be chosen according to the required surface detail and actual physical dimensions of the object.

ANGLE > 20°
- usually not suitable
- low resolution
- rough results
- small file size



ANGLE 5° - 15°
- for medium-sized objects
- medium resolution
- smoother results
- increased file size



ANGLE 1° - 5°
- for small objects, jewelry
- high resolution
- best results, high detail
- large filesize