**Youth Explore Trades Skills Design and Drafting – 3D Drawing**

**3D Model to 3D Printer/CNC Software**

# Description

This activity will go through the steps to get from 3D software (Autodesk Inventor) to 3D printer software or CNC software. The challenge sometimes is to ensure the part is designed so that it can actually be printed using a 3D printer or cut on a CNC machine. Once a 3D part has been fully designed in modelling software, it can be exported out.

# Lesson Objectives

The student will be able to:

* Understand file formats that different programs/machines use
* Understand how to export the correct format for 3D printers (STL format)

# Assumptions

The student will:

* Know how to login to a computer and open up the software
* Have learned how to create parts and assemblies prior to this activity
* Be comfortable using the software

# Terminology

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**Application button**: the icon in the top left corner of the screen that contains New, Open, Save, etc.

**Assembly constraints**\*: rules that determine how parts in an assembly are placed relative to other parts in the assembly. Constraints remove degrees of freedom. Assembly constraints

include angle, flush, mate, and tangent. Constraints may be placed between faces of features,

part edges, points, inferred axes, and part work features such as planes, axes, and points.

**Assembly modelling\***: two or more components (parts or subassemblies) considered as a single model. An assembly typically includes multiple components positioned absolutely and relatively (as required) with constraints that define both size and position. Assembly components may include features defined in place in the assembly. Mass and material properties may be inherited from individual part files.



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**Browser\***: sometimes called the *model tree*, is the graphical hierarchy showing relationships between geometric elements in parts, assemblies, and drawings. Icons represent sketches, features, constraints, or attributes for each model. Objects are shown in the browser in the order in which they were created. Objects may also be edited, renamed, added, deleted, copied, and moved to a different location in the browser.

**Drawing**: a 2D representation of a part or assembly. The drawing file type has an .idw extension.

**Geometry**: lines, circles, etc.

**Graphics window\*:** the active modelling area in which sketches, constraints, features, parts, and assemblies are created and edited. In the Graphics window, models can be rotated, zoomed in and out, and view characteristics such as colour, material, and light defined.

**Home view**: an isometric view of your model. When the Home button on the ViewCube is

pressed, it zooms in and re-orients the model in the isometric view in the Graphics window.

**Navigation bar**: a toolbar containing various tools to move or view your 2D sketch or 3D part in the Graphics window.

**Origin**: the point where the x, y, and z planes or axes intersect.

**Part**: a group of features and faces that have been combined to create a closed volume that is represented as a 3D object.

**Part modelling environment\***: the environment where you create sketches and by using different commands eventually create a 3D part. In part modelling, you create sketches, use feature commands to create three-dimensional features, and then combine the features to create parts.

**Ribbon**: the palette that extends across the top of the Inventor interface and contains multiple tabs for convenient tool access.

**Sketch\***: consists of the sketch plane, a coordinate system, 2D curves, and the dimensions and constraints applied to the curves. A sketch may also incorporate construction geometry or reference geometry. Sketches are used to define feature profiles and paths.

**Sketch environment\***: consists of a sketch and sketch commands. The commands control the sketch grid and draw lines, splines, circles, ellipses, arcs, rectangles, polygons, or points.

**Sketch plane**: a planar face or work plane on which the current sketch is created.

# Estimated Time

15–30 minutes

# Recommended Number of Students

20, based on *BC Technology Educators’ Best Practice Guide*

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# Facilities

Computer lab installed with 3D modelling software (Autodesk Inventor, PTC Creo Parametric, SolidWorks, etc.)

# Tools

Projector with computer and speakers, Internet access

# Materials

Handout for students with instructions

# Resources

Instructional video for teacher and students to follow (Inventor 2013):

* Exporting Your Final Part or Assembly to 3D Printer Software

# Teacher-led Activity

Use a computer with a projector to demo/cover the following:

* How to export a file from Inventor to 3D printer software
* How to create a drawing file and modify it (size, layer)
* How to bring parts into a drawing file

# Student Activity

No activity. Students can simply watch the video on how to export to a 3D printer.

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