

# The Corkscrew: An Intermediate Polygon Modeling Tutorial using Autodesk Maya

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Figure 1:



**Abstract:** We present a tutorial for intermediate 3D Modeling students. This tutorial gives attention beyond “how to model” covering the topic of 3D modeling from a holistic perspective: Taking the student through a research section investigating how objects are made in real life, discussing an efficient 3D modeling workflow and finally putting that knowledge together in a video demonstration modeling a corkscrew. The content and 3D model have been previously used successfully in university 3D Modeling classes.

Keywords: Computer Graphics, Educational material, 3D Modeling, Maya, Polygon workflow, Maya

## 1 Introduction

This project was created as part of an “Introduction to 3D Modeling with Maya” class in 2008/9. The version used for this tutorial is *Maya 2011*.

Note: This tutorial is mostly non-platform specific. However, language has been added regarding keystrokes for the PC / MAC. Please refer to the Maya Hotkey guide for further questions regarding hotkey choices or custom.

By understanding how objects are made in real life students can compare and contrasting this knowledge to polygon modeling workflows and techniques, reinforcing and building their knowledge base needed for the beginner and intermediate 3D student.

This project based learning module requires the student to combine and apply: critical thinking, research, 3D modeling tools, modeling workflows, and aesthetic knowledge. *Part 1* covers research, *Part 2* modeling guidelines, *Part 3* workflow and finally *Part 4* is a written and video tutorial covering polygon modeling processes that combine and apply the previous parts by building a moderately complex 3D object in Maya: a corkscrew.

## 2 Educational Goals

The goal was to develop a unit that takes the students through a process of research, critical thinking and knowledge reinforcement. It is helpful for students learning to model to have some understanding of ways objects are created in real life. This knowledge can then be compared and contrasted with possible modeling approaches. This tutorial also works to develop important construction heuristics the student can use when developing their modeling workflow. These rules of thumb are used within the tutorial but applicable for the decision process in when facing modeling problems in the future. Finally this unit also emphasizes the need to work efficiently. By teaching and reinforcing the use of hotkeys, Maya marking menus and the interactive shelf, this modules helps steer the student away from the less efficient process of using the mouse for all tool choices and thereby helps speed-up the modeling process.

The underlying instructional methodology asks the student to consider the parallels between how objects are created in real life. It also contrasts the similarities by pointing out the differences within the 3D modeling toolsets provided in Autodesk: Maya 2010.

## 3 Methodology

To get the most from the materials, please review the written modeling tutorial first. Next, review the modeling video. Simply watch without taking notes. Try to absorb as much as you can. Set your project in Maya to the corkscrew. Open the 3D modeling file with the finished model. Hide the model, while leaving the reference images on the screen. Build your own corkscrew using the modeling methods you remember from the video. If you get stuck, refresh your memory by rechecking parts of the video or un-hiding the completed 3D model for comparison.

This tutorial is distributed as a ZIP file. It contains the following files:

- Written modeling tutorial module in Adobe Acrobat PDF and Editable .rtf file formats
- Four JPEG reference images of a corkscrew:
  - Corkscrew\_TOP
  - Corkscrew\_SIDE
  - Corkscrew\_SIDEv02
  - Corkscrew\_FRONT
- A Quicktime video showing the modeling process
  - CGEM\_Tutorial\_01.mov // *Modeling the head*

- CGEM\_Tutorial\_02.mov //Modeling the body
- CGEM\_Tutorial\_03.mov //Modeling the arms
- CGEM\_Tutorial\_04.mov //Connecting the body to the shell
- CGEM\_Tutorial\_05.mov //Modeling the screw
- Maya Binary files examples of the completed corkscrew

## 4 Assessment

This teaching gem was created as part of an Introduction to 3D Modeling course at the Rochester Institute of Technology.

This module evolved after having taught 3D modeling multiple times at RIT. In addition over the time period of teaching, this module also applies research in teaching technology from Ken Bain, author of “What the Best College Teachers Do”.

Previous to this module for the 3D modeling tools were demonstrated in lecture, then a project based assignment was given. In another class a model was built while the students followed along modeling while in the lab.

The least effective outcome was having the students try to follow along. This lead to some students being frustrated while other students were board.

Demonstrating the tools in class, then giving the assignment was more effective. However, having the students research real construction methods and have them contrast them with the modeling tools in Maya had the greatest success in several areas: The students started the building process in a more effective way. Previously many students would learn by spending a few hours making mistakes, then finding the more effective method. The pre-visualization also helped the students realize that not all of the models needed to be one single piece.

The final module was developed by the teaching method where:

A simple modeling demonstration of the Maya tools was given. Then a modeling pieces the corkscrew was demonstrated. Next, various images of various manmade objects were presented as part of lecture. Also a question and answer session where students analyzed various objects construction. In lab students were given a project based assignment. This was not necessarily the corkscrew, but an intermediate 3D model with multiple / complex geometry was required..

The video component for this tutorial was created to replace the in-person demonstration of the modeling process. Demonstration of modeling the corkscrew and description of the workflows and construction methods have been presented to two 3D modeling classes with about 15 students in each. The next assignment after the corkscrew was giving the students an even more complex object (a vehicle) which then they need to build as part of a group project. They were allowed to use tutorials for the vehicle but were required to customize the vehicle to make it unique.

Almost every single student came into the class with no 3D experience. Though the learning curve of Maya is steep, the amount of progress the students have made in learning all of the components of 3D Modeling – the tools, aesthetics and workflow was significant. Having taught this course five times over the last three years, the presentation and technique described in this module has by far shown the most success. This success is due to a combination of the delivery of the course content in a multi-modal fashion as well as the students high motivation level.

## 5 Conclusions

Teaching 3D Modeling requires the students learn about workflow, learn about real world modeling, practice by using tutorials then also get practice building objects without tutorials. This cycle of

reinforcing knowledge mixed with increasing difficulty of modeling projects has been proven to be a successful method for most students in the 3D Modeling class.

One final point which is emphasized to the students is that the field of 3D Modeling constantly changes adding new tools and new workflows. They are told that they should constantly apply critical thinking to their work. This and all tutorials are simply a snap shot of one method for building a 3D model.

## **References**

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