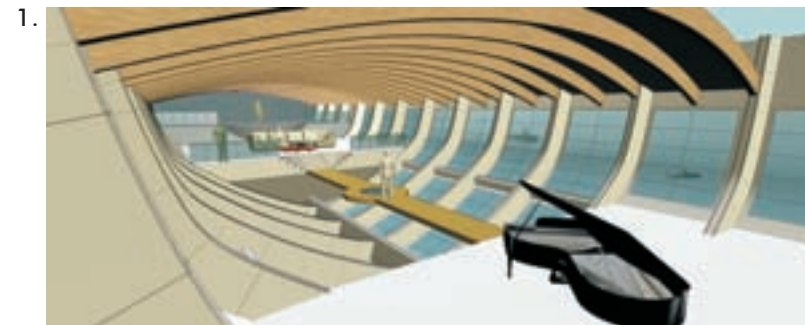


DIGITAL SET DESIGN



SET DESIGN FOR FILM: PAST, PRESENT, FUTURE.

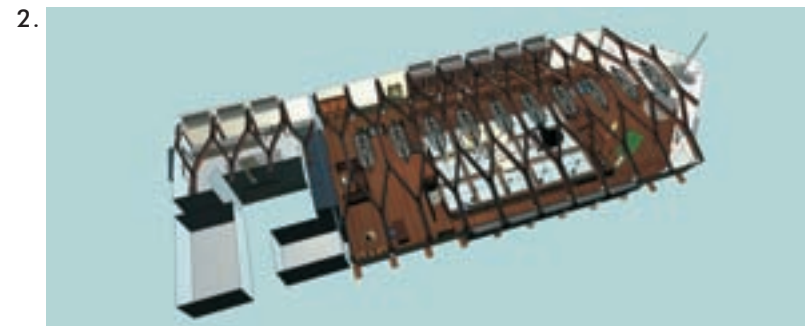
by J. Andre Chaintreuil,
Digital Set Designer

How 3D Modeling Software Is Changing (And Not Changing) How Sets Are Made

Straight out of college a decade ago, I quickly found that it was to my disadvantage that I used a computer in the field of architecture. Hand drafting was still predominant. Later, there was resistance to changing from 2D CAD to 3D modeling, which is now the standard in architectural practice. Today I sit in motion picture Art Departments, as a 3D modeler, watching the same digital revolution again. I find it interesting that the entertainment industry, which is usually so quick to adapt to new technologies, is still almost 10 years behind architecture in software and construction practices.

Most of my work in the last six years – designing sets for films such as *Minority Report* (2002, Alex McDowell, Production Designer), *Superman Returns* (2006, Guy Hendrix Dyas), *Mission Impossible III* (2006, Scott Chambliss), among many others – was performed in a software package called Rhinoceros®. Rhinoceros is a PC-based surface modeling program created by Robert McNeel & Associates. As a Digital Set Designer, my primary concern is designing and defining the surfaces of the sets we wish to build. Rhino, as it is nicknamed, is a highly accurate NURBS surfacing program, which makes it an ideal tool to accomplish

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SUPERMAN RETURNS (2006)

3D modeling can offer an easy way to spot problems in developing the initial concepts for a set.

1. A preliminary design for Lex Luther's Yacht interior. The model quickly revealed that when the glass-bottom floor followed the

shape of the boat's hull, the floor space was reduced and large amounts of blue screen would be needed.

2., 3. The next design provided a large dance floor of glass with ample space for the dramatic action and shooting crew.

4. Photo of set by Damien Drew.

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this task. Rhino easily creates accurate sculpted surfaces, organic shapes, automotive surfaces, as well as traditional architectural forms.

Other 3D tools commonly used in filmmaking today include Maya®, 3D Studio Max®, SketchUp®, Lightwave®, Softimage®, and Form-Z®. For 3D Digital Set Design, Form-Z and Rhinoceros are what I consider to be the most applicable to what a Set Designer is trying to achieve. This isn't to say other programs can't design sets well, and I would never turn away someone based on their software package of choice. In my experience, the talent of a person brings more out of the software than what the software brings out of the person.

2D Software

I recommend learning a 2D program before diving into 3D software. AutoCAD® and VectorWorks® seem

to be the two drafting programs accepted by our industry at this time. In the past, I taught 2D and 3D classes for AutoCAD and found that it was a great drafting tool that had been in development for many years. Lately, however, I've been venturing away from AutoCAD as Rhino itself has begun adding drafting features.

Form-Z also has an internal drafting component.

Many people approach me and ask, "What software should I learn?" I usually recommend that a designer use the same software that their coworkers and friends use. They are the people that you will probably first ask, "What am I doing wrong?" If they use the same software, they will probably be able to quickly answer your questions. That does two things: one, it keeps you moving forward in learning the software; and two, it helps you feel like you're picking up the software quickly. Plus, it's more fun that way.

I would not say that you need to spend a lot for this software. I know there is software out there for \$3,000 or more, but I don't believe most of us need those tools. These days there is a lot of talk about BIM software (Building Information Modeling, or database driven modeling). It's my feeling that it's great for an architect building a skyscraper, or if you are designing *Office Space 2* and need lots of generic desks and doors. In my experience in the film industry, we almost always seek unique looking doors, walls, and windows for our sets. You won't get these by paying more for your software.

Why Traditional Set Design Will Never Stop

I do believe that the pencil will always remain in the Art Department. Lead just works. It can be a fast and clear communication tool. As computers begin eating away at the drafting component of the Art Department, the pencil needs to evolve into its position as president of the tool box. It's not dead, but the pencil's role in the Art Department is definitely changing.

Hand-drafting Set Designers can take a leadership role. The knowledge many of these people have is priceless to our industry. Maybe they will red-line or review digital drawings. Maybe they will focus on complex details in a construction document set. Or maybe they will become Production Designers and Art Directors. Their future is in their own hands, but they must recreate themselves.

The Advantages Of 3D In Set Design

Digital Set Design produces what I call assets. An asset on a show can be a 3D model of a set, a vehicle, or a prop. These assets can be shared among different departments – visual effects, pre-vis, construction, CNC & rapid prototyping firms – and can often be shared even later with marketing or toy merchandising companies. Sharing this data can ensure accuracy between departments, and eliminate redundant work.

3D modeling software can create shapes that are difficult to communicate in two dimensions. Once a shape has been created, it can be used to draw elevations, perspectives and renderings, and even cut sections in any requested direction to help construction craftsmen understand the desired form.

A 3D asset is an efficient means to evaluate fully a design before construction. Using the 3D model, a Digital Set Designer can walk the Production Designer and Director through the model in apparent 3D space and in real time. The Designer or Director can select views of the model from different camera positions, try different virtual lenses within a set, and confirm that the set matches their vision of the script. This asset can also be shared with pre-vis artists for further study with animated characters and camera moves. Viewing sets in 3D can expose issues that might not be obvious in a 2D plan until a section, elevation, or ceiling plan is completed. I can take a digital file of, say, Lex Luther's yacht for *Superman Returns* (2006,

The Impossible Mission Forces Headquarters set
MISSION IMPOSSIBLE: III (2006)

- 1., 3. 3D model allows the Production Designer and Art Directors to walk through the virtual set, choose colors and textures, and experiment with camera coverage.
- 2., 4. The finished set was built on stage at Paramount Studios.

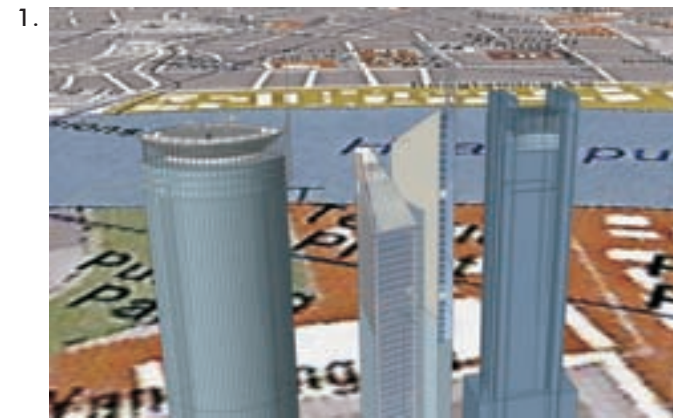


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Guy Hendrix Dyas, Production Designer), and place it within the virtual dimensions of a sound stage to see if the set fits properly into that space, or if a new stage may need to be found.

Over the past five years, 3D tools have opened up in terms of compatibility. Most 3D software programs are able to import and export data from other 3D or 2D systems. Designers using Rhino, Form-Z, AutoCAD, and most other software can easily work together and exchange models and floor plans. The software today also exports model parts into formats compatible with computerized milling machines, laser cutters, and rapid prototyping systems for specialized construction. Rhino, for example, imports and exports every file type that I need, and many more. Bob McNeel and his staff have even added file types to Rhino that I have requested, sometimes in just days.

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Images © Paramount Pictures

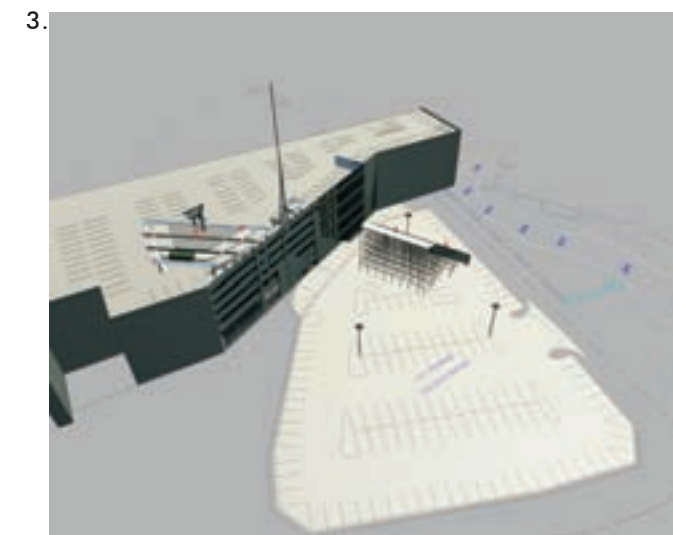
3D modeling can still supply construction departments with the traditional 2D plan documents they are used to dealing with. In that sense, tools like Rhino have not changed the process of set construction. After a 3D model has been built, Rhino can produce 2D drafted plans, and even communicate complex curved shapes as 2D plans and sections, with the accuracy workers need to make all the parts fit. Sometimes complex shapes are best given to the construction department developed or *unrolled*. That is a tool that 3D software has become quite good at, and has come in handy for both study models and full size sets.



A full size digital 3D model provides printing options, as well. I make use of my 42" wide format plotter to print many things for the Art Department – from printouts of oversized glossy illustrations, to full size details for vehicles and props. For *The Cat in the Hat* (2003, Alex McDowell), set designer Sam Page printed full-size wall sections almost thirty feet long for construction. It's great to have people stand next to your proposed design in full scale.

Once a construction coordinator and a foreman learn the additional tricks 3D modeling can bring to the table, they often find new uses for it. For instance, I can print out a perspective rendering of the set from any requested angle, or slice a design open from any section to reveal more of the internal structure and aid their discussions on the best way to build it.

I know a few people in set construction, although not many, that have begun to have 3D programs available at the building site, which they can use to view 3D modeled designs. These applications will run on a personal laptop, and crew members can refer to the 3D model and understand the particular part of the project that they are trying to construct. Viewing a complicated piece of geometry in 3D can give an intuitive understanding of how to construct it, and having access to a digital model enables the crew to take



their own sections, extracting exactly the right data.

In these ways, 3D designs save time and money in the production process.

The Future

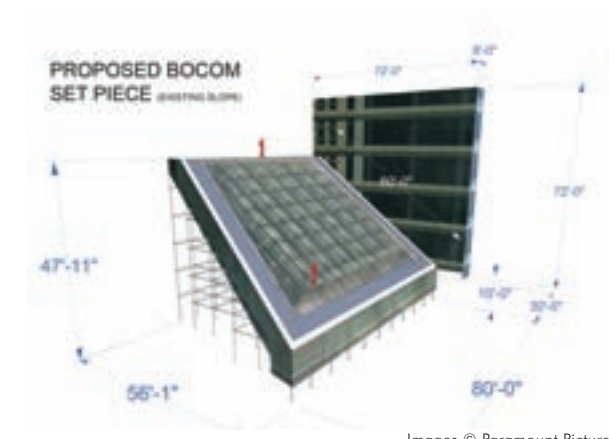
I am beginning to see cracks opening in this long tradition of 2D construction documentation. At first, many construction departments were skeptical of newfangled 3D digital tools. I have definitely run into construction coordinators that are not comfortable with new technology. (I wonder if they fought when power tools came into the industry as well.) It is gradually changing over time, as it has in architecture and manufacturing.

The Set Designer's digital box of tricks has powerful tools that can make great improvements to the filmmaking process. Rhino is an example of an application that is affordable, highly accurate, easy to use, plays well with other software, accepts new technologies that come along in construction, and yet still fits into the flow with the more traditional methods of construction. The film industry is learning to take full advantage of 3D modeling; naturally this is not an overnight phenomenon.

In *MISSION IMPOSSIBLE: III* (2006, Scott Chambliss, Production Designer) Tom Cruise swings from the rooftop of one Shanghai skyscraper to the next tower. Set design for this focused on duplicating a portion of the top of three Shanghai Skyscrapers in Los Angeles. The stunt was filmed on a parking structure at Universal Studios and then later composited with digital set extensions and plate photography giving the effect of the perilous heights. 3D modeling the sets helped determine how much of each set needed to be built.

MISSION IMPOSSIBLE: III (2006)

- 1., 2. 3D model and location photograph showing skyscrapers positioned by Hong Kong harbor.
- 3., 4. Modeled studies for constructed set at Universal Studios.
5. Set under construction.
6. And near completion.



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