The Design Explorer

The Ashlar-Vellum User Newsletter

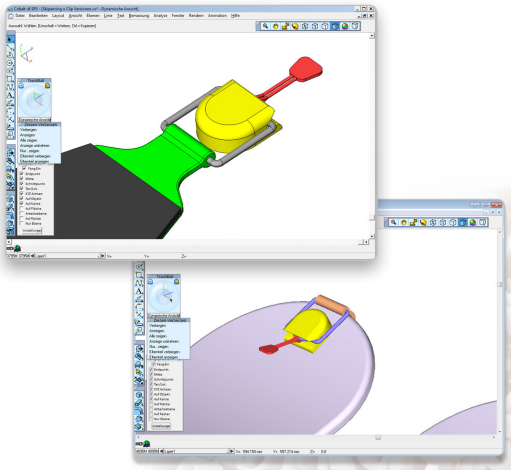
Second Quarter, 2014

The Best Modeling Software for 3D Printing

Ashlar-Vellum CAD and 3D modeling programs are the best choice for designing products for 3D printing. Why?

Because Cobalt™, Xenon™ and Argon™:

- Use a real solid-geometric engine that knows how to handle:
  - Common edges
  - Tolerant edges
  - Closed sets of analytic geometry
  - Closed sets of NURB surfaces



Walter Arnold designed this ski piercing fastener in Cobalt for Montana Sport to secure climbing skins on any shape ski or splitboard tip.

- Create true solids, not merely a collection of surfaces loosely knitted together.
- Let you start not only with a solid model, but also with wireframe or surfaces, and still create a water-tight solid.
- Allow control of meshing parameters individually for each solid in the file prior to STL export so that they can be set or adjusted more conveniently.
- Let you optionally export each part to a separate file for more control while printing.

Tips for Better 3D Printing

- Be sure that each part is a closed solid. If you have a collection of surfaces, stitch them into a water-tight solid using Ashlar-Vellum's advanced tools and options.
- Understand the resolution of the 3D printer and configure the 3D mesh file to be generally twice as fine as the smallest increments on the machine.
- Take advantage of Ashlar-Vellum software's unique ability to control the meshing parameters for each part within the file. Copy the model to a mesh within Cobalt, Xenon or Argon and adjust each part individually, rather than exporting the entire thing to an STL file.
- Learn how to model products that will print successfully by controlling the infill. Walls with much thickness often print as a skin over webbing. They look solid but in reality are not. Experiment with the printer's settings to make the best wall thickness of a part.
- Make the mesh file as "light" as possible vis-à-vis the complexity of your shape for more reliability on the 3D printer. Lighter files have:
  - Fewer facets
  - Courser meshes
  - Flat planes
  - Straight edges
  - Smaller file size
- Eliminate the need for supports whenever possible in your design. Anywhere there is an overhang, it requires something beneath while printing. Supports are discarded after printing, costing time and wasted plastic.
- Understand print direction. If you're printing something like a long rod, the direction of print gives it a grain. If the grain is in the direction of print it may break easily. If printed against the grain it will be stronger. Experiment to see what works best for a particular part and printer.

What Users are Saying

Ashlar-Vellum CAD and 3D Modeling software customers have a lot to say about using it with 3D Printers:

"Xenon and the 3D printer definitely complement each other. I pretty much just get right in the program and start my design within there because it's so easy to go back and make changes to things that you've done in the past. Ashlar's products work well from having more of an artistic background rather than an engineering background."

—Richard Shannon

"It's a good combination with Cobalt and the 3D printer. You can model, remodel and sometimes you print a part to have it in your hands, to check the dimensions, the feeling and how it looks. Then you think about it. You sleep a night, and then another day you remodel it and print it again until you have the perfect part that fits."

—Walter Arnold

"Cobalt software is kind of a no sweat deal into 3D printing. It looks like it's a piece of cake."

—Jim Colwell

"Xenon is basically the only tool I use for 3D printing. It's almost seamless. I like the way Xenon works. I think it's much more intuitive than many of your competitors. I realized that I was going to need some software to drive the MakerBot. I found it to be really well suited to that sort of effort. Precision is really important. I'm designing objects that are visual. I've run into really no issues at all."

—Stephen Chininis

"I've tried some other things over time, but I've gotten so used to [Xenon] that I'm getting old and new interfaces annoy me."

—Richard Sears

"Xenon does exactly what I need. I don't need to have it specify a bolt size. What I do need to be able to do is just build and then tweak and pull a more complicated shape."

—Steven Reiss

"Argon helped me lay it out in 3D because I know how to model in it as opposed to a Cinema 4D, Maya, those types of graphic 3D rendering programs."

—Randy Savage

Best Uses of 3D Printing for Ashlar-Vellum Users

Inventor **Stephen Chininis** also teaches Industrial Design at Georgia Tech.

"I'm an industrial designer and so I basically design products that are going to be in some sort of retail environment. What I'm using the MakerBot for mostly is to test out those designs right before I spend a lot of money to have them tooled. It's working really well for that."

"My partners and I invent products and then we pitch them to companies that we know. If they manufacture them they pay us a royalty, so it's a bit of a different business model than the normal design firm. So with a 3D printer and Xenon we're able to show them the actual concept in a working prototype. Before we were sort of cobbling up things out of whatever we could make them out of. If it had a moving part in it, it was a hard thing to model, but with something like a MakerBot you can do it pretty fast."

"A lot of times when doing student work they'll show me a concept and say, 'It'll work like this and it'll look really good.' And I say, 'No, no, no. How's it going to work and how's it going to look is what we do. You can't just say that. This is a situation where you've got to print the part and you've got to make the part good enough so that I can use it for what you say it's going to be used for.'"

The Satellite dog tread dispenser by Steven Reiss, modeled in Xenon.

A 3D heart by Richard Sears, modeled in Xenon and 3D printed.

Steven Reiss designed this 3D ScratchApple cat toy in Xenon to hold catnip filled corrugated cardboard.

Steven Reiss is a freelance industrial designer with over 35 years of experience mostly in the toy and pet industries.

"Right now we're mostly prototyping. I've done a couple of the products on what you'd call a 'limited run' where I can put eight of them on a platform and run them all at the same time. For the larger items they're prototypes. And they're good enough to bolt together, test them, and take a certain amount of abuse.

If it's a dog item it's something that can fall without shattering, but from there they'll take my 3D files that I've done on Xenon and probably send them overseas to China where they'll have tooling done."

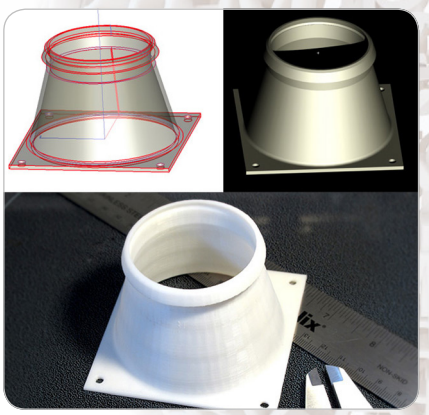
Continued...

Designer **Walter Arnold** is a native of Switzerland where he just finished a project for Montana International using Cobalt, Graphite™ and 3D printing.

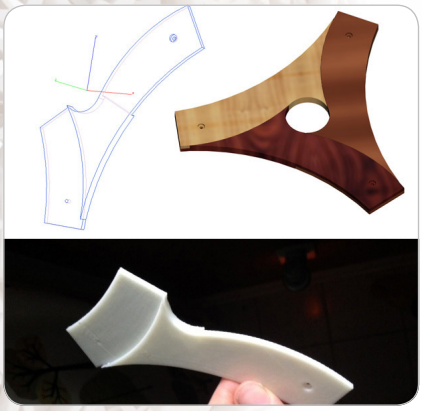
"It's working out very well because you can use Cobalt, you can design all the things that you want. And sometimes when you've made two or three different prototype parts you think, well, now it's perhaps time to print it out, to have it in your hands, to check dimensions, the feeling and how it looks. It's a good combination with Cobalt and a 3D printer. You can model, remodel and sometimes you print a part and then you think about it, you sleep a night, and then another day you copy-paste some part, then remodel it and print it again until you have the perfect part that fits.

For modeling purposes I use Cobalt, of course, especially if I'm doing 3D printing because I need to make the STL files and I only can do it in Cobalt. When it comes to detailing then I still prefer Graphite for 2D. I'm an old Vellum® user. So I copy the geometry from Cobalt to Graphite and them make my technical drawings there. I have for example 10 or 15 different parts modeled in Cobalt and I choose the best part and make the 2D drawings in Graphite. And if there is a little something to modify on the part I do it in 2D mostly and send it to production. The flexibility is the best part for me."

Montana Sport's ski piercing designed and modeled by Walter Arnold in Cobalt, with detail drawings in done in Graphite.



This hose adaptor was modeled and rendered by Richard Shannon in Xenon before 3D printing the result.



Richard Shannon modeled and 3D prototyped this design for a pastor wanting to symbolize the Trinity.

The Additive vs. Subtractive Manufacturing Processes

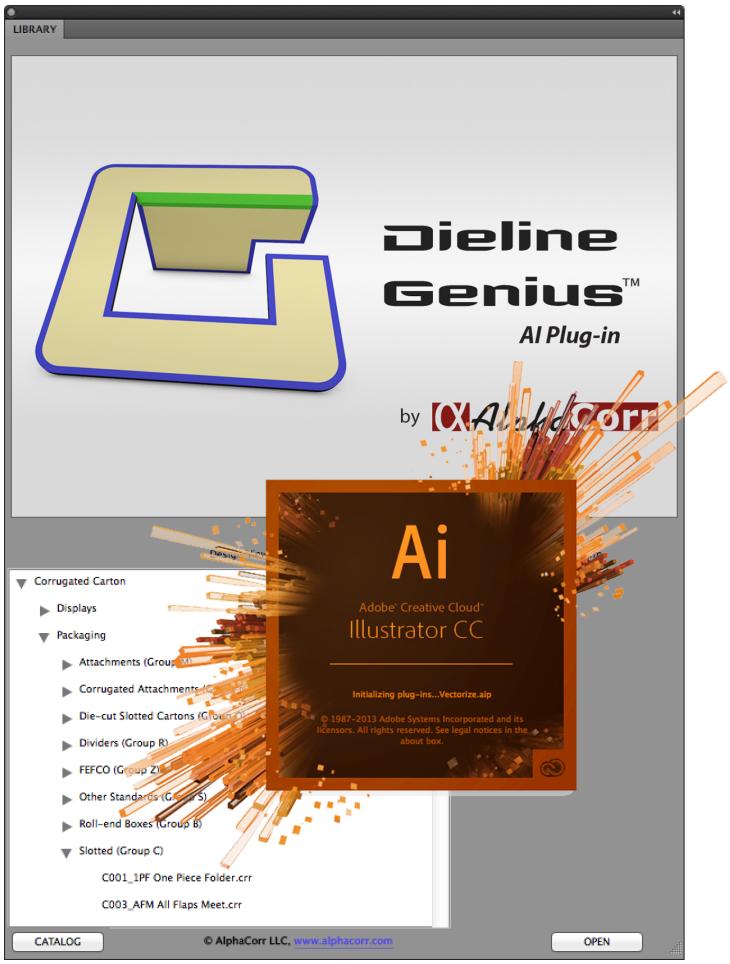
Xenon user, **Richard Shannon**, offers this insight about the additive rather than subtractive manufacturing process using 3D printing.

"I've got an illustration degree and have been using a lot of large printing equipment, 3 axis cutting and milling equipment for making signs. So it's an interesting transition going to something that is additive as far as manufacturing goes. I'm used to cutting and removing things using a mill which would be subtractive. It's kind of a different mindset on how to approach things and how you design things.

When you're adding things you have the ability to have complete hollows inside things and you can make "blind" things that you can't see or get to with some sort of cutting tool. When you're 3D printing you're building in layers. So layers can cover up what was layers underneath them and in the process of doing that you can have cavities and moving parts pre-assembled that aren't really possible with traditional subtractive kind of milling and water jet techniques."

Dieline Genius™ for AI CS6, CC and CC2014

AlphaCorr's™ Dieline Genius is in beta for Adobe Illustrator Creative Suite 6 (CS), Creative Cloud (CC) and Creative Cloud 2014 (CC2014). Dieline Genius lets graphic artists quickly create corrugated and folding carton material structures without worrying about the structural design component. Simply pick from the library of over 500 proven resizable designs, change the dimensions as necessary following the guidelines noted in each design, add graphics as desired, preview the folded design in three dimensions, and save or export it as a 3D PDF for production. DLG currently supports CS4 and CS5 as an Adobe Plug-in. Anticipated released for CS6, CC and CC2014 support is next month.



New Pay-per-Use for DLG Coming

Ashlar-Vellum and AlphaCorr are developing technology to deliver Dieline Genius online on a pay-per-use basis for those who do occasional packaging design. Logging into Dieline Genius, a designer will pick a design from the parametric library, change the dimensions, optionally add graphics, select their export options, then press go and enter their credit card number. That design in that size and file format will be theirs to use at will. Pricing will be based on individual resolve or may be rented on a monthly or yearly basis for greater economy.

Graphite v9 HP8

Hot Patch 8 for Graphite v9 is anticipated the middle of next month, providing bug fixes for several small issues. To download the latest release from within Graphite use **Help > Check Web for Updates**.

A Doggone Good Idea

Steven Reiss had over 30 years of experience in the toy industry when he started doing freelance work for companies in the pet products industry. Through his veterinarian in New Hampshire, Reiss met Mark Robinson owner of HandicappedPets.com.

Robinson had just come up with a great idea for Walkin' Wheels, adjustable wheelchairs for dogs. Walkin' Wheels offer new freedom to animals that have lost control of their rear legs, from hip dysplasia, injury or old age.

Robinson had built a functional design out of modified hardware available on the open market. When he met Reiss he was looking to modify his existing designs to allow for different wheels or more adjustments, and to expand his line with whole new wheelchairs that utilized more injection-molded plastic and less bolt-together metal parts.

So Reiss started sketching some of the interface parts, such as the knuckles where the struts of the wheelchair come together with the extenders.

"I told him that I used a 3D program of which I had become enamored and I could probably build the parts for him here in the USA because these were going to be prototyped in China. He agreed with my suggestion and I started designing and building the parts in Xenon™"

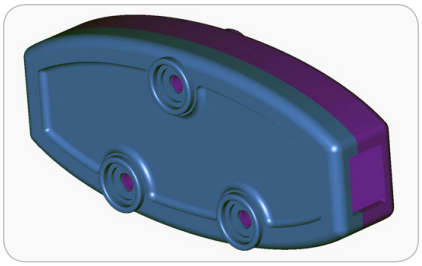
When sent overseas for prototyping, the Chinese company had difficulties interpreting the drawings. This didn't surprise Reiss. He'd had problems with this in previous jobs. That's when he came up with the idea of getting a 3D printer and manufacturing the parts at home…quite literally. This would completely eliminate the problems with the Chinese factory and at the same time reduce the cost and turn-around time for the parts.

The 3D printed parts make excellent prototypes for the larger parts of the wheelchair. "They're good enough for them to bolt together and test them, they take a certain amount of abuse," says Reiss. "If it's a dog item it's something that can fall without shattering." For smaller items they use the 3D printer to do limited production runs.

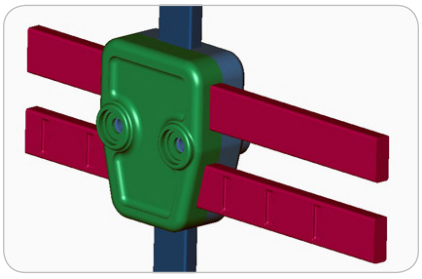
Having used it extensively, Reiss finds his 3D printer a very practical device, but tells us Xenon makes it even better:

"Xenon makes it so much more worthwhile because we didn't buy this as a novelty to print off of Thingiverse. We bought this to build things that are useable through prototyping and it's working"

Steven Reiss helped Mark Robinson refine and build the parts for this canine wheelchair, giving this dog a new lease on life.



The rear sleeve (above) and knuckle (below) were modeled in Xenon by Steven Reiss as part of the design modifications for the dog wheelchairs.



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