Using Clay with CAD Applications – Article

I'm new to this forum but have been an Ashlar user since the early 90's and have been using the software as a "front end" design tool for use with Alias, CDRS, STRIM, and other surfacing and CAD packages basically for the speed and ease of use.

I have talked with both Robert and Nathan at Ashlar, (http://www.ashlar.com/index.html) about Microscribe, (http://www.immersion.com/digitizer/) implementation the past couple of days and I'll pass on my two cents on the subject for all those who are interested...

My basic belief is that if you are designing in 3D...you need a 3D input tool to "speed up" the design process. A mouse is okay for 2D and "useable" in 3D as we have all experienced, but why spend hours or even days building complex curves when you can do it minutes with my "methods"?

I have a Microscribe and I use it on a daily basis as a "3D pencil". The way I use it is a bit unorthodox but I'll challenge anyone to find a better and faster method of developing curve "networks" for complex surfacing projects...(no ego here...I just have had too many projects and too little time...and I don't mind sharing…)

For those still interested here is an explanation of my "method" and the ROI justification for the person with the checkbook ...

I mounted the Microscribe G2 model on a piece of 18"x24"x.5" aluminum tooling plate(the Microscribe CMS platform will work just as well) The G2 and plate are mounted to a commercially available wire rack with swivel casters. I added the available foot switch and the power pack to complete the "digitizing system". The tooling plate was machined with an XY grid to assist in setting up a coordinate system. The digitizer unit sits next to my work area and is connected to my PC via USB.

My digitizing "supplies" consist of various pieces of Chavant clay and clay tools (www.chavant.com), a tube of 1/16" x 36" TIG welding wire, Chart Pak tapes in various widths, and couple of ACU-ARC flexible curves (www.suppliesnet.com/Curves/acuarc_adjustable_curve.htm) along with 6 "duckweights". (http://www.macnaughtongroup.com/spline_weights.htm). I also have a fairly large assortment of traditional French curves and Copenhagen curves sets…(from my "carbon based" designing days.)

Regarding software: I currently use Rhino with the direct Microscribe interface or import the XYZ text data into Vellum and build the curves from the point data…this process works with just about any system that will import XYZ point data in asci format.

The way I use all of this is as follows:

Building 2D Splines/Cross sections – I use the ACU-ARC flexible curves with the duckweights and bend the flex spline into the shape I want on the tooling plate (example @ http://ltswww.epfl.ch/pub_files/brigger/thesis_html/node17.html). I use the G2 with the standard tip and digitize in the shape. I basically just run the tip along the flex curve until I get what I want.

I continue this process until I have the cross sections I want or a single cross section that I will sweep in software. I also develop my 2D sweep rails in this manner. Basically the advantage of this method is I can very quickly "eyeball" in the curve I want with the flex spline and get it into the system ASAP without all of the fuss of developing the curves in software. (I can develop curves just as well in software, but with this method I save hours of time and get what I want on the first pass.) I import in the data and adjust the position of the curve data using the traditional CAD methods and build my surfaces.

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Building 3D Splines – When I need to work fast and don't have the time to "fiddle" with 3D spline "development" in software I use this method to speed up the process: I take a piece of TIG wire, bend or draw it between my fingers into the 3D "armature" I want (a small piece of leather or cloth between the fingers helps with the resultant friction issues); I use the G2 with the fine tip (it has a small step that will run along the wire) and digitize in the shape. I get what I want the first time and make any adjustments to the shape in "real time". I scale the shape in software and position the spline where I want it. I use a 2"X3"X 36" with holes drilled in it to hold the wire armature still while I digitize it. I just drill holes in the board as I need them.

I use this method in automobile, aircraft, boat or any other design project that requires complex 3D splines. I also use the wire to shape other complex curves like door openings on car projects, etc. I have benchmarked this process with a friend of mine who is an ex-Alias App Engineer and surfacing guru and blew him away by doing in 15 minutes what he did in Alias in an hour and 45 minutes (we both built a"look-alike" Corvette fender panel replica).

Complex 3D Problems – When I'm having "problems" or can't drive cross section data for what ever reason I will take a piece of clay and shape it into the form I want. I then will digitize in the clay using the roller ball or standard tip. Basically I can sculpt a close representation of what I want in minutes instead of hours on the tube…we have all had this problem one way or another in our careers, especially with clients or colleagues who can't draw in perspective or "explain" what they want.

I just pop out a piece of clay, whittle a bit until everyone is satisfied with the shape and proceed on getting the shape into the "tube". It's amazing to watch a CEO or non 3D person's expression when you show them this method…they all see the advantages and can calculate the time saving instantaneously! This method has gotten me out of a lot of design "jams"…and everyone knows how to work with clay!

Scanning vs Digitizing – Without going into a lot of details, I have benchmarked scanning in 2D data for use as a template against "tracing" in the data with the G2. Basically there is a 5X time savings tracing in the data with the G2. I have different methods for doing this, based on the drawings I get, but in the case of a car side view, I'll just taphttp://www.ashlar.com/index.htmle off the shape using Chart Pak tape as a guide. The standard G2 tip will follow the tape edge just fine…again another time saver…and I can use Chart Pak on the tooling plate just like I use the flex splines.

When you get really good using a Microscribe, you can develop very complex 3D splines using what I call the "Air Guitar" method…basically you get to the point where you can "draw" the spline in thin air…people who have seen me do this just crack up…but they immediately get the gist of what I'm doing…

So basically, what I have described as my method of using a Microscribe …these methods don't replace what can be done on the tube by a skilled person…they just are another tool I use to get the job done.

On the ROI for a Microscribe – using the methods I described allows me to explain to a client that I use the 80-20 rule. I spend 20% of my allotted time "blocking in" the shape I want and 80% of my time detailing and revising the design…no one has argued against it and the money guys will part with their dollars when they see the advantages and cost/time savings…plus these methods allow an average CAD modeler to really excel in 3D in a very short timeframe.

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