

Geomagic Spark Encompasses That Other Cloud

by Ralph Grabowski

Spark is the first MCAD program to handle the entire range from 3D point clouds through to assemblies and 2D documentation, along with optional rendering and analyses. It manages to do this by integrating functions from Geomagic's Wrap and Studio in SpaceClaim, through a custom version of SpaceClaim's API.

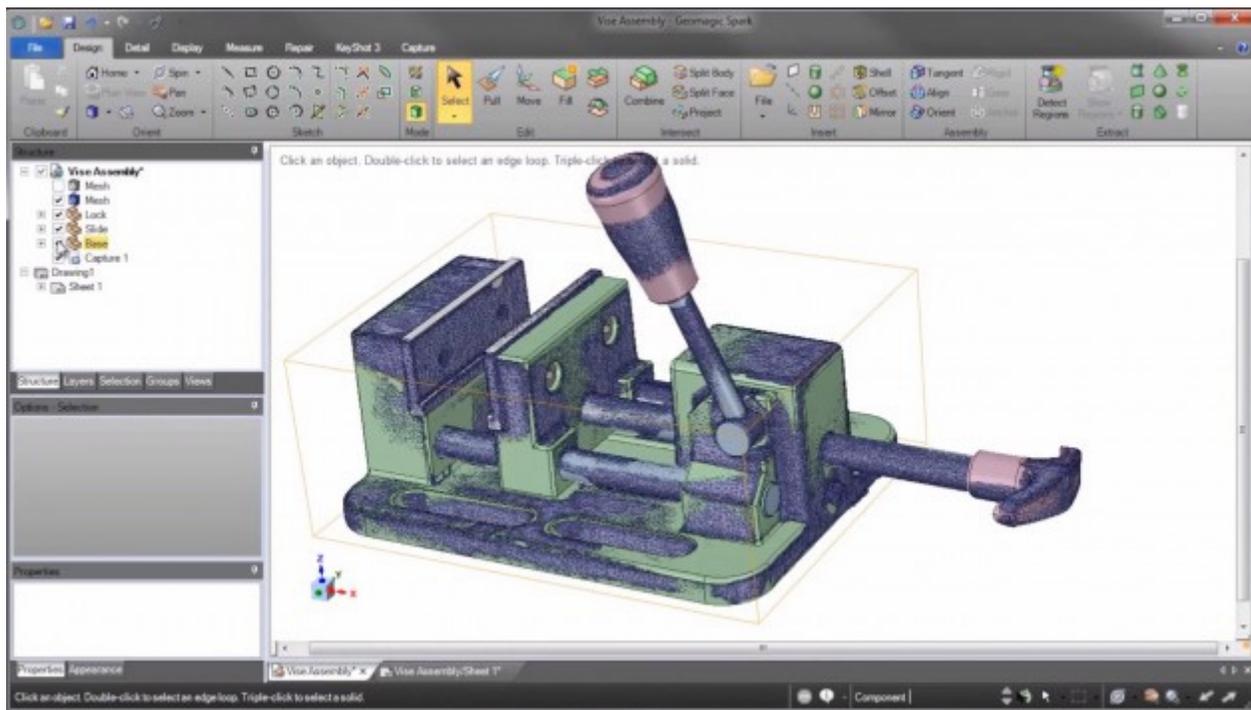
Geomagic product manager Kevin Scofield called last week from his Frankfurt hotel room so that upFront. eZine readers would be the first in the world to read the details on Spark, “the latest in reality-capture and modeling from Geomagic.” Readers of other publications won’t get these details until after a press-only Webinar being held later today.

Sparking Bro’ Love with SpaceClaim

For the past year the company has been working with SpaceClaim on this project. Before then, Geomagic thought of licensing Parasolid or ACIS, and then writing their own 3D modeler -- as competitor Rapidform did. To this, they could’ve added plugins from major scan vendors and added point cloud editing. But then they realized they’d be replicating existing functionality. Why write a CAD system when plenty already exist; with this realization, it was then just a matter of picking the right partner.

Geomagic liked SpaceClaim, its 30,000 customers, its East Coast location, and its well-documented API. “We added a set of new tools to their application,” Mr Scofield explains. “We were more than just an add-on, because we added our own graphics engine to drive point cloud rendering. SpaceClaim benefited, because we added to their API set. I made a lot of trips between here and there,” he laughs.

In addition, SpaceClaim has 100 third-party add-ons, like Keyshot for rendering, and lots of native CAD importers (at additional cost). And so that is how SpaceClaim helps Spark to be the whole package: going from scan data to 3D parts and assemblies to 2D drawings for \$9,900 or e8,500.



Vice model created in Geomagic Spark from scan data.

The slogan is “Design with Scan Data,” where 3D point data from laser scanners becomes the reference around which the model can be designed. “We have parametric fitting commands that work on the point clouds, and use SpaceClaims’s interactive CAD modeling toolset.”

Mr Scofield beat me to one of my standard questions, “Why the name Spark?” All Geomagic product names are verbs, and this one comes from the idea of igniting creativity, taking scans of existing objects to kickstart new designs.

Demo Time

Spark makes these changes to SpaceClaim: it adds a Capture tab to the ribbon, and a Capture window.

The Capture tab contains functions from Geomagic Wrap and Studio software, such as reducing the number of points, converting points to STL meshes, and then making surfaces, solids, and planes from the meshes. There are also functions for repairing and simplifying meshes. Naturally, there are connections to scanners, such as from Faro, Hexagon, and Creoform, plus a few more by the release date.

When working with point clouds, users switch between two windows. The Capture window is the “Geomagic playground” for doing scanning, point rendering, and conversion to polygons.

Then they switch to the regular SpaceClaim modeling window to work with surfaces and solids. The solid and surface extraction tools from Studio intelligently pick up faces. SmartSelection adds to the selection set just by moving the cursor over the areas users want to include; when they pause, the sketch curve is generated automatically; clicking SpaceClaim’s green checkmark button generates the solid from the sketch.

With the solids generated, users use SpaceClaim’s regular tools to manipulate them. There is an analysis tool that shows how much the solid model deviates from the mesh, showing areas that were missed or that are out of tolerance.

Mr Scofield was especially excited that SpaceClaim allows users to deal with incomplete data, because CAD can create data where there is no mesh through copying, arraying (patterning), and revolving. (Previously, they could only model in Studio what was there in captured points.) As well, Geomagic customers now benefit from SpaceClaim’s ability to populate new 2D drawings with views automatically, making it easy for new users; they just need to create detail views and add dimensions.

Q&A

I like talking with Mr Scofield, because he goes beyond the talking points to which most other product managers limit themselves when speaking with the media. In the following Q&A, you’ll see what I mean.

Q: I am wondering about accuracy. During the demo, you showed me how you recreated a plastic molded part in SpaceClaim from scan data. Say one of those plastic ribs is supposed to be 1mm wide. How do you know if it was correctly scanned, without using calipers?

A: Scanners have a stated accuracy, and so to check the accuracy you do have to use calipers every so often. So if something is about 0.996mm according to CAD, it must 1.0mm. The accuracy is not that important when you understand the design intent; engineers usually design to the nearest 0.125 inch

or 0.1mm or 15 degrees or something like that. A good designer will be able to tell, for instance, when a part is designed in metric or imperial. You make up for the scanner's inaccuracy by using common sense.

Q: You mentioned that Spark supports some scanners. Which models are they?

A: It supports all arm-mount scanners from Hexagon, the Handi laser scanner and Goscan white light scanners from Creaform, and any arm mounted laser scanner from Faro.

The Goscan is pretty interesting, because it doesn't use a traditional laser, but a white LED light that flashes. It's brand new from Creaform [which says their new technology provides "shortest 3D scanning experience available on the market, start to finish"].

Q: Last time we spoke, you talked about experimenting with Kinect. How is that coming along?

A: We found that Kinect creates reasonable scan data, such as of people's faces, but that it does not work for mechanical parts due to its lack of [sufficient] resolution. It simply doesn't generate enough points, and it rounds features so that faces are smoothed. This makes it no good for sharp edges on parts.

We did write a plug-in, but we have has not released it. Kinect just needs to get 2-3x better to be useable by engineers.

Q: Last time, you also described experimenting with digital cameras, such those as on iPhones, to get 3D data.

A: We found that programs that combine photographs, like 123D from Autodesk, are not good enough for high precision work. They are fine for getting 3D images of things like lion statues outside of museums, but I could never get a good result from it.

Q: What about scanning buildings?

A: We are not yet ready for BIM, but we are experimenting with scanning buildings.

Q: Now, earlier you said that Spark has a subset of tools from Studio and Wrap?

A: Yes, 80% of the tools in Spark come from Studio, and the other 20% from Wrap. We had to adapt some of the tools to be more interactive, to get away from dialog boxes and instead using gesture-based controls.

Q: When will Spark ship?

A: At the end of January. For more information on Spark, please see www.geomagic.com/en/products/spark/overview.