

solidThinking 8.5

» Few modelling programs cover the entire design and engineering process. solidThinking takes a unique approach to product development, allowing more exploration in design while forming a foundation for engineering and manufacturing. By **Josh Mings**

When you start a design, when it's happening in your head faster than you can force a line across 3-dimensional space, capturing the idea is nearly as important as exploring it. The engineering happens later on, after the design is defined. But what if the process for both happened at the beginning?

solidThinking is that beginning. For those familiar with the program as a concept modeller, bringing NURBS-based solid

modelling and polygon meshes into the same uniform interface, it would make sense to see it as the starting point. However, with the acquisition of solidThinking by Altair in 2008, parametric modelling along with structural optimisation, based on Altair's Optistruct finite-element technology, brings up-front engineering into the same starting point.

It's easy to see how designers can use a product like solidThinking. Along the same lines, engineers can use solidThinking, not only to explore their own ideas, but to prove

» **Product:**
solidThinking 8.5

» **Supplier:**
solidThinking

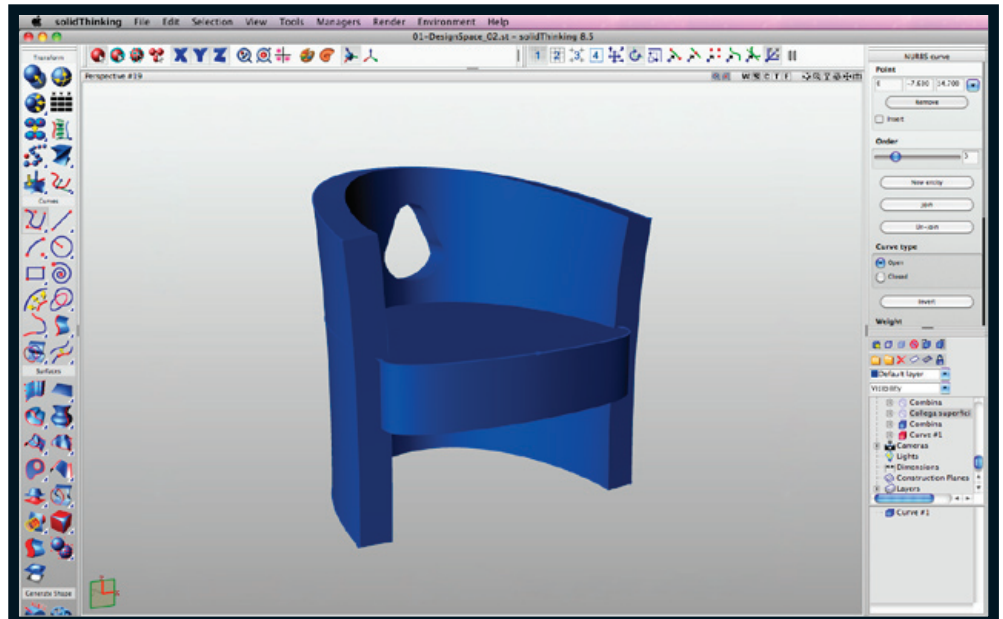
Price on application
www.solidthinking.com

out their ideas through the unique design analysis offered by solidThinking.

In late 2009 Altair introduced the idea of Morphogenesis into the design process with solidThinking 8.0 Inspired. This allows a designer to create a basic shape, apply loads and constraints and then, with the click of a button, visualise the natural forms. It happens across the two products, solidThinking and solidThinking Inspired, and although basic in many ways, the technology is also very powerful. Let's take a look at how it works.

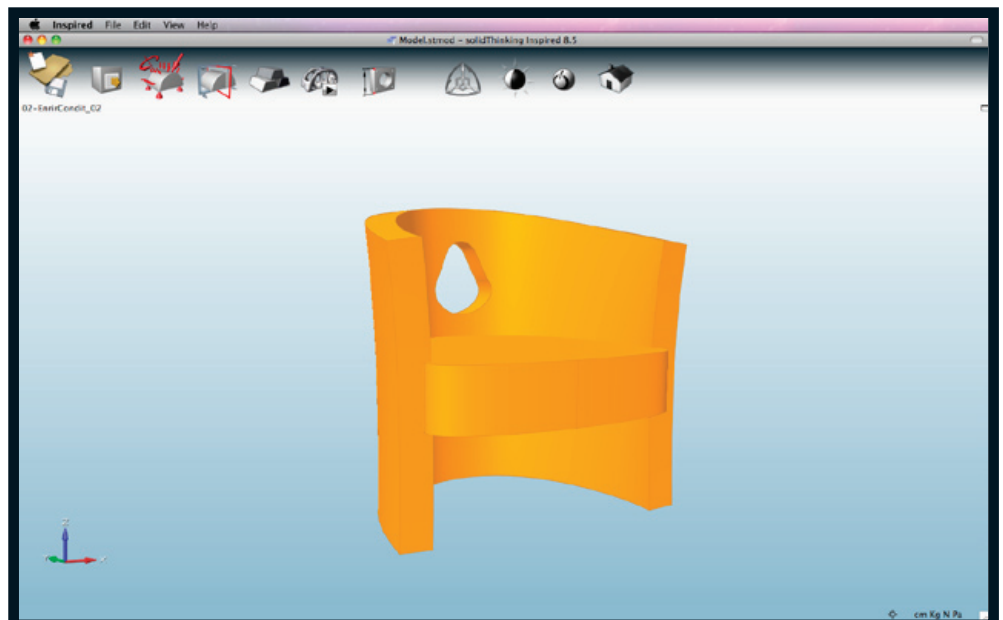
1 CREATE THE BASIC ENVELOPE

solidThinking allows a designer or engineer to quickly create the design space, the envelope. This can be thought as the chunk of material from which a sculptor begins a carving. Curves, parametric constraints and direct manipulation of geometry can all be used here to lay out the general shape of the chair design. At the same time a history-based ConstructionTree allows changes to curves, surfaces and points.



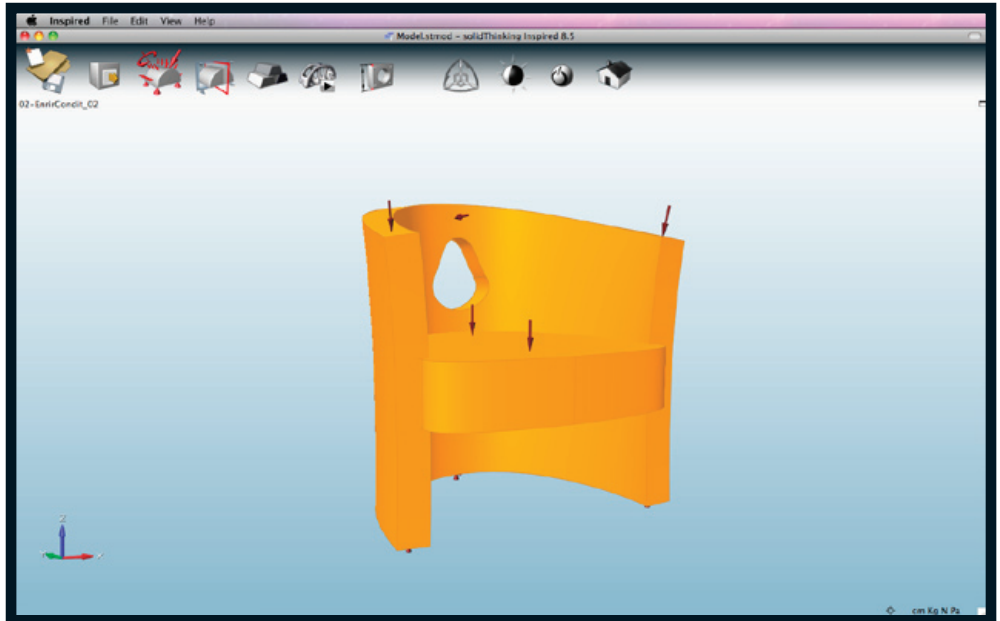
2 IMPORT INTO THE INSPIRED INTERFACE

The chair design space is transferred into the solidThinking Inspired environment. The Inspired interface is simple, with only a few tools needed to explore the substance of various designs. This is where different materials can be applied to the model in preparation for the next step.



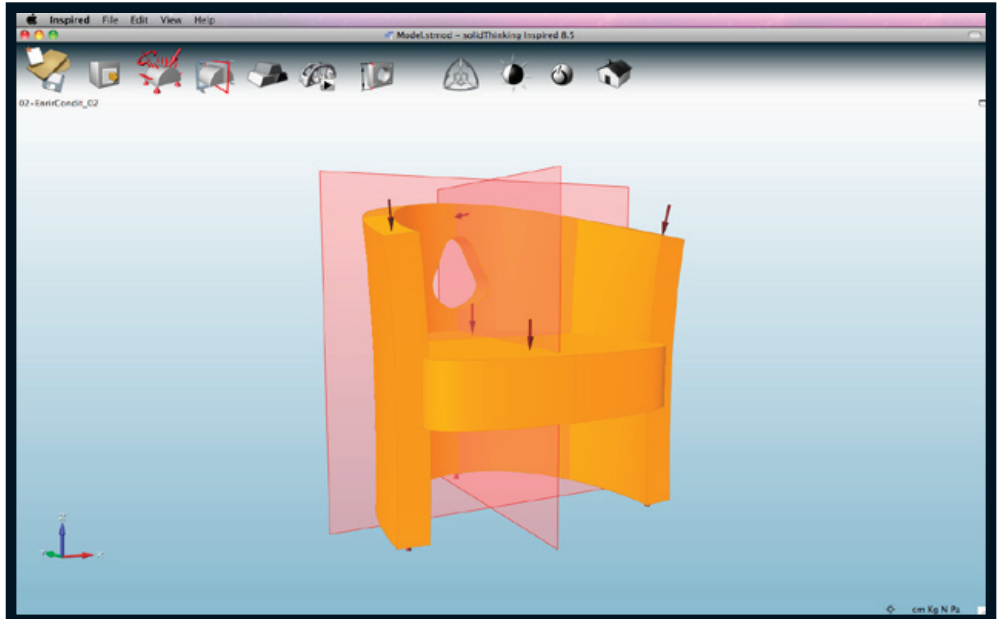
3 APPLY LOADS AND FORCES

Dominant loads and forces that the chair is expected to experience are specified in the Inspired environment. Here Supports are located where the object is held or locked in place. Loads are applied on the areas where the object would be pushed or pulled. Depending on the application, other constraint forces like torque, pressure and gravity can be applied to the model. This is only the starting point. Constraints can be changed later to explore more variation.



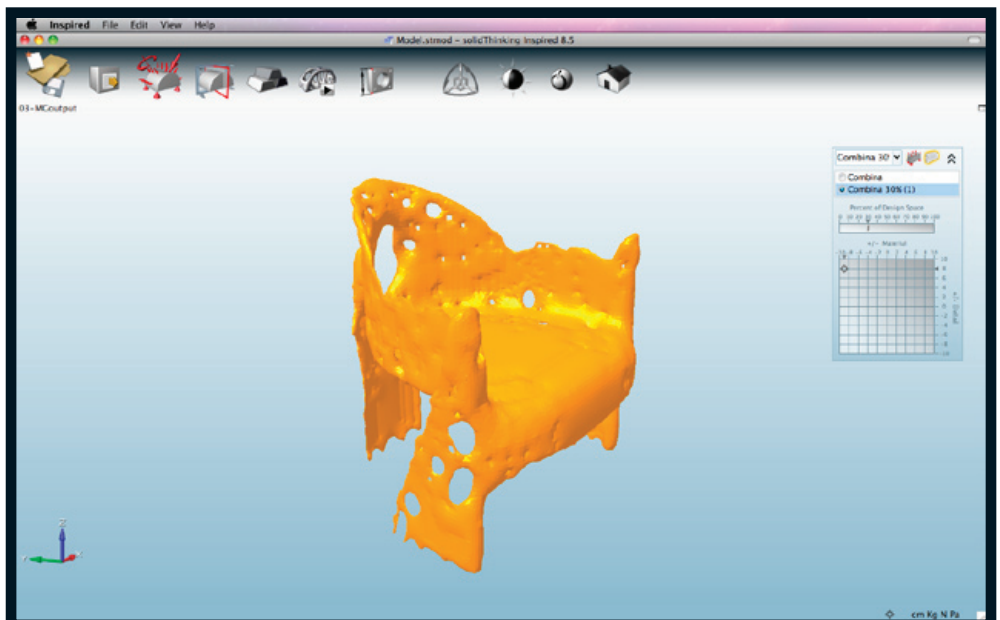
4 APPLY OTHER CONTROLS

The main characteristics of the form to be generated can be governed by various controls. In this picture symmetry planes are defined. Other controls include cyclic repetitions, parting direction, minimum thickness, and fraction of total design space to be used by the algorithm. These adjustable controls give an amazing amount of influence over the resultant geometry.



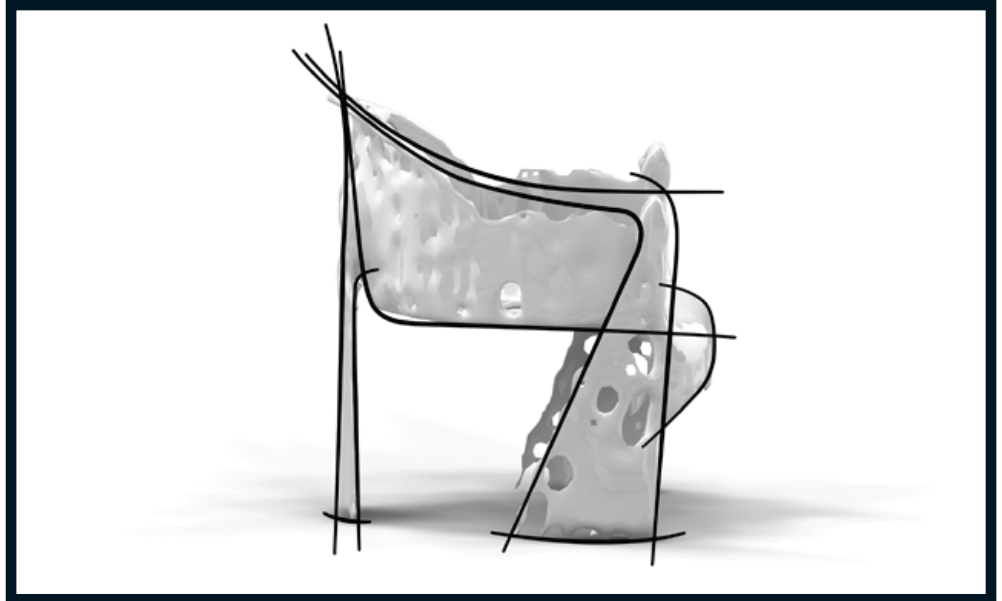
5 RUN THE MORPHOGENESIS

Here is where all the properties applied to the geometry's environment become a visual exploration. When Morphogenesis is applied, a bone-like structure that absorbs applied load forces is generated. The percentage of the design space shown can be cycled through, adjusted and saved for later. The amount of material can be graphed against the amount of detail shown to quickly see how each is affected.



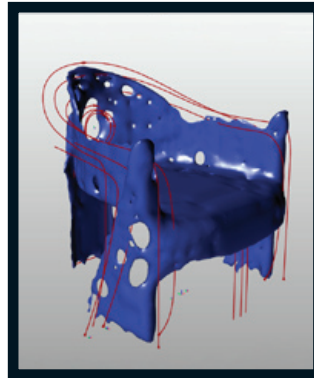
6 INTERPRETING THE DESIGN

The output of the Morphogenesis process can be brought back into solidThinking to begin modelling. Before that however, the interpretation process allows any designer or engineer to identify possible directions for a unique design. This can be done with the tools a designer is most comfortable with or within the solidThinking environment using curves that could eventually become the base sketches for the model.



7 CREATING THE MODEL

Once the designer or engineer has identified the direction for the design to go in, the NURBS model based on the Morphogenesis model can be developed. The modelling process is similar to other modelling programs that use curves and points to define surface geometry. The surface can be pushed, pulled and manipulated while retaining complete access to curves used to generate the surfaces. The model can be thickened and adjusted to meet the structural ideation brought over from Inspired.



8 REAL-TIME RENDERING

While exploring the surface model generation, progressive and real-time rendering can be used to view and create photorealistic images of the model using an assortment of preset materials and environments. Your own materials and environment can be created using JPG or HDR images and the model can be updated in real-time with the results shown in the live rendering window.



CONCLUSION

We like to explore. Whether we're designers or engineers, we like to spill the "ifs" across the table (or screen) in anticipation of that single moment when the design has been realised. solidThinking makes this possible in ways that compliment design and engineering. It makes the design process more dependable and the engineering process more fluid. In this way, it's shaking

up the paradigms that have been sinking in for so many years.

solidThinking is a product to watch and one that other 3D software companies should keep an eye on. It's slamming more than a few slick tools into conceptual design. In a very real sense it's allowing you to form and explore faces, features, joints and ribs as quickly as you think them. That just isn't common in the products that are out there

today. Even with the organic exploration of structures, solidThinking maintains a history of features while not locking you down to their dependencies. Surface and curve creation can be as simple or complex as you want it to be, because transforming them or working with polymesh triangles allows a completely fluid process of design exploration, and wherever we end up, that is where it all begins.