GrafiCalc: The Secret Path to Synthesis

A review by Dr. Joel Orr

Synthesis means, "putting things together." When we attempt to understand technical things through synthesis, we assemble something that looks and acts like the thing itself - then test the synthetic model. We don't worry about whether the form of the synthetic model is anything like the real thing, as long as the functions match in predictable ways.

Most engineering design is non-deterministic. That means we do not have a set of equations into which we plug our specifications, and out of which pops an optimal design. Rather, we must iterate through a process of trial and error - build a prototype, try it out until it breaks, make changes, and do it again. We continue in this process until we reach the desired specifications - or until we run out of time or money.

It would be nice if we had a tool that could show us something of the behavior of our proposed product at a very early point in the design process. That would help us avoid design dead-ends, and minimize the time-to-market of the product.

This brings us to GrafiCalc. It lets users do their "trial and error" quickly, in a place in which errors are inexpensive. And it enables them to pin down product performance very early in the design cycle.

Roughly, here are the steps for attacking a design challenge with GrafiCalc:

1. Sketch geometry within GrafiCalc or import it from CAD
2. Constrain the geometry with rules and calculations.
3. Graphically change the geometry and note the resultant numerical and geometric changes, or numerically specify design goals and see the exact geometry "backsolved", automatically.

The seamless bi-directional linking of geometry and calculations in GrafiCalc flexible models allow users to experience instantaneous decision-support feed back while receiving solutions. The main challenge in using this software is in understanding its full power. Many users have no patience for anything that cannot be taken in at a glance. GrafiCalc is rational in its layout and commands but affords powerful capabilities in a realm in which few engineers invest much time: careful consideration of the problem from a systems point of view.

GrafiCalc is a powerful design tool. Its price is low enough so as to be almost irrelevant. The challenge for users is to learn to think differently about their design problems, which may take some time and training. However, the results, in terms of increased productivity and profitability and shorter time-to-market will justify this investment very quickly.

Dr. Orr is the most influential CAD industry visionary in the USA. He has served as senior advisor to Autodesk and Bentley Systems, while providing strategic technology consulting services to the Fortune 100 companies. Dr. Orr is currently serving as the Chief Visionary for Cyon Research Group in the USA.

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