CAE in the Supply Chain

It’s Time!

Expect an explosion in the flow of mission critical behavioral models through the supply chain as one of the new realities in engineering.

It has well been written over the past 20 years that product development continues to be global. There is just no large company in the world that can rely on the entirety of its product being designed with one team sitting in one location for an entire design cycle. Skill shortages, outsourcing, and suppliers scattered around the world are a few reasons. If you read the myriad of articles written on how to smooth the process, the main topic is about geometry and how to make it flow through the process.

But simulation is beginning to take center stage. Parts and assemblies not only need to fit, they need to perform over the long term. Every CFO who has to account for expensive warranty returns and recalls may not know what the solution is, but knows how important product quality and performance is to the business.

I hear many auto and aero OEMs expressing concern because they cannot receive reliable simulation models from their suppliers or no models at all.

If a supplier provides CAE data today, it is generally static pictures or documents. This was the same as the 70’s and 80’s when drawings of geometric shapes were sent from supplier to the OEM. In the simulation world, static performance data such as frequency response functions, strength allowable, transfer functions, and a myriad of other plots, do not enable the OEM to utilize the data effectively in the simulation of the suppliers’ components effects on the overall system.

As simulation becomes prevalent in design from the system to detail, from conceptual to final, a new way of working is a must and the technologies to enable this new work method are within sight. The new way will enable the supplier to instrument their design and deliver the behavioral representation along with the static data.

The computational/behavioral representation enables an OEM to create a systems simulation model that can be used to select vendors or to refine the performance criteria for the component. Virtual component deliverables enable a bi-directional exchange that lets the systems integrator make the best component decision and lets the supplier tune a component optimized for the system’s requirements.

Many suppliers and OEM’s worry that their technology or “know-how” or unpatented IP information will leak to their competitors through this CAE model sharing. To enable this kind of exchange, CAE systems need to allow exchange of behavioral representations at various levels of fidelity and with an ability to restrict access to detailed IP in the component model.

What is required is a virtual part data model that contains the behavioral representation in detail, but hides that detail with a more “block diagram” view of the component. This data model only exposes the “instrumented” simulation model that contains the required inputs/outputs to allow the virtual component to be part of the OEM assembly and to respond to the “true” boundary conditions that are derived from the systems simulations. This exchange could also allow “sensors” to monitor the behavior of key results anywhere in the component.

In the initial stages of a virtual design, there will remain (even in this new method) the same kinds of approximations and ranges of error as do today with the physical prototypes. Eventually, as the decisions become more refined, the data will become more accurate and the behavior more precisely simulated. Ultimately, test validation will still occur… but design will be largely (and ultimately completely) determined by simulation.

Going forward, expect a new and better way of working and expect MSC Software to deliver the tools to make it happen.