# Update: Autodesk's Cloud-Enabled Strategy for Simulation & Analysis

## *The Role of NEi Nastran in the Autodesk Simulation Portfolio*

***CIMdata Commentary***

*Key takeaways:*

- *Autodesk continues to aggressively invest in Simulation & Analysis technologies that can be used both stand-alone and integrated with 3D CAD*
- *These simulation technologies will now be available to customers on the engineering desktop as well as via Autodesk's 360 Cloud deployment model (see previous CIMdata Commentary on Simulation 360 in September, 2012)*
- *Autodesk's recent acquisition of NEi Software and NEi Nastran is the next step in enabling more advanced structural simulation capabilities based on the widely used Nastran FEA solver format for structural analysis*
- *The ultimate goal and the challenge for Autodesk will be delivering robust simulation technology not only to the traditional analysis specialists, but making simulation best practices available to and readily consumable by a much broader base of engineers and designers in the overall design market*

Autodesk's Design, Lifecycle, and Simulation (DLS) team, led by industry veteran Buzz Kross, recently hosted a one-day industry analyst event at their facilities in Lake Oswego, Oregon to update the community on their evolving strategy for the Simulation and Analysis market and on their specific plans for the NEi Nastran technology in the context of that product strategy.

The Autodesk DLS products team has grown substantially over the past decade with numerous S&A acquisitions including ALGOR, CFDesign, Moldflow, Firehole Composites, and most recently, NEi Software. Autodesk also continues to aggressively invest in global sales and marketing resources focused on mechanical simulation and analysis for the discrete product manufacturing sector as well as the architecture, engineering, and construction (AEC) market segment.

Autodesk's DLS business as a whole is focused on several major paradigm-shifting industry trends and the role that simulation and analysis can play in addressing those emerging market needs and opportunities in the coming years.

The market trends highlighted as business drivers for Autodesk's DLS group are:

- Smart machines requiring the need for systems engineering to integrate across the physical hardware, software, controls, and sensors domains
- Increased use of advanced materials such as composites to minimize weight and cost across a much wider spectrum of industry segments and applications than is the case today
- Widespread use of additive manufacturing (e.g., 3D printing) technologies

The corresponding focus of Autodesk's near-term simulation product development efforts are in the areas of:

- Structural mechanics
- Flow and thermal

Copyright © 2014 by CIMdata, Inc.

- Molding processes
- Structural architecture
- Composite materials

The major emerging trends in simulation and analysis that Autodesk sees cutting across all of these areas are:

- Increasing simulation model size and complexity
- The need for and availability of ever-increasing computing capacity
- "Intuitive" multi-physics capabilities for a broad spectrum of engineers

NEi Nastran was acquired to be a foundation technology to enable the Autodesk strategy of "Design-Visualize-Simulate" and to specifically address emerging trends in the areas of structural mechanics and composite materials. NEi Nastran provides a wide range of structural and thermal analysis capabilities widely used across many industry applications including:

- Linear and nonlinear statics, buckling, pre-stress static, and normal modes
- Dynamics: Normal modes, linear & nonlinear transient response, frequency response, random response, impact analysis, and drop test
- Thermal: Thermal stress, linear & nonlinear steady-state heat transfer, and nonlinear transient heat transfer
- Materials: Advanced nonlinear and hyperelastic materials; composites
- Assembly modeling with contact

Of particular importance, Autodesk believes that NEi Nastran possesses unique capabilities in the areas of system-level analysis for large assemblies with parts in contact, and for robust nonlinear analysis, especially in predicting material strength and failure of composite materials when used in conjunction with the technology and expertise acquired with Firehole Composites.

In keeping with Autodesk's strategy of delivering open, multi-CAE solutions as well as multi-CAD integrated solutions, Autodesk Nastran (a re-branding of NEi Nastran) will continue to be available as a stand-alone FEA solver useable with other leading finite element pre- and post-processing tools (e.g., Hypermesh, FEMAP, and Patran). It may also be used from within the Autodesk Inventor and SolidWorks CAD environments, in the form of Autodesk Nastran-in-CAD. Access from within other leading 3D CAD environments is also likely in the future.

The legacy Autodesk Simulation Mechanical offering uses the previously acquired ALGOR structural finite element solver. Autodesk customers who have purchased that tool will be now be able to choose between using the ALGOR or Nastran solvers at no additional cost. This is a very attractive feature for Autodesk users that demonstrates Autodesk's commitment to providing a flexible and cost effective environment for their small to medium sized customers as well as for larger enterprises.

Autodesk's new Simulation Flex licensing is the next generation of Sim360 which allows users to solve Nastran models on an engineering desktop, workstation, or in the cloud, taking advantage of HPC resources using "Cloud credits." With an annual subscription license for Simulation Flex, engineers can run an unlimited number of analyses on the desktop yet still have direct access to the cloud for overflow capacity or for solving extremely large structural analyses that cannot be run on their desktop platforms.

Copyright © 2014 by CIMdata, Inc.

Overall, this analyst event was an excellent and timely strategic update by the Autodesk DLS products team given the recent acquisition of NEi Software. The logic behind the acquisition was not entirely obvious to many in the traditional CAE industry and Autodesk was relatively silent on announcing any details behind the acquisition, which actually finalized during May 2014. But based on the product strategy presentations and open discussions at this event, it is clear that the NEi Software team located in Orange County, California has already become an integral part of the Autodesk DLS team.

The Autodesk and NEi staff have done a significant level of product integration work in the four short months since the deal closed; the logic behind the acquisition of NEi Software now becomes much clearer given the overall Autodesk DLS strategy and where they intend to compete with their new mechanical and structural performance simulation offerings powered by Autodesk Nastran.

From a very small base a few years ago, Autodesk continues to make significant strides with their simulation product offerings, and their innovative cloud-based delivery options are particularly attractive for small- to medium-size businesses (SMBs) that comprise a large percentage of Autodesk's current customer base in the mechanical design and structural engineering markets.

CIMdata looks forward to monitoring the market's acceptance and adoption of Autodesk's S&A products as the Autodesk DLS team continues to build out their simulation portfolio via acquisitions as well as through organic investment in product R&D.

Autodesk contends: "The promise of simulation is to make better decisions sooner." If they are truly able to deliver products that achieve that promised customer benefit, then Autodesk could indeed become a much more significant driving factor in the long-awaited "democratization of simulation."

## About CIMdata

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise's ability to design and deliver innovative products and services through the application of Product Lifecycle Management (PLM). CIMdata provides world-class knowledge, expertise, and best-practice methods on PLM. CIMdata also offers research, subscription services, publications, and education through international conferences. To learn more about CIMdata's services, visit our website at http://www.CIMdata.com or contact CIMdata at: 3909 Research Park Drive, Ann Arbor, MI 48108, USA. Tel: +1 734.668.9922. Fax: +1 734.668.1957; or at Oogststraat 20, 6004 CV Weert, The Netherlands. Tel: +31 (0) 495.533.666.

Copyright © 2014 by CIMdata, Inc.