10x Productivity Gain with MSC Apex – MSC Nastran Workflow

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In recent years, OEMs in the aerospace, automotive, and shipbuilding industries are being confronted with a variety of challenges. Stricter safety requirements, increasing operation cost, and higher user expectations, are driving OEMs to innovate, especially in product development to gain continuous competitive advantages in the market. These strategic initiatives also bring new requirements for CAE tools. User experience, smart workflows, simulation democratization- you name it! No matter what buzzwords are out there, the core need of CAE users is the same: productivity.

Though determining go-to-market of new products, the productivity of product development depends heavily on CAE simulations, where innovations are fertilized. In current workflows, however, CAE engineers are doing chores instead of innovations due to their software. They need to transfer model files across the pre-processor, FEA solver, and post-processor to perform a single round of analysis. In most cases, CAE engineers have to wait for a modified model from design engineers to begin the next round analysis. Such a process generally repeats multiple times until a final design is frozen. Productivity is often further constrained with poor user interfaces, non-intuitive instructions, and redundant manual operations of the software. As a consequence, CAE engineers spend 50%~70% of their time in model preparations. The engineering teams are in desperate need of a next-generation simulation tool to enable productive simulation-driven workflows.

MSC Apex Iberian Lynx is the ultimate CAE productivity booster for MSC Nastran based users. Beginning with Iberian Lynx, the interoperability between MSC Apex and MSC Nastran enables the new "MSC Apex – MSC Nastran – MSC Apex" workflow. Users can now combine the world-class user experience of MSC Apex with the power of MSC Nastran, the world's most trusted multidisciplinary Finite Element Analysis (FEA) solver, to facilitate their product development. Such interoperability enables existing MSC Nastran users to achieve an up to 10x productivity gain in several different aspects.

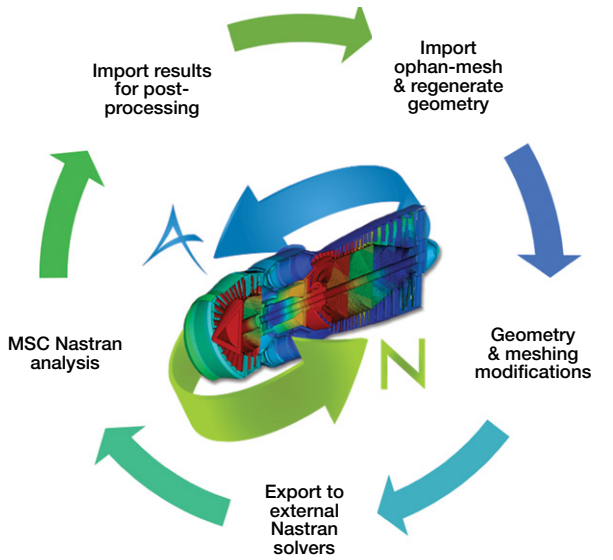

Figure 1. Apex – MSC Nastran – Apex Workflow

“The technology innovation represented in MSC Apex’s capability suite and ease of use was head and shoulders above any other stand-alone CAD healer or integrated CAD-CAE meshing software I have used.”

– W. Scott Taylor, Senior Mechanical Engineer, Dynetics Technical Services, Inc.

MSC Apex - MSC Nastran - MSC Apex Workflow

Before Iberian Lynx, other pre-processors have been used to prepare models for MSC Nastran. Now, users can leverage MSC Apex for pre/post-processing of daily MSC Nastran work, such as importing multiple types of CAD files, repairing and modifying the geometry of parts or assemblies with smart geometry tools, and creating mesh incrementally. When the model is analysis-ready, it can be exported as a Nastran BDF file for subsequent simulation analysis. When the computation finishes, post-processing tools in MSC Apex (such as fringe generation, result probing) can be leveraged to process simulation results.

Thanks to the embedded generative technology of MSC Apex, this new workflow brings several benefits to users at all levels. Using exported BDF files to control external Nastran solution, the expert users have considerable freedom to edit keywords and parameters, to take full advantage of MSC Nastran’s power in the advanced analysis; On the other hand, the entry-level users can benefit from MSC Apex’s analysis readiness check function and integrated solvers for fast model validation before sending to Nastran. Customers can enhance their productivity quite easily when utilizing MSC Apex in daily Nastran-based work.

Orphan-mesh Workflow

Technical companies are used to only saving FE models for future service, repair and modification uses, especially in the aerospace industry. Though FE models are compact and analysis-ready, it is difficult to rebuild geometry models from sketch when performing changes to these legacy FE files. However, this is no longer a problem in the new MSC Apex – MSC Nastran – MSC Apex workflow. Users can now import Nastran BDF files into MSC Apex and regenerate geometry directly from the FE model. With the help of embedded direct-modeling technology, geometry repair and edit can be completed by only clicking & dragging. Then, incremental mesh capacity can help users generate high-quality

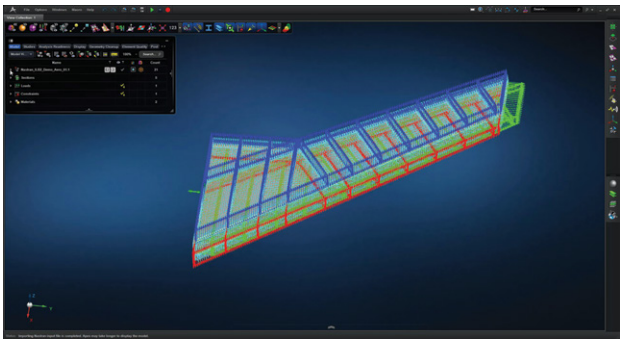

Figure 2. Apex – MSC Nastran – Apex Example: Import Wing Model From Legacy BDF File

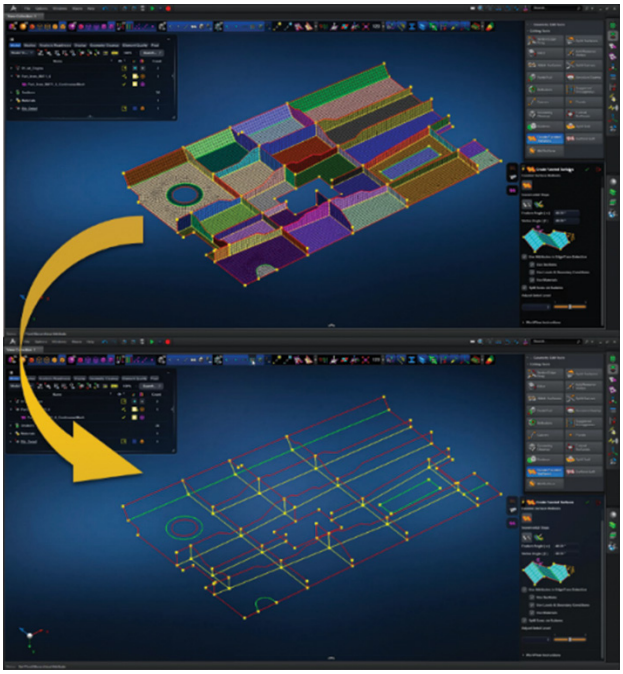

Figure 3. Orphan Mesh Workflow Example – Regenerate geometry from the FE model directly

mesh at a single attempt. Even if some local refinement is needed, the intuitive instruction attached to each feature can aid such work with minimal manual operations. Afterward, users can perform routine analyses as usual.

Generative Direct-Modeling Capability

This inherent direct-modeling technology arms MSC Apex with several unique functionalities, which boost productivity by a factor of 10. For example, it is generally time-consuming to extract the mid-surface model from a thin-wall structure, due to the work of geometry split, manual repair, and repeated mesh,

"The integration of MSC Apex Scripting Technology automates the translation of the CAD data of the ship model into a CAE specific geometry model. This can then be used within MSC Apex to build a simulation model. MSC Apex allows interoperability of different 3D models that can be streamlined with CAD and CAE without having to go through a full project conversion."

– Major US Based Shipbuilding Company

Figure 4. Direct-Modeling Capacity Example

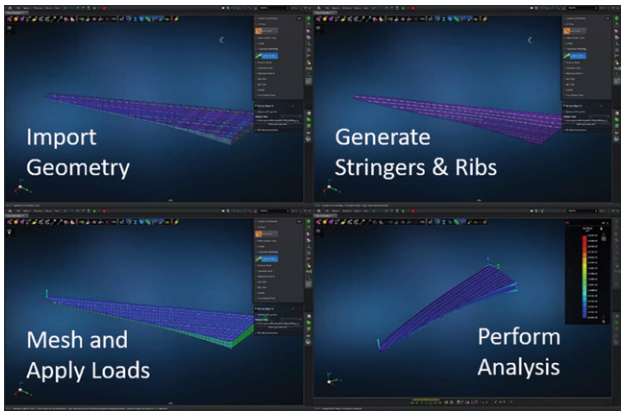

Figure 5. Automation Scripting Example – Import whole wing model by scripts

etc. However, the unique mid-surface extraction tool in MSC Apex can intelligently detect the paired surfaces and extract the mid-surface automatically. If the extracted model has local defects, users can quickly fix them by dragging and clicking geometric features.

What's more, MSC Apex provides a higher-order of productivity gain. Unlike traditional pre-processors, MSC Apex achieves high-quality mesh by an incremental strategy. It automatically generates the highest-quality mesh possible and needs minor essential refinements to deliver a qualified mesh. This "mesh on the fly" capacity updates the mesh automatically when geometry modification exists. For example, as shown in picture 4, mesh generates as the geometry mirror operation happens.

Customizable Automation Scripting

Another highlight within MSC Apex IL is the powerful automation APIs. MSC Apex supports customization of objective-specific workflows by using scripts written in Python3, the most popular and user-friendly programming language at present. Users can define automation functions including but not limited to creating models, performing analysis, and result exploration. This functionality is especially useful in building large assemblies and standardizing in-house workflows. Imagine how much time and potential human error could be saved and avoided in repeated work. Automation boosts users' productivity gains into a higher magnitude.

World-class User Experience

MSC Apex adopts a stylish graphical user interface (GUI), where all functions are placed in an intuitive layout. The integrated search function in MSC Apex provides everything you need right at your fingertips. High expertise requirements from traditional CAE software can be quite painful and time-consuming to learn new without detailed training.

However, MSC Apex is extremely easy to use and easy to learn, aiming at offering the best user experience to all-level users. It includes hundreds of tutorial videos of features and workflows, which provides intuitive operation instructions right at your mouse cursor. Thanks to the user-friendly design, users can follow tutorials at their own speed, instead of attending costly and slow-paced training sessions.

Besides the exceptional functionality mentioned above, there are far more intelligent capabilities within MSC Apex waiting to be explored. Using the MSC Apex – MSC Nastran – MSC Apex workflow, users can broaden their horizon of innovation with an up to 10x productivity gain at a lower cost. Try MSC Apex and experience unparalleled efficiency.

"With MSC Apex's easy to use interface, tedious and frustrating tasks (most notably geometry idealization and meshing) are made simpler, better, and faster. MSC Apex saves us a large amount of time and allow us to focus on "real" engineering."

– Dr. Wade Evans, Simulation Engineer, ADG Mobility

Try MSC Apex Free for 30 Days:
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