COURSE INFORMATION

Introduction to FEA

with MSC Apex and MSC Nastran

Objective:

MSC Apex is a contemporary FEA platform, which supports the MSC Nastran FEA solver. The MSC Apex and MSC Nastran workflow is used in the aerospace, space, and related industries around the world to develop the most advanced products of the future.

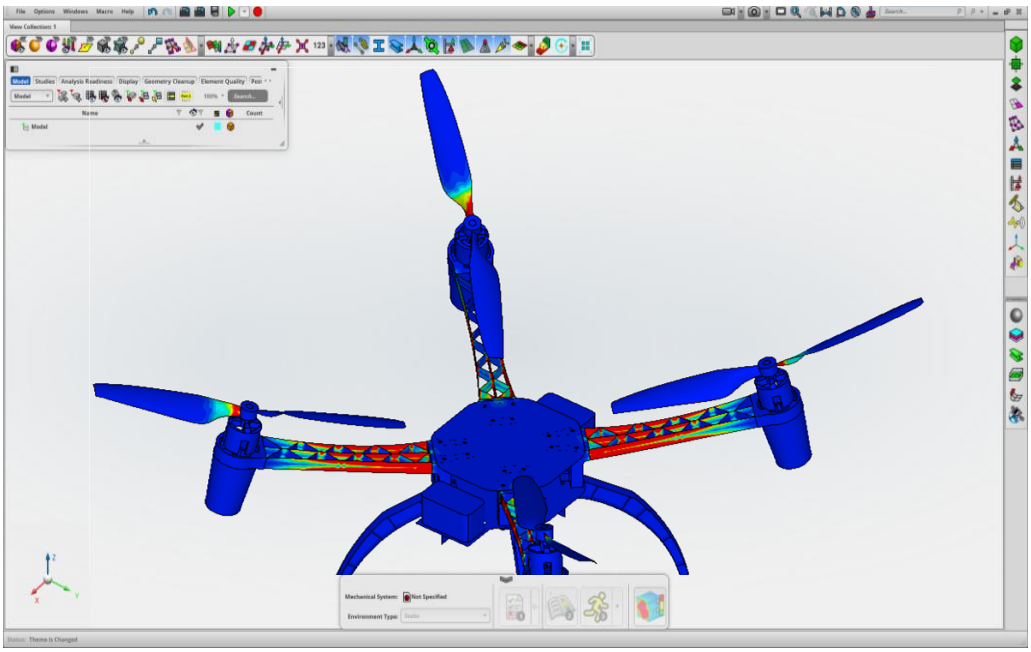
The powerful functionality offers new thinking in how to define a strategy for understanding structural response, from simple components through to complex assemblies with many parts.

- Kick start your professional learning by mastering FEA strategy and development with these incredible tools.
- The online course develops your understanding of the toolsets and the many concepts they support, allowing you to become productive with Apex and Nastran's functionality very quickly.
- You'll become familiar with key workflows, improved modeling strategy and the analysis benefits achievable with this new paradigm that Apex and Nastran offers.
- Through the course, you will advance your understanding from simple modeling tasks, through to looking at complex assemblies, all around a real-world CAD representation of a UAV/drone air vehicle.
- A free, time-limited version of the MSC Apex and MSC Nastran is available from Cadence.
- All the tutorial examples shown during the course are configured for the full MSC Apex professional version.

Content:

The learning experience is underpinned with a combination of instructor-led explanation and demonstration, in parallel with interactive user tutorials, which develop in involvement through the course.

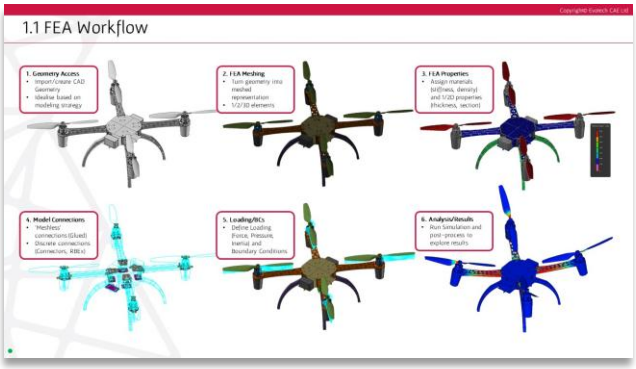
The course is taught through eight discrete lessons, each around 2 hours long, with an overall course duration of around 16 hours.

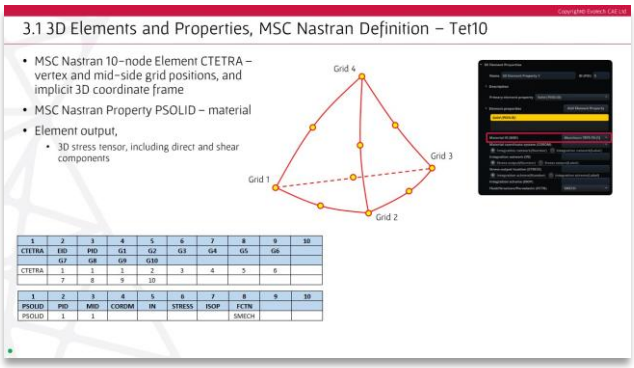


Lesson Structure :

01. Introduction
Covering a brief introduction to FEA, MSC Apex and MSC Nastran, the user environment and a complete 'Propeller Blade' worked example. We'll look in detail at the mathematical FEA solution, the MSC Nastran file types (including the model input file, *.bdf, structure) and the MSC Apex/MSC Nastran workflow steps to allow you to run and explore a detailed FEA model.

02. Model Build (1D/2D)
Covering 1D/2D modeling strategy/element choices and properties, geometry/idealisation for 1D/2D modeling and a 'Stiffened Plate' worked example. We'll look in detail at the MSC Nastran 1D (CBAR, CBEAM, CROD) and 2D (CQUAD4) element definitions, properties and output, along with element quality and checking to ensure robust output.





03. Model Build (3D)
Covering 3D modeling strategy/element choices for both 'Tet' and 'Hex' meshing, geometry/idealisation for solid modeling and a 'Rotor Hub' worked example. We'll look in detail at the MSC Nastran 3D (CTETRA10 and CHEXA8) element definitions, properties and output, along with geometry idealisation, mesh controls and checking to ensure robust output.

04. Model Attribution
Covering model attribution, isotropic/2D orthotropic and composite materials, loads and boundary conditions and a 'Loaded Plate' worked example. We'll look in detail at the MSC Nastran material and property relationships (e.g. MAT1/PSHELL/CQUAD4), along with structural loads and constraints (FORCE, MOMENT, SPCD, PLOAD4 and SPC1).

05. Model Connections
Covering glued contact, mesh-dependent ties, connectors and discrete tie/joints and a 'Glue/Connector' worked example. We'll look in detail at the main MSC Nastran connector types (CBUSH, CBAR, RBAR, RBE2 and RBE3), their definitions, output, and how these can be used to model different joint behaviours and load application methods.

06. Assembly Modeling
Covering part/assembly structure, manipulation, verification and a 'Drone Assembly' worked example. We'll look in detail at the MSC Apex product hierarchy, and how this can be used to simplify build and verify part/assembly behaviour, through model representation and the MSC Nastran 'INCLUDE' file structure.

07. Analysis
Covering analysis readiness, simulation scenarios, analysis, post-processing and a 'Drone Analysis' worked example. We'll look in detail at the model set-up, analysis and result exploration using the MSC Nastran-embedded solver within MSC Apex, focused on linear static and normal modes analysis.

08. External FEA Workflow
Covering companion, external MSC Nastran and orphan mesh workflows and an 'External MSC Nastran' worked example. We'll look in detail at how MSC Apex can support third-party FEA software integration, external MSC Nastran solution with the exported BDF data, and approaches in tackling legacy FEA models where no geometry is available.

Topic Format:

Each lesson follows a consistent teaching format, which includes;

1.Overview
How does this topic relate to your modeling and analysis process?

2.Lesson Detail
What are the key features that enable this?

3.Tutorial Overview
We show you this in action through a worked tutorial.

4.Worked Tutorial
Your turn to put these concepts into practice.

5.Tutorial Review
We review your tutorial and further work.

Evotech Background :

This course is developed and delivered by Evotech CAE Ltd, a Cadence business partner. As Director and Lead FEA Engineer of UK–based Evotech CAE Ltd, Dr Steffan Evans has over 25 years' experience of the practical usage of advanced FEA techniques in diverse industrial settings.

This has included the development and delivery of many training courses and programs covering FEA fundamentals, industry application of the technology, alongside direct teaching in how to get the most from your commercial FEA software.

"Evotech's online FEA training courses deliver a great learning experience. The presentation is excellent, guiding the user through a series of well thought out, realistic workshops with subassemblies building to a complete model. Highly recommended for both new and existing users."
Senior Technical Consultant, Cadence

"I just completed the online course and I've been impressed by the quality of the course. It is very well structured and very well presented. Very easy to understand and it permits to take the control of MSC Apex and MSC Nastran in just a few hours."
FEA Analyst/Trainer/Author, FEA Academy

"Just completed the Evotech 'Introduction to FEA with MSC Apex and MSC Nastran' course. I think this is an excellent introduction to model build, and to solution with the inbuilt solver, or externally in Nastran. Excellent tuition from Dr Steffan Evans."
Principal Stress Engineer, Aerospace Industry

Pre–Requisites:

A basic knowledge of strength of materials and CAD modeling is highly recommended.

No previous knowledge of FEA is required.

Duration: 12–16hrs (online)

Pricing: See evotechcae.com/learn