
3D TRAINING, SIMULATION & VISUALIZATION

Introduction

Using interactive 3D model simulation (virtual reality) for training would enable students in the technical/engineering schools to understand and learn the system operation faster, especially for complex concepts or operational tasks.

The digital training & technical documentation modules also enable equipment operators & engineers in the various industries (such as automotive, marine, aerospace, energy, and telecommunication) to access system information readily.

3D Simulation - Overview

A typical 3D training simulation pack, known as virtual task trainer, comprises 4 modules:

- **Exploration module**
- **Observation module**
- **Practice module**
- **Assessment test module**

In a classroom where practical lessons are conducted, students can complete the virtual “hands-on” lessons and assessment before going to the physical equipment for physical hands-on sessions.

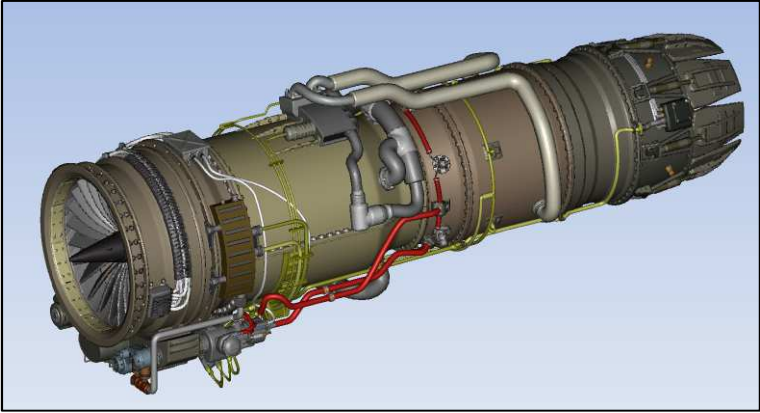
This would speed up the student’s understanding of the subject as well as reduce the training time. For example, a 5-day course can be changed to a 4-day course while still achieving the learning objectives.

3D Simulation - Explained

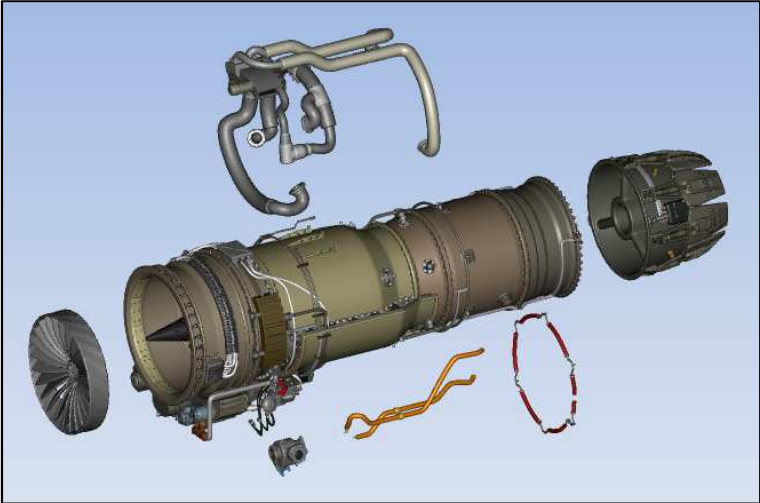
(1) Exploration Module (Parts Catalogue)

Explore the component parts & structure to understand the various components that make up the assembly/equipment. Explore system parts using exploded view, context view, and embedded information such as part number, materials, supplier data.

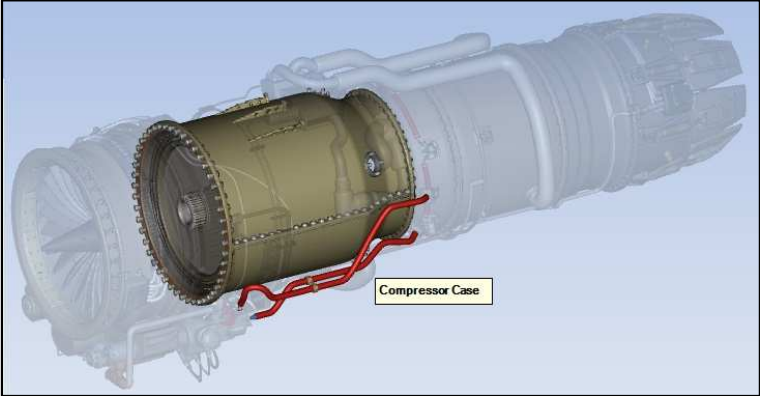
Example: Aircraft Jet Engine



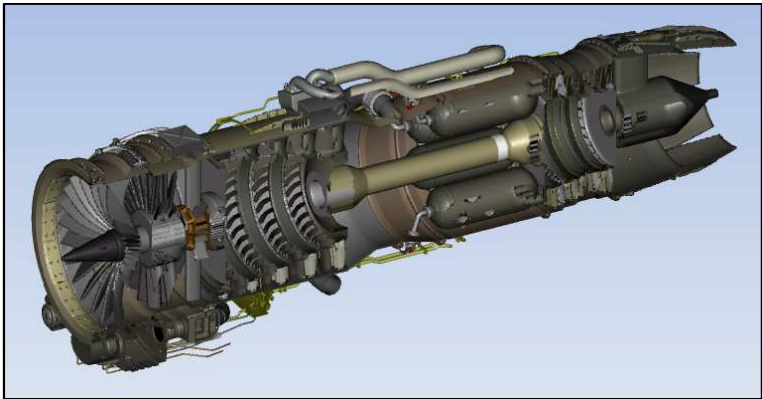
Move & rotate the individual 3D model parts to view the specific parts.



View a part/assembly in [context view](#) where the specific part/assembly is highlighted. For example, there are 4 major assemblies in a jet engine (fan, compressor, combustion & turbine). The compressor can be highlighted for user to understand its position and relation with respect to the whole engine.

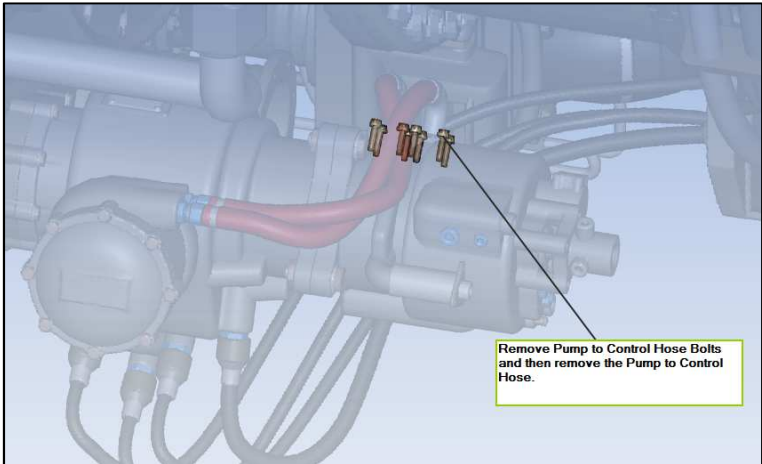


Apply [cut-out model](#) to view the internal components of the equipment.



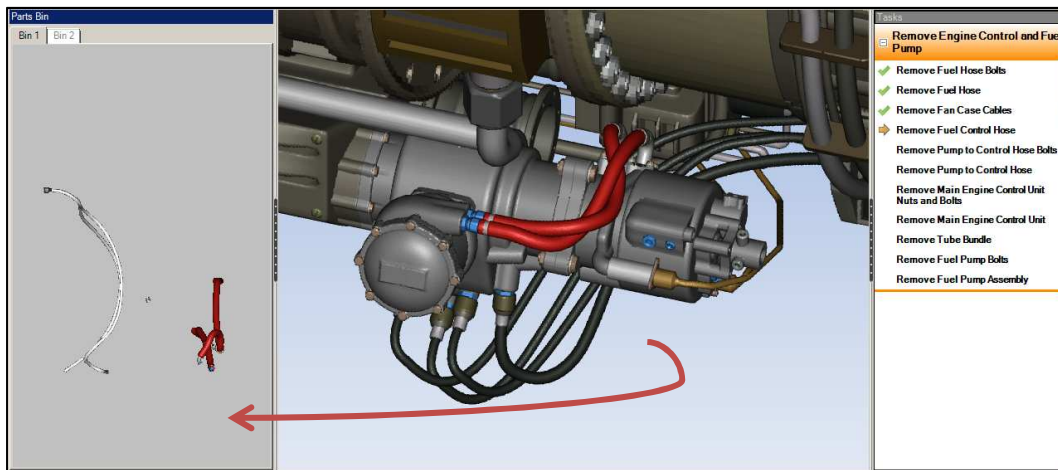
(2) Observation Module (Operation Guide)

Observe procedural steps in guided 3D animation sequence (with voice-over and text-over) to learn how to operate the equipment.



(3) Practice Module (Virtual Hands-on Training)

Practise virtually to operate equipment by interacting with the 3D equipment. Follow the procedural steps (right panel), and drag-drop the required parts from the 3D model (centre panel) to the parts bin (left panel). This enables user to learn faster & retain the knowledge better as he performs virtual hands-on practice on a realistic digital model.



(4) Assessment Test Module

Take an assessment to recap on what has been learnt. Interact virtually with the 3D equipment *without* guided steps to complete the procedure. Answer multiple-choice and fill-in-the-blank questions. System records assessment results such as number of correct steps taken and answers.

Web Browser Ready

The 3D models used are [lightweight models](#) with small file size that can be rendered and run in web browsers. It is not required to use computers with enhanced graphics processors to run the application. Hence, user can access the 3D e-learning modules easily via web browser.

Conclusion

3D simulation modules can be effectively deployed for instructor-led or self-directed learning.

This is an effective learning tool to engage the students as they are able to interact intuitively with the realistic 3D digital models to perform virtual hands-on practice. This would enhance knowledge retention; and encourage students to pursue more self-directed learning.

Compared to existing learning tools like slides & videos, students would be able to achieve the learning objectives in a shorter amount of time.