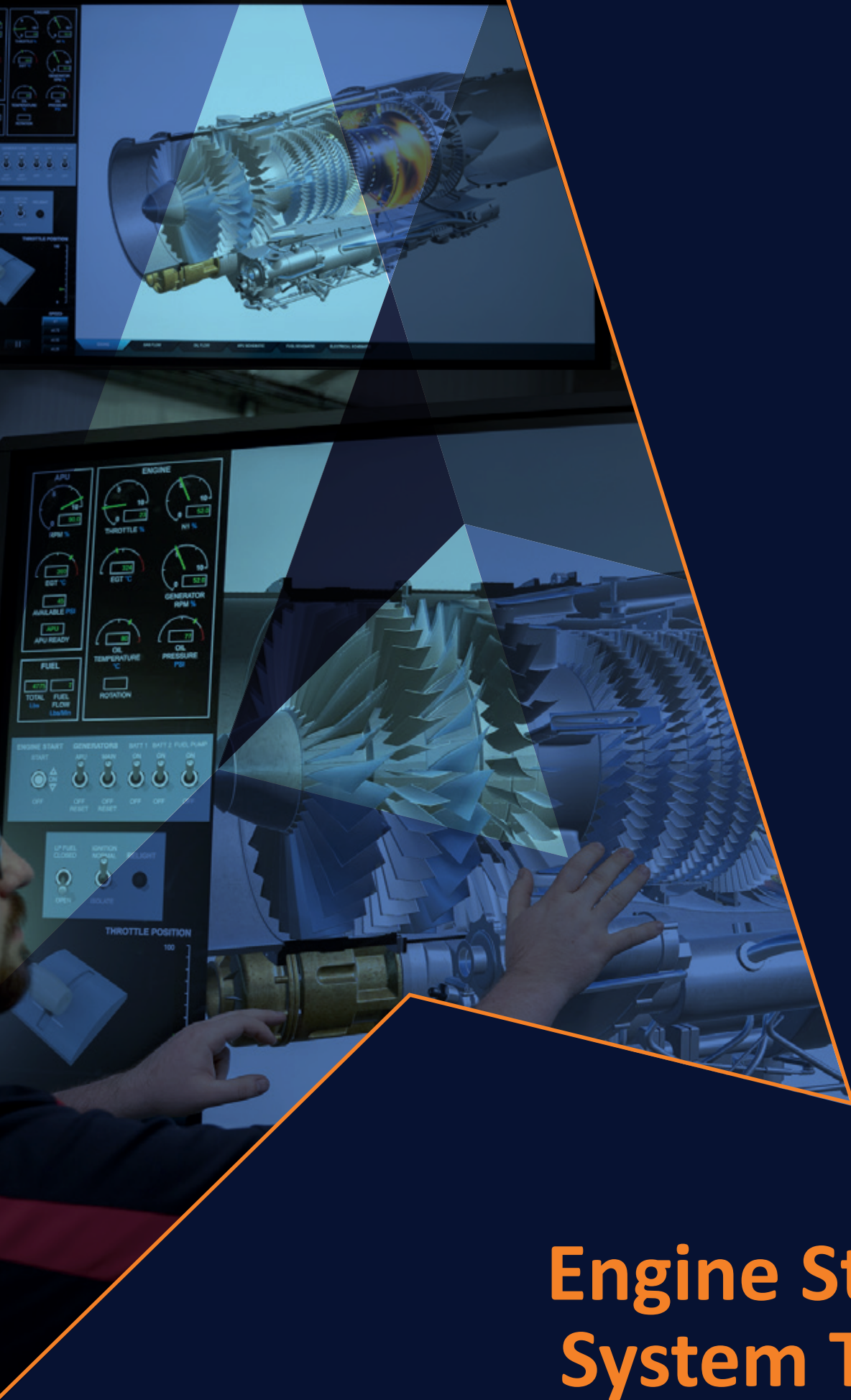




Engine Starting System Trainer



Introduction

The Engine Starting System Trainer (ESST) can be a bolt-on option to Pennant's Integrated Avionics Maintenance Trainer (IAMT) and Fixed Wing Aircraft Systems Trainer (FWAST) or used in a standalone configuration. The enhancement provides an interactive training aid that focusses on a typical engine starting system.

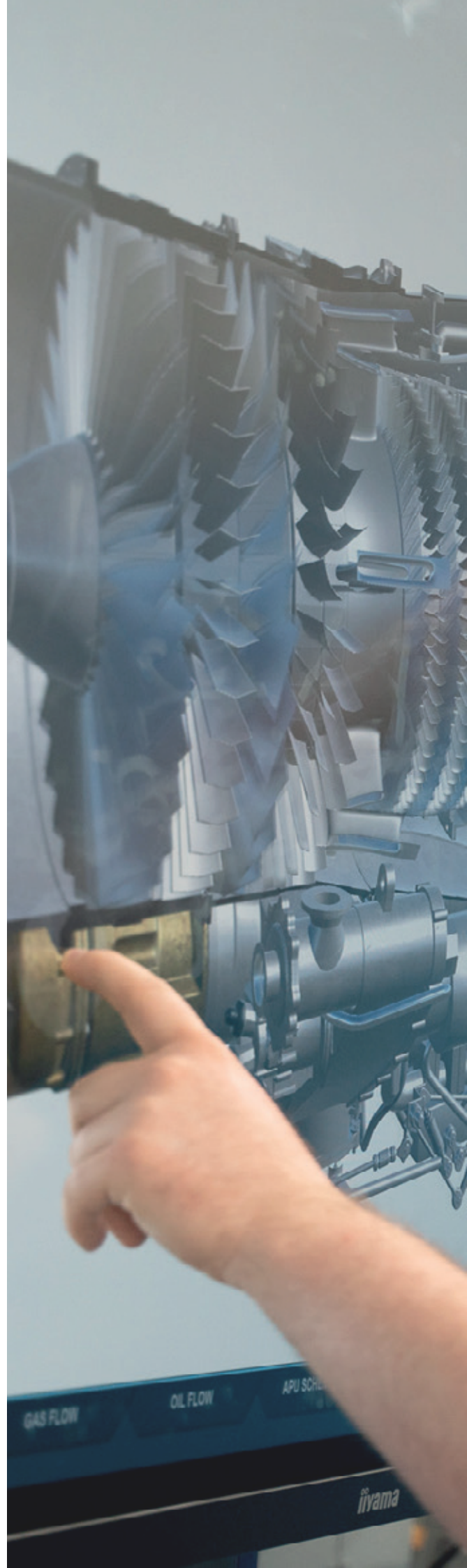
The ESST can drive a range of display types from either a large display device attached to the IAMT airframe to a handheld tablet to present a representative full and working 3D cutaway model of the engine supplemented by detailed electrical, fuel, air and oil schematics.

The ESST provides a full working picture of the complete engine starting cycle, enabling the seamless instruction in part or full-cycle along with relevant faults consolidating student learning electrically and mechanically in engine starting and indication, pressures and temperatures and basic gas turbine theory.



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Deployability

Standalone

The Engine Starting System Trainer can be deployed either as an instructor lead teaching aid or deployed classroom wide.

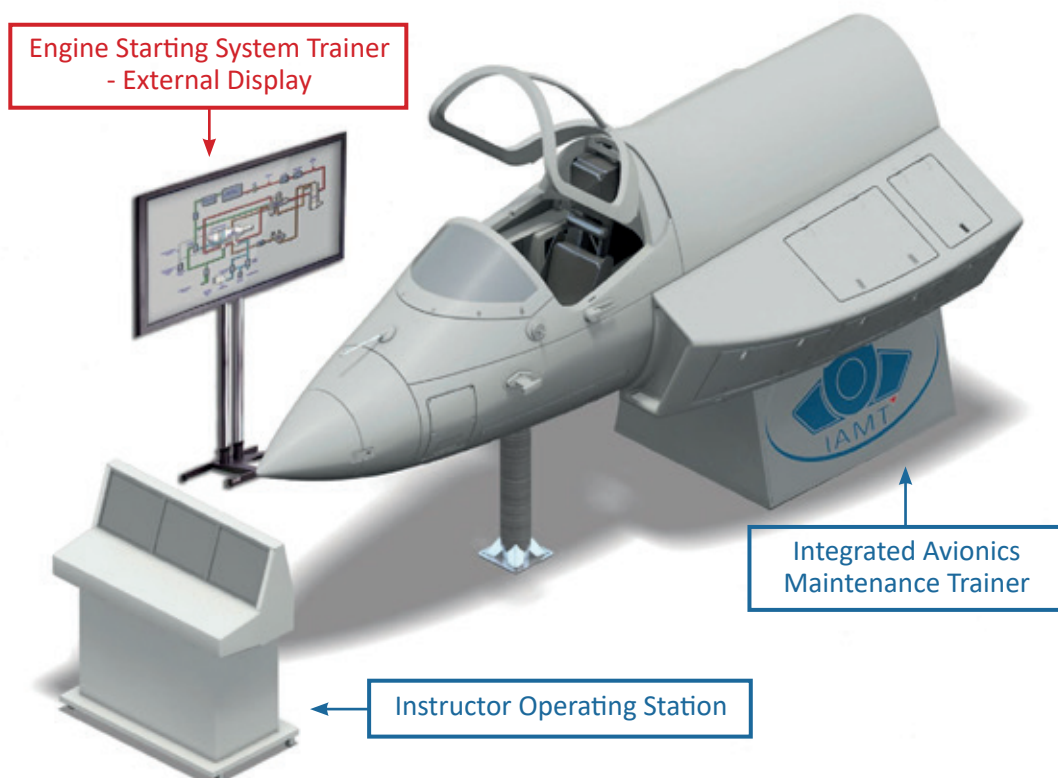
As an instructor lead teaching aid, the instructor can bring the inner workings of a modern aircraft engine to life. The additional pages allow the instructor to dig deeper into a range of engine systems while ensuring the cohort remain engaged via the interactive graphics.

The deployment classroom wide includes all the same functionalities and allows the students to carry out self-paced learning, as well as research and experimentation on fault conditions and the effects of incorrectly following procedures. This deployment can be via a large external display or on a tablet that provides students and training institutes with an easily portable, interactive training aid for teaching the complete engine starting cycle. Watch your students build confidence, expand knowledge and hone skills, whether they are in a classroom, on the shop floor or out in real-world scenarios.

Tethered - FWAST or IAMT

Customers of both the Fixed Wing Aircraft Systems Trainer and Integrated Avionics Maintenance Trainer can benefit from tethering the Engine Starting System Trainer to their current training aid allowing interaction between either the virtual cockpit (Fixed Wing Aircraft Systems Trainer) or physical cockpit (Integrated Avionics Maintenance Trainer) enabling a more in-depth learning experience of the engine starting system.

In both cases the integration of the two training aids is seamless and can be carried out by the customer.



An example of the Engine Starting System Trainer tethered to the Integrated Avionics Maintenance Trainer



External Display Hardware

The 65" external touchscreen display system will run the ESST software to display the engine model. It connects neatly into the IAMT Instructor Operating Station network with no need for hardware changes.

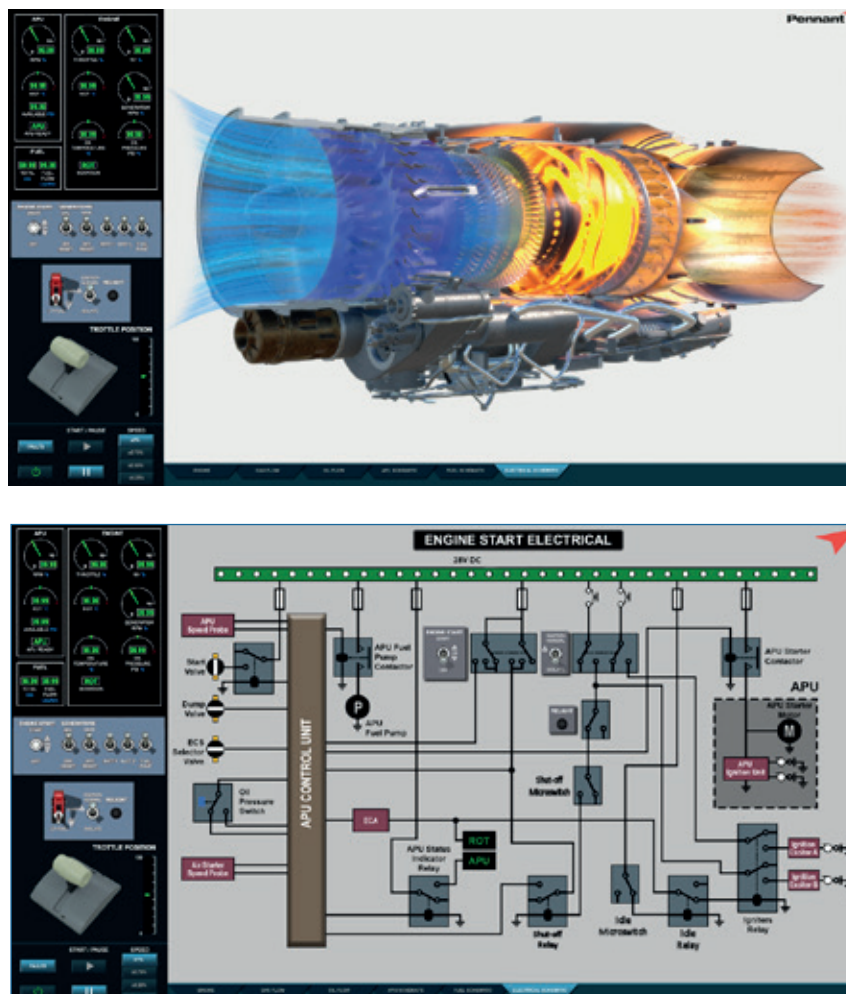
Additional Display Graphics

The external displays show a full and working 3D cut away model of the engine supplemented by detailed electrical, fuel, air and oil schematics.

The schematics will update in real time to reflect the status of the system as the user in the IAMT cockpit operates the controls to start the engine.

All major engine components are detailed, and the instructor can feed the labels so that the student can name components during the starting cycle or as a specific teaching point.

The APU schematics detail in real-time the APU starting up to on speed and as demand for air is placed by the engine starting cycle.



Typical additional display layout



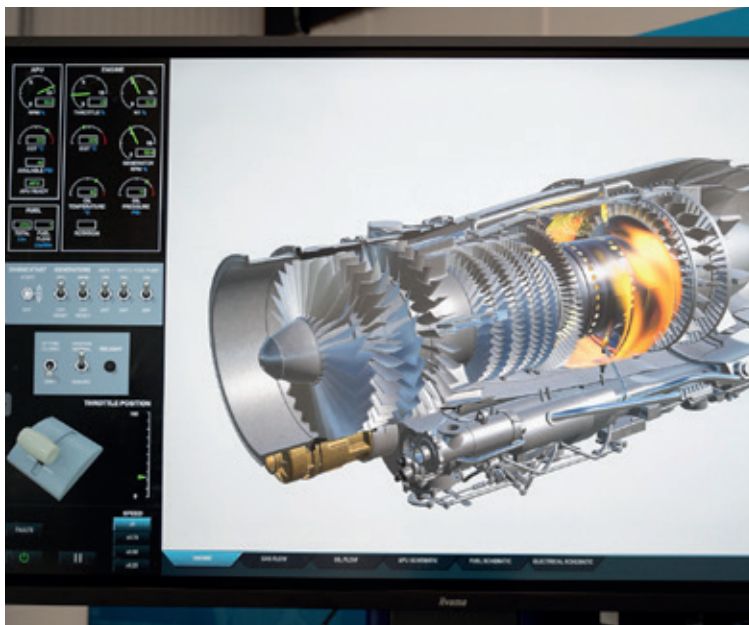
Alongside the schematics, it is possible to show information or graphics of engine related cockpit controls and indications. This can include:

- Throttle (including the relight switch)
- Navigation pane containing the following switches:
 - LP FUEL SHUT-OFF
 - GENERATORS APU
 - BATT 2
 - IGNITION
 - GENERATORS MAIN
 - FUEL PUMP
 - ENG START
 - BATT 1

Faults

The trainer provides representative faults associated with a typical engine starting system and gas turbine engine starting cycle.

When coupled with the engine 3D model and schematics, faults represent in real-time. A pause function enables the showing and discussion of how and why they occur.





Teaching points

STARTING

Explain the design and components of starting systems APU and engine
Explain the operation of a gas turbine engine starter
Explain the inspection and servicing procedures for starting systems
Explain the operation of an auto-start system.

IGNITION

Explain the types of operation of turbine engine ignition systems and their components
Explain turbine engine ignition system safety precautions.

INDICATION

Explain the principles and operation of engine indicating systems
Explain inlet air flow pressure and temperatures
Explain Interstage compressor pressure and temperature
Explain exhaust gas temperature and interstage turbine temperature
Explain oil pressure and flow
Explain fuel pressure and flow
Explain engine speed
Explain fault detection.

Aviation Regulations Alignment

EASA/EMAR PART 66

Module 15.13 Starting and Ignition Systems
Module 15.12 Air systems (APU bleed air)
Module 14.2 Engine Indicating Systems (pressures, temperatures, indications)
Core for B1 turbine engine categories; ESST simulates full starting cycle, faults, and indications (current with 2023–2025 amendments).

- Understand operation and sequencing (electric/air turbine, APU to main engine).
- Visualize real-time electrical/fuel/air/oil schematics and cockpit controls.
- Diagnose faults (e.g., hung/hot/no-start) with pause/discussion.
- Monitor indications (pressures, temperatures, RPM) during cycle.



FAA

14 CFR Part 147 Appendix D (Powerplant): Ignition and Starting Systems

ATA Chapter 80 Starting (air turbine starters, valves, sequencing)

FAA-H-8083-32B Chapter 5 (Engine Starting Systems)

Required for A&P Powerplant certification; ESST provides practical simulation of turbine starting (unchanged in 2026 FAR-AMT).

- Demonstrate complete starting cycle (APU bleed, starter engagement, ignition, self-sustaining).
- Interact with virtual controls (throttle, ignition, start switches) and schematics.
- Troubleshoot faults (e.g., valve issues, low air) in real-time.
- Practice safe procedures and indications per FAA handbook.

CITY & GUILDS

2675-03/2675-05 Level 3 Diploma in Aircraft Maintenance (civil/military pathways): Units on gas turbine engines, starting/ignition, monitoring (e.g., 216/217, 205/206)

4608-60 Level 3 Diploma (Military Development Competence): Units 301–304 (core practices), 455 (systems maintenance), electives for starting components

Competence-based quals include engine starting/monitoring/fault diagnosis; ESST supports portfolio evidence (current handbooks v4.0+, Sept 2025).

- Perform fault diagnosis on starting systems (real-time insertion/pause).
- Carry out scheduled maintenance/testing (inspections, adjustments).
- Simulate full cycles and incorrect procedures for evidence.
- Reinstate systems safely post-activity.

CASA & MEA (MEA07 RELEASE 6.0, SEPT 2025)

MEA319 Inspect gas turbine engine systems and components

MEAMEC0013 Inspect, test and troubleshoot gas turbine engine systems and components (supersedes MEA314)

Vocational competencies for CASA Part 66 B1.1/B1.3 licences; ESST aids practical evidence.

- Build competency in inspecting/testing/troubleshooting starting systems (sequences, pressures/temperatures, ignition).
- Use interactive 3D models/schematics for cycle simulation and fault effects.
- Practice safety procedures and indications in self-paced/instructor-led modes.
- Support evidence collection for vocational outcomes.

