



Aircraft Engine Maintenance and Shop Visit Management Course: Borescope, LLPs and EGT Margin



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Introduction:

Aircraft engine maintenance and shop visit management, covering borescope inspection, LLPs and EGT margin, is a 2-week course for powerplant engineering, engine shop and fleet technical teams that ends with an Engine Shop Visit Workscope and Removal Forecast Plan for a case operator. Operators lose time on wing and money when deteriorating engines are removed unplanned, life-limited parts strand costly stub life and shop workscope are set without trend or borescope evidence. Nominees already monitor, inspect or plan turbofan engines and work through case studies built on trend, borescope and LLP records. CoreConcept Training Center delivers this aircraft engine maintenance course.

Course Objectives:

- Explain turbofan module construction and how thrust rating, flight cycle ratio and operating environment drive deterioration of each module
- Perform and report borescope inspections against engine manual serviceable limits and decide between continued operation, repeat inspection and removal
- Interpret engine condition trend monitoring data, including EGT margin, fuel flow, vibration and oil indicators, to build an engine removal watch list
- Track life-limited parts with back-to-birth records and plan replacements that balance stub life against the next shop visit build goal
- Select shop visit workscope and estimate their cost drivers, contract terms and lease return conditions for each engine
- Prepare an Engine Shop Visit Workscope and Removal Forecast Plan with restoration targets, spare engine cover and fleet KPIs

Target Audience:

- Powerplant engineering teams responsible for engine reliability, removal decisions and fleet engine technical status
 - Engine shop and overhaul teams responsible for incoming inspection, module repair, build and test
 - Line and base maintenance teams responsible for on-wing borescope inspections and engine trend data capture
 - Engine records teams responsible for life-limited part traceability, cycles remaining and engine build documentation
 - Fleet technical and engine asset teams responsible for spare engine cover, shop contracts and lease return condition checks
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Course Outline:

Day 1: Turbofan Architecture, Modules and Engine Removal Context

- Two-Spool and Three-Spool Turbofan Layouts and Bypass Ratio
- Fan, Booster and High-Pressure Compressor Module Breakdown
- Combustor and High-Pressure and Low-Pressure Turbine Module Functions
- Modular Engine Build Standard and Module Swap Logic
- Engine Removal Cause Pareto for a Mixed Fleet

Day 2: Engine Maintenance Philosophy, Manual Limits and Life Drivers

- On-Condition Versus Hard-Time Engine Maintenance Philosophy Comparison
- Engine Manual Inspection Limits and Serviceable Damage Tables
- Life-Limited Part Cycle Limits for Disks and Shafts
- Flight Hour to Flight Cycle Ratio Effects on Wear
- Thrust Derate and Outside Air Temperature Severity Factors

Day 3: On-Wing Borescope Inspection Practice

- Rigid and Flexible Borescope Probe Selection by Engine Station
- Borescope Port Access and Core Rotor Turning Procedure
- Turbine Blade Damage Classification for Burns and Coating Loss
- Combustor Liner Cracking and Fuel Nozzle Coking Assessment
- Borescope Image Measurement and Inspection Report Template

Day 4: Engine Condition Trend Monitoring and Health Data

- Engine Condition Trend Monitoring Cruise Snapshot Parameter Set
- EGT Margin, Fuel Flow and Core Speed Delta Trending
- Engine Vibration Survey and Magnetic Chip Detector Findings
- Oil Consumption Trend and Spectrometric Oil Analysis Results
- Engine Health Alert Thresholds and Removal Watch List

Day 5: Case Study: Week-One Engine Health Review

- Case Study Rising EGT Trend With Borescope Confirmation
 - Case Study Foreign Object Damage on Fan Blades
 - Serviceable Limit Versus Removal Decision Matrix Application
 - Unscheduled Versus Planned Engine Removal Cost Comparison
 - Week-One Engine Health Findings Summary Sheet
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Day 6: Shop Visit Workscoping and LLP Stub Life Planning

- Workscope Planning Guide Levels From Minimum to Full Overhaul
- Performance Restoration Versus Core Refurbishment Workscope Selection
- LLP Back-to-Birth Traceability and Cycles Remaining Records
- LLP Stub Life Build Goal and Replacement Timing
- Shop Visit Interval Forecast From Cycles and EGT Deterioration

Day 7: Shop Visit Cost Drivers, Repairs and Quality Control

- Shop Visit Cost Breakdown by Labour, Material and Repairs
- Hot Section Blade and Vane Repair Versus Replacement
- Used Serviceable Material and Alternative Part Sourcing Risks
- Teardown Report Findings and Workscope Change Control
- Engine Test Cell Pass-Off Run and Release Documentation

Day 8: Shop Contracts, Lease Return Conditions and Engine Coordination

- Time and Material Versus Fixed Price Shop Contracts
- Flight Hour Engine Support Agreement Risk Allocation
- Engine Lease Return Conditions for LLP Life and EGT Margin
- Spare Engine Pool Sizing and Short-Term Lease Engine Cover
- Engine Removal Coordination Between Planning, Operations and Shop

Day 9: Performance Restoration Measurement and Engine Fleet KPIs

- Post-Shop Visit EGT Margin Restoration Verification Method
- On-Wing Engine Water Wash Effect on EGT Margin Recovery
- Time on Wing and Shop Visit Rate KPIs
- Engine Maintenance Cost per Engine Flight Hour Benchmark
- Repeat Removal Root Cause Review Using Teardown Evidence

Day 10: Case Study Capstone: Engine Shop Visit Workscope and Removal Forecast Plan

- Case Operator Engine Fleet Health and LLP Status Review
 - Removal Forecast Build From EGT Margin and LLP Limits
 - Shop Visit Workscope Selection and Cost Estimate Drafting
 - Lease Return and Spare Engine Cover Check
 - Engine Shop Visit Workscope and Removal Forecast Plan Completion
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Skills You Will Gain:

- Turbofan Module Assessment
- Borescope Inspection Reporting
- Engine Trend Analysis
- LLP Stub Life Management
- Shop Visit Workscoping
- Engine Maintenance Cost Estimation
- Lease Return Condition Review
- Spare Engine Planning

Why Attend This Course:

- Deliver an Engine Shop Visit Workscope and Removal Forecast Plan for a case operator to the head of powerplant engineering and the fleet technical manager
- Decide whether an engine stays on wing, receives a repeat borescope check or is removed, and which workscope level it needs
- Avoid unplanned removals, stranded LLP stub life and lease return shortfalls that add cost and ground aircraft
- Pass on borescope report templates, trend alert sheets, LLP status tables and workscope cost models to engineering and shop colleagues

Conclusion:

Back at work, the participant hands the Engine Shop Visit Workscope and Removal Forecast Plan to the head of powerplant engineering, the fleet technical manager and the contracts team. They use it to approve the engine removal sequence, the workscope level and budget for each shop visit, LLP replacements and spare engine cover. After the first shop visit under the plan, the unit should compare restored EGT margin, actual cost and turnaround time with the estimate and update the trend alert thresholds and removal forecast.

Frequently Asked Questions FAQ:

What should participants know before an aircraft engine maintenance and shop visit management course?

Participants should already work with turbofan engines in powerplant engineering, an engine shop, line maintenance or engine records and read engine trend data or inspection reports. Bringing anonymised trend plots, borescope images or an LLP status sheet helps them apply the case studies to their own engines.

How does aircraft engine maintenance and shop visit management differ from an industrial gas turbine or airframe maintenance course?

It concentrates on aircraft turbofan engines removed for shop visits: borescope limits, trend monitoring, LLP stub life, worksopes and lease return conditions. Industrial gas turbine courses cover power plant machines and outages, and airframe courses cover check planning and maintenance programmes.

Why does EGT margin matter in aircraft engine maintenance and shop visit planning?

EGT margin shows how much temperature headroom an engine has before it reaches its limit during takeoff. As modules deteriorate the margin shrinks, so its trend is used to forecast removals and to measure how much a shop visit restores.

What do participants take back from the aircraft engine maintenance and shop visit management course?

Participants take back an Engine Shop Visit Workscope and Removal Forecast Plan for a case operator, with a borescope report template, trend alert sheet, LLP status table, workscope cost estimate and spare engine cover check they can adapt to their own fleet.
