

Advanced CBTC Systems Engineering and Assurance Training Course

1 – 5 March 2027
Madrid

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Training Center

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Ref: 2163_258394 **Date:** 1 – 5 March 2027 **Location:** Madrid **Fees:** 6500 Euro

Overview

Advanced CBTC Systems Engineering and Assurance Training Course is a one-week advanced course for rail signaling, metro operations, integration, testing and safety teams, who leave with a CBTC System Integration and Readiness File. The course connects CBTC architecture, ATP ATO ATS integration, moving-block train control, train-to-wayside communications, CBTC testing and commissioning, safety assurance and operational readiness. Agile Leaders Training Center presents CBTC systems engineering practice.

Who Should Attend

- Signaling teams responsible for train-control requirements and architecture
- Integration teams responsible for onboard, wayside and control-center interfaces
- Testing teams responsible for verification, commissioning and acceptance evidence
- Operations teams responsible for service readiness and degraded modes
- Safety teams responsible for hazards, assurance evidence and change control
- Asset teams responsible for migration, handover and lifecycle decisions

The course assumes participants work with rail signaling, systems integration or metro operations; it leaves out general railway operations, rolling-stock maintenance and supplier certification.

Departments and Industries

The course supports CBTC delivery and assurance across urban rail and engineering services.

- Metro and rapid-transit signaling departments
- Rail systems engineering and integration contractors
- Testing, commissioning and assurance services
- Operations control and service-readiness teams
- Transport asset management and maintenance engineering

Learning Objectives

By the end of this course, participants will be able to:

- Apply CBTC performance and functional requirements.
- Analyze ATP, ATO and ATS functional allocation.
- Evaluate moving-block and communications dependencies.
- Use interface and verification matrices.
- Prioritize safety and degraded-mode evidence.
- Build a system integration and readiness file.

Course Agenda

Day 1: Frame CBTC Requirements

- IEEE 1474.1 CBTC Performance and Function Map
- IEC 62290 UGTMS System Boundary Model
- Grade of Automation Operating Concept Matrix
- Headway, Availability and Safety Requirement Register
- CBTC Stakeholder and Lifecycle Responsibility Map

Day 2: Allocate Train-Control Functions

- ATP Protection Function Allocation Diagram
- ATO Driving and Station-Stop Function Matrix
- ATS Supervision and Regulation Control Map
- Moving-Block Separation and Movement-Authority Model
- Onboard, Wayside and Control-Center Architecture Baseline

Day 3: Engineer Communications and Interfaces

- Train-to-Wayside Data Flow and Latency Map
- Radio Coverage, Handover and Interference Risk Register
- Localization and Train-Position Confidence Chain
- Interlocking, Platform Door and Traction Interface Matrix
- Cybersecurity Boundary and Configuration-Control Record

Day 4: Verify Safety and Readiness

- CBTC Verification and Validation Cross-Reference Matrix
- Functional Test Case and Traceability Template
- Hazard Control and Safety Evidence Register
- Migration, Cutover and Mixed-Mode Decision Plan
- Operational Readiness and Degraded-Mode Checklist

Day 5: Practice CBTC Integration

- Exercise: Analyze CBTC Requirements and Functional Allocation
- Exercise: Diagnose Communications and Interface Failures
- Exercise: Build a Functional Test and Evidence Chain
- Exercise: Evaluate Migration and Operational Readiness
- Capstone Exercise: Complete the CBTC System Integration and Readiness File

Practical Exercises

The course uses suggested activities based on new-line, resignaling and metro operational-readiness cases.

- Suggested activity: map ATP, ATO and ATS functions to onboard, wayside and control-center subsystems.
- Suggested activity: trace a communications failure through movement authority, train location and degraded operation.
- Suggested activity: link requirements, test cases, hazards and acceptance evidence.
- Suggested activity: prepare a migration and service-readiness decision for operational handover.

FAQs

Who suits CBTC systems engineering training, and what does it assume?

CBTC systems engineering training suits signaling, integration, testing, operations, assurance and asset teams. It assumes experience with rail systems or metro operations and does not provide supplier certification.

How does CBTC systems engineering differ from general railway operations training?

CBTC systems engineering focuses on train-control architecture, functional allocation, communications, interfaces, testing and assurance. General railway operations training focuses on service delivery, rules and operational processes.

How are ATP, ATO and ATS integrated in a CBTC system?

ATP, ATO and ATS are integrated through allocated protection, driving and supervision functions, shared train-state information, defined subsystem interfaces and traceable operating and safety requirements.

What evidence supports CBTC testing and commissioning?

CBTC testing and commissioning use requirements traceability, interface baselines, functional test cases, defect records, hazard controls, configuration evidence and acceptance results linked to operating scenarios.

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What belongs in a CBTC operational-readiness decision?

A CBTC operational-readiness decision includes verified functions, interface status, safety evidence, migration controls, degraded-mode arrangements, staff handover needs and unresolved restrictions.

Conclusion

Participants take back a CBTC System Integration and Readiness File linking requirements, architecture, communications, interfaces, tests, hazards and operating decisions. The file improves traceability across design, verification and handover. It also supports coordination among signaling, integration, assurance, commissioning and operations teams.