JUPITER PRIME

Consulting • Training • Advisory

جوبيتر برايم للاستشارات والتدريب

COURSE BROCHURE

# Railway Safety Case and Risk Engineering Training Course

26 – 30 April 2027
Barcelona

**jupiterprime.uk**

info@jupiterprime.uk

Registered in the United Kingdom and Saudi Arabia

# Railway Safety Case and Risk Engineering Training Course

**Ref:** 1165_43815 **Date:** 26 – 30 April 2027 **Location:** Barcelona **Fees:** 6200 GBP

Railway Safety Case and Risk Engineering is a 1-week training course for rail systems engineers, safety assurance staff and asset reliability leads, and it produces a rail hazard log and safety argument outline. New metro and freight lines, automated signalling and ageing assets mean every change must be shown to be acceptably safe before service. Jupiter Prime Training runs this course on railway safety case and risk engineering.

## Why Railway Safety Case and Risk Engineering Matter Now

Three forces are reshaping rail safety assurance. Rapid network expansion brings new lines, rolling stock and interfaces that must be accepted by independent assessors before passengers or freight move. Digital train control, such as the European Rail Traffic Management System ERTMS and its European Train Control System ETCS layer, shifts hazards from track and drivers into software and data. Operators and maintainers, meanwhile, must keep older assets reliable while budgets tighten. A railway that builds clear hazard logs and evidence-based safety arguments gains approvals and avoids rework; one that treats safety as paperwork faces delays, incidents and loss of public trust. The course draws on railway RAMS reliability, availability, maintainability and safety lifecycle practice and the ERTMS specifications.

## Who Gains Most from Railway Safety Case and Risk Engineering

- Those who identify hazards on new lines, depots and system upgrades
- Those who write and maintain hazard logs and safety arguments
- Those who analyse reliability and failure data for rolling stock and infrastructure
- Those who prepare evidence for independent safety assessors
- Those who approve design changes and temporary works on operating railways

A rail operator, infrastructure manager or contractor gains most when its systems, safety and maintenance engineers attend together.

## Railway Safety Case and Risk Engineering Capabilities

Participants learn to turn hazards into controlled, evidenced claims that an assessor can follow.

- Apply structured hazard identification to rail interfaces and operations — systems engineer
- Assess risk using frequency, severity and exposure for train, track and station hazards — safety manager
- Calculate reliability and availability figures from failure records — asset reliability lead
- Specify safety requirements and allocate them to subsystems — design authority
- Build a goal-structured safety argument linking claims to evidence — independent assessor
- Communicate residual risk and operating restrictions to operations staff — control centre and depot

## Key Railway Safety Case and Risk Engineering Terms

- Hazard log — a live record of identified hazards, their causes, controls, owners and closure evidence.
- Safety case — a structured argument, supported by evidence, that a rail system is acceptably safe for a defined use.
- RAMS — reliability, availability, maintainability and safety, managed together across a rail system lifecycle.
- Safety integrity level — a band of required reliability for a safety function, driving design and verification rigour.
- Fault tree analysis — a top-down method tracing how combinations of failures lead to an undesired event.
- Independent safety assessor — a competent party, separate from the project, who judges whether the safety argument holds.

## Railway Safety Case and Risk Engineering Day by Day

### Day 1: Rail Safety Assurance Context

- Rail System Lifecycle and RAMS Phases — From Concept to Decommissioning
- Roles in Safety Acceptance — Design Authority, Operator and Assessor
- Rail Hazard Families — Derailment, Collision, Platform and Electrical
- Digital Train Control Changes — ERTMS and ETCS Hazard Shifts
- Risk Acceptance Principles — Codes of Practice, Reference Systems, Estimation

### Day 2: Hazard Identification and Risk Assessment

- Structured Hazard Identification Sessions — What-If and HAZOP for Rail
- Interface Hazard Analysis — Track, Train, Signalling and Station
- Risk Matrices and Tolerability — Frequency, Severity and Exposure
- Hazard Log Structure — Causes, Controls, Owners and Status
- Human Factors in Rail Operations — Driver, Controller and Maintainer Error

### Day 3: Reliability and Failure Analysis

- Failure Mode and Effects Analysis — Rolling Stock and Points Machines
- Fault Tree Analysis — Signal Passed at Danger Scenarios
- Reliability and Availability Metrics — Failure Rates and Downtime
- Safety Integrity Levels — Allocating Requirements to Functions
- Maintenance Data for Reliability Growth — Learning From Defect Records

### Day 4: Building the Safety Argument

- Goal Structuring Notation — Claims, Arguments and Evidence
- Safety Requirements Traceability — From Hazard to Test Record
- Verification and Validation Evidence — Tests, Inspections and Trials
- Assessor Engagement — Preparing for Independent Review
- Operating Restrictions and Residual Risk — Handover to Operations

## Day 5: Practising the Hazard Log and Safety Argument

- Depot Upgrade Case — Applying Day 2 Hazard Methods
- Points Failure Reliability Study — Applying Day 3 Analysis
- Signalling Change Safety Argument — Applying Day 4 Structure
- Assessor Challenge Session — Defending Claims and Evidence
- Rail Hazard Log and Safety Argument Outline — Hazards, Controls and Evidence

## Applying Railway Safety Case and Risk Engineering After the Course

- Review the hazard log for one active project and close or re-own any hazard without current evidence.
- Run a fault tree on the most frequent service-affecting failure and agree two design or maintenance actions.

## Railway Safety Case and Risk Engineering Questions FAQ

### What is railway safety case and risk engineering and why does it matter now?

It is the method of identifying rail hazards, controlling them and proving the result in a structured argument. Network growth and digital signalling mean more changes now need formal safety acceptance.

### Which roles gain most from railway safety case and risk engineering training?

Rail systems engineers, safety assurance staff, reliability leads and maintenance engineers working on lines, depots and rolling stock gain most.

### How does railway safety case and risk engineering differ from a general occupational safety course?

It addresses system safety: train control, interfaces, reliability and acceptance by assessors. A general occupational safety course focuses on workplace injuries, permits and personal protection.

### What do you bring back from railway safety case and risk engineering training?

You bring back a hazard log, a fault tree study and a safety argument outline built on a realistic rail change.

## Railway Safety Case and Risk Engineering: The Way Forward

The rail hazard log and safety argument outline connects each hazard to its controls and supporting evidence. Its first use is deciding whether a planned change is ready for assessor review, and it serves systems, safety and maintenance engineers. After the first acceptance milestone, revisit which evidence assessors challenged and how hazard owners kept the log current.