Human Factors and Human Error Prevention: Task Analysis, HEART and Procedure Design

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Introduction:

In high-hazard operations, human factors and human error prevention decide whether a valve line-up, an isolation or a shift handover goes to plan, yet many sites still treat error as a training or discipline issue after the event. Prevention starts earlier: in how tasks, procedures, rosters and interfaces are designed. This Core Concept course equips HSE, operations and engineering staff to analyse safety-critical tasks, estimate human error likelihood and design the controls that make errors less likely and easier to recover. Participants produce a Safety-Critical Task Human Factors Review Pack for a real task.

Course Objectives:

- Explain human performance and error at work using skill-, rule- and knowledge-based performance levels and the slips, lapses, mistakes and violations taxonomy
- Identify safety-critical tasks and break them down with hierarchical task analysis to locate credible human failures at each step
- Estimate human error probability for a task step using HEART and judge when another human reliability method fits better
- Design procedures, checklists and handover protocols that reduce error likelihood and support recovery
- Assess fatigue, workplace and interface conditions that shape performance and propose design, procedural or organisational controls
- Produce a Safety-Critical Task Human Factors Review Pack that embeds human factors into projects, change and daily operations

Target Audience:

- HSE practitioners responsible for human factors input to risk assessments and safety cases
- Operations and shift leads accountable for safety-critical tasks, handovers and rosters
- Process, instrument and maintenance engineers responsible for task, equipment and interface design
- Procedure writers and technical trainers responsible for operating and maintenance instructions
- Asset integrity and reliability specialists reviewing maintenance and isolation errors

Course Outline:

Day 1: Human Factors Foundations and Human Performance at Work

- Human Factors Definition: Job, Individual and Organisation Influences
- Skill-, Rule- and Knowledge-Based Performance Levels in the SRK Model
- Slips, Lapses, Mistakes and Routine or Exceptional Violations
- Performance Shaping Factors: Stress, Cognitive Load, Workload and Fatigue
- Site Human Factors Maturity Self-Assessment Checklist

Day 2: Task Analysis and Human Reliability Assessment Methods

- Hierarchical Task Analysis Diagram and Plan Notation
- Safety-Critical Task Identification and Screening Matrix
- Human Error Identification Guidewords Applied at Each Task Step
- HEART at Overview: Generic Task Types, Error Producing Conditions and Proportion of Affect
- THERP and CREAM at Overview: Selecting a Human Reliability Method

Day 3: Designing Procedures, Checklists and Critical Communications

- Procedure Criticality Rating and Format Choice: Checklist, Job Aid or Full Procedure
- Procedure Step Structure, Warnings, Hold Points and Verification Signatures
- Checklist Design: Do-Confirm Versus Read-Do Formats
- Shift Handover Log and Permit-to-Work Communication Protocols
- Procedure Usability Walkthrough With Operators and Technicians

Day 4: Fatigue, Interfaces, Maintenance Error Traps and Learning

- Fatigue Risk Assessment for Shift Rosters, Night Work and Extended Hours
- Control Room and HMI Human Factors at Overview: Layout, Displays and Workload
- Maintenance Error Traps: Isolation, Reassembly and Post-Maintenance Testing
- HFACS Coding of Past Events to Reveal Recurring Error Producing Conditions
- Just Culture Principles and Learning Team Session Format

Day 5: Case Work: Safety-Critical Task Human Factors Review

- Guided Case: Tank Transfer Line-Up Task Analysis and HEART Estimate
- Guided Case: Night-Shift Isolation Task Fatigue and Procedure Review
- Error Reduction Options Ranked by Design, Procedural and Organisational Control
- Human Factors Integration Plan for Projects, Change and Routine Operations
- Safety-Critical Task Human Factors Review Pack Presentation and Peer Challenge

Skills You Will Gain:

- Human Performance Analysis
- Hierarchical Task Analysis
- Safety-Critical Task Screening
- Human Reliability Estimation
- Procedure and Checklist Design
- Fatigue Risk Assessment
- Human Factors Integration
- Learning Team Facilitation

Why Attend This Course:

- Return with a Safety-Critical Task Human Factors Review Pack built on a task from your own site
- Replace retraining and reminders with design and procedure changes that remove error traps
- Put a defensible number on human error likelihood for a task step and show what reduces it
- Test task and procedure designs with peers from oil and gas, chemicals, power, aviation maintenance and mining

Conclusion:

Human error is predictable when tasks, procedures, rosters and interfaces are examined before work starts. The course moves from human performance levels, error types and performance shaping factors, through task analysis, safety-critical task screening and human reliability methods, to procedure, checklist and handover design, then fatigue, interfaces, maintenance error traps and learning from events. The final day applies these methods to guided cases and produces a Safety-Critical Task Human Factors Review Pack ready for use on site.