CONCEPT

Construction Equipment Management: Earthmoving Productivity, Fleet Matching and Machine Hour Cost

13 – 17 December 2026
Riyadh - KAFD district five-star



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Ref: 378_15766 **Date:** 13 – 17 December 2026 **Location:** Riyadh - KAFD district five-star **Fees:** 20000 SAR

Introduction:

Construction equipment management often fails on earthworks and civil projects because machines are chosen by habit, excavators and haul trucks are mismatched, productivity is guessed rather than estimated from cycle times, and plant sits idle or broken while the schedule slips. This Core Concept course trains contractor equipment planners, plant managers and project engineers to select and size an earthmoving fleet, estimate output per hour, price owning and operating cost per machine hour, decide between buying, leasing and renting, and track utilisation with telematics. Participants build an Equipment Plan and Cost Model for a project of their own.

Course Objectives:

- Classify earthmoving and construction machines by function and match each type to soil, haul distance and site conditions
- Estimate excavator, loader, dozer and haul truck productivity from cycle times, bucket fill, swell and job efficiency factors
- Balance a loading unit with its haul fleet using match factor analysis and size the fleet to a required daily production
- Calculate owning and operating cost per machine hour and compare buy, lease and rent options for a given project duration
- Load equipment onto the project schedule, level plant resources and set mobilisation and demobilisation dates
- Track plant utilisation, availability and fuel use with telematics data and act on idle time and breakdown trends

Target Audience:

- Professionals who plan and allocate earthmoving plant to contractor projects
- Professionals who run plant yards, equipment pools and site workshops for civil contractors
- Project and site engineers who estimate earthworks quantities, durations and equipment output
- Estimating and tendering staff who price plant cost into bids for roads, infrastructure and site preparation
- Project controls staff who schedule resources and report equipment cost against budget
- Owner-side and consultant engineers who review contractor equipment plans and productivity claims

Course Outline:

Day 1: Earthmoving and Construction Plant Types and Applications

- Machine Families Map: Excavators, Backhoes, Wheel Loaders, Dozers, Graders, Scrapers and Compactors
- Hauling Units: Rigid and Articulated Dump Trucks, Road Tippers and Haul Road Limits
- Mobile and Crawler Cranes at Overview: Duty Charts, Radius and Site Selection Factors
- Material Properties for Plant Selection: Bank, Loose and Compacted Volumes and Swell Factors
- Current Fleet Register and Plant Allocation Snapshot Template

Day 2: Productivity Estimating and Fleet Matching Models

- Cycle Time Build-Up: Load, Haul, Dump, Return and Spot Times
- Excavator and Loader Output: Bucket Capacity, Fill Factor and Job Efficiency Correction
- Dozer and Grader Production: Blade Capacity, Push Distance and Pass Counts
- Match Factor Method for Loader and Haul Truck Fleet Balancing
- Mass Haul Diagram: Cut and Fill Balance, Haul Distance and Borrow and Waste Decisions

Day 3: Owning and Operating Cost and Acquisition Decisions

- Owning Cost per Machine Hour: Depreciation, Interest, Insurance and Storage
- Operating Cost per Machine Hour: Fuel, Lubricants, Tyres or Undercarriage, Wear Parts and Operator
- Buy, Lease and Rent Decision Model Using Project Duration and Expected Utilisation
- Economic Life and Replacement Timing From Cumulative Cost per Hour Curves
- Internal Plant Hire Rates and Cost Recovery to Project Budgets

Day 4: Equipment Scheduling, Telematics and Plant Availability Risks

- Equipment Resource Loading and Levelling in the Project Schedule
- Mobilisation, Demobilisation and Transfer Planning Between Sites
- ISO/TS 15143-3:2016 Telematics Data: Engine Hours, Idle Time, Fuel Burn and Fault Codes
- Plant Availability, Utilisation and Mean Time Between Breakdowns Tracking on Site
- Equipment Safety at Overview: Pre-Start Checks, Blind Spots, Exclusion Zones and Spotter Rules

Day 5: Guided Earthworks Cases and the Equipment Plan and Cost Model

- Guided Case: Road Embankment Earthworks Fleet Sizing From a Mass Haul Diagram
- Guided Case: Site Preparation Package Rent Versus Own Decision for a Contractor
- Equipment Plan and Cost Model Build for a Participant Project
- Plant Performance Dashboard: Production per Hour, Cost per Cubic Metre and Utilisation
- Equipment Plan Presentation and Peer Challenge Panel

Skills You Will Gain:

- Plant Type Selection
- Cycle Time Analysis
- Fleet Match Factor Calculation
- Mass Haul Planning
- Machine Hour Costing
- Plant Acquisition Appraisal
- Equipment Resource Scheduling
- Telematics Utilisation Analysis

Why Attend This Course:

- Return with an Equipment Plan and Cost Model built on a project, quantities and machines of your own
- Challenge an optimistic productivity figure or a hire quotation with worked cycle time and cost per hour sheets
- Spot over-trucked or under-trucked loading operations and idle plant before they erode margin
- Compare plant practice with contractors and engineers working on roads, site preparation, utilities and infrastructure works

Conclusion:

Earthworks margins depend on putting the right machines on site, in the right numbers, for the right period. The course moves from plant types and material behaviour, through productivity estimating, cycle times, fleet matching and mass haul planning, to owning and operating cost, acquisition decisions and replacement timing, then to equipment scheduling, telematics, availability tracking and equipment safety. The final day applies those methods to road and site preparation cases and produces an Equipment Plan and Cost Model for each participant's project.