



Metallurgy for Non-Metallurgists: Alloy Types, Properties and Applications

DURATION

5 days

CONTACT HOURS

30

LEVEL

Foundation

FEE PER DELEGATE

US\$1,500

What metals do under load, heat and attack, for engineers who specify and inspect them without a metallurgy degree.

Most failures blamed on a material are decisions made earlier: the wrong grade for the service, a heat treatment skipped, a weld that changed the structure nobody checked afterwards. This week gives the engineers who make those decisions enough metallurgy to make them well. It stays practical throughout. Structure, phase and grain are covered because they explain behaviour, not for their own sake, and every property introduced is tied to something a participant has to specify, inspect or explain. By the end somebody should be able to read a material certificate properly, ask a supplier a useful question, and recognise a failure mode from the fracture surface.

Available as classroom, live online, in house.

Who it is for

Mechanical, maintenance, process and project engineers, inspectors and QA staff, procurement specialists buying materials, and technical managers who sign specifications.

What you will be able to do

- Relate structure and processing to the properties a specification asks for.
- Choose between carbon steel, low alloy, stainless and nickel alloys on the service rather than on habit.
- Read a material test certificate, and know what it does not tell you.
- Recognise the common failure modes from the evidence they leave.
- Anticipate what welding will do to a material before it is welded.

The outline

DAY 1

Structure and property

Crystal structure, grains, and why grain size matters · The iron carbon diagram, read as a working tool · Strength, ductility, toughness and hardness, and the trades between them · Tensile, impact and hardness testing, and what each actually measures

DAY 2

The alloy families

Carbon and low alloy steels · Stainless steels: austenitic, ferritic, martensitic and duplex · Nickel alloys, and where their cost is justified · Aluminium, copper and the lighter alloys

DAY 3

Heat treatment

Annealing, normalising, quenching and tempering · Hardenability, and what it means for section thickness · Post weld heat treatment, and why codes demand it · Sensitisation, and the stainless failure it causes

DAY 4

Welding metallurgy

What the heat affected zone becomes · Dissimilar metal joints · Hydrogen, hot cracking and cold cracking · Dilution and consumable choice

DAY 5

Degradation and failure

The corrosion mechanisms in one pass · Fatigue, creep and embrittlement · Reading a fracture surface · Building a case for a root cause rather than naming a culprit

What you leave with

- A material selection rationale for one real application, written down.
- A certificate review checklist.
- A failure mode reference tied to the materials on your own plant.

Published dates

DATES	WHERE	FEE
23 to 27 November 2026	Cairo, Egypt	US\$1,500
30 November 2026 to 4 December 2026	Kampala, Uganda	US\$1,500
7 to 11 December 2026	Maseru, Lesotho	R15,000
14 to 18 December 2026	Lagos, Nigeria	US\$1,500

Fees are per delegate and cover all materials and meals arranged by the delegate. Reg

Register or ask a question

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This copy was produced on 30 October 2026.