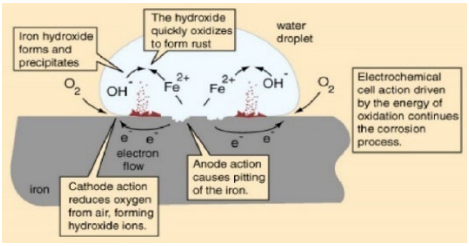
METALLURGY MATERIALS WORKSHOP

ENGINEERING TRAINING INSTITUTE AUSTRALIA

DR. CLAYTON THOMAS *PhD, MMet, BSc(Eng), ARSM, MICorr*

- Metallurgist for over 35 years with extensive experience in manufacturing and engineering and has worked on major projects both onshore and offshore.
- For last 20 years has been director of Lloyd-Thomas Consultancy Ltd.
- Presents at the University of Sheffield as well as the UK Institute of Materials, Minerals and Mining.



WORKSHOP SUMMARY 8 hours of CPD

Metals are still the major engineering material. Their alloying, heat treatment and fabrication has a major effect on their properties and how they behave in service. By correct processing and selection, costs may be reduced and failures prevented. Therefore, it is important that engineers and fabricators have a basic understanding of the materials they are using.

This workshop will allow both structural and mechanical engineers to fully understand the chemical, physical and structural properties of steels and the alloys that are included within them. The course will then address the potential failure of these metals with regards to fatigue, fracture and corrosion.

Tutorial exercises (and solutions) will follow at the end of each session.

PROGRAMME *(8.30am Zoom invite will be emailed)*

9.00 - 11.00 Session 1
- STEEL AND CAST IRON: MANUFACTURE AND MECHANICAL PROPERTIES

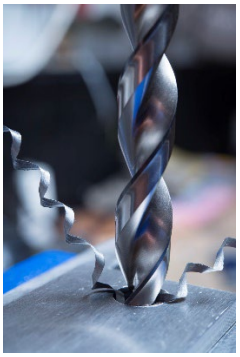
- The production of steel
- Tensile strength and the derivation of stress – strain curves
- Hardness and toughness testing
- Mechanical properties of typical steel and cast-iron grades
- Tutorial

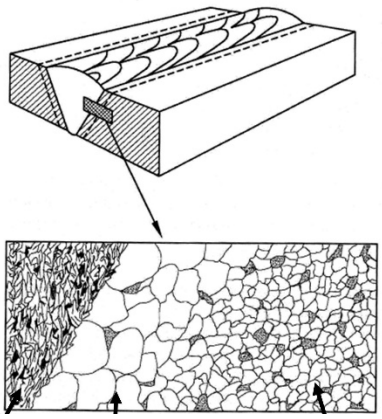
11.00 - 11.15 Morning Break

11.15 - 1.00 Session 2
- ALLOYING AND HEAT TREATMENT OF STEEL

- The role of microstructure and properties including grain size
- Phases in steel (eg Austenite, ferrite, bainite, martensite) and the different types of microstructure and how they are formed
- Alloying of steel (eg effect of C, Mn, Si, Cr, Ni, Mo, S, P, Al, V)
- Heat treatment of steel (eg annealing, normalising, quenching and tempering)
- Hardenability and heat treatment of steels including the treatment of structural grades
- Tutorial

1.00 - 1.30 Lunch Break





Livestreamed via zoom

1.30 - 3.00 Session 3
- FRACTURE & FATIGUE OF METALS
- FAILURE OF METALS

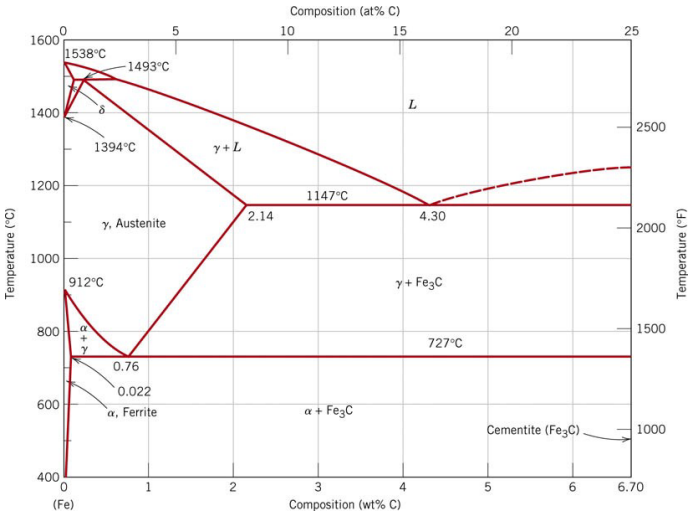
- Brittle and ductile fracture
- Fracture toughness testing
- Application of fracture mechanics
- Fatigue and crack growth
- Failure analysis
- Prevention of metal failures
- Tutorial

3.00 - 3.15 Afternoon Break

3.15 - 5.00 Session 4
- CORROSION OF METALS

- Types of corrosion and their mechanism
- Electrochemical basis for aqueous corrosion
- Oxidation of steel and the formation of rust
- Stainless steels and passivation
- Corrosion rates of steels in various environments
- Tutorial

Certificate of Attendances will be emailed



CALCULATORS REQUIRED

- One day course – **$755 pp**

FURTHER INFORMATION

- (02) 9899 7447
- +61 413 998 031
- registrations@etia.net.au

- *To register, visit our website* www.etia.net.au ***OR*** *scan the QR Code.*

Cancellations made more than 5 working days prior to a course will incur a 20% processing fee of the full registration amount.
Cancellations made 5 working days or less will incur forfeiture of the full registration fee.