

# MATERIALS & FORENSIC ENGINEERING

*TAWFIK has undertaken numerous forensic engineering investigations in material and mechanical system failures, complex construction disputes, product liability, manufacturing defects, industrial accidents & component damage.*

## INSPECTIONS

- Detailed visual examinations, site condition/corrosion surveys
- Weld inspections, weld profile measurements, metal thickness measurements, coating inspection
- Quality control (QC) and quality assurance (QA) examinations of finished products, equipment and processes
- Witnessing and surveillance of qualification tests and production trials of construction materials and products

## MATERIALS ENGINEERING

- Durability management plans (DMP) and specifications of construction material, coatings, for atmospheric, buried and immersed exposure environments
- Product/asset integrity review: mechanical, metallurgical, destructive/non-destructive examinations
- Corrosion and failure risk assessments
- In-situ crack, strain/stress monitoring measurements and defect detection through structural health monitoring
- Product conformity and performance assessment by testing against client and statutory requirements
- Physical metallurgy, corrosion, fatigue analysis, tribology (wear), thermal-stress analysis
- Characterisation of metals/alloys, polymers, composites, surface/heat treatments, weldments, coatings
- Weld process qualification, specification, training, witnessing & verification

## FORENSIC ENGINEERING

- Coordinating failure investigations including, evidence collection, recovery, cataloguing & documentation
- Defect evaluations, chemical/mechanical/thermal/water damage assessments of assets and products
- Vetting specifications, design drawings, test reports, material certificates & inspection test plans
- Expert review and interpretation of relevant industry standards and codes of practice
- Construction material, protective coatings, and mechanical failure analysis
- Fabrication and/or manufacturing process failure analysis
- Evaluation of structure, plant or product non-conformance for durability or performance
- Industrial and personal accident investigations
- Intellectual property breach investigations in manufacturing processes, construction materials and products
- Failure modes and Effect Analysis, Root Cause Analysis (RCA) to allocate liability
- Forensic data analysis
- Fractographic analysis to identify deterioration and/or failure mechanisms
- Detailed macroscopic and microscopic examinations
- Stereomicroscopy & Scanning Electron Microscopy (SEM) with Energy Dispersive X-ray Spectroscopy (EDX)
- Fitness for purpose, quality and compliance assessments of finished products

## EXPERT WITNESS

- Impartial expert witness reporting for litigation and insurance
- Concurrent expert evidence and joint expert reporting
- Presenting expert evidence in litigation and arbitration proceedings
- In-situ expert technical support throughout litigation and arbitration

**tawfik**

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