

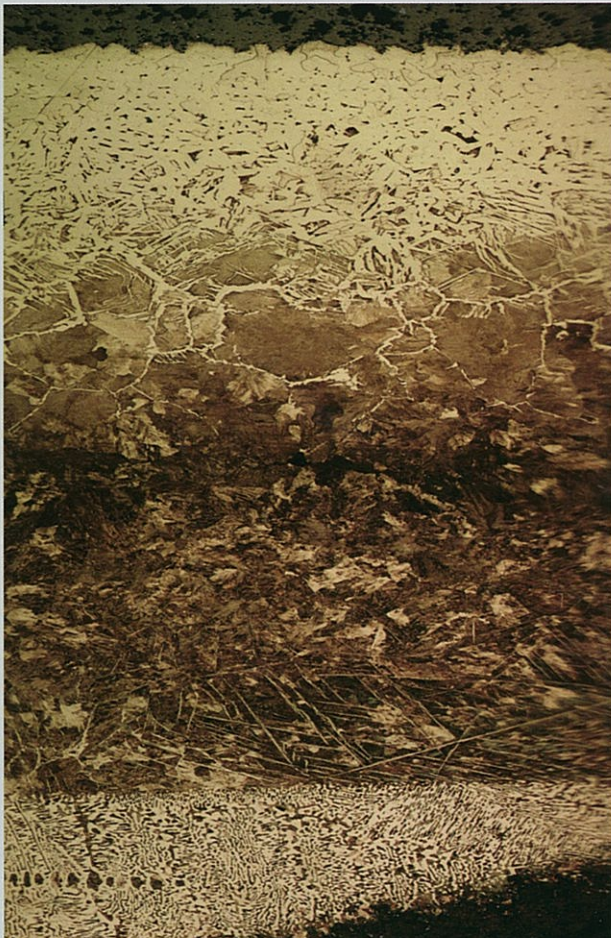


OUR HISTORY

Forensic Services was established in Malaysia in 1986 and has grown to a full time staff of 25 who carry out in excess of 200 investigations per year throughout Asia.

CONSULTANTS

Our consultants are professionally qualified in chemical engineering, mechanical engineering, electrical engineering, metallurgy, chemistry and forensic science. They have appeared as expert witnesses in courts in Australia, Malaysia, Thailand, Singapore, Taiwan, USA and the Philippines.



Range of microstructures seen across the wall of a failed thermal oil heater tube



FSA determined the gantry collapsed as a result of poor welding

METALLURGICAL EXPERTISE

Forensic Services carries out metallurgical failure analyses for industry, insurance companies and the legal profession. Examples follow

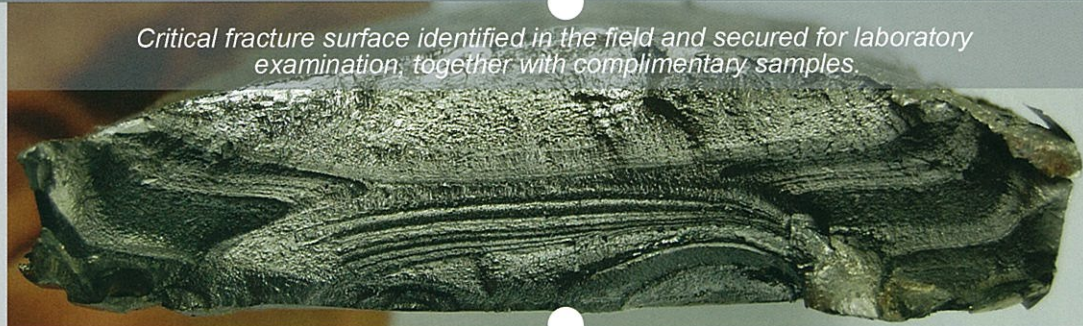
- Boiler failures ranging from LP boilers at small factories; plantation and refinery boilers; through to failures at HP boilers and recovery boilers in the paper pulp industry.
- Over 100 turbine failures at palm oil mills and power stations in Malaysia, Thailand, Indonesia and Philippines.
- High alloy reformer tube failures.
- Chemical reactor failures at polymer manufacturers.
- Drill stem and wire rope failures on drilling rigs.
- Mining industry failures of dredge buckets, pulverisers and gyratory crushers.
- Pumps and hydrogen and oxygen compressors.
- Corrosion and fatigue failures of tube bundles, flat plate & spiral heat exchangers, die blocks & moulds. Cooling towers, silos, tanks, railway lines, elevator ropes, compressors, canned foods & drinks.

FROM SITE TO LABORATORY

Forensic Services has turbine engineers, metallurgists and electrical engineers who regularly go to accident sites, carry out investigations and bring samples back for laboratory examination. The photographs on this page show the stages of one investigation.

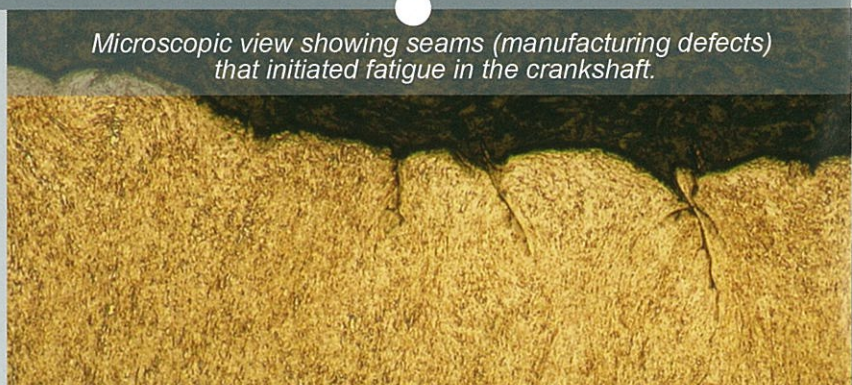


Our skill at field examination shortcuts the investigation process, enabling concentration on the right items.



We understand the importance of control samples and documentation of evidence, making sure the correct samples go to the laboratory.

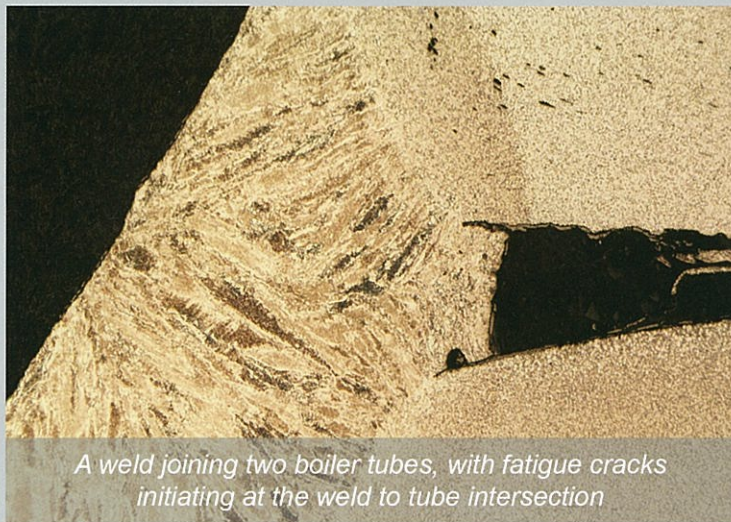
The experience of our consultants is available to guide our clients through the investigation process.



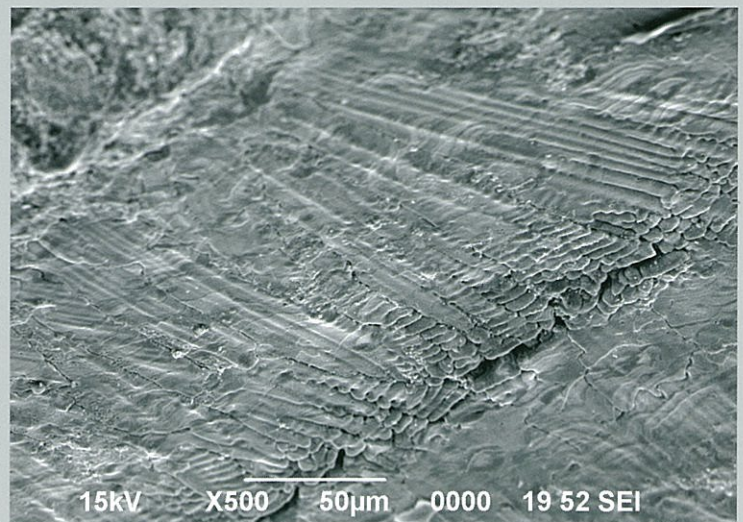
FAILURE ANALYSIS = EXPERTISE + EXPERIENCE + LABORATORY



Macro and microscopic examination is at the core of our laboratory. We are skilled at taking the critical photographs that illustrate the failure mechanisms that are occurring.



A weld joining two boiler tubes, with fatigue cracks initiating at the weld to tube intersection



LABORATORY CAPABILITY

Our laboratory facilities allow us to carry out the following basic metallurgical tests.

- Macrophotography.
- Metallographic preparation
- Microscopic examination of microstructures
- Hardness testing
- Microhardness testing
- Positive material identification by XRF.

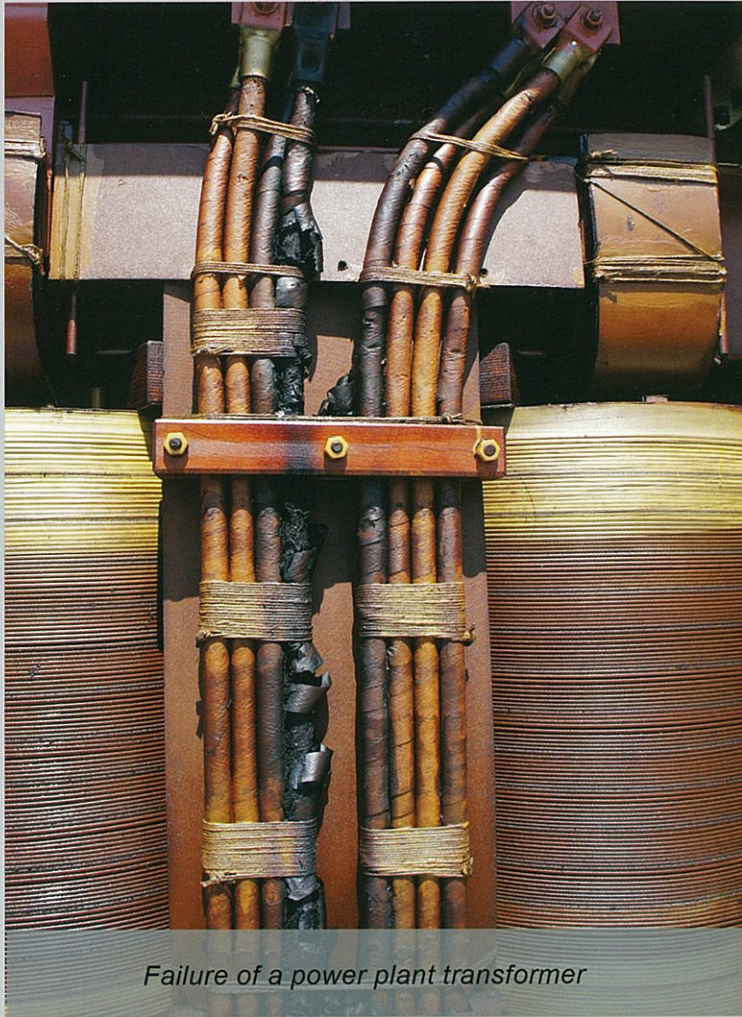
ADDITIONAL FACILITIES

We have arrangements with local institutions and industry that allows us to have a wide range of other testing performed if found necessary. These include

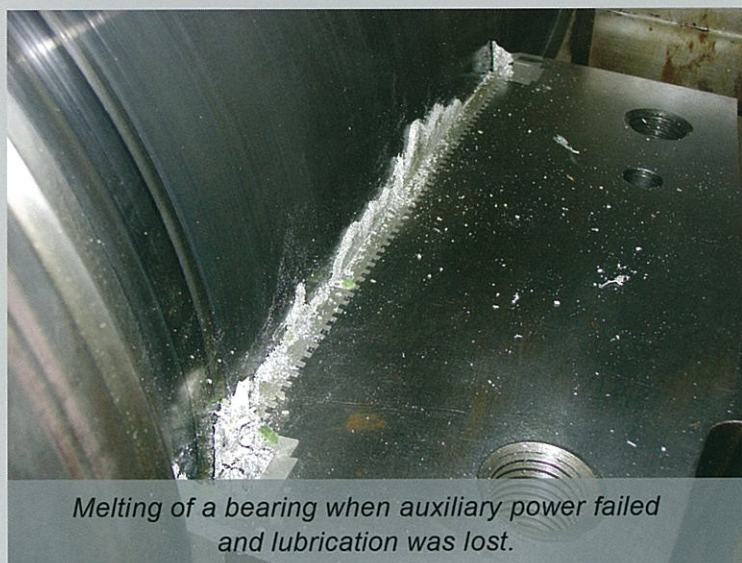
- Scanning electron microscopy
- EDX analysis
- X-ray diffraction
- Chemical analysis

WIDE EXPERTISE

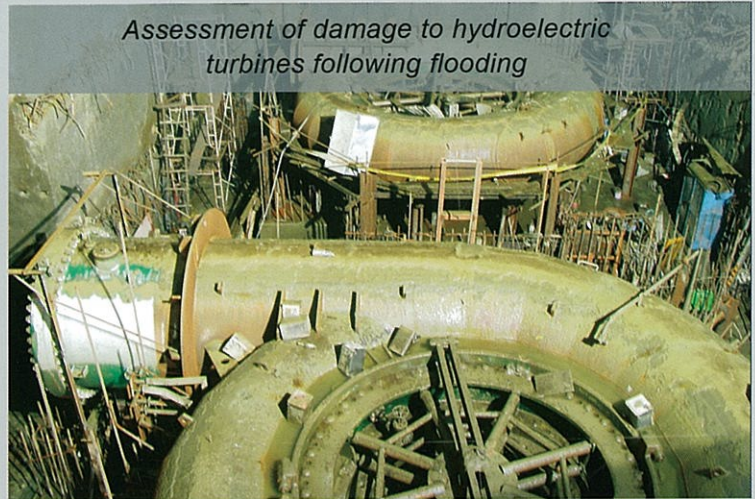
A feature of the service we offer is our wide expertise, which extends to generator and transformer failures at power plants.



Failure of a power plant transformer



Melting of a bearing when auxiliary power failed and lubrication was lost.



Assessment of damage to hydroelectric turbines following flooding



Examination of thinning of blades by erosion at a hydroelectric plant



Damage assessment of a turbine rotor set after a road accident

Forensic Services (M) Sdn Bhd

12A Jalan Mesra, 55000 Kuala Lumpur, Malaysia. Tel: +603 2145 2022 Fax: +603 2145 1022

Forensic Services Asia Pte Ltd

51 Goldhill Plaza, #07-10/11, Singapore 308900. Tel: +65 6240 6899 Fax: +65 6354 3261

Website: www.forensic.cc **Email:** office@forensic.cc