

PUBLICATIONS

The Tribology Handbook

A Tribology Casebook

Mechanical Seal Practice for Improved Performance

Bearings - A Tribology Handbook

Component Failures, Maintenance and Repair –
A Tribology Handbook

Couplings and Shaft Alignment

Drives and Seals – A Tribology Handbook

Engineering Measurements, Methods and Intrinsic Errors

Flexible Couplings

Guide to the Condition Monitoring of Machinery

Lubrication – A Tribology Handbook

Piston Ring Design

Precision Forming

An Introductory Guide To Industrial Tribology

Lubrication and Reliability Handbook



NEALE CONSULTING ENGINEERS LTD

For more details please visit our website

www.tribology.co.uk

NEALE CONSULTING ENGINEERS LTD

Highfield, Pilcot Hill, Dogmersfield,

Hants RG27 8SX. UK

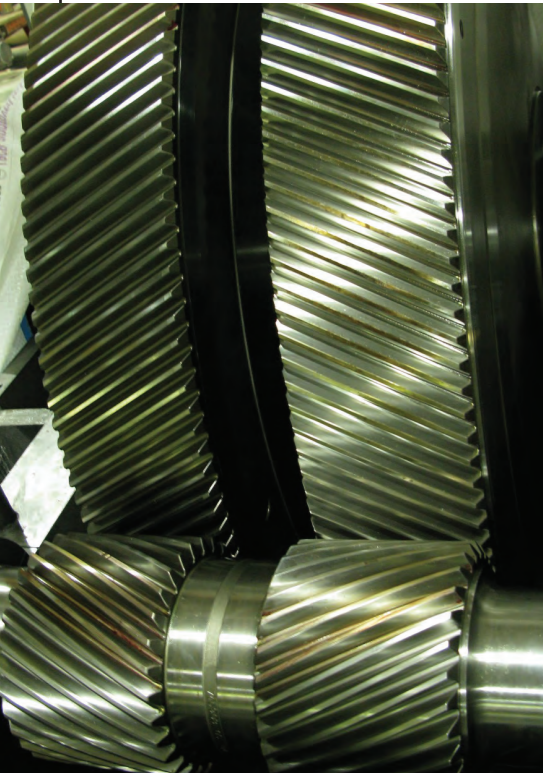
Tel: +44(0) 1252 629199

Fax +44(0) 1252 815625

www.tribology.co.uk

ncel@tribology.co.uk

COMPANY OVERVIEW



Neale Consulting Engineers Limited has about 50 years experience of solving machinery problems worldwide. Founded in 1962 by Michael Neale, a past President of the Institution of Mechanical Engineers with career experience at Rolls Royce and Glacier Bearings, our area of specialisation is Tribology, the science of surfaces moving with relative motion. This covers friction, wear and lubrication, fundamental factors in determining machine reliability. Our principal expertise areas are bearings (both rolling element and plain bearings), gears and gearboxes, seals and lubrication. Our consultancy consists of a team of highly qualified and widely experienced engineers supported by associates with specific expertise, who are called upon as required.

Our main role is as trouble-shooters, investigating the causes of problems and devising practical and economical solutions. We frequently get involved in failure and accident investigations, and we also provide design advice, design audits, and assistance with development of new machinery and devices.

Our engineers all have extensive experience of Expert Witness work, and we also present practical courses to engineers on tribological topics.



OUR STRENGTHS

We have extensive experience of machinery and bearing/gear/seal problems, combined with a detailed understanding of the design of these components, and their failure mechanisms. This enables us to adopt a holistic approach to problem solving; for example, bearing failures are not approached in isolation since the problem is often found not to be with the bearing itself but with the design of the particular machine, the bearing selection or its operating conditions. It is the relatively moving parts of machines which fail most often, because they combine load and movement in one area, which provides the necessary energy for a failure to be generated, but the root cause of the failure may be something outside the bearing itself.

OUR ACTIVITIES



ROLLING ELEMENT BEARINGS

- Sudden premature catastrophic failures of ball bearings on large electric motors driving boil off gas compressors on LNG tankers.
- Spherical roller bearing failures on power take off shaft of large marine gearbox.
- Train axle box taper rolling bearing failures. (Investigation and expert witness work)
- Large slewing bearing on a Single buoy mooring following collision by oil tanker. (Expert witness)
- Large spherical roller thrust bearing, supporting the weight of a rotating tower on a building, which failed suddenly after a few months in service.
- Analysis of premature fatigue failures of wind turbine main shaft bearings.

GEARS AND GEARBOXES

- Expert witness in sewage plant aerator gearbox failure dispute.
- Wind turbine gearbox failure investigations.
- Premature failures of gearboxes on power station cooling tower fan drives.

SEALS

- Expert witness on epicyclic gearbox oil seal leakage dispute.
- Expert witness on drill ship winch failure caused by grease leakage from gear coupling onto winch disc brake due to inadequate sealing.
- Study of the market for dry gas seals.

PLAIN BEARINGS

- Investigation of sudden catastrophic failures of crankpin bearings on 1.5 MW high speed Diesel engines in generator applications.
- Analysis of failure of tilting pad thrust bearings on a multistage sub-sea pump.
- Design and advice on testing of product lubricated dishwasher pump plain journal bearing.
- Wear prediction of dry rubbing motorway bridge bearing.
- Investigation of paper mill roll hydrostatic bearing failure.
- Investigations of large tilting pad thrust bearings in hydropower turbines.
- Performance comparison of various materials for marine sterntube bearings.

OTHER TRIBOLOGY PROJECTS

- Escalator step chain wear – development of improved long-life, low-maintenance designs.
- Passenger lift cables, premature degradation from combined wear and fatigue.
- Performance assessment and design advice on long chain conveyor systems in factories and postal sorting offices.
- Development assistance on tribological aspects of Jacquard machine mechanisms.
- Design of slewing system for the rotating enclosure on a large optical telescope.
- Design and development assistance on water powered hydraulic motors.
- Survey of industrial wear problems in the UK.
- Assistance with design and development of tribological aspects of a downhole pipe expansion tool.
- Development of a tribological test rig for assessing performance of polymeric rubbing bearing materials.
- Investigation of failures of roller screw jacks used on a swing bridge mechanism.
- Investigation of premature wire rope failures on a stacker crane.
- Studies of piston ring and cylinder liner wear on highly rated Diesel engines.

EXAMPLE PROJECTS

- In a patent dispute relating to the lubrication of the parts of small engines, the use of oil splash from the moving components was established as a well known technique. An attempt was made to patent this already established technique in order to claim damages from a major engine builder, using these techniques. Our presentation to the European Court resulted in the court revoking the patent, and thus relieving the engine builder of any claim.
- A fatal crash of a passenger aircraft was traced to the failure of a screw actuator which controlled the tailplane incidence. The actuator used a bronze nut/steel screw combination, and a major factor in the failure was a transition from mild wear to severe wear under marginal lubrication conditions, which had not been identified by the wear monitoring procedure. There were a number of other contributing factors, as is often the case with accidents and failures.
- The examination of a main bearing of a marine diesel engine showed rubbing damage in its bore. This was found to be due to an insert sleeve in the bearing housing having a raised area in one position, causing the bearing shell to distort and rub locally on the crankshaft.
- Investigations of gearbox failures in cooling tower fan drives. Several such problems have been investigated, with causes ranging from water contamination of the lubricant, to resonant vibrations in the drive system.
- Investigations of various wind turbine gearbox failures. Causes included incorrect assembly procedures, and inadequate allowance for transient loads and shock/vibration effects in the driveline.

PRINCIPAL CONSULTANTS

Michael Neale

***OBE, BSc(Eng), DIC, FCGI,
WhSch, FEng, FIMechE***

Michael Neale, a past president of the IMechE, started his career as an engineering apprentice at Rolls Royce for five years together with a successful study for an honours degree in engineering. He now has 50 years experience as a consulting engineer solving problems with machinery and accidents, all over the world. He is an expert in the moving parts of machines such as bearings, gears, and seals etc and their friction lubrication and wear,

Sandy Polak

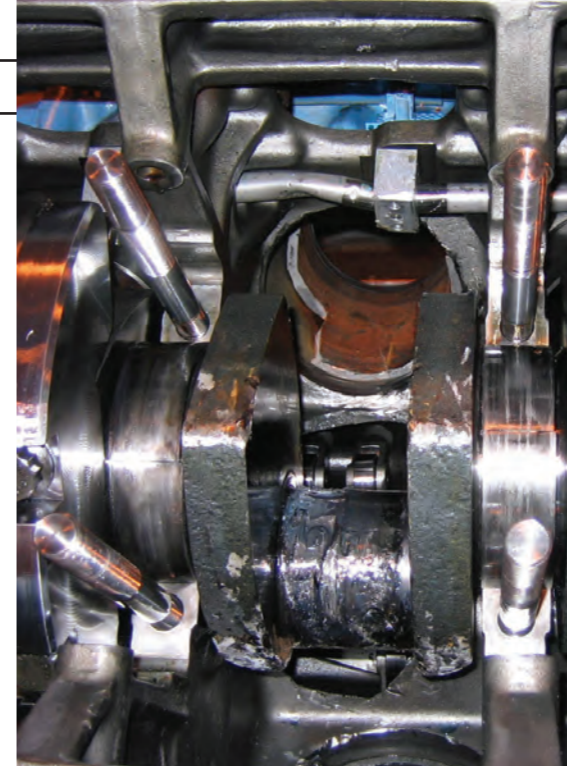
MA, CEng, MIMechE

Sandy has a 1st class degree from Cambridge, and in his early career worked with Mather & Platt, and Ricardo Consulting Engineers. He joined Neale Consulting Engineers in 1983, and has worked on a wide variety of projects in many industries. Areas of specialisation include engines, gearboxes, hydrodynamic bearings and rolling bearings. He also has a strong interest in renewable energy and appropriate technology projects.

David Harrison

MA, PhD, CEng, FIMechE

David has a 1st class degree and PhD from Cambridge; his degree was in Engineering and his research covered Rail Corrugations. He has 20 years experience with BP as a team leader in mechanical engineering research and as a senior mechanical engineer in operational integrity with BP Exploration. Since joining Neale Consulting Engineers in 1999 he has worked on a wide variety of assignments. His particular areas of expertise are rolling element bearings and seals.



Roger Allen

BA, CEng, MIMechE

Specialising in rotating machinery for the oil, gas and power industries. This includes; turbines (steam, gas and wind), compressors, engines and pumps. Having worked for original equipment manufacturers, owner/operators and contractors in these industries he has a good grasp of problems and solutions that all too frequently face all sides of industry. Roger joined Neale Consulting Engineers in 1999 and has worked on a wide variety of assignments and has extensive International experience.



Our team of Principal Consultants is supported by a network of Associate Consultants who contribute expertise in complementary areas.