



SANDY POLAK

Mechanical Engineer/Tribology Specialist

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Sandy has worked for Neale Consulting Engineers since 1982 and concurrently works as a consultant on machinery and tribology investigations at Brookes Bell since 2015. Sandy is responsible for troubleshooting and finding solutions to problems with machinery of all types, in a wide variety of industries and locations around the world. Specialist knowledge in tribological components (bearings, gears, seals, couplings, etc.), lubrication, vibration, and related topics such as condition monitoring.

Academic Qualifications

BA (Cantab) 1st Class Hons
MA (Engineering)
CEng, MIMechE (Institution of Mechanical Engineers)
E.I.T.B. Fellowship in Manufacturing Management

Previous Employment History

Loughborough University, Mech. Eng. Department - Research Associate

One-year contract on a combustion research project. Responsible for design and operation of system for fast data acquisition from running engines.

Ricardo Consulting Engineers, Shoreham by Sea - Development Engineer & Design Analyst

Development Engineer - Practical development work on diesel and other engines. Responsible for organising and running engine tests, and analysing results.

Design Analyst - Design and analysis of components for engines of all types and sizes. Development of computer programs for engine simulation and automated design of specific components.

The Royal Society Aldabra Research Station, Seychelles - Maintenance Technician

Maintaining all mechanical and electrical equipment.

Surveying and Consultancy Experience

Investigation of premature wire rope failures on passenger lifts for a metropolitan rail operator. The cause was found to be principally that the system design was inappropriate for the high-cycle operating duty (although it fully complied with the design standards), and a contributing factor was insufficient lubrication.

Investigation of bearing damage and vibration problems on a steam-turbine-driven multi-stage gas compressor set in an oil refinery. The problem was found to be a combination of assembly tolerance variations and contamination of the lubrication system.

Design of a novel hydrodynamic combined slider/rotary bearing for an innovative IC engine crank mechanism. Testing demonstrated the bearing was robust and efficient.

Analysis of vibration problems with conveyor drive systems on a coal handling plant. Design deficiencies were discovered, and modifications were devised to cure the problems.

Investigation of catastrophic failure of a ship's engine. The reason was found to be dirt contamination from incorrect maintenance or overhaul procedure.

Review of new gearbox design for a high-performance motorcycle. Various potential weaknesses were found, and appropriate modifications were devised.

Assistance with development of a range of textile machines, during which a new mechanism concept was devised and implemented. This resulted in reduced cost and substantially improved reliability.

Investigation of the reasons for increasing unreliability of a large number of sewage aerators. A detailed specification was written for replacement equipment to ensure maximum reliability.

Analysis of failures and problems on an appropriate technology windmill, followed by complete re-design and testing. The product has demonstrated reliable operation in a number of developing countries.

Investigation of failure of a coupling system used on railway carriages. Design and maintenance improvements were devised to ensure safe operation.

Design of ultra high-speed bearing systems for a flywheel energy storage device. Unusual operating conditions required novel solutions, which were subsequently patented by the client.

Machinery types worked on:

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|---------------------|---------------------------|----------------------|
| –Aircraft equipment | –Flexible couplings | –Pumps |
| –Clutches | –Gearboxes | –Sewage equipment |
| –Compressors | –Generator sets | –Steel rolling mills |
| – Conveyors | – Hydraulic equipment | – Test rigs |
| – Cooling towers | – IC engines | – Textile machinery |
| – Diesel engines | – Medical equipment | – Vehicles |
| – Electric motors | – Offshore equipment | – Water turbines |
| – Escalators | – Paper mills | – Winches |
| – Fans | – Power station equipment | – Wind turbines |

Principal consultant on over 200 client assignments, part of team on a further 100+.

Presentation of results to board directors, engineers, or fitters/technicians as appropriate.

Experienced at giving evidence as expert witness in legal cases including personal accidents, machinery failures, and patent disputes.

Lecturer on courses for engineers run by NCEL, also presented papers at various technical conferences.

Named inventor or co-inventor in 4 patents, and also received the Worshipful Company of Turners silver medal for the design of a windmill pumping system for developing countries.

List of Recent Publications

Books

Engineering Measurements: Methods and Intrinsic Errors,
T A Polak & C Pande, Professional Engineering Publications.

The Tribology Handbook, 2nd Ed. Editor: M J Neale, Butterworth Heinemann.
(Contributed sections on one-way clutches, and cams and followers)

Technical Papers

Bearing failures due to thermal transients: diagnosis, analysis and solutions. World Tribology Congress, September 1997, London.

Gearbox and gear system problems. I Mech E Gearing seminar.

Client Reports

Principal author of over 200 client investigation reports in last 20 years. Contributions to numerous other reports.

Examples of Expert Witness Reports

Improver Corporation -v- Remington Consumer Ltd. A study of 2 hair removing devices and the patents relating to them. TRD392.

Seaforth -v- Rustons. An investigation of a breakdown and damage to a Rustons 6 RKCM Diesel engine. FRR396.

Tilda Rice -v- South Glamorgan Trading Standards. An investigation of Rice Processing and Packing Plant. TRT405.

Par Fox -v- Erin. A study of two extensible suspension devices and the patents relating to them. TRP432.

Regina -v- Eamon Michael Campbell. Technical report on the safety of an articulated vehicle. ERT470.

Hansen Transmissions -v- Qualter Hall. Analysis of problems with conveyor drives at Drax power station. LRQ 577. P502.

Always Engineering Ltd -v- Newmec Engineering Ltd. Independent analysis of ball castor units. LRA 592. P524.

Cummins Power Generation Ltd -v- China Petroleum Engineering Construction Corporation. (International Arbitration). Technical assessment of specifications of diesel generating sets. LRZ610 P512.

Dubai Shipping Company. Analysis of bearing problems on 2 ships' engines. The client requested this report in contemplation of taking action against the shipbuilder and engine supplier. Ultimately no action was taken, despite a good technical case. Ref P616.

CHS Engineering Ltd -v- Robert Kellow. Dispute over the performance of a tyre shredding plant. Case settled. Ref P680.

Container Systems Ltd -v- Campsie. Dispute over performance and reliability of a conveyor and packaging system in a water bottling plant. Settled out of court. Ref P686.

Glasgow Science Centre -v- Carillion. Dispute over costs and losses associated with failure of the bearing system for a large rotating structure. Case settled at mediation, Ref P639.

(Client name confidential). Claims associated with collapse of a marine crane. Case pending. Report prepared in

David Brown Ltd -v- Alcoa. Dispute over repairs and downtime on a large gearbox in an aluminium rolling mill. Case settled at mediation.

(Note that many investigations carried out by the author were commissioned in anticipation of legal action, and the early clarification of the technical issues enabled the dispute to be resolved.)