



### THOMAS ALEXANDER (SANDY) POLAK

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Sandy Polak joined Brookes Bell as Consultant Tribologist in 2015 from Neale Consulting Engineers Ltd. He 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 using his specialist knowledge in tribological components (bearings, gears, seals, couplings etc.), lubrication, vibration, and related topics such as condition monitoring.

#### Typical assignments:-

- 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:-

Aircraft equipment	Flexible couplings	Pumps
Clutches	Gearboxes	Sewage equipment
Compressors	Generator sets	Steel rolling mills
Conveyors	Hydraulic equipment	Test rigs
Cooling towers	I C 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, also presented papers at various technical conferences.

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

**LIST OF PUBLICATIONS****Books:**

Engineering Measurements : Methods and Intrinsic Errors,  
T A Polak & C Pande, Professional Engineering Publications, 1999.

The Tribology Handbook, 2nd Ed. Editor: M J Neale, Butterworth Heinemann. 1995. (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, Sept. 1999.