

Historical Review

Tribology: How a word was coined 40 years ago

For centuries there was no word to describe the scientific concepts of friction, wear and lubrication. Now the entire world celebrates.

Editor's Note: March 9, 2006, marks the 40th anniversary of the word "tribology." Recently, the editors of TLT asked Dr. H. Peter Jost to jog his memory banks and describe the state of lubrication engineering in 1966 and how this word came to be. The following article contains the story, to the best of his recollection.



Dr. H. Peter Jost at the launch of an English government report on March 9, 1966, when the concept of the word "tribology" first entered the public domain.

In the early 1960s there was a steep increase in the reported failures of plant and machinery due to wear and associated causes, some causing heavy financial losses. Technology was improving and the cost to operate a plant was increasing. Continuous processes made machinery breakdowns more costly and serious than ever.

This trend was recognized by specialists involved in the subjects of friction, wear and lubrication. Numerous papers on

various facets of these subjects were presented. However, it was not until October 1964 that a Conference on Iron and Steel Works Lubrication, organized by the then Lubrication & Wear Group of the Institution of Mechanical Engineers and the Iron and

Steel Institute, revealed the magnitude of the problem and its occurrence on an international scale. The situation called for more and better education and for more and better coordinated research on a national scale.

An investigation starts

As a result, representations were made to the British government and a Working Group was set up by the then Minister of State for Education and Science, the Rt. Hon. Lord Bowden of Chesterfield. Its terms of reference: "To investigate the present state of lubrication education and research in this country and to give an opinion on the needs of industry thereof."

While trying to establish the reasons for the wide neglect of the subject in the past, despite its technological and economic importance, the Working Group found three principal reasons:

- First was the interdisciplinary nature of the subject, which includes engineering, physics, metallurgy and chemistry.



The Founding Fathers of Tribology

- Second, only with the technical advances in production methods of recent years had attention been focused on the importance and interdependence of the constituents of this interdisciplinary subject.
- Third, the term “lubrication,” used in its narrower sense, had not only prevented many people from fully appreciating the economic significance of the subject matter, it also was a misnomer for the description of the sphere of transference of force from one moving surface onto another when the surfaces were in relative motion. This occurred whether the purpose of the transfer of such forces was associated with high friction (brakes, clutches, tires) or, alternatively, with low friction (bearings, slides, etc.).

Lost for a word

There was no word in English or other known languages to describe the concept embracing these points. The chairman of the investigation, therefore, consulted the Oxford English Dictionary. The Greek word *tribos*, meaning “rubbing,” seemed to be the nearest expression covering this concept. It

was known that during World War II Bowden and Tabor had established a Tribo-physics Laboratory for the Commonwealth Science & Industry Research Organization (CDSIR) in Melbourne, Australia, but this was discontinued after Bowden and Tabor returned to the Cavendish Laboratory in Cambridge, England.

After due consideration, the term ‘tribology’ (triboscience or tribotechnology) was recommended for describing the subject matter. Tribology was defined as “the science and technology of interacting surfaces in relative motion and of related subjects and practices.”

On March 9, 1966, the English government published the Working Group’s report which confirmed the prognosis that had prompted its establishment. The report found a direct link between tribology education and research and progress in industrial efficiency and development. Potential savings of £515 million per annum (in 1966 terms) were estimated for industry by better application of tribological principles and practices.

The report suggested that as a nation whose livelihood was inextricably tied to the success of its exports and its industrial efficiency, the United Kingdom could not

The Rt. Hon. Lord Bowden of Chesterfield, minister of state for education and science, (sixth from the left) visited a meeting of the Working Group in July 1965. Also pictured (from left to right): Dr. J.G. Laverder, department of education and science; Mr. Solomons, ministry of technology; D.W. Tanner, department of education and science; A.D. Newman, Glacier Institute of Management; Dr. J.E. Garside, principal, Borough Polytechnic; Lord Bowden; Dr. H. Peter Jost, chairman of the Working Group; L.F. Hall, English Electric Co. Ltd.; Dr. D. Dowson, University of Leeds; J.G. Withers, British Petroleum Co. Ltd.; R.P. Langston, ministry of defence and D. Scott, National Engineering Laboratory.

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afford to overlook the economic, industrial and commercial advantages to be gained by further study of tribology. The report made a number of recommendations dealing with research, education and information. It also called for the establishment of Centres or Institutes of Tribology and a handbook on tribo-design and engineering to be made available to all designers and works engineers.

Tribology takes off

After consideration of the report by government departments, the Rt. Hon. Anthony Wedgwood Benn, MP, then Minister of Technology, announced to the House of Commons on Aug. 11, 1966, the establishment of

a committee to advise on the implementation of the recommendations contained in the report issued by the Ministry of Education and Science. The committee was to be called Committee on Tribology and composed of industrial executives, senior members from the academic and research world and department representatives.

By the end of September 1966, all preparatory work had been completed, and on Sept. 26 the Committee on Tribology was introduced at a press conference, chaired by Wedgwood Benn.

According to *Hansard*, the official procedures publication for the House of Commons, the following were included among the committee's duties:

Life in 1966

What was life like 40 years ago when the word "tribology" was first coined? These factoids might bring back a few memories.

Lyndon B. Johnson was president of the United States. Hubert H. Humphrey was vice president.

U.S. population: 197 million. World population: 3.4 billion.

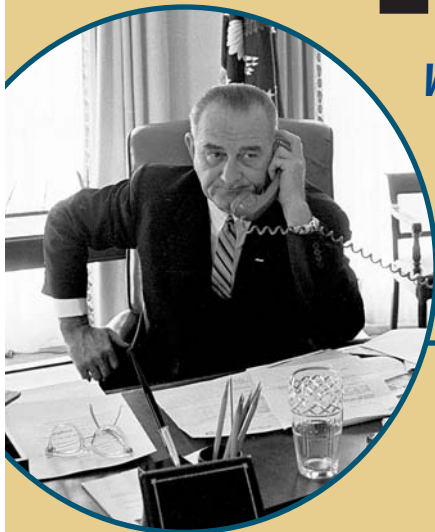
Life expectancy for a U.S. citizen: 70.2 years.

Cost of a U.S. postage stamp: 5 cents.

Supreme Court decides *Miranda vs. Arizona*, protecting the rights of the accused.

FDA declares the Pill safe for human consumption.

Nobel prizes in science awarded to: Chemistry—Robert S. Mulliken (U.S.) for research on bond holding atoms together in a molecule. Physics—Alfred Kastler (France) for work on energy levels in atoms.



- (a) Advising the minister of technology on measures to effect technological progress and economic savings in the sphere of tribology.
- (b) Advising government departments and other bodies on matters associated with tribology.
- (c) Examining and recommending to industry the latest techniques on tribology.
- (d) Reporting to the minister of technology annually on its own activities and on trends and developments in tribol-

ogy considered to be of technological or economic significance to the nation.


Life begins at 40!

Attention to the concept of tribology was needed in every industrial country in the world. It was, therefore, no surprise that its significance was recognized worldwide. Tribology societies and groups were formed, and chairs in tribology were established in many countries. A global body, the International Tribology Council, now comprising 36 countries, was formed. An award for

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HOUSE OF COMMONS
OFFICIAL REPORT

PARLIAMENTARY
DEBATES
(HANSARD)

11 AUGUST 1966 *Written Answers* 402

Jost Report

Mr. Lubbock asked the Minister of Technology if he will make a statement on the Jost Report.

Mr. Benn: Yes. In December, 1964, at the invitation of my noble Friend the former Minister of State for Education and Science, a Working Group was formed under the Chairmanship of Mr. H. Peter Jost with the following terms of reference:

"To investigate on an informal basis the present state of lubrication education and research and to give an opinion on the needs of industry in respect thereof".

My right hon. Friend the Secretary of State for Education and Science and I have now considered the recommendations contained in the Working Group's Report which was published earlier this year. We are satisfied that there is considerable scope for savings in this field and we accept the Working Group's recommendations in principle as useful indications of ways in which the needs of industry might be met. My right hon. Friend has drawn the attention of the educational authorities concerned, and the appropriate Training Boards, to the recommendations in the Report which are of interest to them.

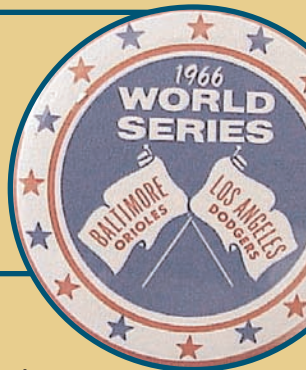
In accordance with the Report's recommendations I propose to set up a Committee on Tribology, a word which the Working Group has used to cover lubrication and bearing technology and associated fields. It will include members from industry, the universities and professional institutions, as well as from the government departments and other agencies chiefly concerned. The functions of the Committee will be to advise me on how the objectives of the Report can be most effectively pursued. The Committee will also be able to advise government departments and other bodies as requested. In particular, I will ask the Committee as a matter of priority to consider whether the use in industry of the latest technologies and best designs can be most successfully fostered by the establishment of one or more Institutes of Tribology or by other means.

House of Commons Report, Aug. 11, 1966, which states the government's acceptance of the Jost Report (so named by the government) and probably was the key to the development of tribology.



NBC broadcasts first episode of Star Trek. CBS backs out of scheduled airing of Psycho, deeming it too violent.

Baltimore Orioles win World Series. Boston Celtics win NBA championship. Montreal Canadiens win Stanley Cup. England wins World Cup. Notre Dame is crowned college football's national champion. Super Bowl does not exist yet.



The Sound of Music wins Academy Award for best picture. Lee Marvin named best actor. Julie Christie named best actress.



Emmy winners include The Fugitive, The Dick Van Dyke Show, Bill Cosby, Barbara Stanwyck, Mary Tyler Moore and Don Knotts.

Tony winners include Marat/Sade, Man of La Mancha, Hal Holbrook and Rosemary Harris. <<

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supreme achievement in the field, The Tribology Gold Medal, often referred to as Tribology's Nobel Prize, was established.

Perhaps the reason for this extraordinary development can be found in the words of Professor Hirano of Japan, the 1987 Tribology Gold Medallist, in his now famous lecture on "The Technological Progress of Tribology and its Philosophical Background." He compared the emergence of tribology as, "an all-pervading concept, a historically and culturally significant event comparable with the Industrial Revolution in the middle of the 18th Century."

If the birth of the word tribology 40 years ago is regarded as a start of life, the world can expect many benefits from tribology in areas as diverse as wealth creation, the environment, energy preservation, medical engineering and, in general, the quality of life. As we celebrate this milestone anniversary on March 9, 2006, STLE joins the world's tribologists in wishing, "Many Happy Returns." <<

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E-mail: mail@omegachemicalsinc.com
www.omegachemicalsinc.com

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HOUSE OF COMMONS
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PARLIAMENTARY DEBATES

(HANSARD)

Lubrication Engineering

11. Mr. J. H. Osborn asked the Minister of Technology what consideration he has given to the sponsorship of lubrication engineering; and which are the research associations studying tribology.

Mr. Shore: I would refer the hon. Member to the statement my right hon. Friend made in reply to the hon. Member for Orpington (Mr. Lubbock) on 11th August. He has since appointed the Committee on Tribology which he then proposed. Thirteen research associations carry out applied lubrication research of which the hon. Member will find details in the Appendices to the Jost Report.

Mr. Osborn: What action in addition does the hon. Gentleman intend to take? Is he satisfied that those taking part represent a broad enough aspect of those involved in lubrication engineering, and is he going to take over sponsorship specifically?

Mr. Shore: The composition of the Committee which my right hon. Friend appointed has been made known, and includes people drawn widely from the universities and from industry who are thought to be most knowledgeable in this field, and it is chaired by the energetic and expert Mr. Jost himself. The Committee has been asked as a matter of urgency to look into a number of matters, including whether Institutes of Tribology should be established.

House of Commons Report, Oct. 18, 1966.



Peter Jost is president of the International Tribology Council in London. You can reach him at hpjost1@aol.com.