TRIBOLOGY – from Basics to

Productivity and Employment

also

commemorating the 40th Anniversary

of the International Tribology Council

by

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At this 40th Anniversary year of the founding of the International Tribology Council on 24th September 1973, it is appropriate to reflect the reasons for ITC's formation and to investigate its relevance in today's different climate.

When on the eve of the first European Tribology Congress, the leading members of some European Tribology Societies met, the support they had from their industries and their professional organisations was often weak, in a few case there was hostility. Generally, the scientific and economic importance of tribology was insufficiently recognised in their countries. This led to Tribology Societies often feeling isolated. Yet here at the pre-congress meeting there was friendship and connections, but above all, there was real understanding of mutual problems.

THE FOUNDING OF THE INTERNATIONAL TRIBOLOGY COUNCIL

1. To maintain a live and continuous contact between tribology and kindred societies and groups anywhere in the world.
2. To facilitate tribology and kindred societies and groups to keep each other informed of their activities, in particular of their forward programmes.
3. To ensure that its international congresses are arranged at agreed intervals; however, the organisation of such congresses to be conducted by the respective Host Society or Societies.
4. To facilitate exchange of views, comments and opinions on tribological matters between member societies and groups.
5. To advise and assist – where requested – in the founding of tribology societies in countries where such societies do not exist.
6. To assist through international co-operation in matters connected with tribology science, technology, and education.
7. To undertake such other actions within the field of tribology science, technology, and education, whether pure or applied, which at least three quarters of all member groups or societies desire it to do.

It was then and there the meeting decided to combine, in a form that did not interfere with freedom of decision, members, and activities of individual national societies. This was the birth of the International Tribology Council. The following objectives were laid down and unanimously agreed:

For election to the International Tribology Council, a tribology society, association, or group had to show that it was not political or commercial. Its functions had to be to promote tribology education and research and international cooperation in the fields of education, research, and application of the science and technology of tribology.

It was also agreed that every two years the ITC should meet at an "ITC In-Session" meeting and that at meeting the venues of the four yearly European Tribology Congresses – since 1997 World Tribology Congresses – and other matters, should be decided.

These arrangements were based on common sense, and probably because of that, they have stood the test of time and led to growth of ITC membership worldwide, as well as to the width and depth of their activities.

It is hoped that ITC members will make full use of their ITC membership, as it can strengthen and further their own activities - for the objectives of the International Tribology Council are as relevant today as they were 40 years ago – if not more so.

TRIBOLOGY AND THE GROWTH OF TECHNOLOGIES

New materials and new technologies are cascading upon the world, but the consequential tribological effects are not always recognised by its potential users, at least not to the extent they should be. The degree of this insufficient recognition of tribology's benefits varies from country to country.

However, tribology is not limited to technology or engineering. The basic definition of tribology viz *"interacting surfaces in relative motion"* has led research and activities of both horizontal and vertical growth. Bio-tribology, eco-tribology, nano-tribology and others have emerged as (additional) subjects and are playing prominent parts in many conferences, including the present Congress. This is particularly so in the case of Green Tribology, at times called Eco-tribology, first enunciated by Professor Si-wei Zhang.

Green Tribology – the science and technology of the tribological aspects of ecological balance and environmental and biological impact - *the objects of Green Tribology being the saving of resources and energy, as well as the enhancement of the environment and the quality of life.*

BRIDGING THE GAP

Whilst on one hand, in most countries, the world of tribology academia has grown steadily, and thereby increased the capacity of knowledge available, on the other hand, with notable exceptions, the response by potential users, particularly industries, to utilise this knowledge capacity has not kept pace. As a result, there has developed an increasing gap between the creators of useful tribological knowledge and many of the users i.e. beneficiaries of such knowledge, especially those relating to the new technologies.

Investigations aimed to overcome these problems and to rectify this position in the sphere of industry for the benefit of increased productivity and profitability has taken place in some countries, most prominently in China. China's massive 2008 Report suggests numerous areas in which the gap can be bridged. The Report's many useful recommendations, including those directed at governmental organisations, including:-

Formal and continuous education in tribology leading to development of a reasonable multi-level team of tribology experts

- Innovative approach, particularly in the spheres of major mechanical equipment and engineering.
- Tribology support of development of new technologies and new equipment technologies.

TRIBOLOGY A ROUTE TO PROFITABILITY

The Chinese Report and others recognised the problem faced by tribologists, especially those who have produced often excellent research results. It is how to persuade the users to turn this new knowledge into application, resulting not only in increased productivity and competitiveness (using competitiveness in its widest interpretation), but ultimately resulting in greater employment, as well as resources and energy saving benefits.

It is suggested that the basis to achieve these ends requires us to be fully aware of the routes of tribology from its basics to the final goals of productivity, competitiveness and profitability and then to successfully take these routes to find ways and means to action the desired results. One of the routes by which tribology customers' awareness can be met, to enable them to gain improved productivity and profitability, is shown on the attached diagram, which is self-explanatory.

As in any product, promotion is required, but more often than not, under- estimated by many scientists. Fortunately, the cost of the tribological promotion is generally very small and its considerable beneficial effects can be very large. Promotion of the benefits of tribology is important, if not essential.

TRIBOLOGY AND THE PREVENTION OF FAILURES

We all know that the prevention of the financial damage which the non-observance of tribological knowledge can and has caused is a strong incentive for the user to engage in tribology.

How can this be achieved? There are several ways. Experience would suggest that one of them, namely to demonstrate the real cost of tribological failures, was found to be very effective.

The advantage of this approach is that no reasonable thinking industrialist wishes to produce or not prevent costly failures, the causes of which are known. As in many areas of life, a so-called "fear of failures" factor, has been found useful to make potential Tribology Users aware that many tribological problems can be avoided. This is an area where support by the media can be very helpful.

It is in this light, ITC member societies may consider the holding of national and international meetings and conferences largely with user industries, devoted **solely or primarily to failures, damages**, and showing **costs** that could have been prevented had often known tribological knowledge been applied. Such occasions may be difficult to arrange, but their effect can be very persuasive. The media should be invited to these meeting and be strongly briefed. Direct links to the financial aspects of costs and damages often speak louder than references to figures of national savings expressed in terms of GNP or GDP.

TRIBOLOGY ANDS EMPLOYMENT

There is one further aspect to our work. It is to make governments aware of the influence of tribology on employment. The relation of GNP to employment are not easy to establish. It is a very complex area in which wholly credible results have yet to be produced. An investigation into this important feature showed the totality of reduction of friction and wear does not in itself affect the GDP. What it can do is to increase the Net Domestic Product (NDP).

We have to demonstrate that reduced friction and wear on the scale envisaged by us could add to nation's economic wellbeing to an extent that would result in additional people being in the workplace.

The figures obtained from UK statistics are that in money terms savings on depreciation of 1% to 1.39% of GDP would equate to around £15-30 billion a year by comparison. My own figures of savings of £8-10 billion a year, probably not as well researched, are more conservative. All this for an expenditure, mainly on applied research, of 1% to 2% of the savings generated.

Reduced depreciation does not itself cause employment. What it does do is improve the net product of the workforce. In this sense economic wellbeing, of 1% to 1.3% GDP would be in the same proportion as an additional **300,000 –350,000** of the workforce.

I must stress that these figures relate to the United Kingdom only and, as already mentioned, they are not definite; research in this area is continuing. They however may be useful for comparison purposes in the conditions prevailing in other countries.

CONCLUSION

ITC members have an important task to establish a usable link between financial savings on a national scale and their effect on employment. These tasks for tribology societies are additional to tribology's role resource and energy savings and environmental benefits. Together they are likely to make our subject more acceptable to our respective governments – hoping this will lead to greater recognition and financial support.

With these thoughts, I wish all participants a pleasant and productive Fifth World Tribology Congress in Turin.

H Peter Jost

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