TEROTECHNOLOGY – AN AID TO DEVELOPMENT

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We hear so much of plant, vehicles and trains breaking down or waiting for repair. Also that there is a large investment on additions and replacements. How to get the best out of the investments? What are the factors that relate to reliability? Can we be more constructive?

This is what Terotechnology is about and a seminar on aspects of Terotechnology was held at the Sri Lanka Foundation Institute Hall on the 23rd of September to which the public was invited.

Systems thinking has developed apace in recent years to match the growth in complexity of modern life. Organisations grow larger and more diverse, processes become more involved and interdependent.

It was the result of a survey on maintenance in U.K. from 1968/69 that the ramifications of maintenance began to be understood and the word "Terotechnology" was coined from the Greek "Terein" meaning 'care'.

A committee definition of Terotechnology is "a combination of management, financial and engineering and other practices, applied to physical assets in pursuit of economic life-cycle costs. It is concerned with the specification and design for reliability and maintainability of plant, machinery and equipment, buildings and structures, with their installation, commissioning, maintenance, modifications and replacement with feedback on design, performance and costs".

Briefly what is required is a systematic approach for buying, operating and replacing capital assets so as to optimise the total costs of ownership and use over the whole life of the asset.

Although there are new post-graduate studies available at Universities in U.K. (and it is understood that two SRI LANKANS will be taking these courses during the next academic year), it is unlikely that there will ever be a pure terotechnologist as the full range of activities and techniques involved is too vast for any one normal individual. Development of education and techniques is, therefore, most needed in communication and the understanding of the limitations and capabilities of each discipline. The 'terotechnologist' is most likely to be a team of people working together on the lines used by many consultancies.

Communication does not stop there however. The major problem is to ensure that information is passed between the multiplicity of users and the designer and manufacturer. At present there is a gap at both directions.

How is a user to be persuaded to pay perhaps twice as much for plant, because the Research and Development has been more thorough and the quality of manufacture higher, if the user has an inadequate system of investment appraisal and does not appreciate the advantages of reduced downtime, maintenance or operating cost over its life?

The part of the accountant in these procedures is clear; he has the job of collecting, analysing and presenting factual information on cost, developing improved cost forecasting for the whole life-cycle of new assets and control and feed-back of comparisons with the original forecast.

For the engineer, given an asset there are three basic options to protect the investment in terms of the adopted maintenance policy. They are :—

1. "Wait and See"—or emergency breakdown maintenance.
2. Preventive Policy– using planned maintenance.
3. Life Prolonging Policy—This implies the use of condition monitoring techniques and also the application of those materials compatible to the operating conditions.

It should be clear that not only increased technical ability is required for the introduction of life prolonging techniques, but also the administrative system must be geared to reflect these activities.

Perhaps now, we can be a little more specific, expressing the quality of assets to an operating time and showing the effects on reliability.

The figures in the following table are derived from mathematics related to reliability and in this case the formula for random failures has been used. The table has been based on hours-use and in brackets an interpolated mile usage is given for easier understanding.

Quality Mean Life Before Failure	Use 100 Hrs. (1500 Miles)	Operating Time 500 Hrs (7,500)	1000 (15,000)	(Miles) 2500 (37,500)	10,000 (150,000)
10,000 Hrs. (150,000 Miles) A.	99%	95.1%	90.5%	77.9%	36.8%
30,000 Hrs. (450,000 Miles) B.	99.7%	98.3%	96.7%	92%	71.7%
Reliability %					

Quality is expressed as *mean life before failure.*

For A: given 100 vehicles the equivalent of 36 would be running after 150,000 miles,

For B: 71 would be running after 150,000 miles.

Engineers who work with plant and vehicles can readily feel the figures are practical.

The quality aspect will be tied to the original specification, and the type of attention it gets through its life.

The programme for the Seminar on 'Aspects of Terotechnology' consisted of 4 papers on Administrative/ Management aspects, 3 papers related to condition monitoring and three papers on corrosion, reclamation and emergency repairs.

It can be seen therefore that an attempt was being made to explain the needs that will help to define 'LIFE' and some of the needs that will be required to prolong that 'LIFE'.

Finally I must conclude by explaining that the Seminar had a typical terotechnological background having been developed by a varying group of Academics, Administrators, Accountants and Engineers.