

CONFERENCE REPORT BASE ISOLATION OF BUILDINGS

**International Conference in Kuala Lumpur,
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R.I. Skinner

This conference was held to survey and promote developments in the use of flexible mounts under buildings to provide increased resistance to earthquake vibrations or the attenuation of other types of ground vibration. The conference was attended by 140 delegates from 25 countries including Drs R.W.G. Blakeley and R.I. Skinner from New Zealand.

The International Conference on Natural Rubber for the Earthquake Protection of Buildings and Vibration Isolation, was sponsored by the Malaysian Rubber Research and Development Board (MRRDB) and the United Nations Industrial Development Organisation (UNIDO). It was organised by the Rubber Research Institute of Malaysia (RRIM) and the International Society for Seismic Isolation (ISSI), for which the writer is the first President.

The primary aim of MRRDB and RRIM was to promote the sale, and increase the Malaysian processing content, of locally produced natural rubber, while a primary aim of ISSI and UNIDO was the advancement of this area of earthquake engineering. A further objective of UNIDO was the industrial development of Malaysia. All the above aims were advanced by the conference and particularly those of ISSI.

The inclusion of vibration isolation of buildings as a conference topic complemented the study of isolation for earthquake resistance as they both presented many of the same building structure problems, arising from a flexible interface between the building and the foundations. Since several hundred buildings have been vibration isolated, this provides important site experience which can be applied to designs for earthquake isolation.

The earthquake isolation systems initiated and developed by PEL are provided with horizontal flexibility under the structure and hysteretic damper shock absorbers. The flexibility is provided by rocking with uplift, flexible columns, or laminated rubber mounts, while the hysteretic damping is provided by the plastic deformation of steel beams or of constrained lead plugs. These hysteretic dampers are patented in several countries. The French isolator for nuclear power plants uses laminated rubber mounts for flexibility and sliding friction for hysteretic damping. The vibration isolation systems provide base flexibility for both vertical and horizontal motion using studded rubber mats. The flexibility and deformations required are much less than for the horizontal motions of earthquake isolators. The associated damping is also much lower.

The countries leading in the development and applications of base isolation for earthquake protection are New Zealand, the United States, France and the United Kingdom, while the United Kingdom leads in base isolation for vibration protection. Unfortunately, the substantial French contribution to the base isolation of nuclear reactors was not represented as this group is basing their flexible mounts on synthetic rubber bearings.

New Zealand has made important contributions to the field of earthquake isolation with 15 bridges, one building, and one chimney already isolated. The United States and the United Kingdom have performed isolator component tests and several countries have made design studies. However, France is understood to have isolated at least one nuclear power plant, using a technique which does not infringe New Zealand patents. A Californian group working on base isolation and isolator components and the study of proposals for the isolation of particular structures is led by Professor James M. Kelly, who worked in the writer's group from August 1971 to August 1972 on a National Research Fellowship.

The conference was an essential step in the promotion of the appropriate use of base isolation for earthquake protection. It provided further contacts and enabled attitudes to be assessed and influenced, and is assisting in directing the further work in this field in New Zealand.

The Malaysian Rubber Research and Development Board are undertaking the publication of the proceedings of the Base Isolation Conference.