LOCK-UP DEVICE for Bridge Structures **2000 Nova Award Nomination 4**

Protection For Structures Against Seismic, Braking, and Traction Forces

The primary purpose of the Colebrand Lock Up Device (LUD) is to provide a temporary rigid link between the deck of a bridge and its supporting abutments and piers so that under fast acting and short duration seismic, traction, braking, or collision forces the load is shared between the supports. Under slow acting thermal, shrinkage, or creep movements the Colebrand LUD no longer acts as a rigid link and moves with the deck. While the concept, and some early examples of such a device have been in existence for several years, it is only recently that Colebrand has fully developed the idea into a viable commercial economic proposition.

Innovation

The innovation is both the product and the concept of economically harnessing the product and its derivatives for Civil Engineering applications.

Applications

New Build: Colebrand LUDs may be utilized on New Structures as the force sharing made possible by their use will allow a continuous deck structure to be designed lighter, giving potential savings in pier sizes and foundations.

Strengthening of existing Structures: Due to ageing, increase in traffic loading and density and / or code revisions, many existing bridges now require strengthening works to be carried out. Colebrand LUDs provide a means of strengthening existing bridge substructures at a far lower cost than by conventional structural methods.

Seismic Retrofitting: The introduction, in many countries, of revised seismic design codes and the subsequent structural design assessment, often dictate that the structure be upgraded to cater for an anticipated earthquake. This up-grading, by load sharing, may be economically achieved by the installation of Colebrand LUDS. This retrofitting does not require any amendment to the structural bearings and hence expensive jacking of the structure is not required. The Colebrand LUD provides an engineered solution to seismic retrofits rather than the use of cable restrainers which cannot provide the same level of seismic protection.

Origination

The original concept of the LUD was developed in the UK about twenty-five years ago. The Colebrand team of Design Engineers have now developed the product such that a variety of options are available to the bridge designer.

Use

Colebrand Lock Up Devices have already been used to protect a wide variety of structures both in the USA and around the World. Recent projects being the protection of elevated structures on the New Korean High Speed Rail Project, and the seismic protection of an Illinois structure near to the New Madrid Fault Zone.

Future Uses

International Bridge Engineering Projects in the 21st Century present the design engineer with ever more demanding problems that will require innovative solutions. The Colebrand Lock Up Device and its derivatives provide engineers with exciting opportunities for innovation and flexibility in bridge design. Hence the Colebrand LLTD is expected to be increasingly used throughout the world over the next decade and beyond.

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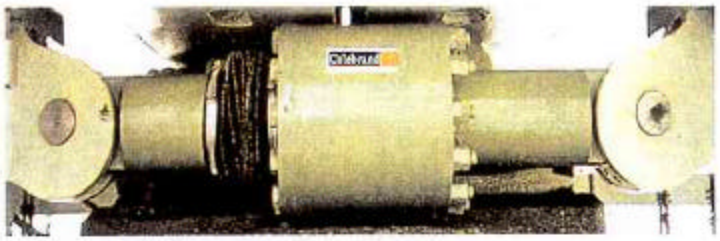
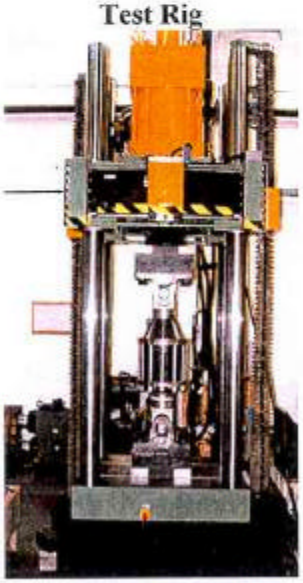
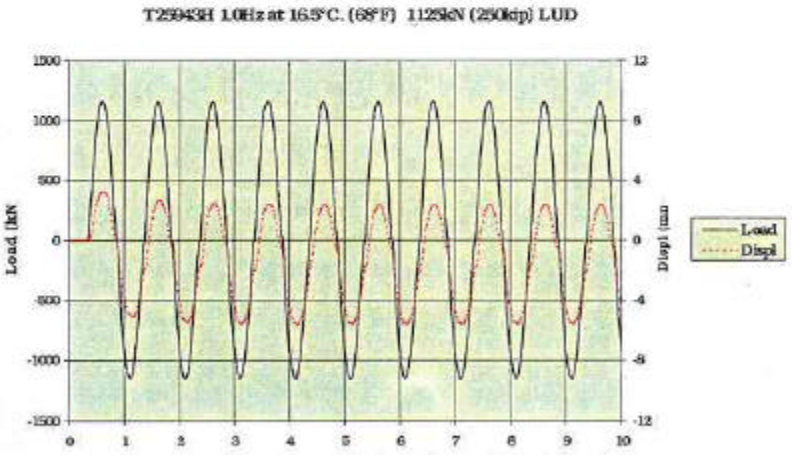
The Colebrand Lock-Up device



Seismic protection of Structures

Test Rig





Test results showing units locking with minimal movement after application of shock loading

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