Industry-University Interaction Session

Presented by: Dr. Mohammadreza Vafaei

20 August 2019

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Johor Campus

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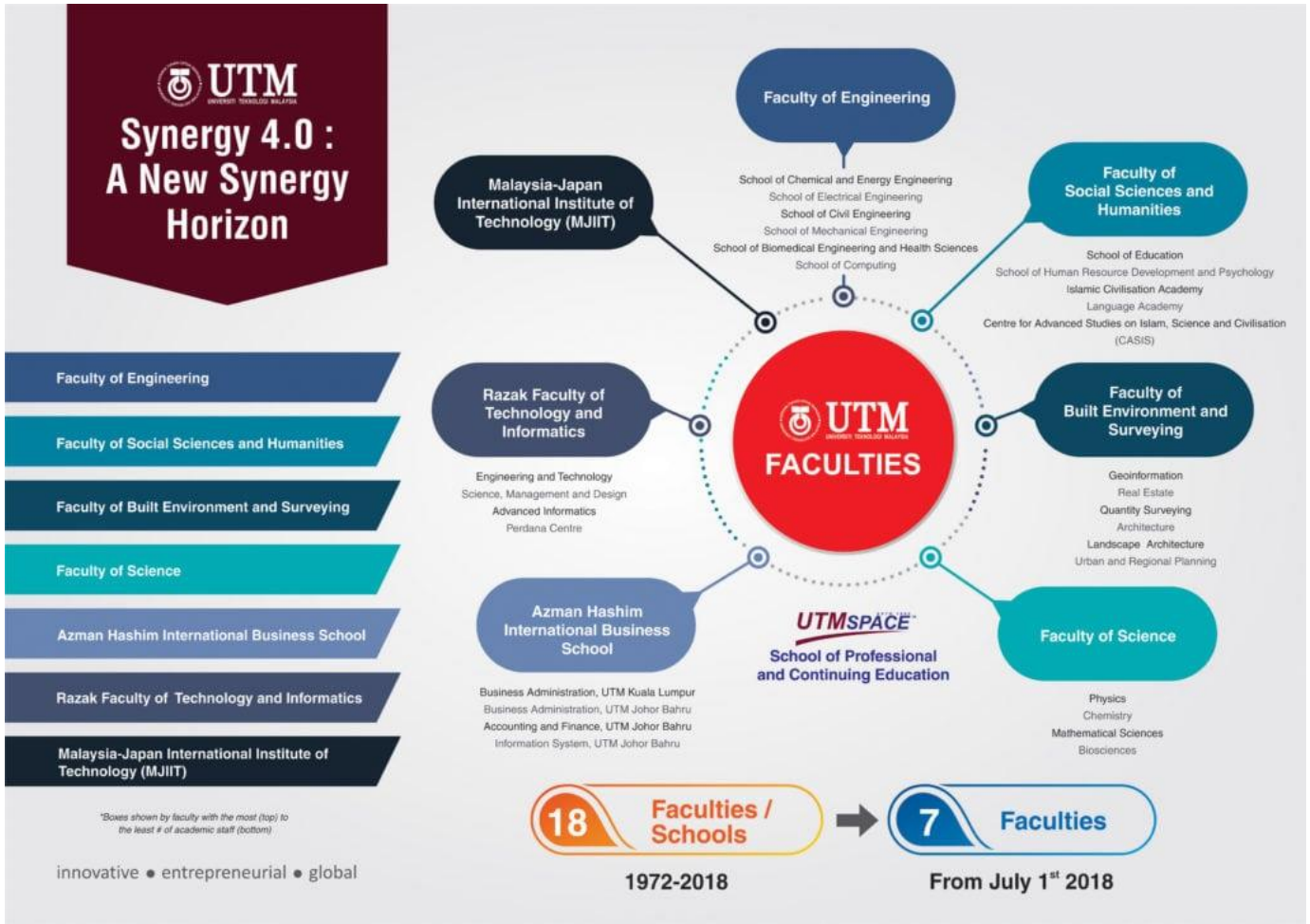

Faculty of Engineering:

1) School of Computing
2) **School of Civil Engineering**
3) School of Electrical Engineering
4) School of Mechanical Engineering
5) School of Chemical and Energy Engineering
6) School of Bioscience and Medical Engineering

- **School of Civil Engineering:**

i. *Dept. Structure and Materials*
ii. Dept. Geotechnics and Transportation
iii. Dept. Hydraulic and Hydrology
iv. Dept. Environmental Engineering

Department of Structure and Materials

The Structures and Materials Department is headed by **Associate Prof. Dr. Norhisham Bakhary.**

- **Largest department** in the School of Civil Engineering
  - **61** academic staff
  - 12 professors, 18 Associate Professors, 31 Lectures

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Department of Structure and Materials (Facilities)

The **Structural Engineering Research laboratory** are housed in a building covering a floor space area of **550 m²**.

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Department of Structure and Materials (Facilities)

Strong Floor System:

A **13 m x 27 m reinforced concrete strong floor** with 1 m grid anchor points. One of the largest strong floor areas in the region. Every anchor point has a carrying capacity of **500 kN** and **350 kN** in the vertical and horizontal directions respectively

Testing Reaction Frames:

Universal testing frame: for full scale testing with **200 ton** capacity. The frame height is 5.2 m and the testing clear height of 2.5 m.

Full scale Test on RC frame

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Testing Reaction Frames:

Magnus frame: a self reacting frame with **40 ton** capacity. Frame dimensions 4.5 m x 0.8 m x 2.4 m high with the maximum testing clear height of 1.3 m.

Meccano set frame components: frame components can be assembled to form any required size and shape of testing rig.

- A range of load cells with capacity of **100 kg to 300 ton**

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Testing Machines

- **Universal Testing Machine** with capacities of **5000 kN** and **2000 kN** in compression and tension respectively. Loading actuators is servo-controlled for consistent load increments used for static and dynamic testing on reinforced steel bars and other materials for bending, tension and compression.

- **25 ton Dynamic Testing Machine** which is a smaller version of the Universal Testing Machine for testing of smaller materials or structural components such as fibres, threads, geotextiles, etc..

- **Two units of compression machine** with **300 ton** capacity for testing of concrete cubes, cylinders, etc.

Universal Dynamic Testing Machine

Department of Structure and Materials (Facilities)

Three modular controllers – **DARTEC**-acquisition system, can also control actuators for static and dynamic loadings. The capacity range is **10 to 100 ton**.

Department of Structure and Materials (Facilities)

Shake Table with the maximum Payload of **1 ton** and size of 1.2m by 1.2m for applying harmonic load with the frequency range of **0.6 Hz to 2.6 Hz**.

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Research on Rubber Products In SKA, UTM

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Development of Viscoelastic Dampers For Vibration mitigation of Structures

DR. MOHAMMADREZA VAFAEI

DR. SOPHIA C. ALIH

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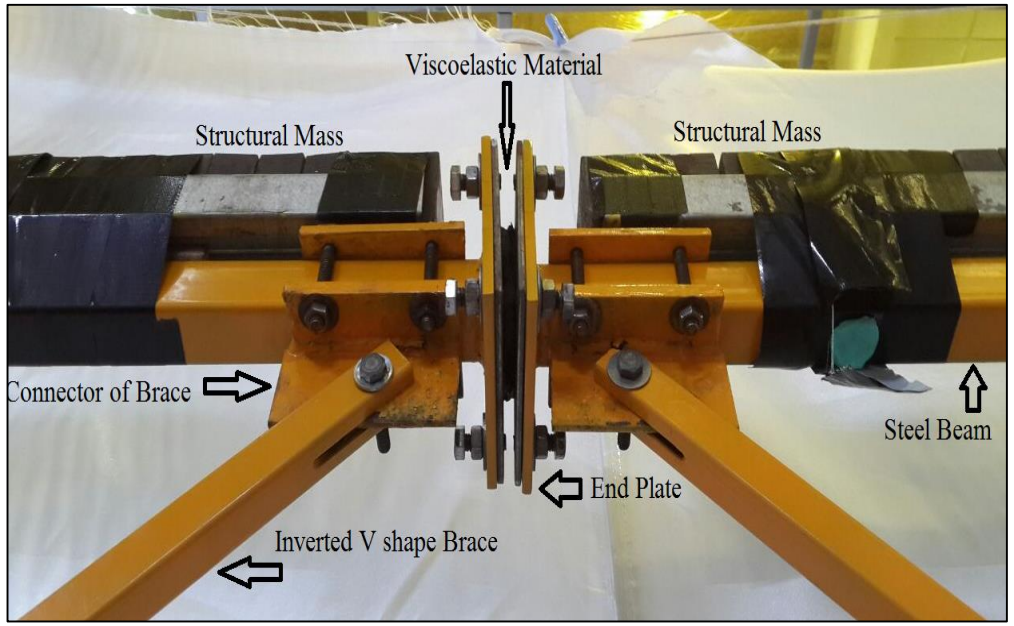
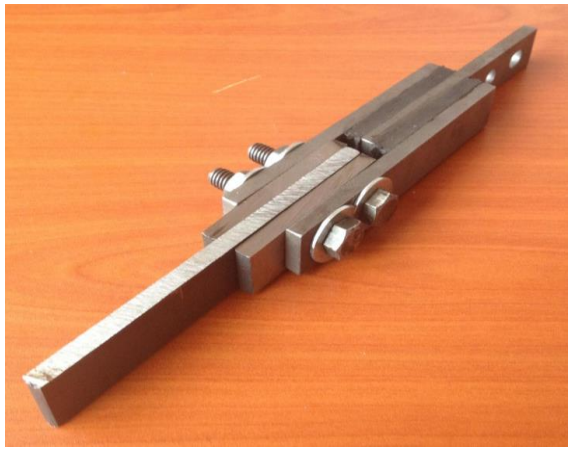
Our Previous research with industry

NOVEL VISCO-ELASTIC DAMPER



Invented Viscoelastic Damper



Conventional Viscoelastic Damper

Testing of the Invented Viscoelastic Damper

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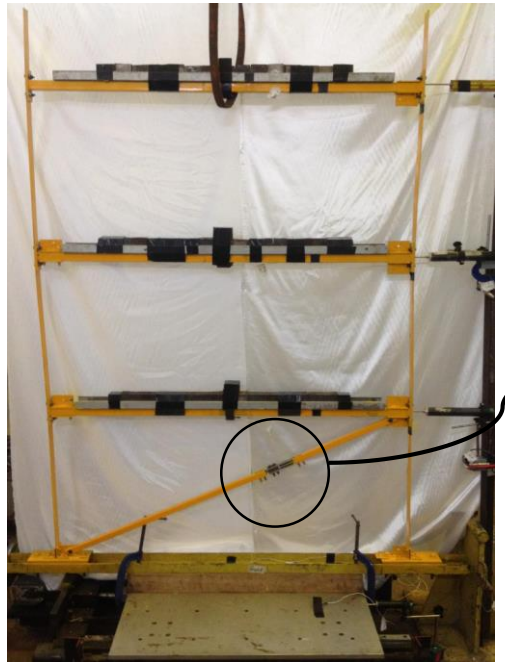
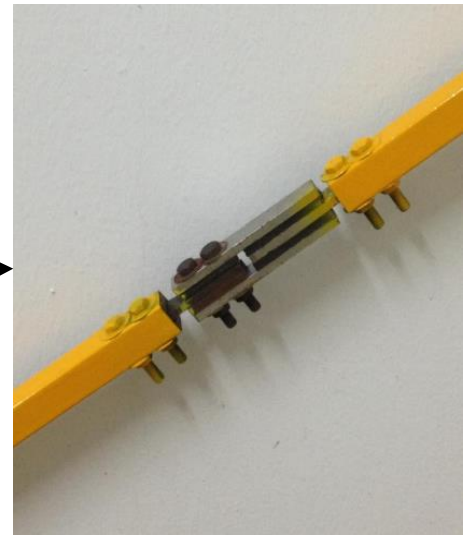
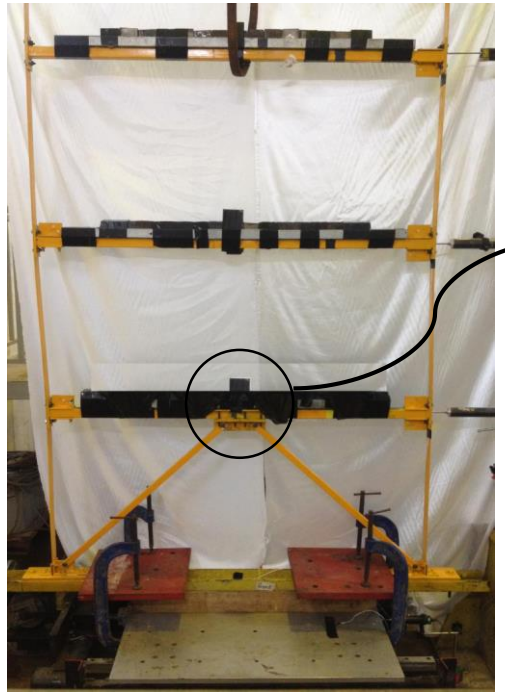
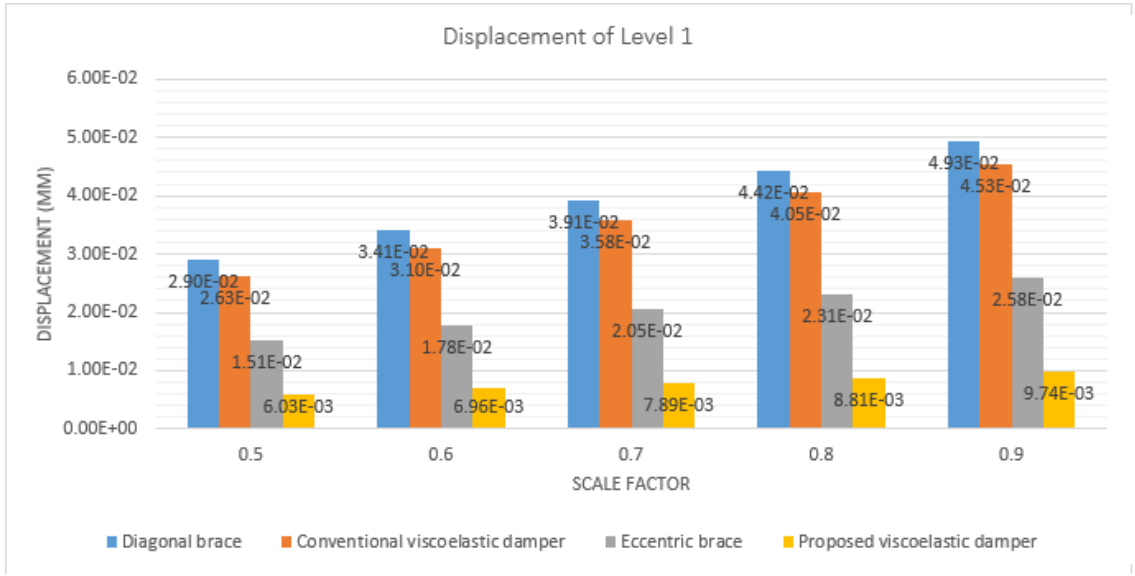
Quality Control Assessment (Structure) in UTM

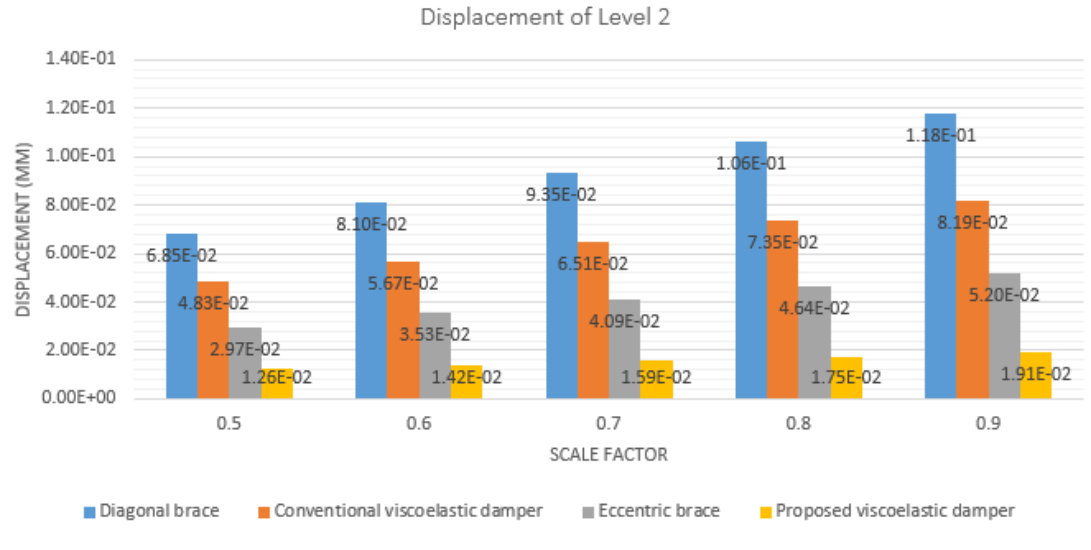


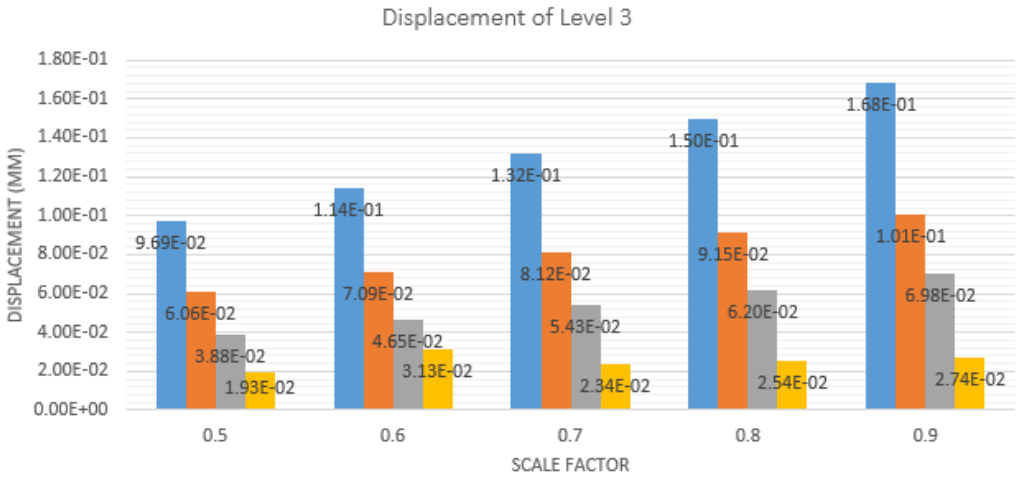




Results Of Experimental Tests:







Our research with industry

Way Forward:

1) Development of a Novel Visco-plastic Damper

This damper combines the concept of a Visco-elastic damper with a metallic yielding damper in order to enhance
the energy dissipation capacity of the structural system against dynamic loads. This system is adeal for resisting against low to strong ground motions.

2) Development of a Toggle-brace Viscoelastic damper

This damper employs a toggle-brace system together with a viscoelastic damper for energy dissipation. Unlike conventional viscoelastic damper this system dissipates the input energy by torsional deformation. Higher energy dissipation capacity and lesser obstruction during installation are the main advantage of this system.

THE USAGE OF NATURAL RUBBER LATEX AS BINDER IN PRODUCTION OF NATURAL FIBRE ACOUSTIC ABSORBERS

AP. Dr. Zaiton Haron

Dr. Khairulzan Yahya

FEATURES

- Natural rubber latex has potential as replacement for urea formaldehyde (UF) as binder in the natural fiber acoustic absorber production.

- UF is synthetic binder which is carcinogenic and hazardous to human, thus, the usage of natural rubber latex will produce the eco green sound absorber product with environmental friendly concept.

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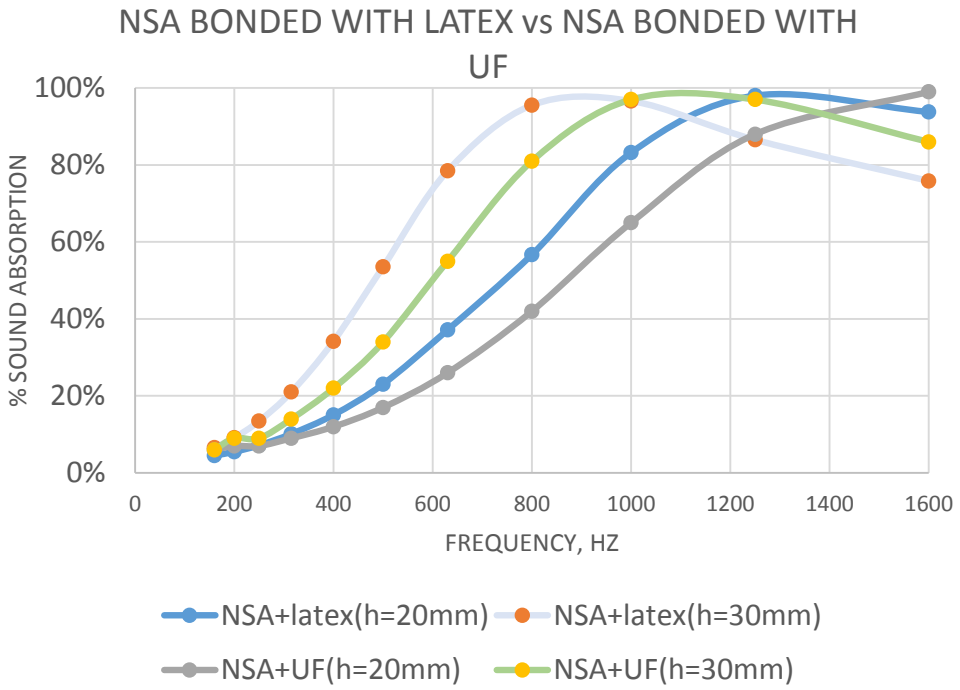
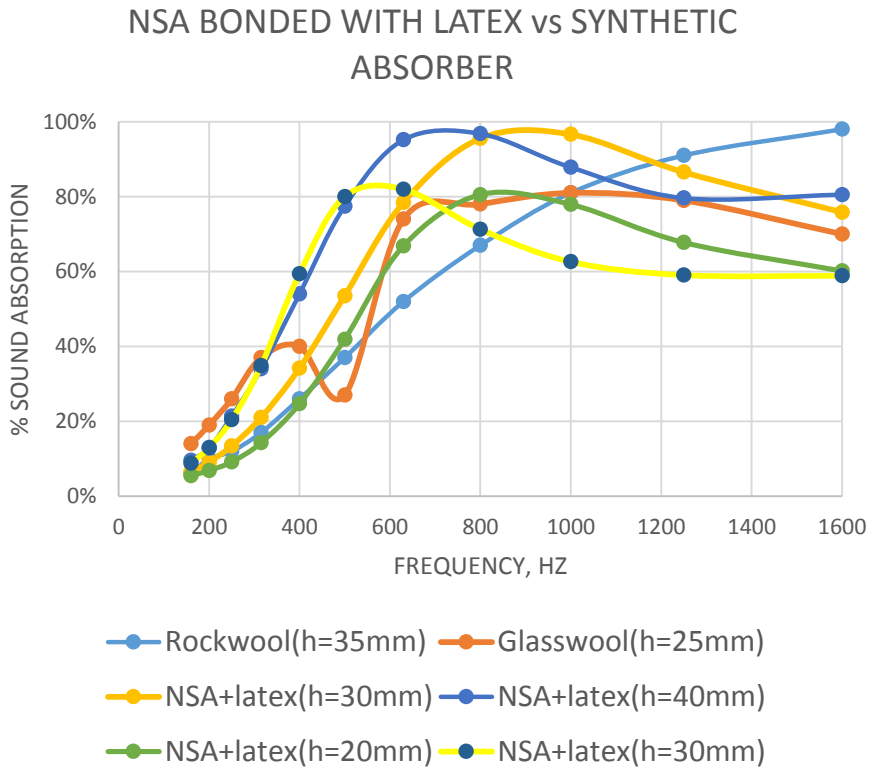
NOVELTY





Sound absorber made of natural fibre bonded with latex (NSA) has better sound absorption performance below 1000 Hz than that of bonded with UF

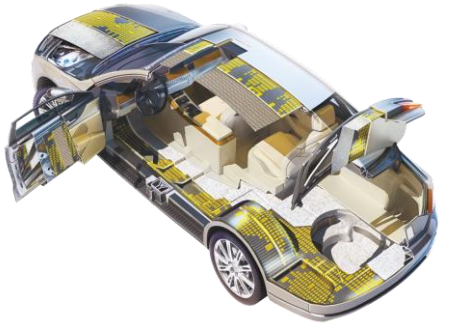
- NSA produced similar average sound absorption at 250, 500, 1000 and 2000 Hz
- NSA has acoustic quality with that of using synthetic binder.

IMPACT TO SOCIETY AND INDUSTRY

- Valuable use of natural rubber latex.
- Valuable use of agro-industrial waste.
- Superior in acoustic properties as good as synthetic acoustic absorbers

POTENTIAL MARKET

- Construction industries –acoustic panel/ceiling in the building
- Automobile industries – acoustic absorber in vehicles



Durability and Sound Absorption Evaluation of Concrete Containing Wastes Tires Aggregate

PROF. DR. MOHAMMAD BIN ISMAIL

AIMS AND OBJECTIVES

This study aims not only to reduce the wasted pollutant, but it also brings new discoveries to the uses of wastes in study.

I. **To determine the effect of ground granulated blast-furnace slag (GGBS) combined with tires aggregate on the mechanical properties of concrete.**

II. **To evaluate the effect of a rubberised concrete combined with ground granulated blast-furnace slag GGBS on durability and sound absorption for sustainable construction.**

AIMS AND OBJECTIVES

III. To determine Microstructure of RC contains GGBS and analysis aggregate/paste interfacial transition zone ITZ.

IV. To compare and verify between Experimental sound test and Numerical results of modeled rubberised concrete.

V. To develop a model to identify the effect of sound on modified concrete.

DEVELOPMENT OF WASTE TYRE AND PALM OIL FUEL ASH MODIFIED CONCRETE

PROF. DR. MOHAMMAD BIN ISMAIL

Objectives

1)To determine the **optimum mix design** for modified rubberised POFA for application as structural concrete.

2)To identify the **engineering properties of concrete** with different types, shapes, and sizes of tyre-rubber aggregate in terms of physical and mechanical qualities.

3)To determine the property-improvement of POFA-rubberised concrete in terms of **acoustic properties**.

4)To evaluate the **durability of POFA-rubberised concrete**,

Thanks for your attention

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