

Mechanism for Transportation Problems caused by Vibration

Even if product has been shipped after operating thorough inspection at the factory, vibration generated by transportation makes damage for product in some cases. It comes to nothing if product had some kind of problem when customer received product.

Do you have anything like this?



Major Method of Transportation Test

Tester based on the JIS/ISO standard

The test based on the "JIS/ISO: Packaged freights-Method of vibration test" makes it difficult to reproduce real transportation conditions.

WHY??

- ◆ Vibration direction is only single axis vibration
- ◆ Hard to identify which vibration influenced
- ◆ Not only vibration!!

Reproducing of damages during transport is

10% or less.

Actual road test



Actual road test varies quite a bit difficult to quantify.

WHY??

- ◆ Test result is greatly affected by transportation conditions
- ◆ It cannot identify cases (Vibration ? Shock?...)
- ◆ Investment of time

Difficult to determine

Reproduce damages more than 90% occurring during transport!!

Point 1 Transportation Vibration Data

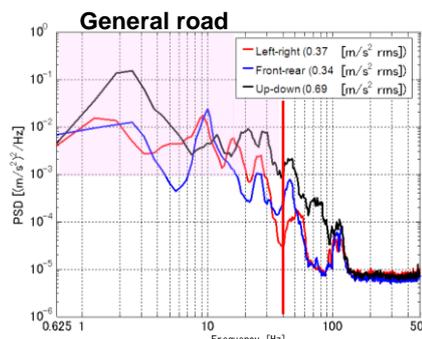
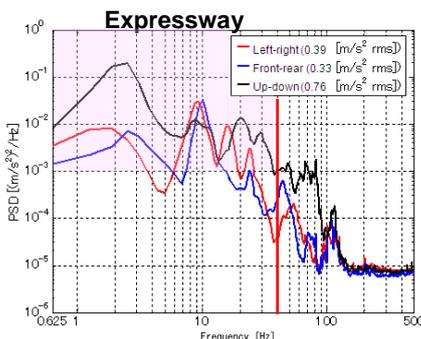
Meishin Expwy Katsuragawa PA (Kyoto)
 ↓ Expressway Approx. 460km
 Chuo Expwy Hachioji Exit
 ↓ General road Approx. 6km
 IDEX CO., LTD. (Tokyo)



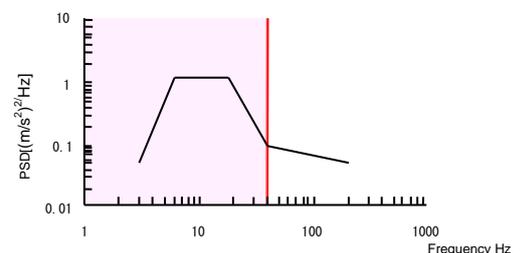
◆ **Triaxial simultaneous vibration** occurs to products

◆ **Stress influence from vibration**

⇒ **Low frequency vibration 40Hz or below** occurs frequently during real transportation



JIS Z0232 Annex A - Fig. 1



JIS gives importance to the low frequency vibration 40Hz or below

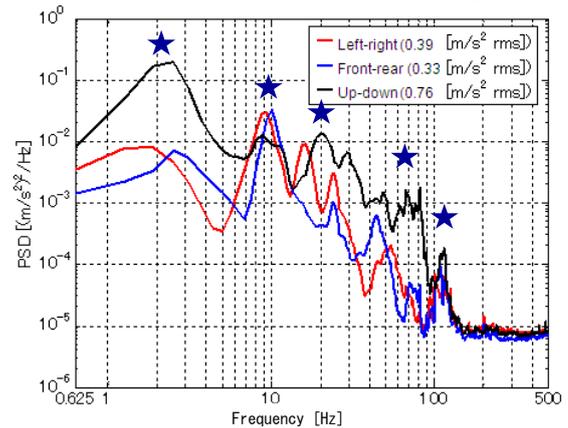
Point 2 Damage caused by vibration

Resonance

Inside/outside of product given primary vibration makes occur secondary vibration (acceleration) caused by resonance, and then, damages during transportation occurs caused by resonance.

Can improve the product strength and appropriate packaging became clear by finding the resonance point of product.

Find out the resonance point

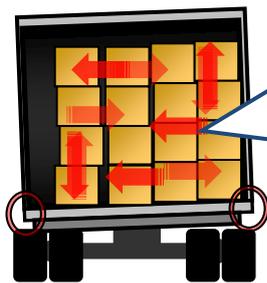


Working out measures by finding the resonance point

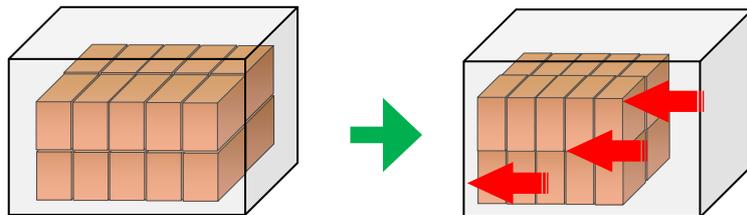
Point 3 Not only Vibration!

Cargo during transportation is not only vibration but also many factors such as drop, shock, temperature, and humidity.

Furthermore, there is left-right movement of packaging cargo occurring left-right turn by a truck.



Left-right turn by a truck



Inside of a box is given vibration that makes it moves to the right and left.

⇒ It will be increased friction force that makes trouble such as friction and pin-hole.

Point 4 The reason selected IDEX

- ◆ **Triaxial simultaneous vibration** same as real transportation conditions
- ◆ **Detect resonance points** in combination with the **3-Dimensional Wireless Vibration Recorder**
- ◆ **Simulate left-right turn** by a truck!



Reproduce damages more than 90% occurring during transport!!



At present, IDEX in corporation with the Graduate School of Kobe University, Transport Packaging Laboratory, conducts research on the reproducibility of real transportation and equivalence of the tester.

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