

# DOS : Vibrations problems

Number of participants: 10



## 1. For pedestrian bridges, excessive vibrations are usually caused by

5 correct answers  
out of 6 respondents



Walking pedestrians



5 votes

Earthquakes



0 votes

Wind excitation

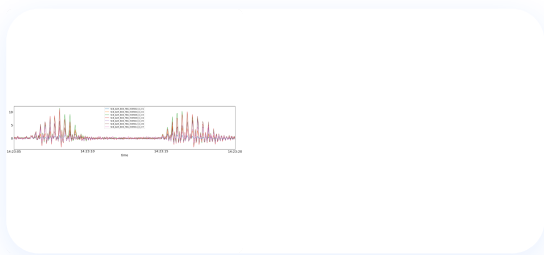


1 vote

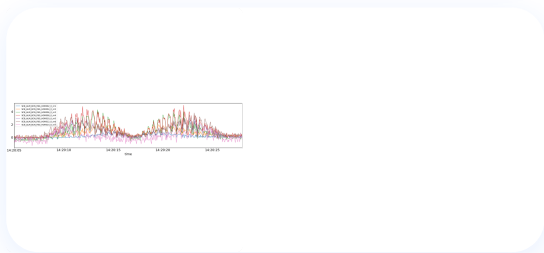


2. **These measurements are from the 'Smart Circular bridge' project, that equipped a composite bridge with fiber optical strain gauges (and accelerometers) to monitor the structure.**

6 respondents



1 correct answer  
1 ————— B Running



1 correct answer  
2 ————— A Walking



**3. In high-rise buildings, excessive vibrations are usually caused by**

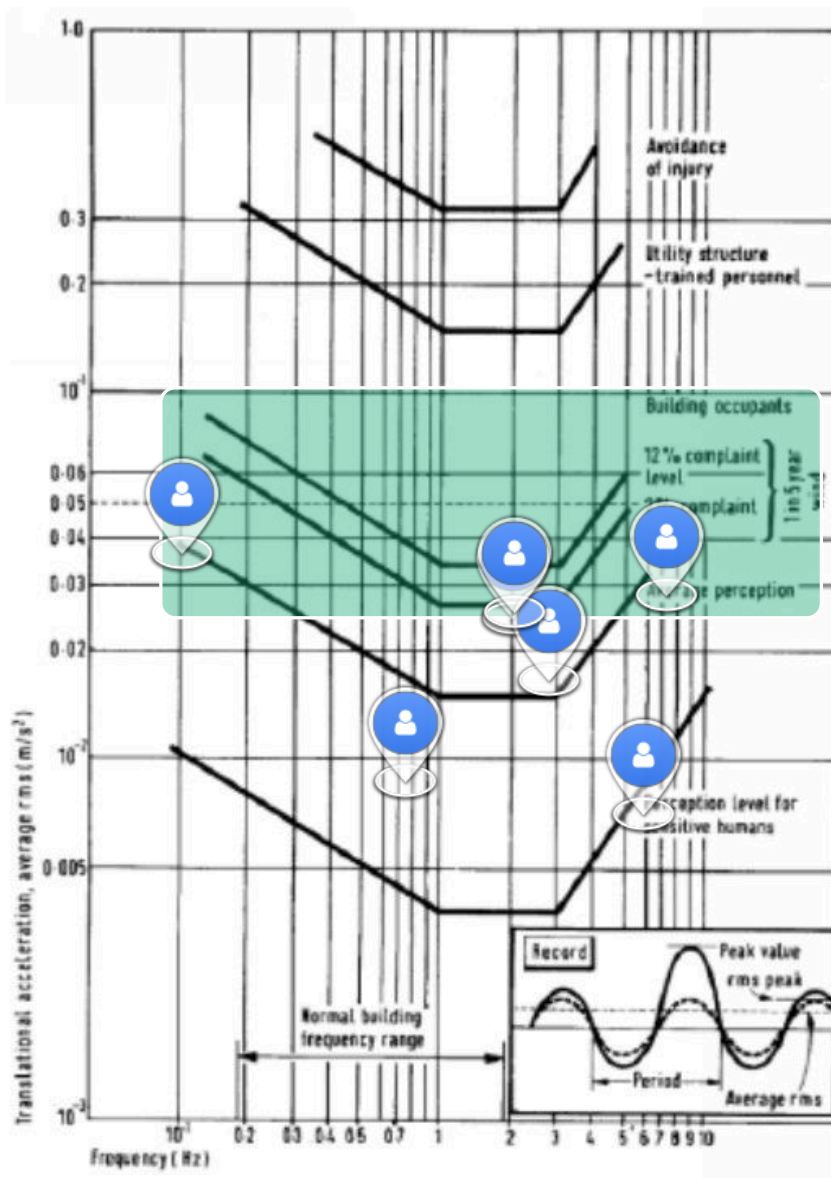
**4 correct answers**  
out of 8 respondents

- People in the building 0% 0 votes
- ✓ Wind 100% 8 votes
- ✓ Earthquakes 50% 4 votes



**4. What is excessive? Which vibration limits would you consider for designing a high rise building?**

7 respondents





**5. Cite a few examples of machine induced vibrations**

**0 correct answer**  
out of 9 respondents

Washing machines

Washing machines

Washing machine

Cars

Washing machine

Motors

washing machine

Machine à laver

Rotating machine

**Correct answer**

**Washing machines, power generators**



**6. Cite a few examples of precision equipment which should be protected from vibrations**

**0 correct answer**  
out of 7 respondents

Microscope

Microscope

surgery robots

Welding machine

Hospitals (surgery)

Microscope

Microscope

**Correct answer**

**microscopes, litography machines, art pieces**



**7. The most common problem with lighting poles and chimneys is**

**6 correct answers**  
out of 7 respondents

turbulent wind excitation

0%

0 votes



vortex induced vibrations

86%

6 votes

galloping instabilities

14%

1 vote



### 8. A common problem encountered with power lines is

4 correct answers  
out of 7 respondents

vortex induced vibrations



0 votes



galloping



4 votes

divergence



3 votes



### 9. What is the most dangerous problem related to vibrations for bridge decks ?

1 correct answer  
out of 5 respondents

resonance

Wind

Wind excitation

Wind

Flutter

**Correct answer**

**flutter**

10. YouTube (Wind Tunnel Test for Bridge Sample-Torsional Flutter)

0 respondent

Wind Tunnel Test for Bridge Sample-Torsional Flutter



11. What is the main difference between VIV and instabilities like galloping and flutter ?

0 correct answer  
out of 4 respondents

Interaction between the structure and the flow

Symmetry

Limited amplitudes by damping

**VIV is a resonance problem, the amplitude is limited by the damping in the system. Flutter and galloping are instabilities, the interaction with the flow causes the total damping in the system to reach a zero/negative value, the amplitude is not limited anymore. In practice however second order effects limit the amplitude and the system goes into so-called limit cycle oscillations. It is difficult to differentiate the two effects with a visual inspection of the phenomenon, it is the understanding of these two physical effects which can help understand which is taking place (evaluation of critical wind speed for the two phenomena, which are different).**