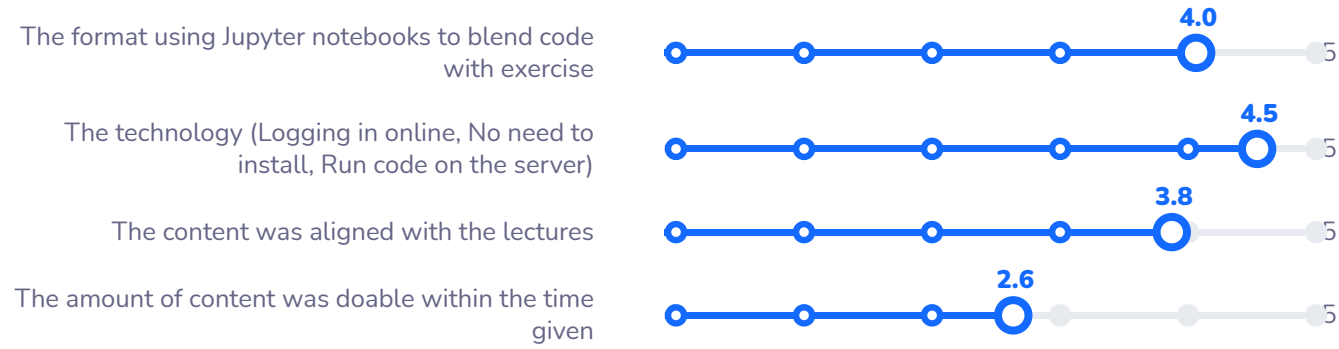
VIB : Vibrations problems

Number of participants: 26

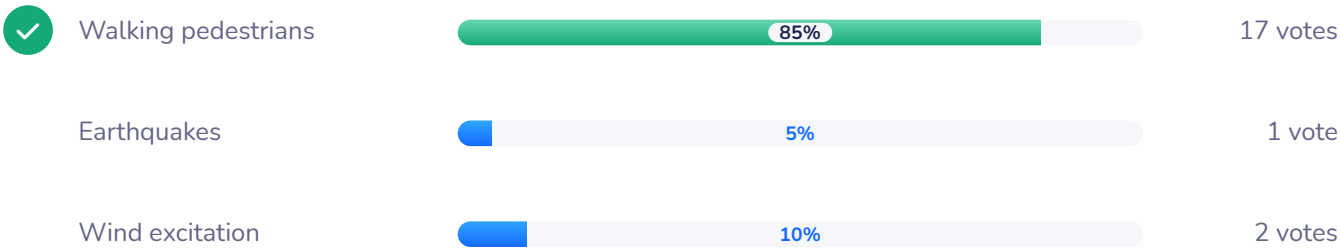
1. What did you think about the exercise sessions?

21 respondents



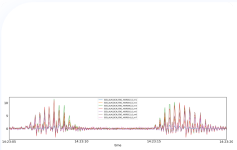
2. For pedestrian bridges, excessive vibrations are usually caused by

17 correct answers
out of 20 respondents



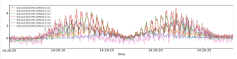
3. These measurements are from the 'Smart Circular bridge' project, that equipped a composite bridge with fiber optical strain gauges (and accelerometers) to monitor the structure.

20 respondents



6 correct answers

1 → A Running



6 correct answers

2 → B Walking

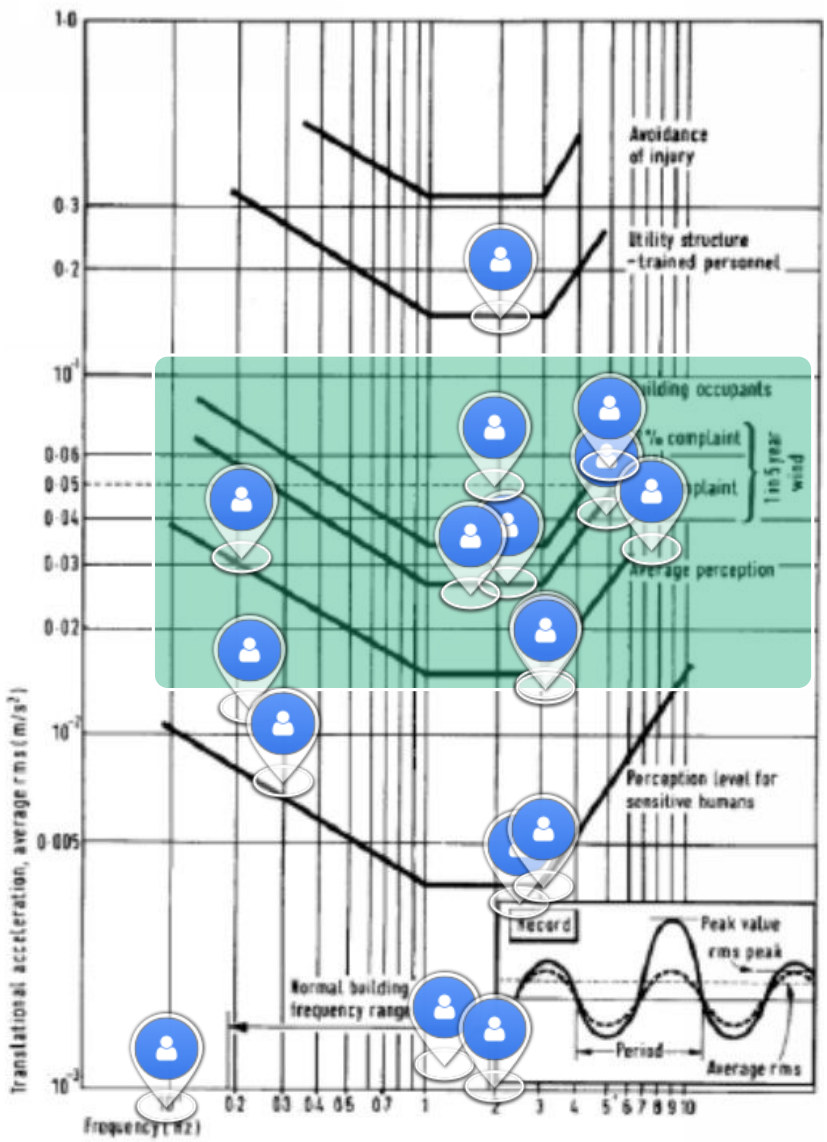
4. In high-rise buildings, excessive vibrations are usually caused by

7 correct answers
out of 20 respondents

	People in the building	5%	1 vote
✓	Wind	100%	20 votes
✓	Earthquakes	35%	7 votes

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

17 respondents



6. Cite a few examples of machine induced vibrations

0 correct answer
out of 19 respondents

- Drill, steering-wheel and washing machine
- Engine
- Engine, washer
- Rotary machines Cranes
- Washer, car,
- Vibrations by generators in building
- Unbalance masses
- Car engines, washing machines
- Engine
- Car engine
- Helicopter engine
- Washing machine, car engines
- Laundry machine
- Washing machine
- Car motor
- Car
- Washing machine
- Washing machine

Motor

Correct answer

A washing machine

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

0 correct answer
out of 15 respondents

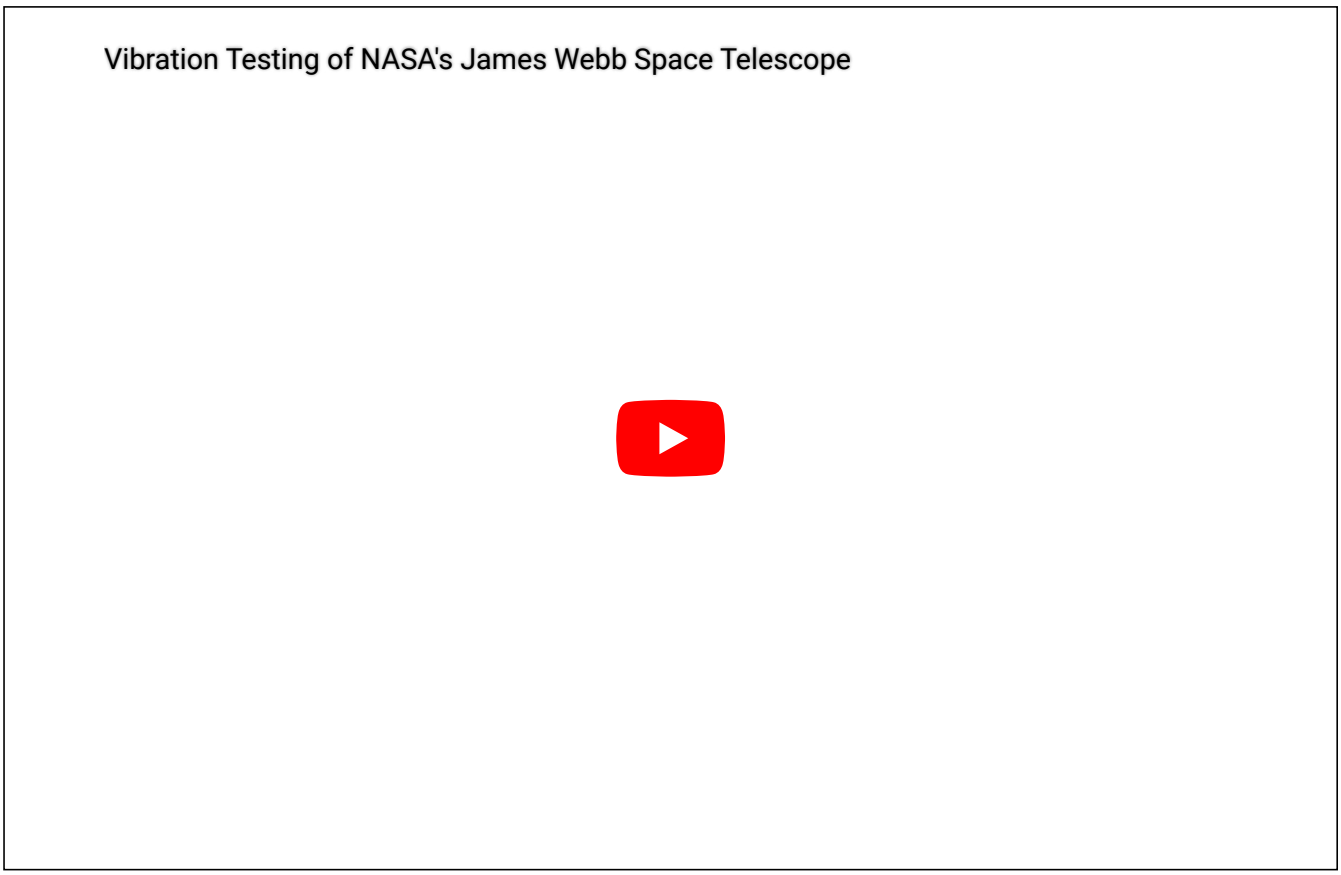
- turbines, airplane
- Equipments in medicine
- Steering-wheel. Pilot control. Car seat
- Microscopes
- Microscope
- Space carriage
- Satellites
- Pick and place machines (Electronics Assembly)
- X-ray machines
- Medical equipment, sensors
- Equilibrate mass
- Microscopes
- Microscope
- Microscope
- Microscope

Correct answer

A microscope

8. YouTube (Vibration Testing of NASA's James Webb Space Telescope)

0 respondent



9. Help! My steering wheel is shaking, what could it be?!

0 correct answer
out of 16 respondents

Correct answer

Unbalanced wheel

10. The most common problem with lighting poles and chimneys is

17 correct answers
out of 21 respondents

	turbulent wind excitation	14%	3 votes
✓	vortex induced vibrations	81%	17 votes
	galopping instabilities	5%	1 vote

11. A common problem encountered with power lines is

12 correct answers
out of 17 respondents

	vortex induced vibrations	0%	0 votes
✓	galopping	71%	12 votes
	divergence	29%	5 votes

12. What is the most dangerous problem related to vibrations for aircrafts ?

5 correct answers
out of 13 respondents

- Hard grip on wheels
- Flutter
- Divergence and galloping
- Instabilities on the wings
- Flutter
- Limit cycle oscillations
- Flutter
- Wings failure
- Flutter on wings
- Flutter
- Wings flutter
- Flattering
- Flutter

Correct answer

flutter

13. YouTube (Airbus A380 Flutter Test)

0 respondent

14. What is the main difference between VIV and instabilities like galopping and flutter ?

0 correct answer
out of 9 respondents

- Linearity
- VIV has a periodical spectra
- Damping is not zero in VIV
- Instability
- VIV cause big vibrations but galloping can cause collapse of the structure
- Viv occur at resonance
- The nature of the flow
- VIV occurs only at resonance frequency and can be avoided by changing speed.
- Viv is limited because of damping, this is not the case with the instabilities

Correct answer

VIV is a forced vibration problem where the excitation is at a specific frequency, which, if matching the resonance frequency of the structure, can cause excessive vibrations but which are always limited by the amount of structural damping. Instabilities result from an interaction with a flow which leads to 0 or negative damping, hence if the resonance is excited, the levels of vibrations will not be limited by any energy dissipation mechanism (although at some point the behavior will be non-linear and limit somehow the levels, leading to so-called limit-cycle oscillations).