

Wall Inspection System for High-Safety Maintenance of High-Rise Buildings

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Motivation

- Historical background
- In 1999, there was a news report ...



In October 2005

- Housing, Planning and Land Bureau raised a public consultation on mandatory building inspection
- It needs more than six years' time to achieve the community' consensus that it is the responsibility of owners to inspect and maintain their buildings in order to safeguard public safety.

Building Situations in Hong Kong

- There are about 80,000 blocks of buildings in Hong Kong.
- 39,000 blocks belongs to private
- 13,000 blocks are currently older than 30 years
- It will increase to 22,000 blocks in ten years' time.
- There is a great potential risk to the general public

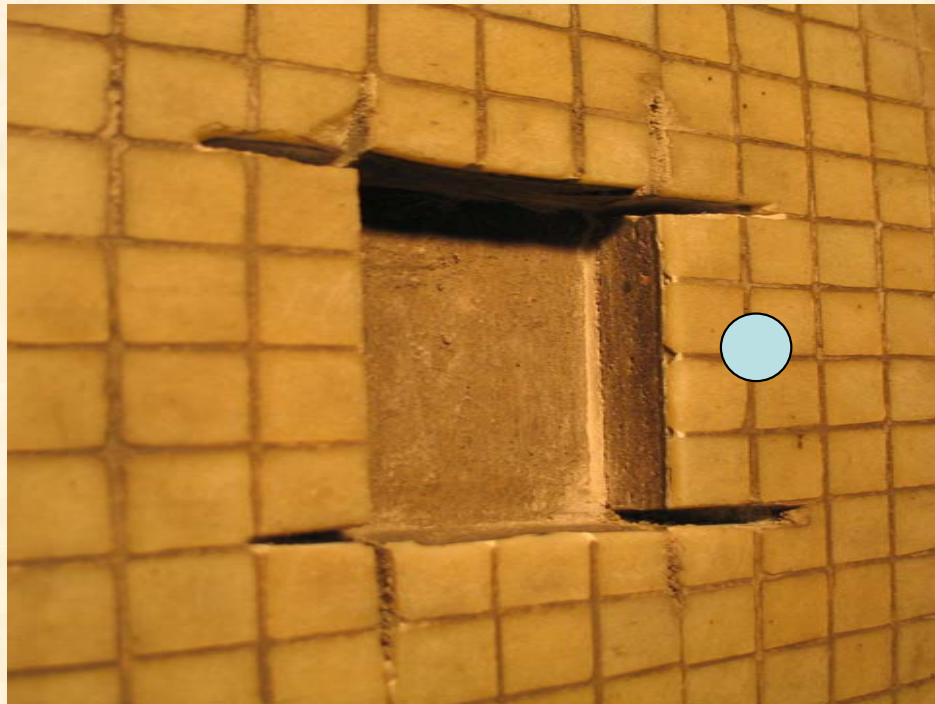
Risk Arose from Manual Building Inspections

- Quality of manual inspection is questionable because it subjects to human error
- Human workers are required to inspect and clean the exterior wall in mid-air - dangerous
- Accidents do happen occasionally and some have actually caused severe injury and even death
- Insurance cost of operators working in mid-air is becoming higher and higher.

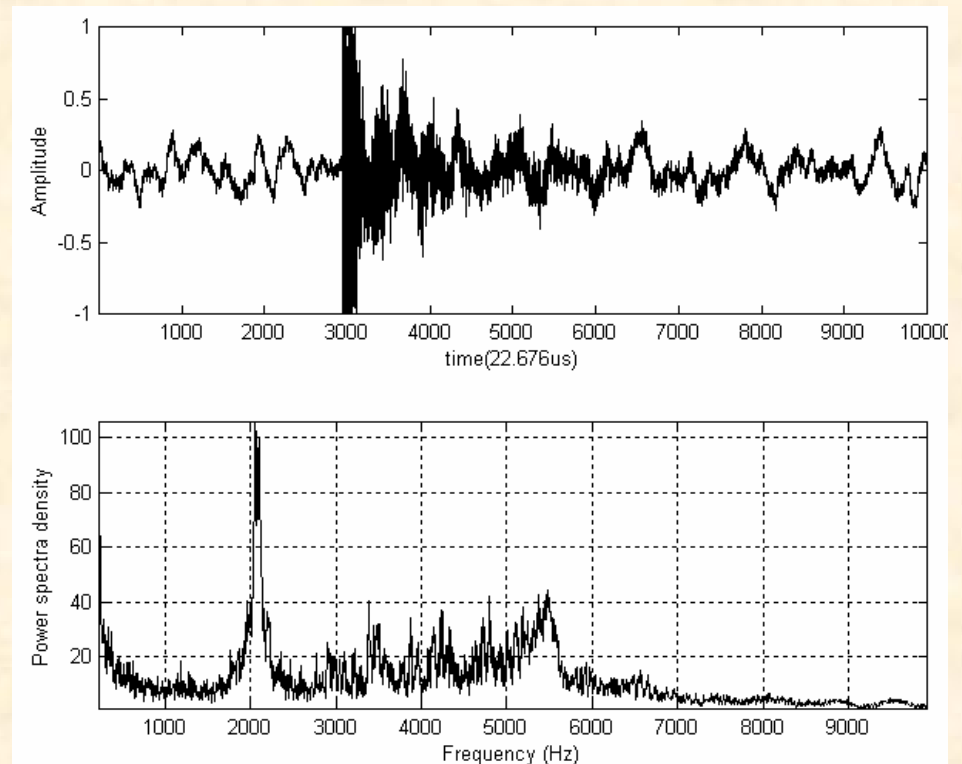
Challenges in Engineering Applications and Advances in Technologies

- With the introduction of new technology for doing building inspection, the mandatory building inspection scheme can be more successful.
- The paper presents an unmanned wall inspection system for high-rise building.

Technology Background: Good title-wall bonding

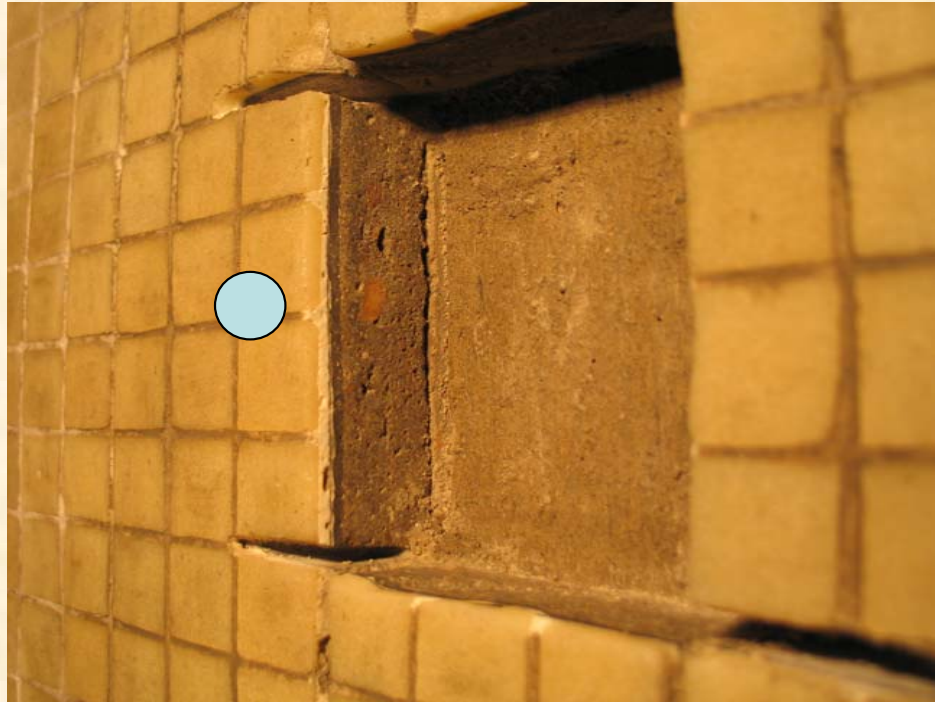


Sound waveform

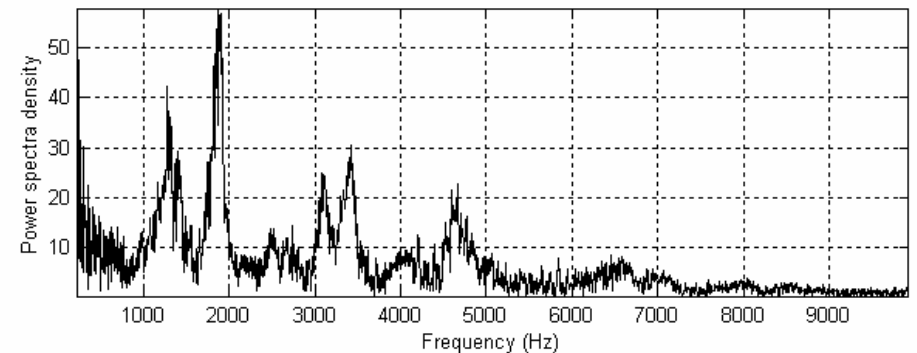
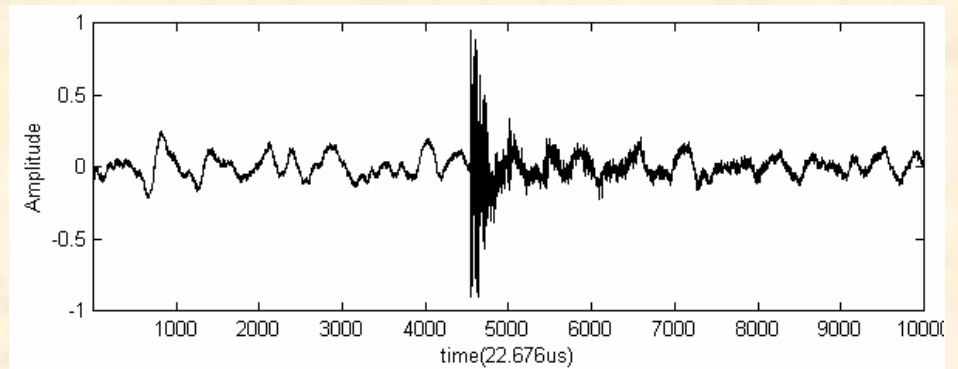


**Power density (against
frequency) of impact**

Technology Background: Poor title-wall bonding



Sound waveform



**Power density (against
frequency) of impact**

An Automatic Unmanned Wall Inspection System

The key features are:

- Using gondola technology – easy to be accepted by the building maintenance industry
- Automatic de-bond identification
- Better than 1 cm position accuracy
- Easy to transport
- Ability to store all inspection signals and results for quality assurance purpose

Video Record of Site Testing



Some Achievements

- To reduce the need for human workers to work at life threatening height – lower insurance cost
- To automate wall inspection processes of high-rise buildings
- To provide reliable non-destructive test (NDT) platform
- Able to work in windy conditions

Conclusions

- There will be more and more old buildings in Hong Kong.
- Poor building maintenance is risky
- This presentation has introduced a commonly acceptable and reliable way to do tile-wall inspection
- The improvement on operation speed of the system is undergoing

Q & A

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