

BETM 3583

Vibration Analysis and Monitoring

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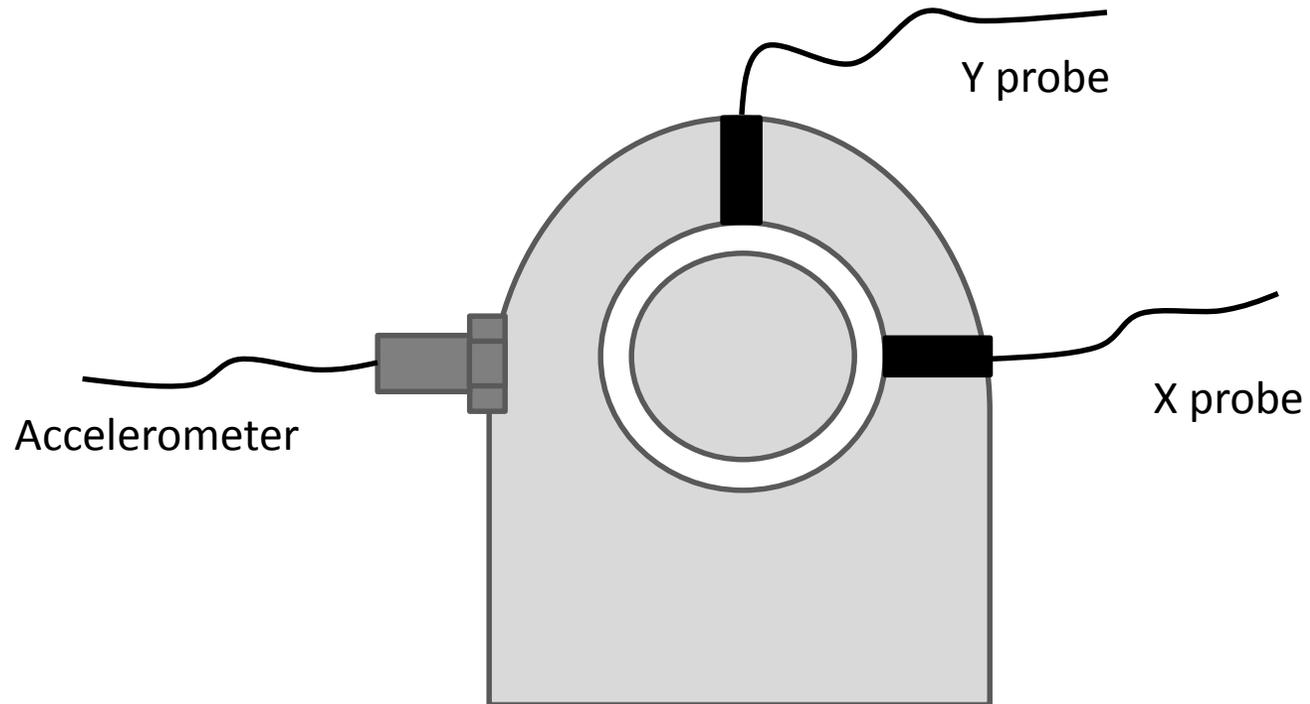
Learning Outcome

1. Understand the equipment used for vibration testing
2. Understand the procedure of vibration testing and the use of signal processing units

Vibration Instrumentation

Absolute vs Relative Measurement

What is the difference?



Vibration Instrumentation

Proximity Probe

- Displacement measurement
- Permanent monitoring
- Relative motion between a shaft and casing / bearing housing

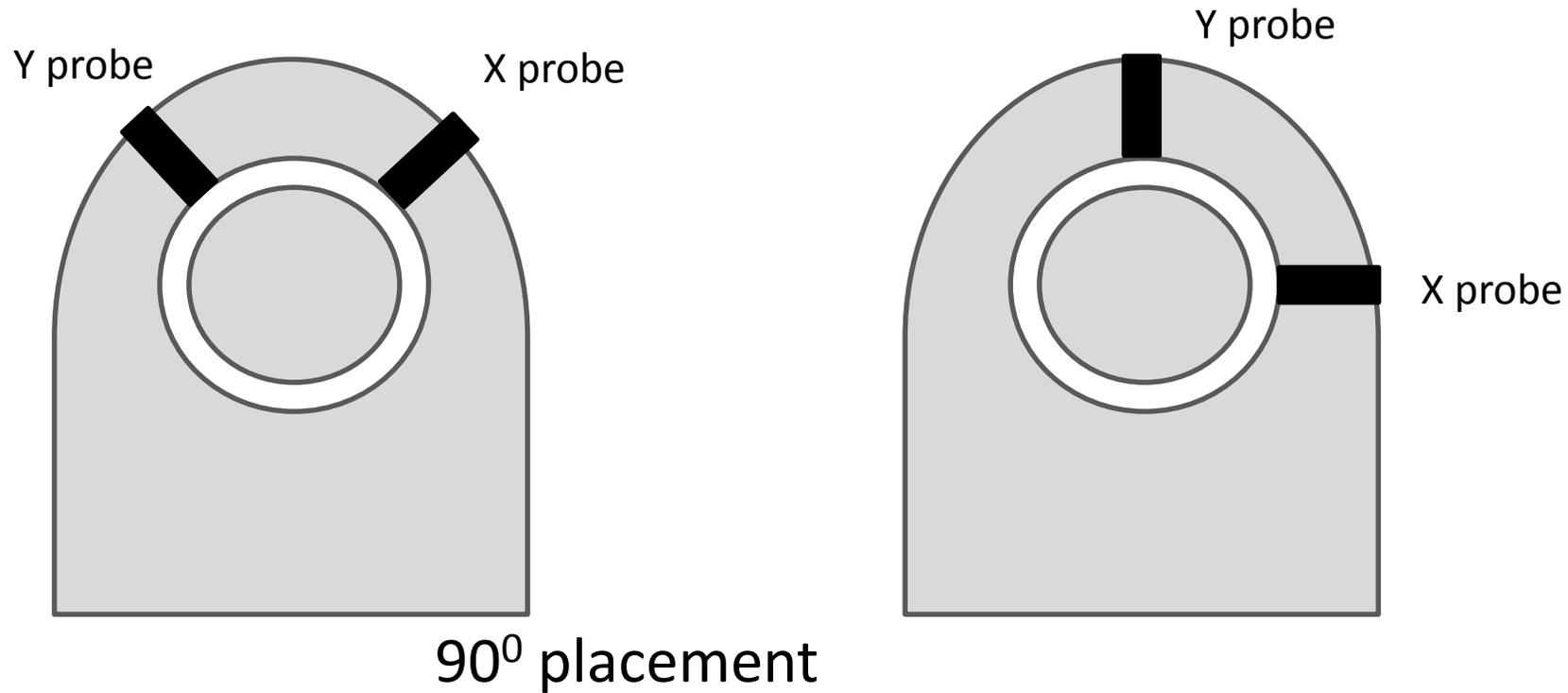
Vibration Instrumentation

Proximity Probe



Vibration Instrumentation

Proximity Probe



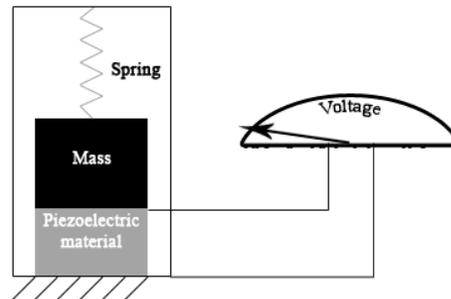
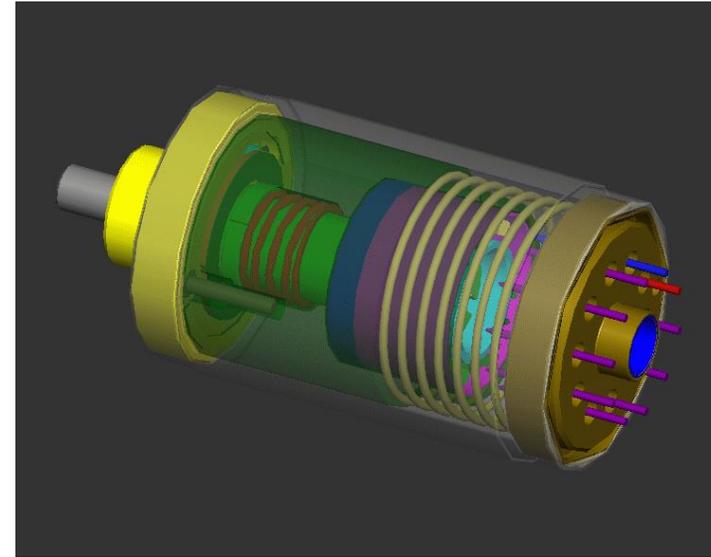
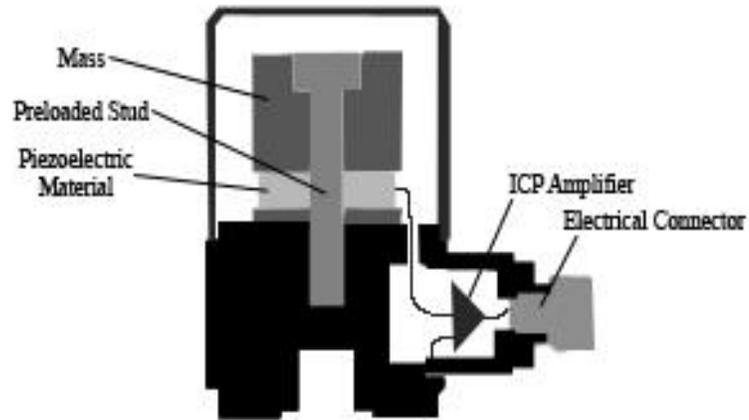
Vibration Instrumentation

Velocity Transducer



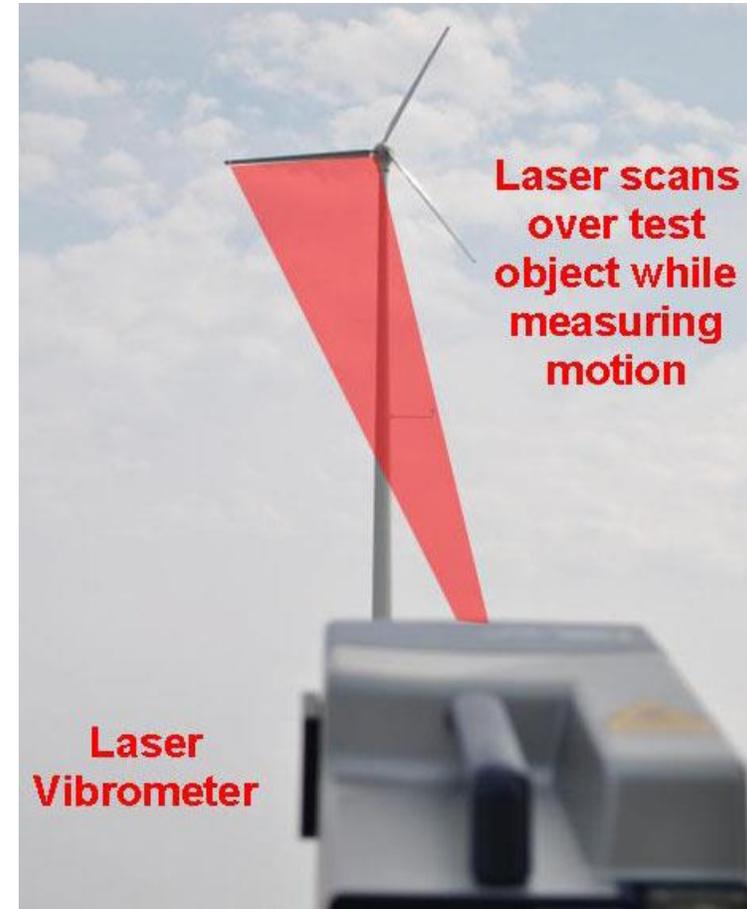
Vibration Instrumentation

Accelerometer



Vibration Instrumentation

Other : laser Vibrometer



Vibration Instrumentation

Typical Frequency and Dynamic range

Displacement → Low frequency : Less than 600 Hz

Velocity → Mid-High frequency : 600 - 5000 Hz

Acceleration → Above 5000 Hz

Vibration Instrumentation

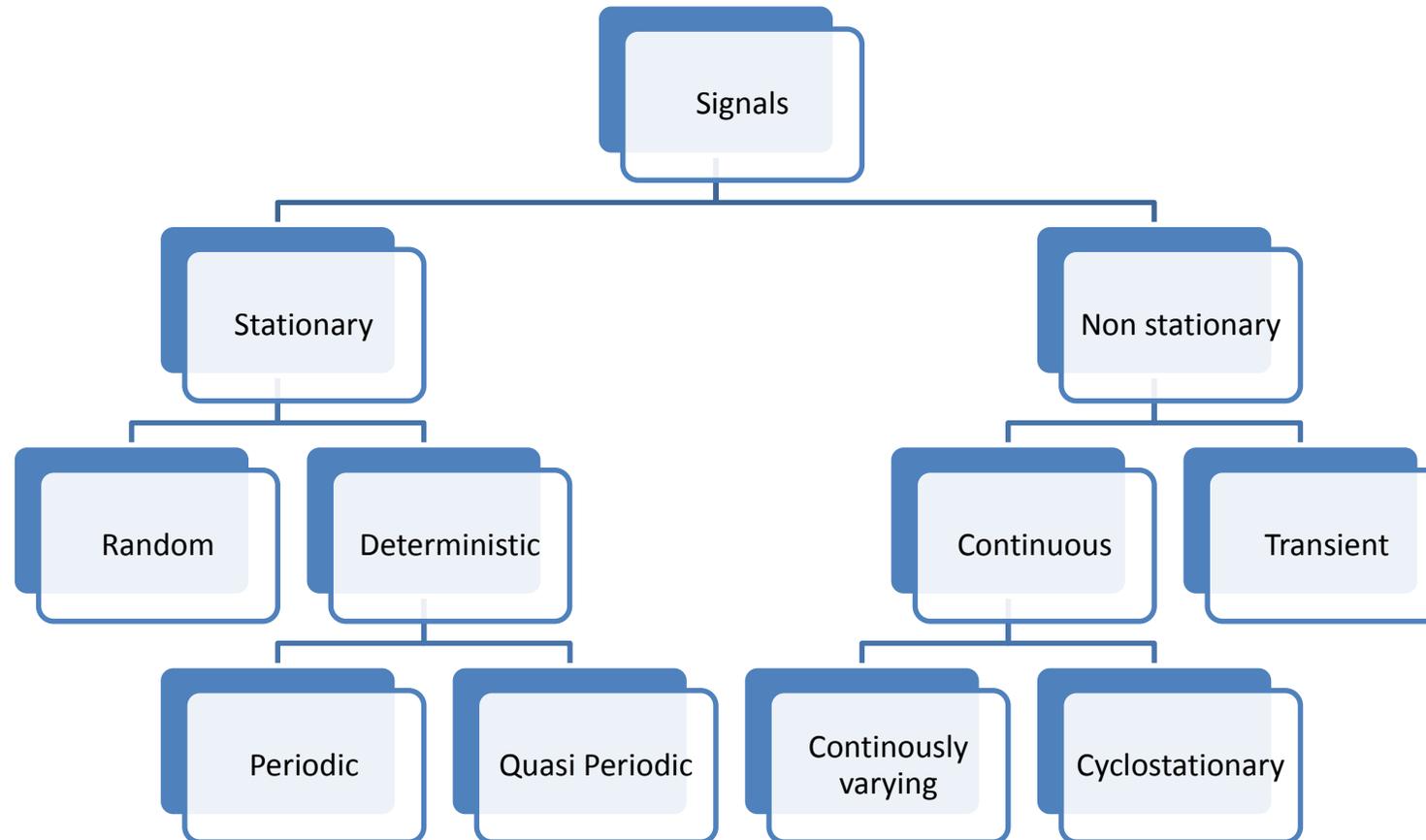
Dual Vibration Probes

Combination between 2 probes :

Proximity Probe + Seismic Probe

(either **Velocity Transducer /Accelerometer**)

Signal Conditioning and Modification



Signal Conditioning and Modification

Some examples :

Periodic → Sine Wave

Quasi Periodic → Gas turbine

Cyclostationery → Piling work

Random → White noise

Signal Conditioning and Modification

What is signal conditioning?

Any manipulation process of an analog signal that somehow can meet requirement for further processing

Signal Conditioning and Modification

Modifications

Any changes needed of an analog signal that helps the processing

Signal Conditioning and Modification

Signal conditioning :

1. Amplification
2. Filtering
3. Isolation
4. Converting, range matching, and any other processes required to make sensor output suitable for processing after conditioning.

Signal Conditioning and Modification

Amplifying :

Increasing the resolution of the input signal, and increasing its signal-to-noise ratio

Signal Conditioning and Modification

Filtering :

Filtering the signal frequency spectrum from containing invalid data

Signal Conditioning and Modification

Isolating :

Isolating to pass the signal from the source to the measurement device

Isolating expensive equipment used to process the signal after conditioning from the sensor.

Thank you

Q n A