



**Advanced Vibration
Isolation**

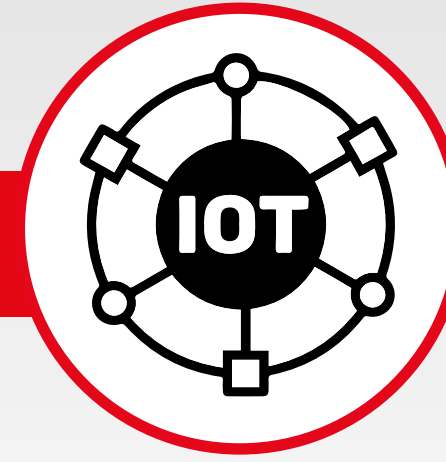
Electronic Microscopes

Application Note





**Vibration
isolation**



IoT



**Artificial
intelligence**

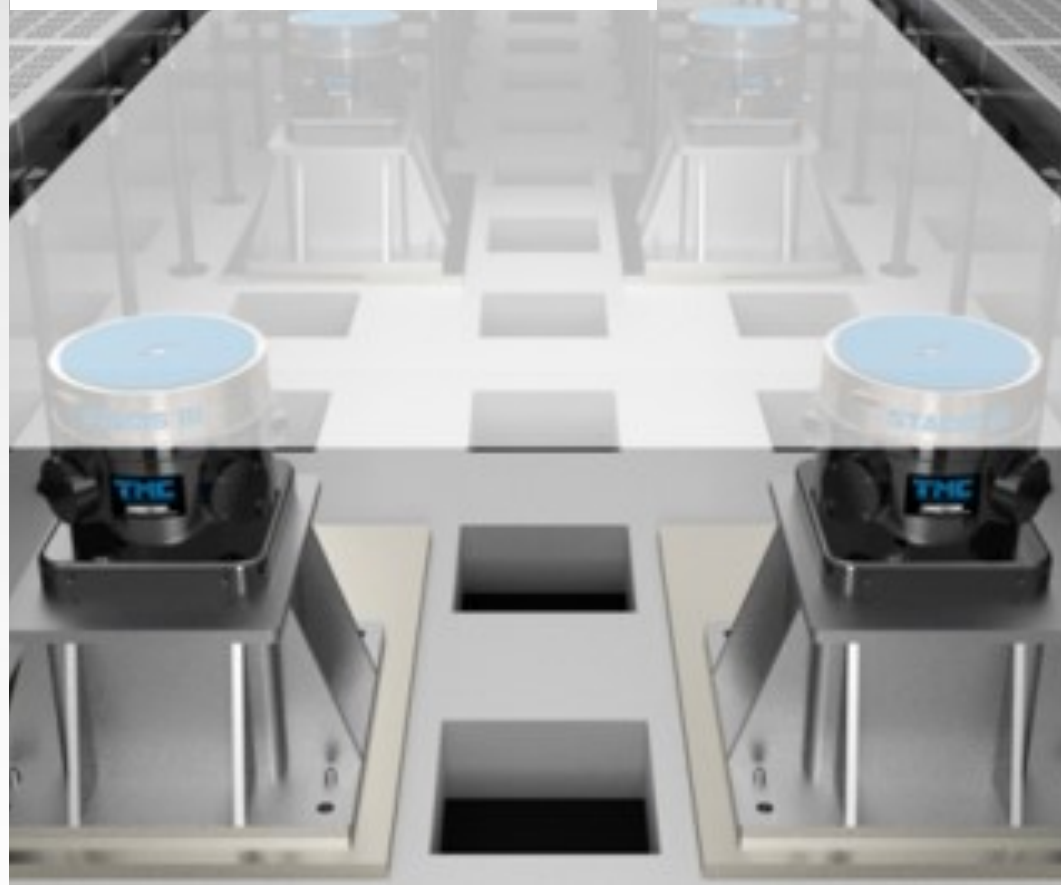


**Sensing
vibration
sources**



Existing Methods

Building Specially-Raised
Isolated Floors



Changing Ground Foundation
With Special Concrete Blocks

Passive Damping
With Concrete
Blocks



Fundament
No possibility to
change tool location



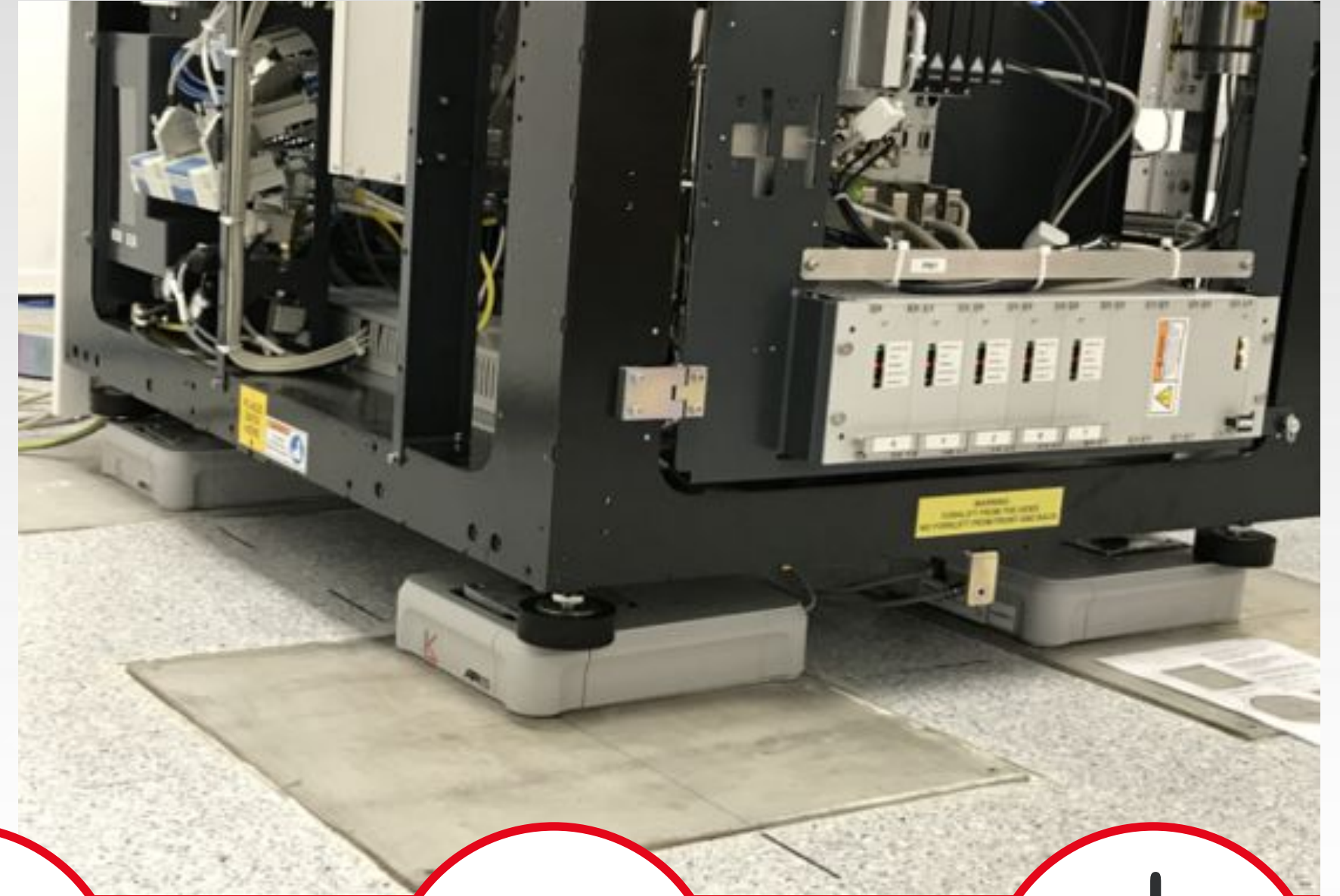
**Machine long
down time**



**No flexibility
no
configurability**



Expensive



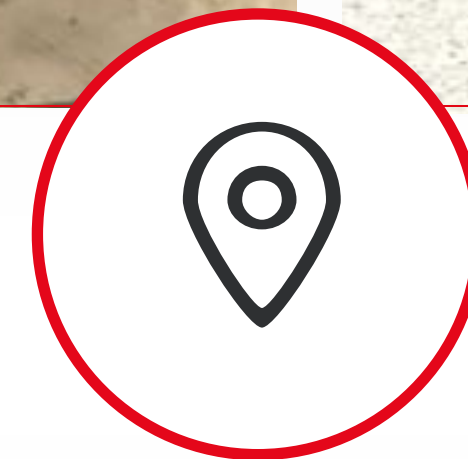
**Elegant
Design**



**Lower
Installation Cost**



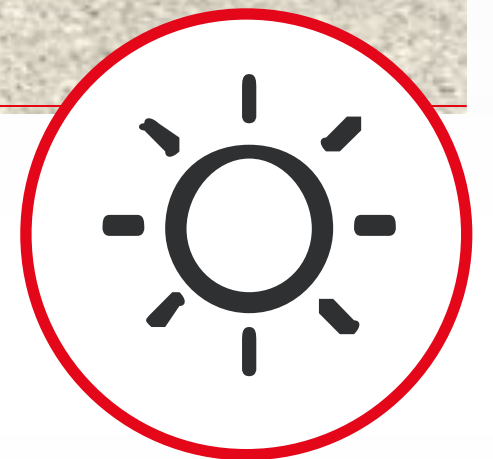
**Straightforward
Installation**



**Flexible
location**



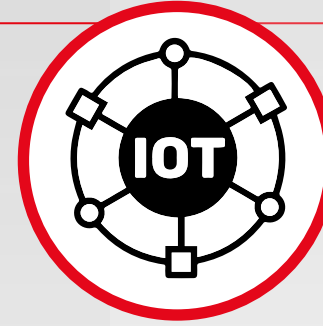
**High
performance**



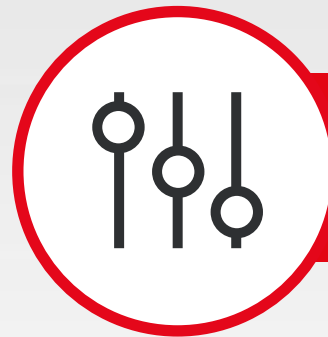
**Adjustment to
environment
conditions**



Real Time Multi Channel Data Collection

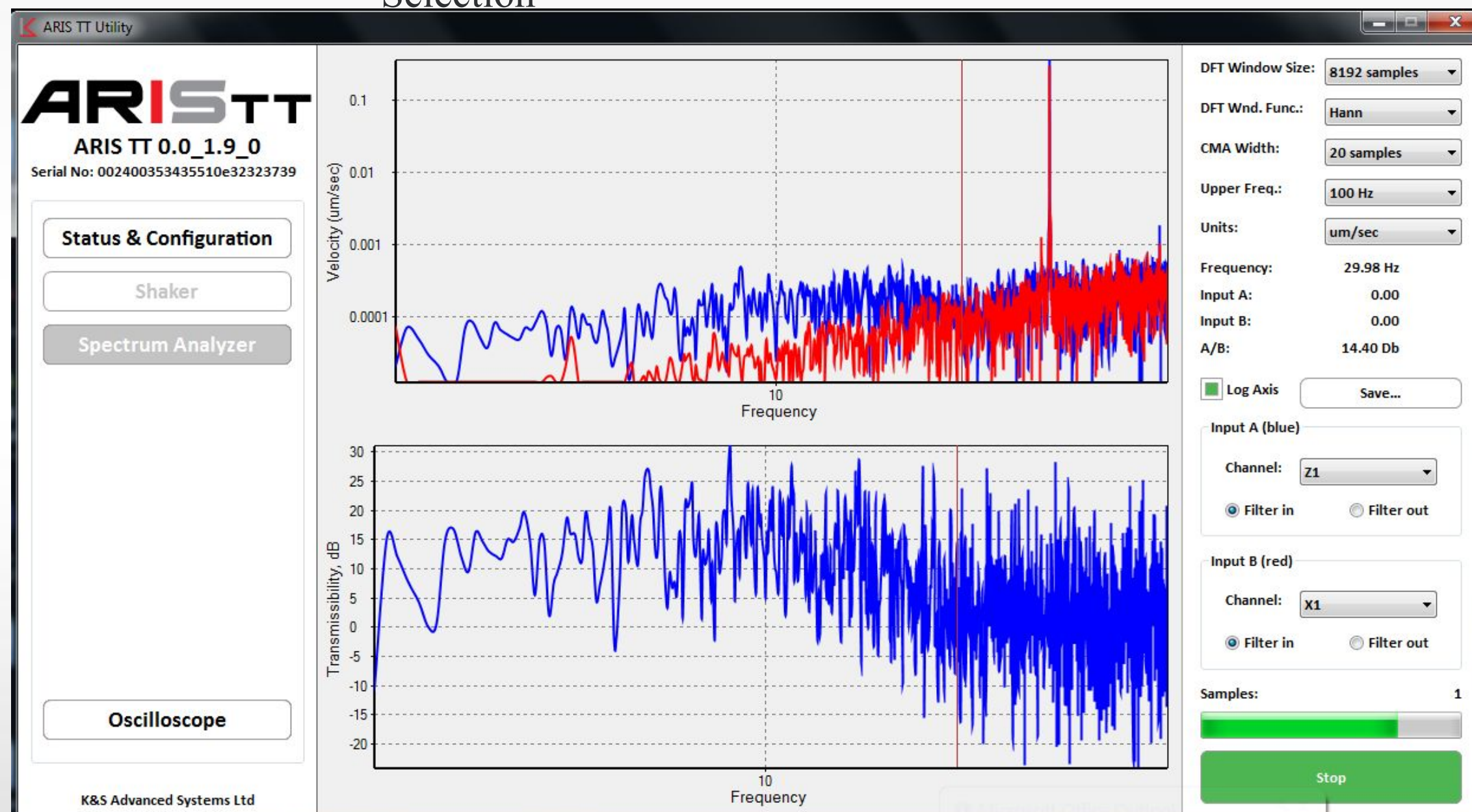


IoT



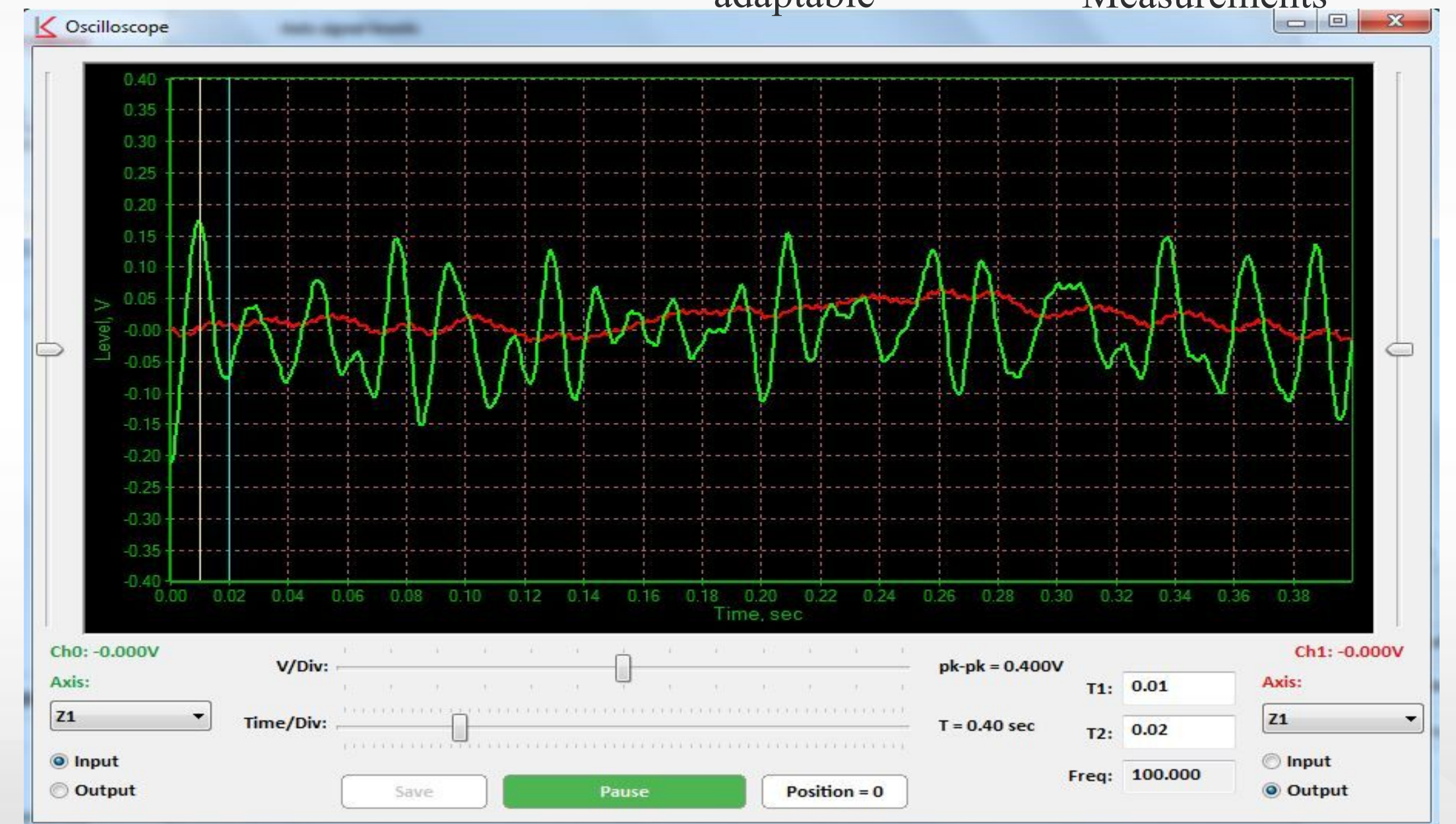
Embedded Real Time Spectrum Analyzer

2 Channels
Multiple Inputs Selection
Measuring Velocity/
Acceleration/Power/Voltage
Frequency domain



Embedded Real Time Oscilloscope

2 Channels
Sensors Real Time Signal
Time/Volt division adaptable
Automatic Frequency Measurements



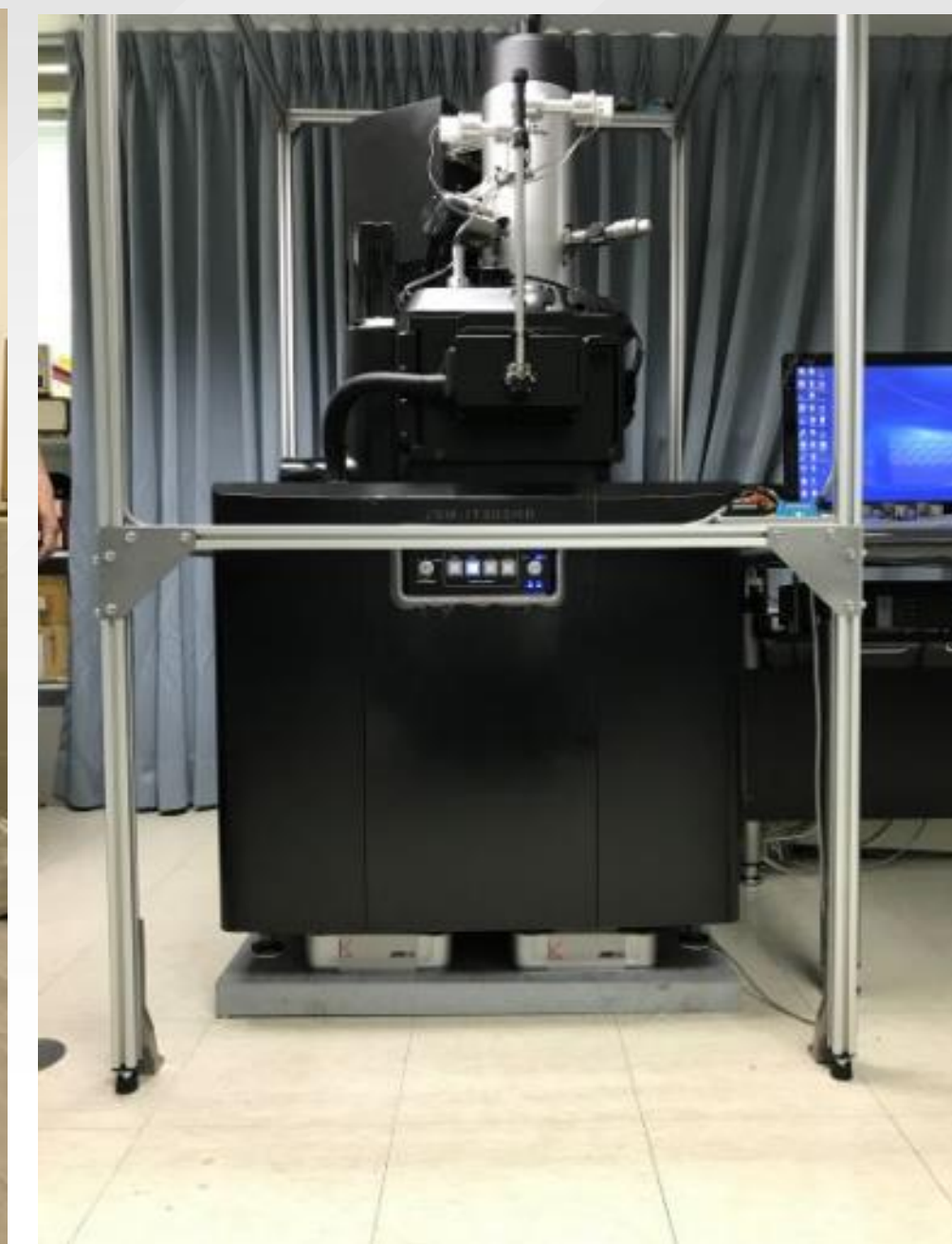
Installation Examples – Extreme Cases



TFS Helious FIB
Installed on 13th floor Micron Seattle



JEOL TEM
Installed on a 4th Floor



JEOL SEM
Installed on a 10th Floor



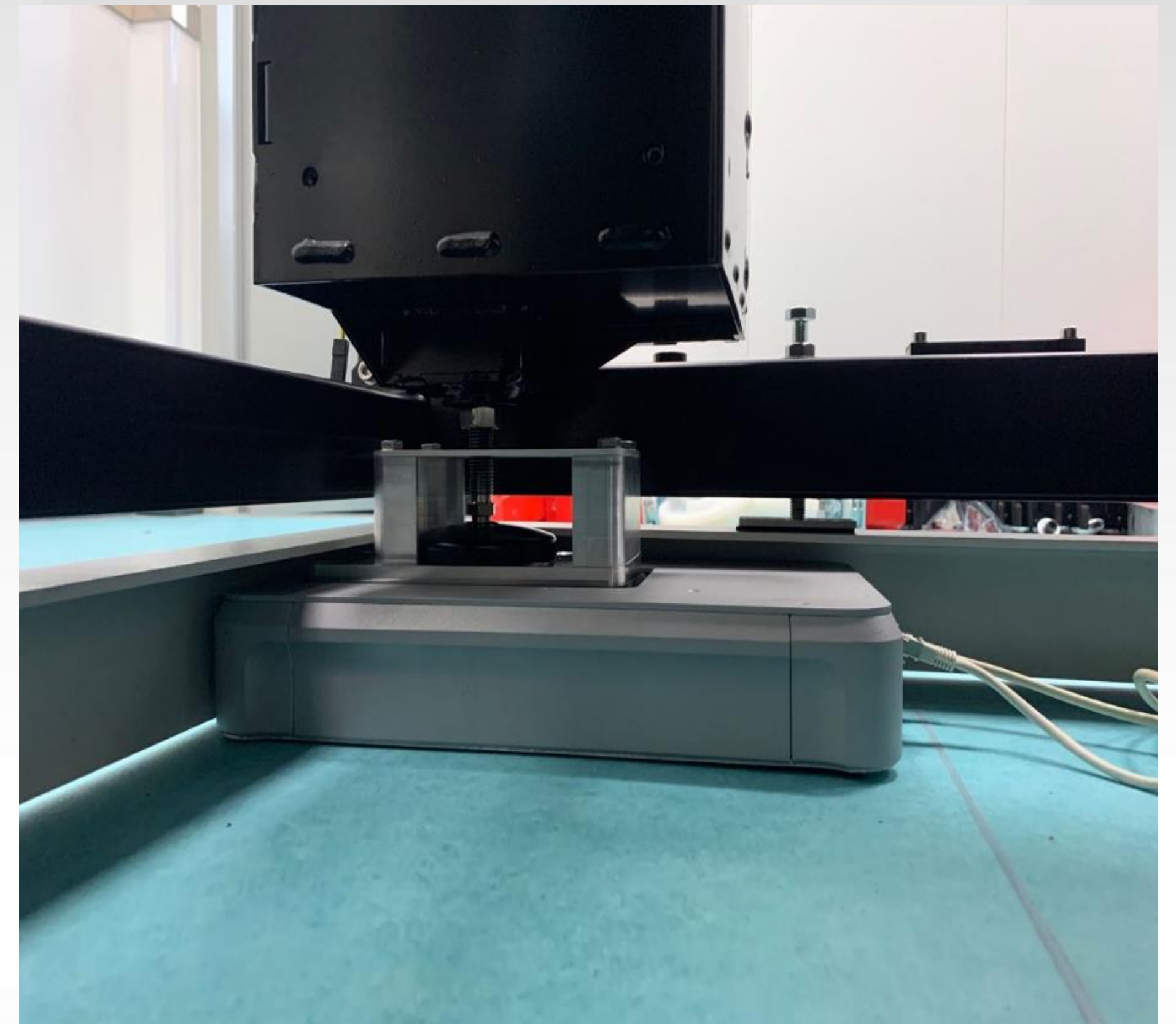
Installation Examples – No need to lift the tool



Hitachi SEM



Tescan SEM



TFS Talos TEM



Installation Examples – No need to lift the tool



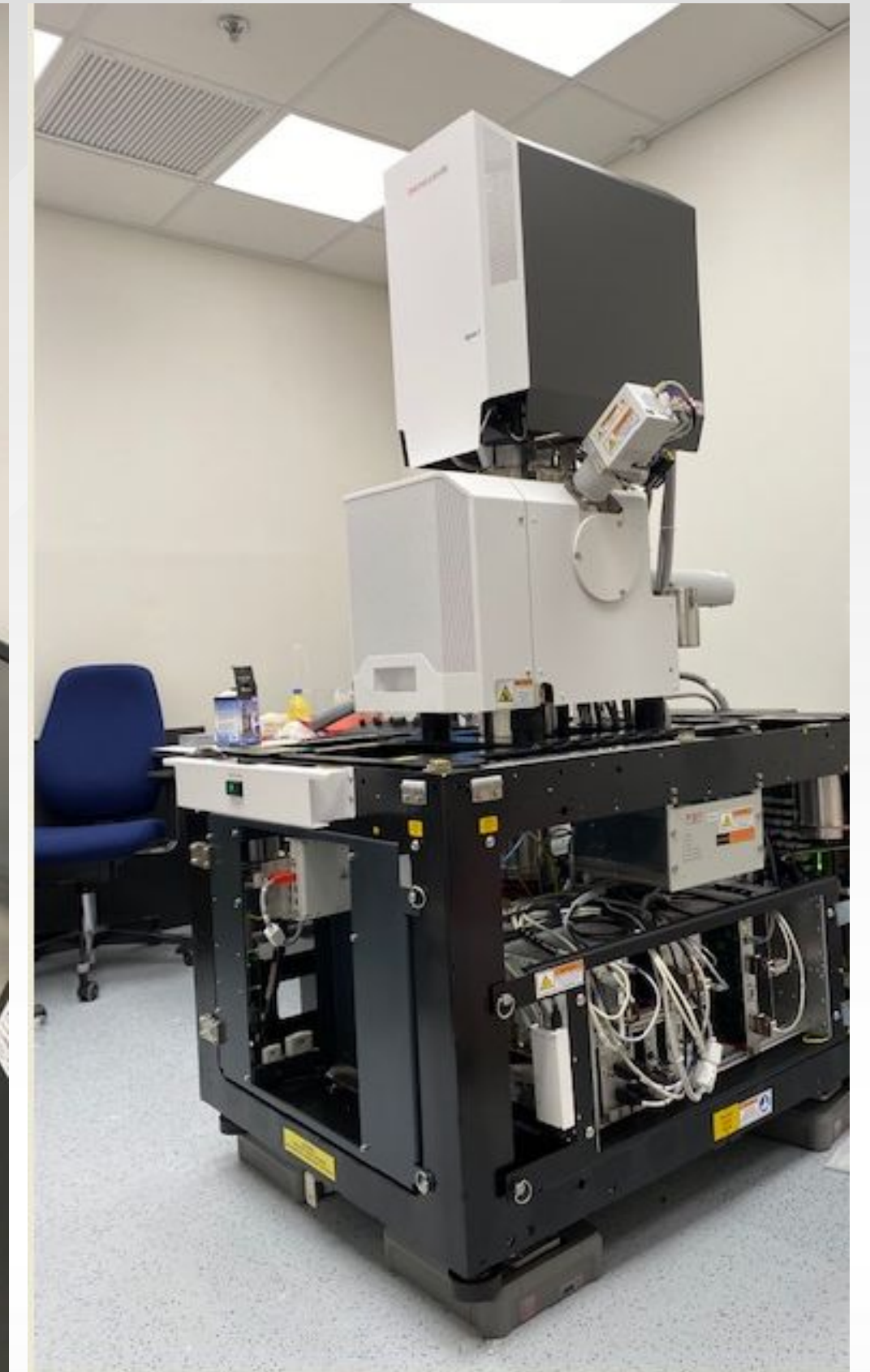
FEI Titan TEM



FEI Meridian SEM – ArisMD
installed under
the SEM



FEI Helios FIB
Installed on 2nd Floor



FEI Apreo SEM
Installed on 1st Floor

Installation Examples – No need to lift the tool



Zeiss Sigma SEM
Installation on Raising Floor

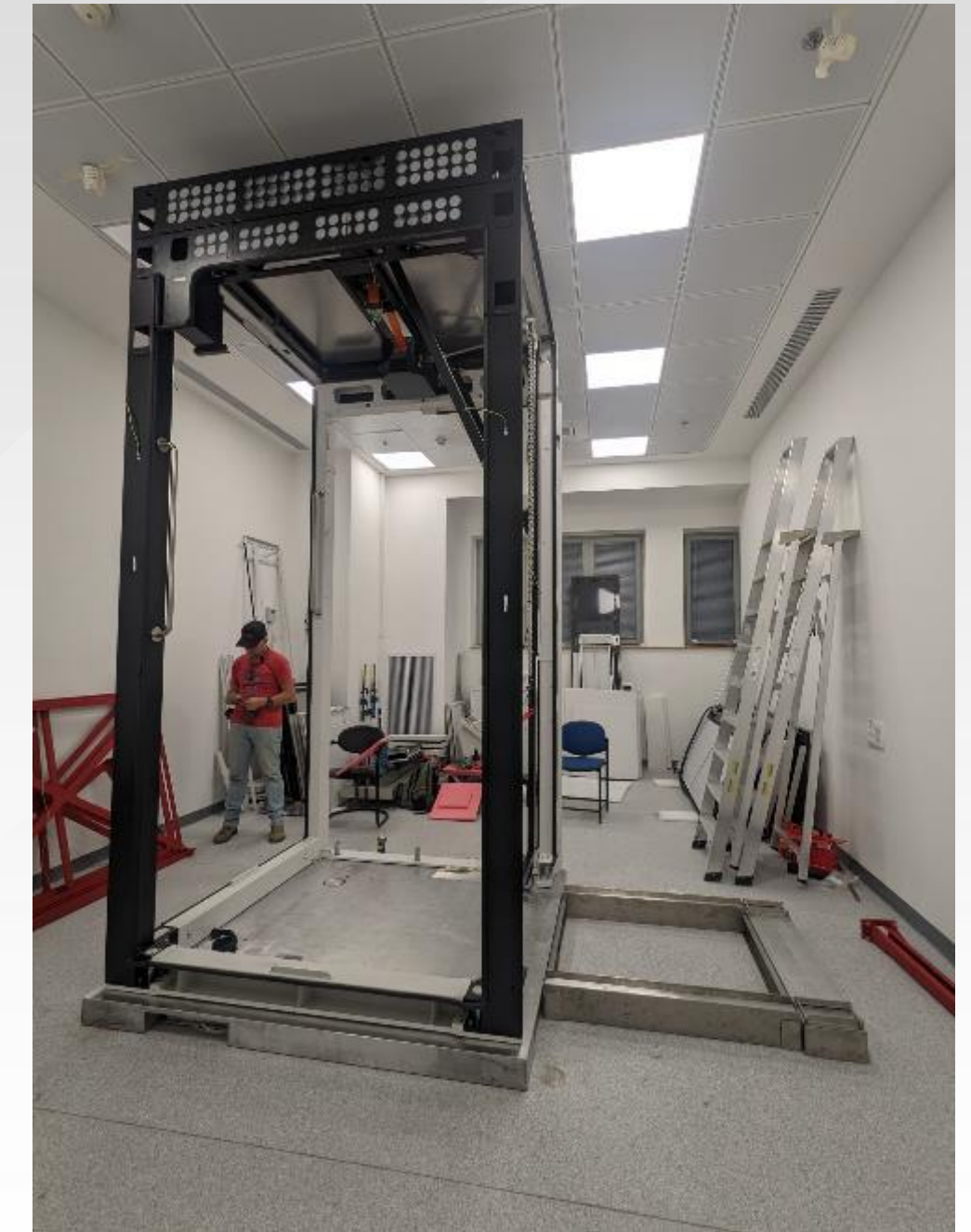
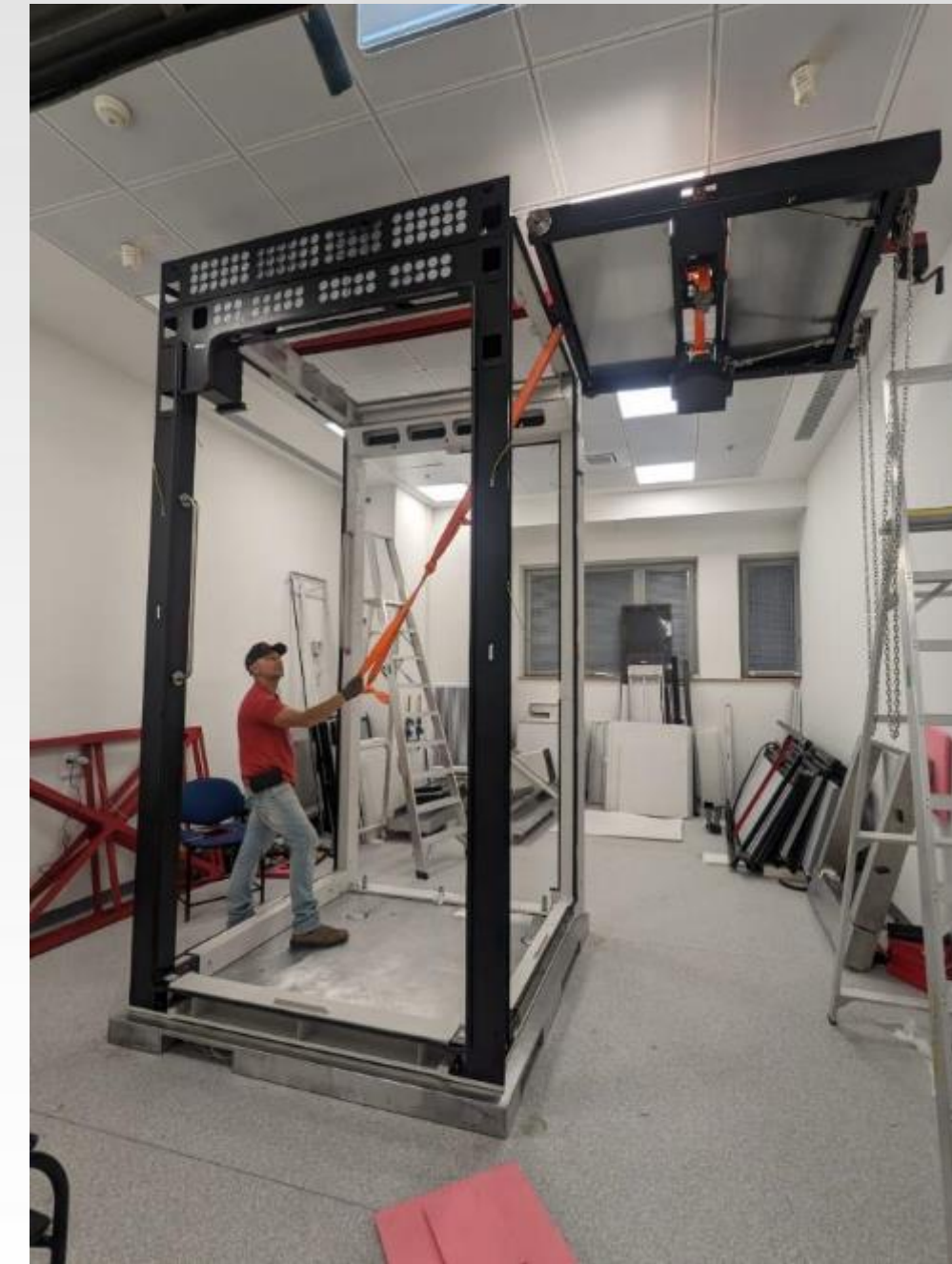


Zeiss Gemini
Sigma500



Zeiss SEM
Installed on a bay area
On a wood floor

K Installation Examples – TFS HTEM's





Key Features

▣ Performance

- 6 degrees of freedom
- Active gain starting from 0.5Hz
- Decoupled architecture (patent pending)
- Variable Damping (patent pending)
- Build In Artificial Intelligence Feature

▣ Small Size, elegant design, low weight.

▣ No piezo electric elements in use

- Practically unlimited lifetime for sensors and motors, using by K&S systems
- Significantly lower lifetime cost

▣ Easy installation for heavy tools – no need for lifting tools and heavy construction.

▣ Capabilities

- Higher Actuators stroke
- Adjustable by software active bandwidth
- Remote control

▣ Built in real time diagnostic tools

- Spectrum analyzer
- Oscilloscope

▣ Highly Tunable Vibration Isolation Control – the systems can be configured to challengeable environmental conditions

▣ Customizable due to flexible internal architecture



Comparison K&S **arismD** versus competitors Piezo Electrical elements based Active Vibration Isolation Systems

Feature	Air Base Vibration Isolation Systems	Piezo Electric Vibration Isolation System	K&S ar smD PRO	Comments
Load Capacity	Practically Unlimited load with properly sized Isolators	Up to 2000Kg per Isolator not more than 4 isolators per system in total max 8000kg	Up to 1500 Kg per Module Practically Unlimited load due to unlimited number of modules per system	Number of modules calculated for required load and size
Architecture	Centralized Control: Central Controller, Maximum 4 Isolators per system connected in Star configuration	Centralized Control: Central Controller, Maximum 4 Isolators per system connected in Star configuration	Distributed Control: Independent Modules, Unlimited number of Modules per System	Flexible configuration: - Saves cost <u>Increase System reliability.</u>
Performance	~2 times vibration reduction from 2 Hz at Floor vibration <u>less than 45 µm RMS</u> (combined for all frequencies) Good Isolation above 20 Hz	~10 times vibration reduction from 2 Hz and above, at Floor vibration <u>less than 9 µm RMS</u> (combined for all frequencies)	~10 times vibration reduction from 2 Hz and above, at Floor vibration <u>less than 45 µm RMS</u> (combined for all frequencies)	arismD pro - No air (avoid all associated problems with air) - Frame mountable - Properly damped - Significantly smaller in size
Motor's Stroke, used to compensate Floor displacement	Air floor controlled actuators or Linear motor's Stroke practically unlimited <u>200 µm (p-p)</u>	Piezo actuators Stroke LIMITED to <u>≤12 µm (p-p) below 10 Hz</u>	Linear motor's Stroke practically unlimited <u>200 µm (p-p)</u>	<u>Air based</u> systems have all problems related with high air flow. Required heavy linear motors to control position. <u>Piezo systems</u> will have ZERO isolation at the high Floor displacement input (happened randomly/periodically on real FAB floors)



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Feature	Air Base Vibration Isolation Systems	Piezo Electric Vibration Isolation System	K&S arismD pro	Comments
Size and Mount	Isolators size is proportional to the required load. Height typically > 300 mm Mount <u>only</u> ON THE TOP of the Platform	Each Isolator is 300 x 320 x 275 mm Mount <u>only</u> UNDER the top of the Platform	Each Module is 270 x 230 x 75 mm Can be positioned <u>and</u> ON THE TOP <u>and</u> UNDER the Platform	Height is very important • Effect height of Tool's CoG (more sensitive to Tilt and Roll) • Tool or room ceiling height can be a limit • Adds ergonomic difficulties to operation and maintenance
Use as a second level of Isolation	<u>Cannot</u> be used in serious with internal Isolation system	Required additional Heavy duty Platform to support Tool Required lifting Tool ~0.5 m above the Floor to place 4 Isolators and Platform	No Platform needed Modules designed to fit between Floor and Tool's frame, space exist because of Tool's own leveling feet. NO LIFTING!	arismD pro • saves cost • significantly reduces installation complications • does not add height



**Advanced Vibration
Isolation
Thank you**