CALMFLOOR

ACTIVE VIBRATION CONTROL

Active Vibration Control for World Leading Performance and Sustainability

CALMFLOOR
ACTIVE VIBRATION CONTROL

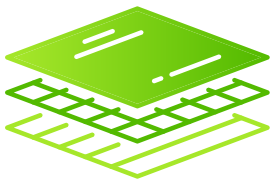
Innovative Technology for Floor Vibration Control

We offer innovative technology that reduces floor vibrations without need for structural modifications or additional construction materials.

Our compact, lightweight and highly effective Active Mass Damping (AMD) technology has been mastered through years of research, and can be used in both new and existing buildings.

CALM®FLOOR AMDs offer staggering reductions in floor vibrations caused by a range of vibration sources, including those transmitted by people walking. In some cases it is possible to reduce floor vibration to a completely imperceptible level. Numerous field trials have demonstrated that vibration reductions up to 90% are readily achievable! This enables engineers to design modern, efficient and sustainable buildings with amazing long-span floors without worrying about problematic floor vibrations.

Enhancing Performance and Sustainability



Improve existing floors to reduce or stop vibration issues or convert them to more sensitive use

Cost-effective option reducing the need for structural modification and extra materials

Easy installation: Simply bolt on, plug in, set and go!

Reduce the carbon footprint of new building construction

Intelligent system providing continuous performance monitoring

Suitable for existing and new buildings

Product Showcase

Key Features and Technical Specifications

KEY TECHNICAL SPECIFICATIONS

- Typical frequency range 3-30 Hz
- Maximum control force capacity 1.2 kN
- Dimensions 630 x 386 x 122 mm
- Power 110-240 V, 50/60 Hz AC single phase 5A supply required
- Network connection Cat 5e/6 Ethernet
- Weight 67 kg total, internal moving mass 35 kg

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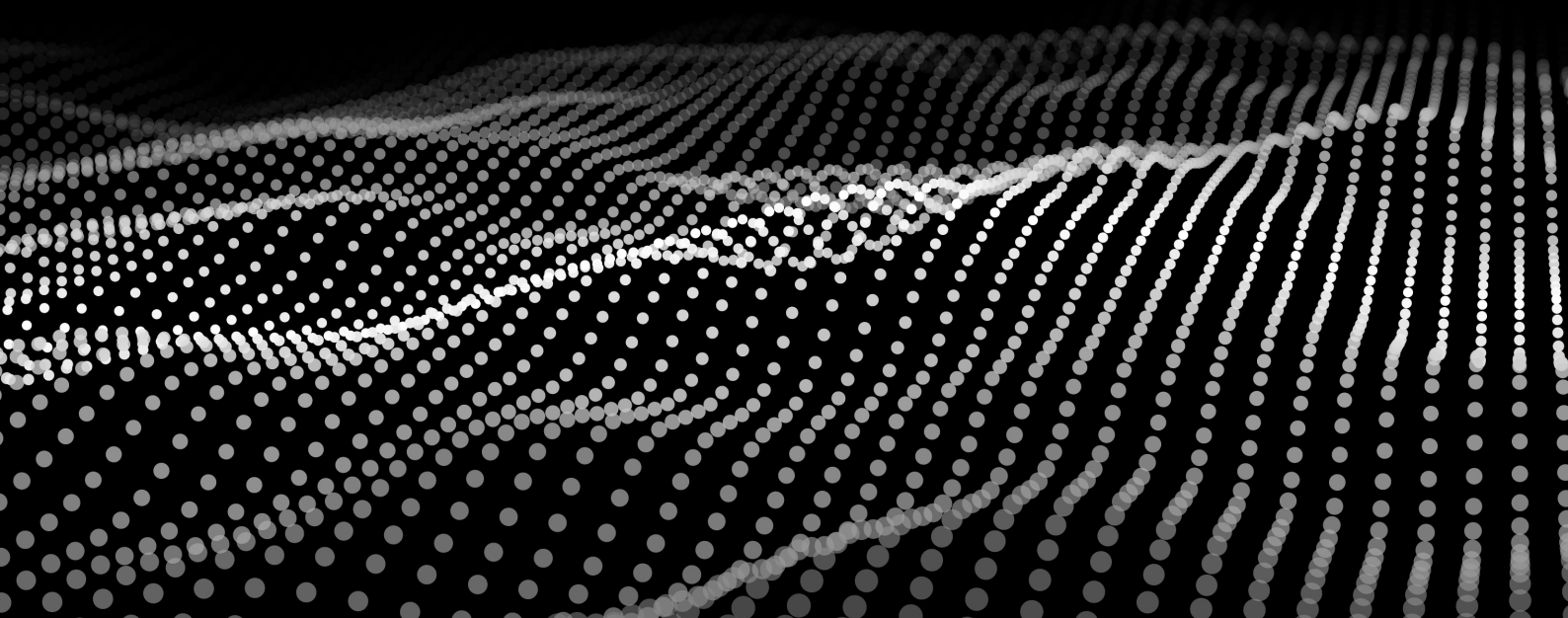
The definition of Active Control



Active vibration control uses continuous measurement of structural motion to instantly generate control forces that provide an extremely high level of effective damping.

Our innovative CALMFLOOR active mass dampers (AMDs) use an inertial mass driven by powerful motors to generate the required control forces. Each CALMFLOOR unit contains all of the hardware and software required to measure structural motion, carry out sophisticated signal processing and supply command signals to the motors.

The technology is similar to noise cancelling headphones, but on a much larger scale.

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The Major Impacts of Floor Vibrations

Human discomfort: Floor vibrations can cause discomfort to occupants of buildings. Excessive vibrations can result in a noticeable shaking or swaying sensation, leading to discomfort, unease, and even motion sickness for some individuals.

Lack of productivity: Excessive vibrations can cause discomfort, distraction, and even fatigue among individuals. When working or concentrating on tasks that require focus, these vibrations can disrupt mental clarity and hinder productivity. Furthermore, prolonged exposure to floor vibrations may contribute to physical discomfort, such as muscle fatigue and joint strain, further diminishing productivity.

Malfunction of sensitive equipment: Vibrations can adversely affect sensitive equipment or machinery, especially in environments where precision is crucial. For example, in laboratories, hospitals, or manufacturing facilities, excessive vibrations can disrupt delicate experiments, medical procedures, or precision manufacturing processes, leading to inaccurate results or product defects.

Occupant perception: Even though floor vibrations generally do not pose immediate safety risks, they can still affect the perception of a building's quality. People may perceive a structure with noticeable vibrations as less stable, leading to concerns about safety and overall satisfaction with the building.

Functional limitations: Vibrations can impose functional limitations on certain activities within a building. For example, in spaces where precise measurements, fine artwork, or delicate operations are performed, excessive vibrations may hinder the ability to carry out these activities effectively.

Architectural restrictions: High levels of floor vibrations may impose restrictions on architectural design. To mitigate vibrations, additional structural reinforcements might be necessary, which can limit design options and increase construction costs.

ABOUT US
WHO WE ARE

Unique Expertise: The Pioneers of Active Mass Damping Technology on a Grand Scale

FSD Active Ltd was created to introduce our innovative active vibration control technology as an effective, convenient and sustainable approach to reducing vibrations in buildings and other structures. We have decades of collective experience in vibration analysis, design, measurement and control, which we have applied to some of the most impressive vibration challenges in the UK and around the world.

CALMFLOOR delivers a step-change in our ability to deal with vibrations in both existing and new buildings, giving vibration mitigation and sustainability improvements that were previously unattainable. Our firm grounding in the highest quality academic research coupled with broad industry expertise means that we are best placed to deliver this amazing solution to market.

ABOUT US
OUR STORY

FSD Active was incorporated in 2020 to bring floor active mass damping (AMD) technology to market. From our base in the South West of the UK, our focus is to promote the use of this advanced vibration control technology throughout the world.

We are, at heart, problem solvers. After seeing first hand for many years the significant challenges in meeting vibration requirements in modern structures, our team developed CALMFLOOR: a unique option for reducing building floor vibrations which is commercially available worldwide.

Thriving on innovation and quality British engineering, we are also keen to develop bespoke solutions for structures that demand it. At FSD Active, we strongly believe in using the right tool for the job, and when that tool doesn't exist yet – we create it.

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ABOUT US
OUR VISION

Our vision is a world where unparalleled performance, efficiency and sustainability of buildings and civil structures is achieved through the use of intelligent technologies.

Buildings go beyond being mere structures; they embody our progress, culture, and achievements. They are the living symbols of our collective journey. As we march towards a sustainable future, we invite you to join us on an exciting expedition of developing cutting-edge technologies.

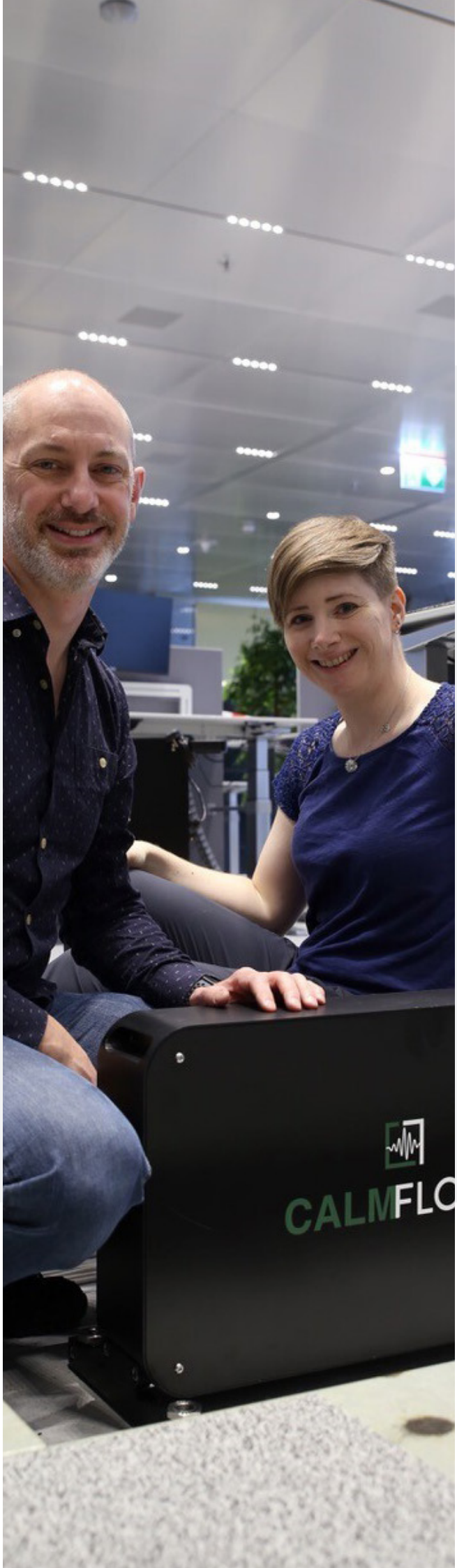
Together, we will protect these architectural marvels and ensure the well-being of all those who work, live, and cherish them. We offer a unique approach to reducing floor vibrations in a wide range of buildings. Using state-of-the-art sensors, actuators and controllers, CALMFLOOR adapts to various sources of vibrations, ensuring a comfortable and high-quality environment for occupants.

We believe that our CALMFLOOR Active Mass Dampers have the potential to transform the way buildings are designed and constructed. Our system provides numerous benefits:

- **Enhanced Comfort:** Reducing excessive floor vibration improves living and working conditions within a building, promoting well-being and productivity

- **Easier Change of Use:** Buildings should be reused, not demolished and rebuilt! CALMFLOOR provides an easy and convenient upgrade path for existing buildings where more stringent vibration standards need to be met, helping reduce global carbon emissions

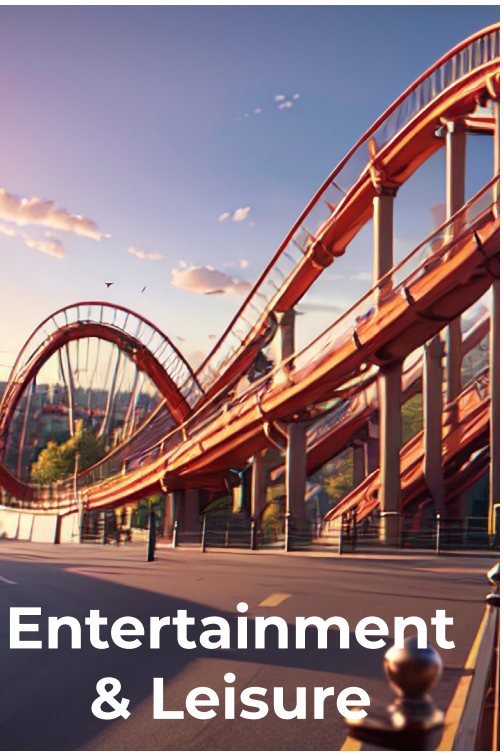
- **Reduced Embodied Carbon in New Buildings:** New structures can be designed to be lighter and more slender than ever before, reducing embodied carbon whilst maintaining excellent vibration performance

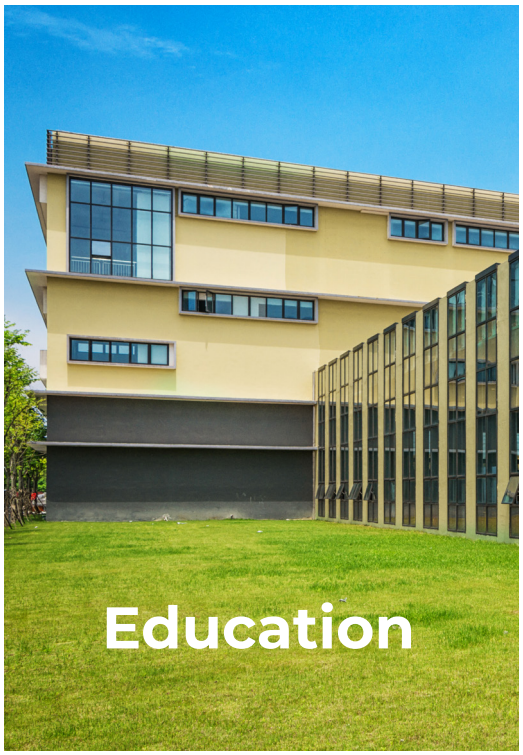



Offices


Commercial
& Retail


Transportation


Entertainment
& Leisure


Education


Airports


Museums &
Libraries


Healthcare


Refurbishment

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Our Expertise

FSD Active has been created by world-leading experts in vibration serviceability with many decades of collective expertise in:

- Performance monitoring
- Analysis and simulation
- Vibration testing and performance assessment
- Vibration control

We enable early adoption of vibration control technology with far-reaching benefits for structural configurations, material efficiency, and overall building design.

We developed the world's first active mass damper for a concert venue floor.

In CALMFLOOR, we have developed the world's first mass produced AMD system for floor vibrations.

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Paul Reynolds
CEO

Paul is an internationally recognised expert in structural vibration and control who has held academic positions at the Universities of Sheffield and Exeter since 1998. He has been a regular consultant to industry and was a founding director of expert consultancy Full Scale Dynamics Limited in 2008.

He is a founder and CEO of FSD Active Limited, which was incorporated to commercialise the active vibration control technology that he has been working on for the best part of two decades.

Emma Hudson
CTO

Emma has pioneered active control of floor vibrations for the last 12 years. Her work has enabled the technical advances needed to translate academic theory into industry products.

Leading on from success winning an InnovateUK Sustainable Innovation Fund grant, she now leads FSD Active R&D, with a particular focus on developing our CALMFLOOR damper.

Aleksandar Pavic
Director

Alex's particular internationally recognised expertise is in vibration serviceability of long-span floors, footbridges and grandstands, which are occupied and dynamically excited by humans.

Alex also co-authored and helped experimental validation of arguably worldwide most advanced design guidelines on crowd dynamic loading of grandstands published by the UK Institution of Structural Engineers in 2008.

Our Team

Our team consists of highly skilled individuals with diverse back-grounds and expertise in their respective fields. From seasoned industry veterans to innovative thinkers, our team is driven by a shared passion for excellence and a commitment to client success.

With their deep knowledge and experience, our experts work collaboratively to tackle complex challenges and provide tailored solutions that meet the unique needs of our clients. Together, we strive to exceed expectations, empower businesses, and achieve remarkable outcomes.

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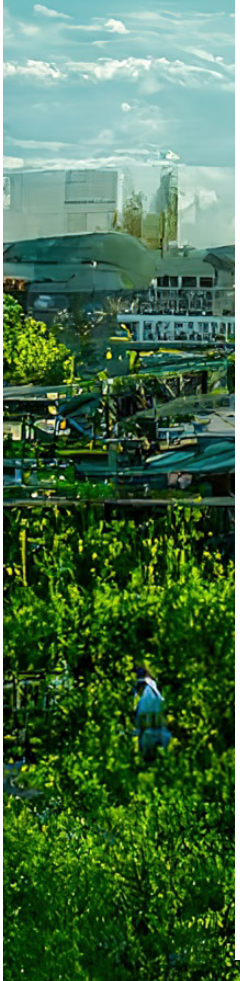


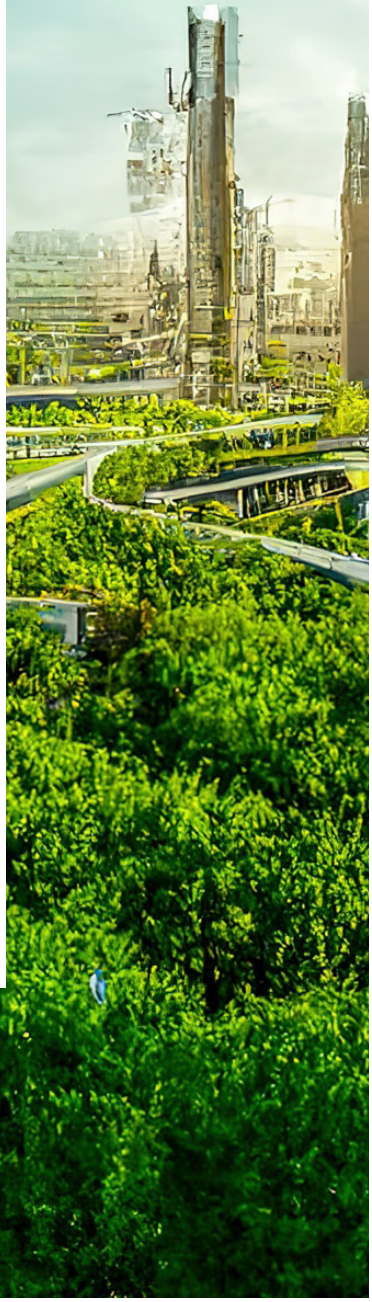
Innovative technology for the control of vibrations in building floors

An advanced solution to enhance sustainability of long span floors

- Minimise Embodied Carbon
- Create Beautiful Versatile Interiors
- Reduce Vibration in Long Span Floors

Why use CALMFLOOR to reduce floor vibrations?

- Reduces embodied carbon in buildings supporting net zero targets
- Cost effective solution compared to using additional building materials or tuned mass dampers
- Assures occupant comfort and wellbeing
- Quick and easy installation and maintenance
- Isolates and combats floor vibration areas easily
- Enables building repurposing



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Why is floor sustainability important?

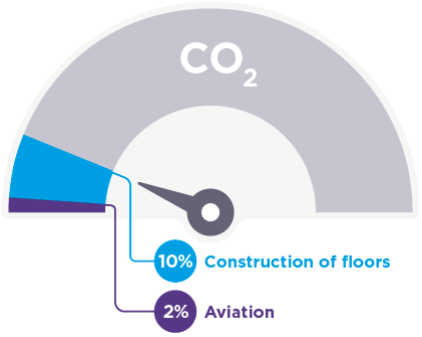
According to the UN, 230bn m^2 of floors will need to be built in the next 30 to 40 years.

That equates to one city of Paris per week being built on planet Earth.

39% of all global greenhouse gas emissions are due to buildings and construction. More specifically, recent estimates indicate that the construction of floors may be generating a staggering 10% of global greenhouse emissions.

That's five times the amount produced by the whole of the aviation industry each year!

Hence, reducing embodied carbon in floors has the potential to have a massive impact on global carbon emissions.



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Achieve your net-zero construction ambitions

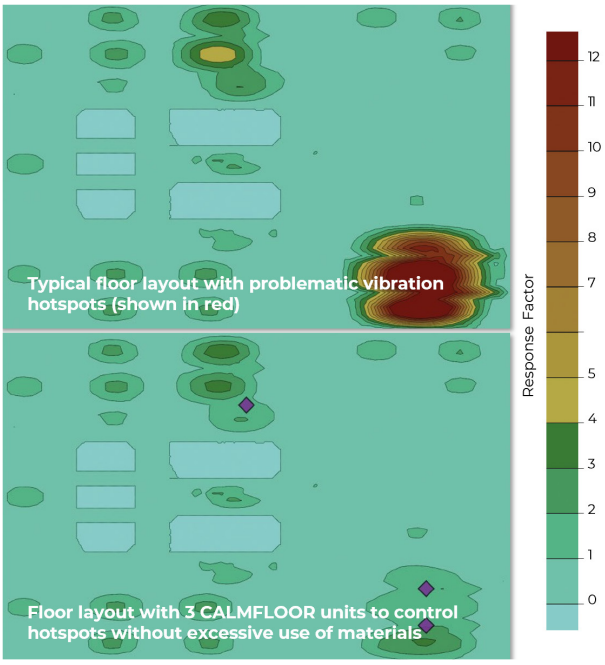
The typical office floor layout below, with 14 m spans, is designed to minimise embodied carbon by using CALMFLOOR to control vibrations.

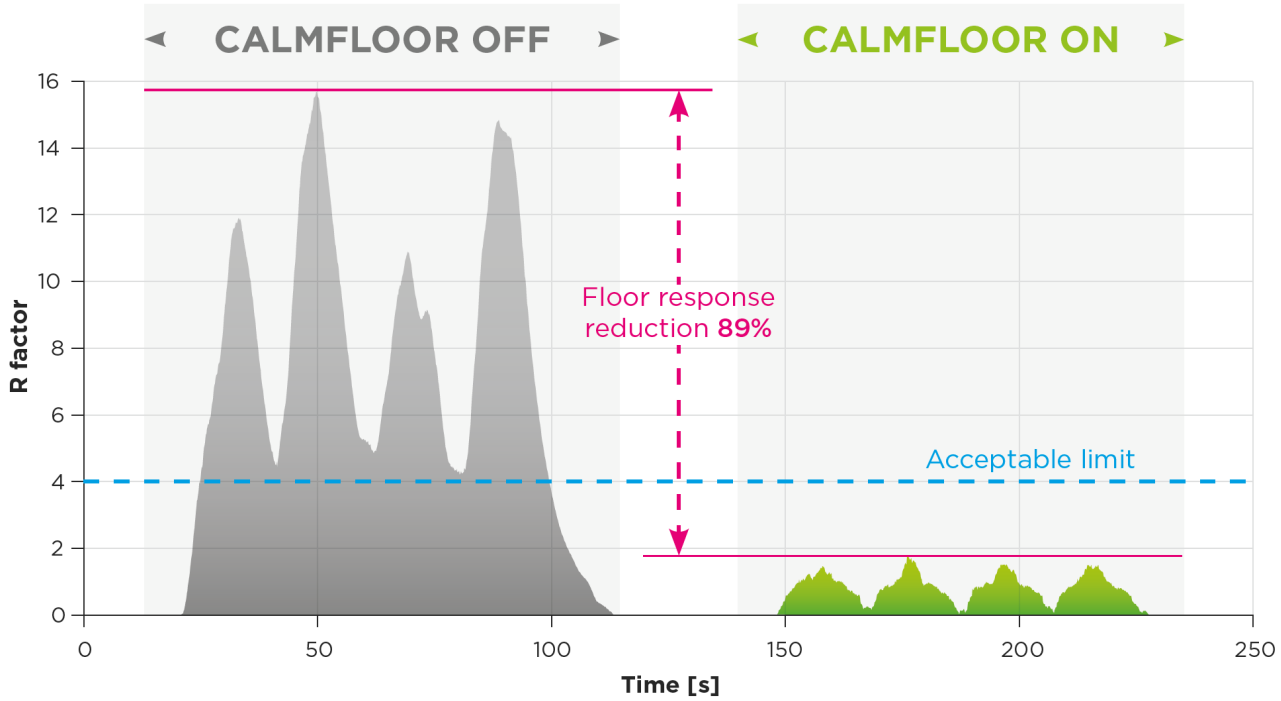
Vibration hotspots can be controlled by CALMFLOOR without wasteful use of additional materials.

In this example, 36.5 kgCO2e is saved for each m^2 of floor, whereas the embodied carbon in the CALMFLOOR units is 1.3 kg-CO2e per m^2.

Other benefits:

- Overall floor depths reduced, reducing building heights or allowing extra storeys
- Structural framing and foundation sizes reduced due to lower floor weights, resulting in further carbon savings
- Architectural demands for slender floors can be achieved without sacrificing sustainability





Proven Performance

The plot above shows actual performance of CALMFLOOR technology in an office building in the UK. The addition of a single AMD reduced vibrations by 89%, instantly converting the floor performance from highly problematic to excellent and well within accepted limits.

Advantages of CALMFLOOR over competitors

- Reduce vibrations from a wide range of sources, from pedestrians walking to external road/rail traffic
- Reduces floor vibrations that disrupt building occupants and affect sensitive equipment
- Up to 40 times less moving mass than equivalent performance tuned mass dampers (TMDs)
- Suitable for new and existing buildings
- Up to 90% reduction in vibrations
- Easy installation
- First modern digital solution to reduce problematic floor vibrations
- Internet connection to secure online portal, for performance and health monitoring
- Low powered devices; typical average power 20-25 W

Mounting Arrangements
for a Wide Range of Structural Configurations

Floor mounted (using feet)

Soffit mounted (using bracket)

Beam / Web mounted (bolted directly through back of unit)

Certifications

Providing excellence to our clients and partners

"As a structural engineering consultant we often develop and embrace new and innovative solutions to solve complex issues in building design. We are thus proud to be the first consultant in the world to successfully apply the CALMFLOOR vibration control on a carbon efficient, lightweight and open-plan composite floor. The new active mass damping technology transformed and improved the floor's vibration behaviour beyond expectations. By virtually eliminating floor vibration response under a footfall dynamic loading, the results of CALMFLOOR is impressive. It has an exceptional performance, is very easy to install and - most importantly - it has excellent reliability, operating flawlessly since the installation almost a year ago. CALMFLOOR is a real game-changer when it comes to solving complex floor vibration issues."

"The vibration control technology supplied by FSD Active is hugely effective in reducing floor vibration and currently a unique product – it's a go-to solution for lively floors when we require a step change in vibration performance, with minimal site work required and negligible impact on the base-build. The product is backed by a highly experienced and capable team providing great support. We have seen the successful installation of the system in a high-profile tower in London and are currently considering other projects for installations."

"CALMFLOOR is one of the most exciting vibration control products to emerge in the last 20 years. It is the world's first commercially available mechatronics device specifically developed to replace structural materials as a solution for excessive resonant floor vibrations. This is crucial as vibration serviceability has become the governing design criterion for many modern open-plan, long-span commercial floors, determining the size and shape of millions of square feet that Thornton Tomasetti designs every year in the US and around the world."

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