

falken°hr
home of music

Technology-Guide

Much more than just a Hi-Fi rack.



Dear music lover,

in this guide we will try to explain the technological requirements of a hi-fi rack as clearly as possible and to present the solutions derived from them in FalkenOhr audio furniture.

If anything is unclear or if you have any further questions, please feel free to contact us at office@falkenohr.at.

We hope you enjoy reading.

Robert Mayr, CEO FalkenOhr



DEFINITION OF TASK

Basic requirements for hi-fi racks:

To enable outstanding sound from the components of your hi-fi system, they must be kept as free as possible from interferences.

Interferences can be of an electromagnetic or mechanical nature.

Interferences can come from outside the hi-fi rack or from inside.



TYPES OF INTERFERENCES

Electromagnetic interference in the form of electromagnetic fields:

In practice, every electrical device causes (emits) electromagnetic interference (EMI). On the other hand, every device is also a receiver of interference. Line-bound interference is transmitted directly via signal lines, field-bound interference as electromagnetic fields.

Mechanical disturbances in the form of oscillations or vibrations:

Vibrations occur in several ways and can be transmitted by structure-borne or air-borne sound. Structure-borne sound is generated e.g., in the housings of the hi-fi components themselves, and is present to a greater or lesser extent depending on the design of the components. Airborne sound e.g., generated by loudspeakers, stimulates our eardrums but also all other bodies to vibrate.



ORIGIN OF MECHANICAL DISTURBANCES

For the technological design, it is important to distinguish between vibrations that act on the hi-fi rack from the outside and those that occur in the hi-fi rack itself due to the components.

Vibrations that occur outside the hi-fi rack and thus act on it from outside, such as impact sound, vibrations from floors, the excitation by bass waves from the speakers, etc., usually have in common that they are low-frequency vibrations. And low-frequency vibrations can be damped most effectively with mass.

Vibrations that occur within the hi-fi rack and thus affect it from within, are micro-vibrations, which are caused by mechanical and/or electronic components of the hi-fi components themselves. These can now either be damped or specifically and quickly transmitted. Damping always leads to a loss of dynamics and clarity. You can check this very easily for yourself by placing classic felt gliders under the feet of your turntable or your power amplifier and analyze how the sound image develops.



TASK DEFINITION IN DETAIL

From a technological point of view, this results in the following tasks for our audio furniture:

- Reduction of external influences to the greatest possible extent
- Transmitting and damping of the mechanical vibrations of the hi-fi components
- Mechanical decoupling of the hi-fi components among themselves
- Reduction of electromagnetic interference between the devices



TECHNICAL IMPLEMENTATION

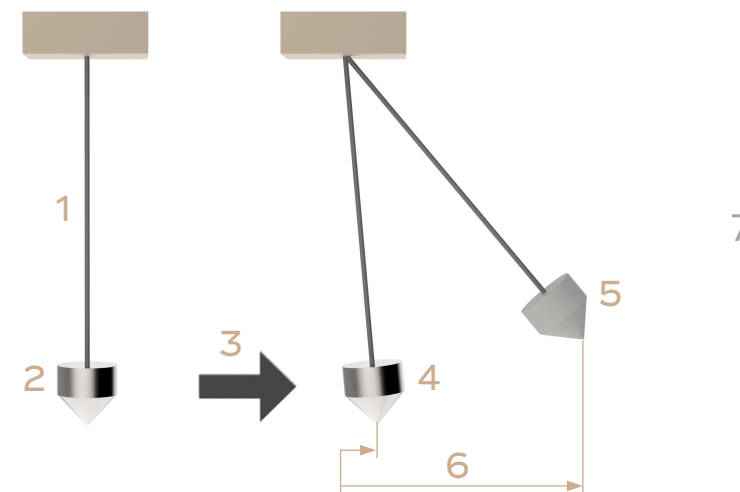
Mass:

Low-frequency vibrations can be damped most effectively with mass. Mass directly counteracts external excitation. Furthermore, besides decoupling, mass is the essential element for damping impact sound = structure-borne sound. High precision machines like grinding machines or measuring machines take this fact into consideration and have very heavy and rigid foundations.

FalkenOhr audio furniture is therefore constructed from heavy solid materials with the most homogeneous damping characteristics possible and weighs between 70 and 280 kg depending on size and design.

Effect of mass is illustrated with a body suspended on a thread, which is stimulated by an external force (symbolic illustration). The effect of the higher mass on the amplitude of the oscillation is immediately apparent.

High mass = low deflection



- 1...very thin thread
- 2...body with constant volume
- 3...external influence e.g., sound wave, or wind
- 4...body made of steel - high mass
- 5...body made of styrofoam - low mass
- 6...deflection due to the external influence



TECHNICAL IMPLEMENTATION

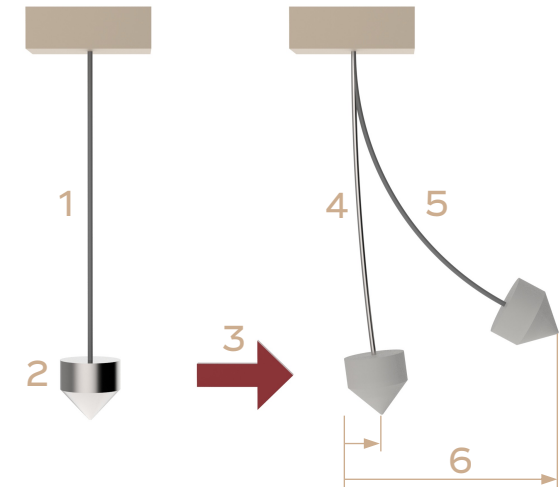
Stiffness:

It describes the resistance of a body to elastic deformation by an external force.

FalkenOhr audio furniture is designed using finite element methods. The basis are stiff base materials with optimized cross-sections. **All connections relevant to strength are bolted connections tightened with a torque wrench.** There are no screws in plastic or in wood!

Effect of stiffness illustrated with a body attached to a thin tube stimulated by an external force (symbolic illustration). The effect of the higher stiffness on the magnitude of the deflection of the oscillation is immediately apparent.

High stiffness = low deflection



- 1...hanging with constant cross-section
- 2...body with constant mass
- 3...external influence e.g., sound wave, or wind
- 4...hanging made of steel tube - high stiffness
- 5...hanging made of plastic tube - low stiffness
- 6...deflection due to the external influence



TECHNICAL IMPLEMENTATION

3D/10 technology = transmitting resp. damping of micro-vibrations and decoupling of the shelves:

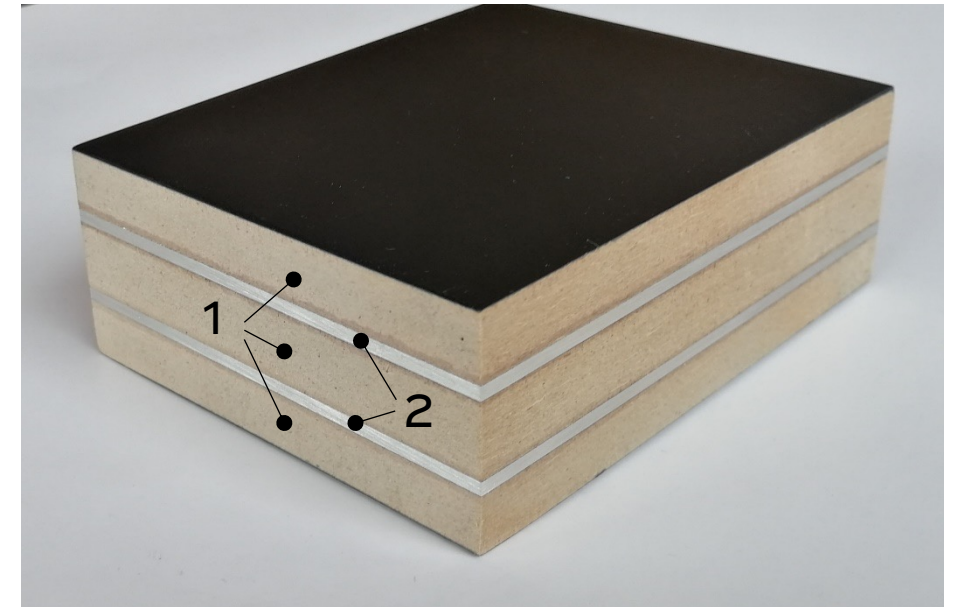
For us, the fine art of dynamic sound imaging lies in transmitting micro-vibrations as targeted as possible and damping them as little as possible.

Shelf:

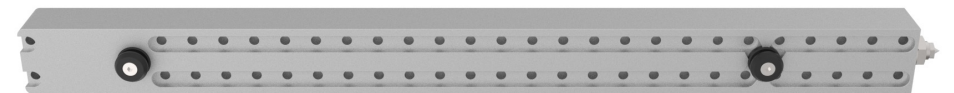
The shelves are of compound construction made of multilayer MDF and aluminum. This combination is characterized by high mass and rigidity, as well as the ability to quickly and selectively transmit vibrations and induced voltage via the aluminum layers.

Stands:

The stands are made of cast aluminum and then anodized.



- 1...MDF - Medium Density Fiberboard
- 2...Aluminum

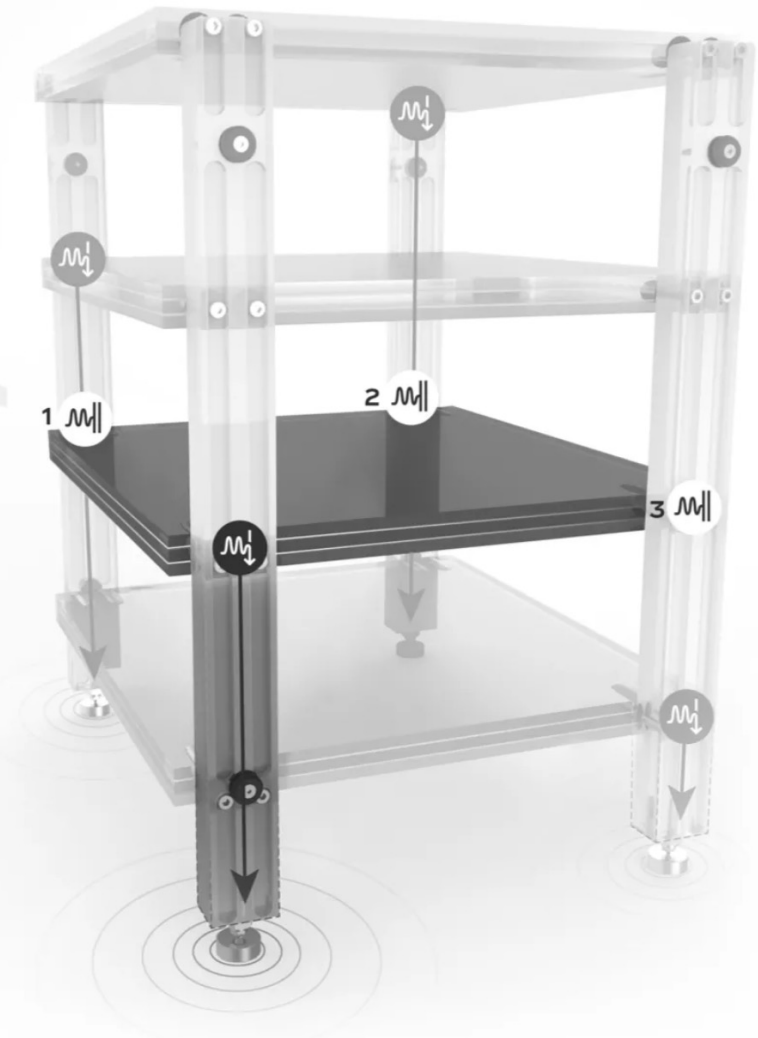


TECHNICAL IMPLEMENTATION

3D/10 technology = transmitting resp. damping of micro-vibrations and decoupling of the shelves:

Structure of vibration transmission:

A shelf is connected to one stand in a transmitting manner and to the other three stands in a damping manner (3D/10 = 3 x damping, 1 x out). This means that each stand is connected to only one shelf in a transmitting manner and to all other shelves in an insulating manner. In this way, the vibrations of one shelf can be transmitted without affecting the other shelves. This system works up to 4 levels. If a rack is designed with more than 4 levels, it makes sense to couple two levels to one stand, whose components are usually not operated together e.g., turntable and CD player. For the model 516 the connection to each stand is redundant i.e., double. This leads to perfect transmission of the micro-vibrations of the electronics and to maximum rigidity of the sound core.

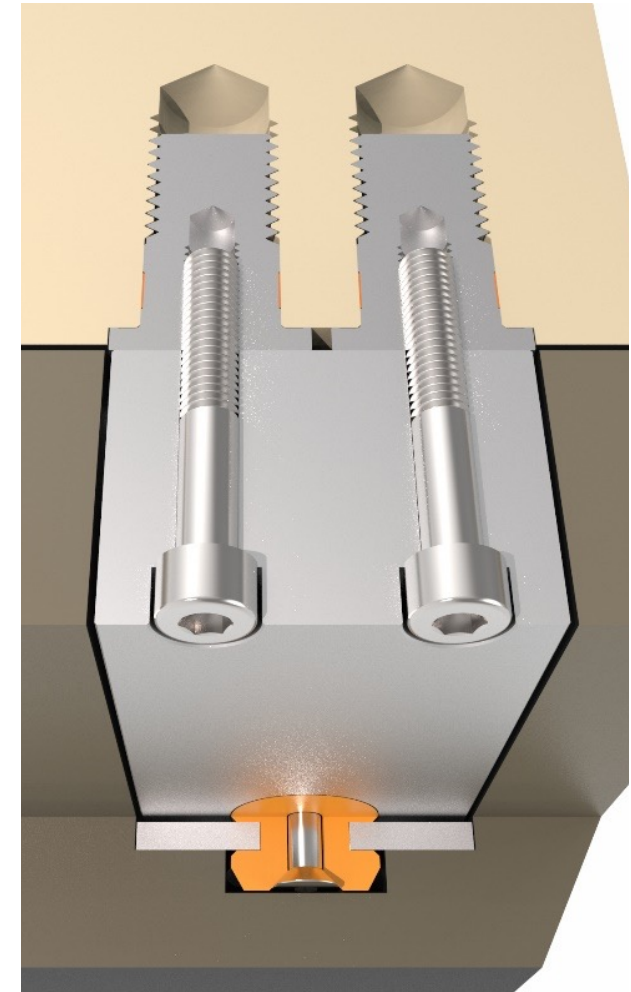


TECHNICAL IMPLEMENTATION

3D/10 technology = transmitting resp. damping of micro-vibrations and decoupling of the shelves:

The transmitting shelf connection to the stands:

The transmitting connection is made via anodized aluminum parts. Raw aluminum is relatively soft, so it absorbs resonances well and can dissipate and transmit them very evenly due to its ordered microstructure. If the surface is anodized, a hard layer is created, which makes the aluminum insensitive and at the same time extremely fast in transmitting vibrations. This results in fast transmission of vibrations and resonances and at the same time a certain and intended damping. This combination is not found in such a balanced way in any other material.

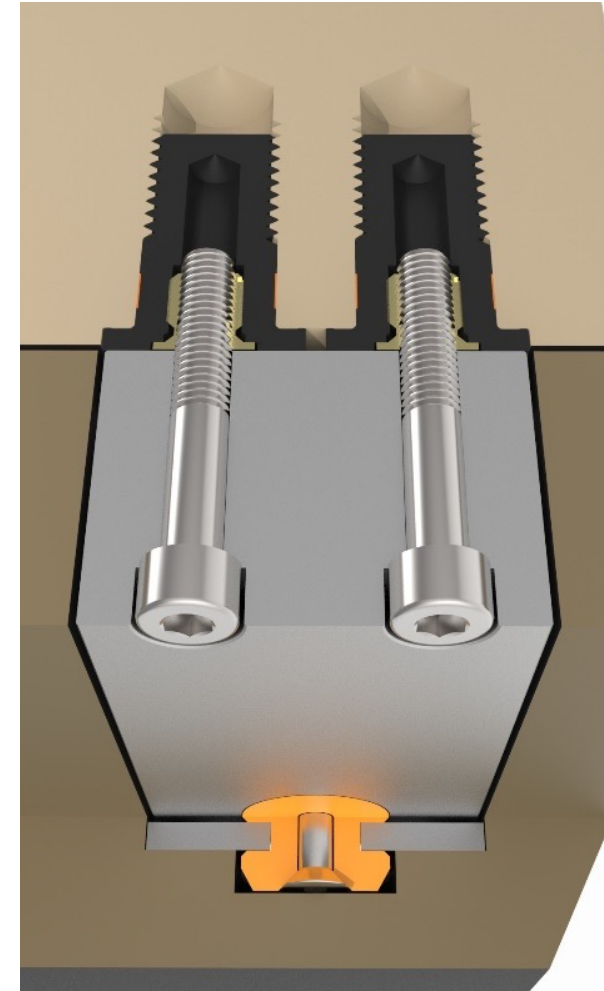


TECHNICAL IMPLEMENTATION

3D/10 technology = transmitting resp. damping of micro-vibrations and decoupling of the shelves:

The insulating shelf connection to the stands:

The insulating connection is made via a specially molded thermoplastic element. This plastic, which is also used specifically in mechanical engineering, is characterized by its high homogeneity and thus uniform damping properties combined with high strength. Threaded inserts specially adapted to this plastic are used for the screw connection.



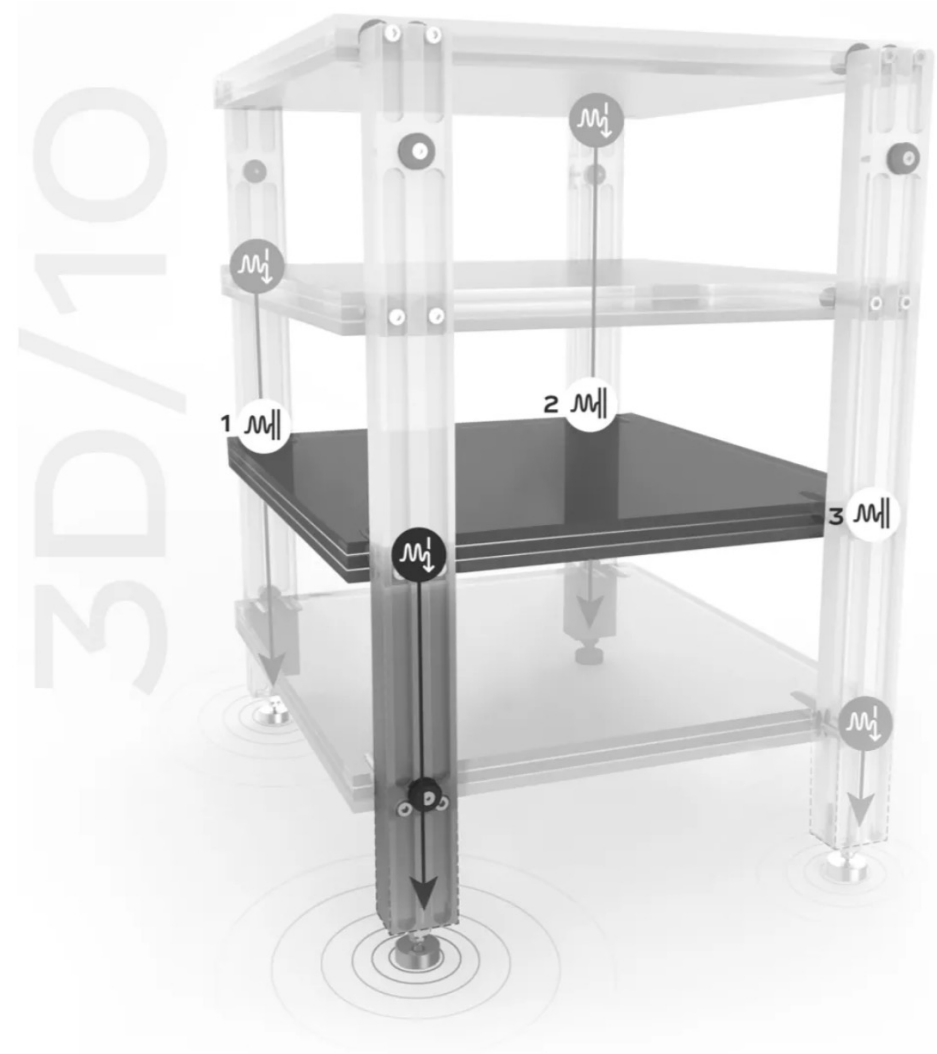
TECHNICAL IMPLEMENTATION

3D/10 technology = electromagnetic decoupling of the levels resp. components:

Potential equalization of the induced voltage:

Due to the aluminum inserts of the shelves and based on the above-described transmitting resp. insulating connection of the shelves to the stands, it is possible to discharge the voltage induced by the electromagnetic field of the audio components by means of potential equalization for each level independently. Each stand can be individually grounded for this purpose.

Your benefit: This leads to a drastic reduction in electromagnetic interference between the various devices and thus to a significant increase in precision and clarity of the sound image.

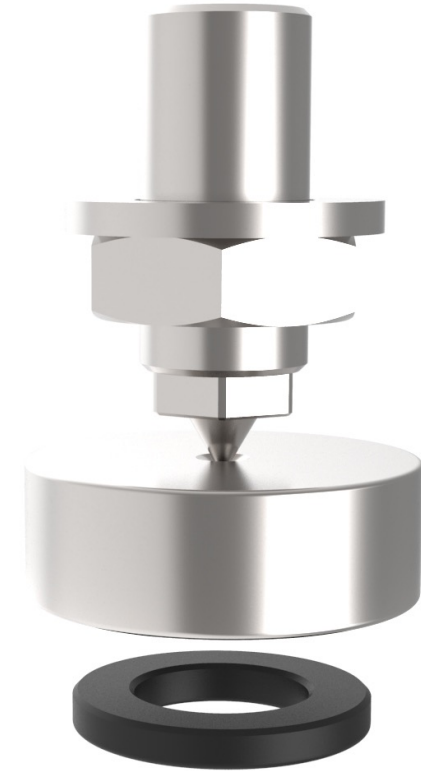


TECHNICAL IMPLEMENTATION

Decoupling resp. connection to the floor:

After numerous tests with different variants, such as ceramic balls, air springs, and others, we decided on the "classic" variant of a fast-transmitting stainless-steel spike with a ground plate for reasons of dynamics and precision. Here, the micro-vibrations transmitted via the stands are decomposed and converted into heat.

It is also possible to adjust the sound image to your listening preferences and living space conditions by changing the damping of the ground plates. If stone floors, certain audio components, or living room conditions create a too hard analytical sound, it is possible to insert a plastic ring into the ground plate. Otherwise, the stainless-steel ground plate rests directly on the floor. The damping can be changed individually for each stand and thus for each shelf e.g., only for the level with the power amplifier.



TECHNICAL IMPLEMENTATION

Clear structure:

FalkenOhr audio furniture has a clear structural separation into three main subassemblies. These are assembled independently and are decoupled from each other.

Sound core (1):

The heart of your audio furniture. Designed for an extremely clear, powerful and spacious sound image.

Functional body (2):

The more possibilities and functionality for your audio furniture. Designed for your living space and your high-end audio components.

Cladding (3):

The beautiful cover for your audio furniture.

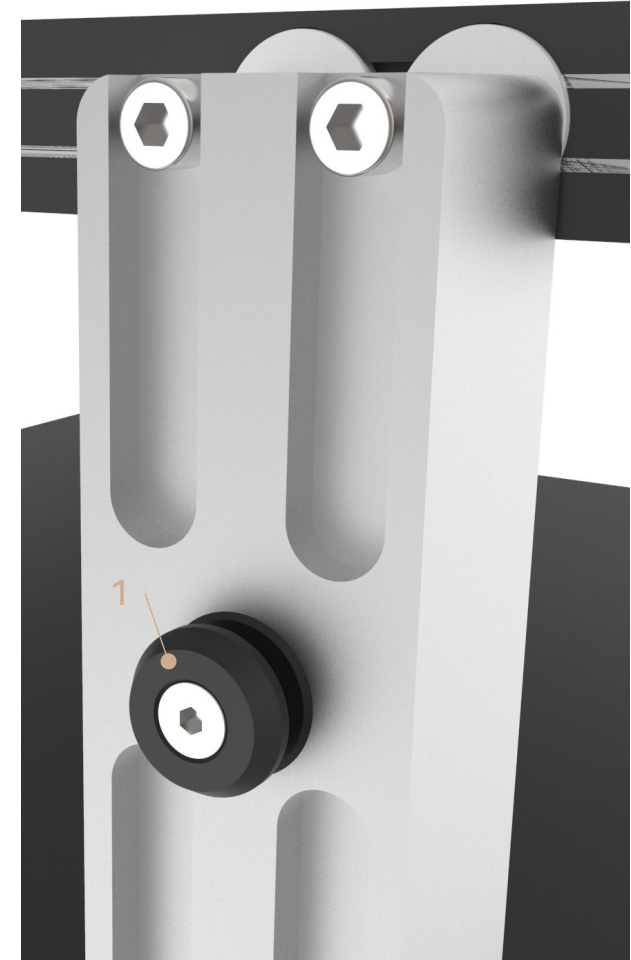


TECHNICAL IMPLEMENTATION

Decoupling of the attachments:

All parts attached to the sound core are made of damping material on the one hand and are decoupled on the other hand by a specially molded thermoplastic as a connecting element. This plastic, which is also specially used in mechanical engineering, is characterized by its high homogeneity and thus uniform damping properties with high strength.

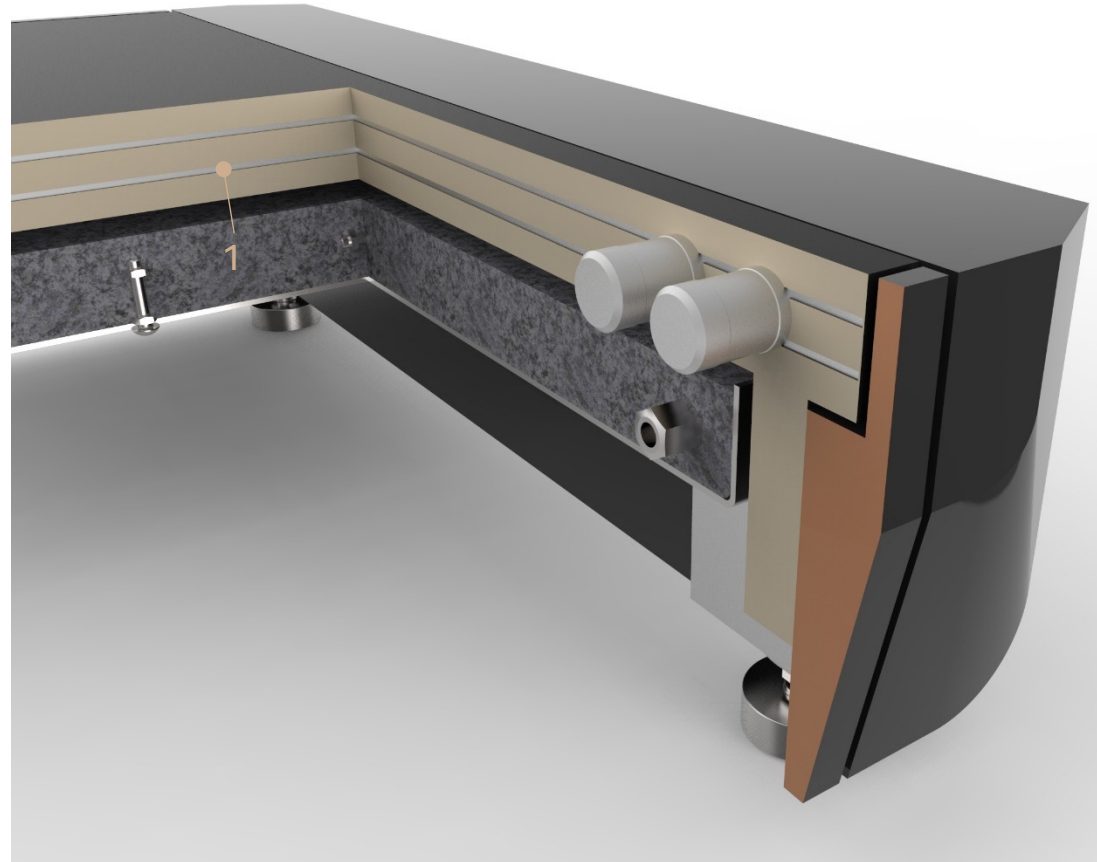
1...Mounting and decoupling of the cladding



TECHNICAL IMPLEMENTATION

Klangbasen – Amp Stands:

Everything said so far applies in the same form to the design of our bases. To **drastically increase the stability and insensitivity of the bases to external vibration influences**, they are equipped with an added 25 kg **stabilization level (1)** filled with damping concrete.



TECHNICAL IMPLEMENTATION

Clear structure:

FalkenOhr bases have a clear structural separation into three main subassemblies. These are assembled independently and are decoupled from each other.

Sound core (1):

The heart of your bases. Designed for an extremely clear, powerful and spatial sound image.

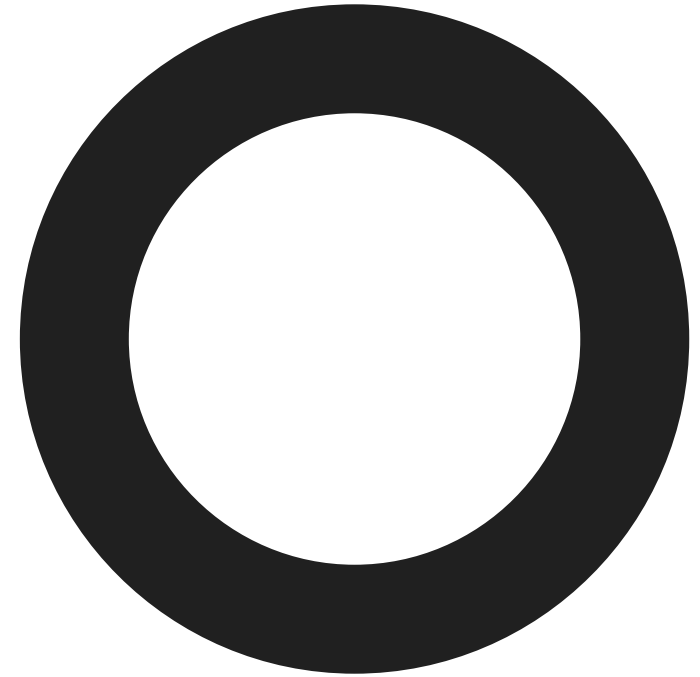
Stability core (2):

More mass and stiffness for more precision.

Cladding (3):

The beautiful cover for your bases.





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