AcouPlex™ and Isolation of Audio (and Audio/Visual) Components
Ceci n'est pas une sofa

Back in the day, when many amplifiers sounded the same and cables made practical no difference, you placed your Hi Fi system on any bit of furniture that had a flat surface. And off you went. Life was so simple then….

But someone opened Pandora's Box, and all hell was let loose on the world of sound reproduction. Turns out records hold a lot more musical information than anyone thought.

Today, when using capable, highly musical electronics and speakers, there is a great potential for optimising the system before there is an incentive to upgrading the electronics or speakers. Why? Because the improvements achieved by going to the next model up might be minor compared to placing the electronics on a Hi Fi rack that is optimised to protect the expensive and highly sensitive equipment from adverse vibrations created by the music and the electronics themselves. Conversely, the support must also allow energy that is either generated by the equipment itself, or has reached the equipment, to be dissipated, or drain efficiently to a mechanical ground. The required starting point here is to optimise mechanical isolation rather than compromising the design in terms of choice of materials that resemble a piece of furniture. A comparison that could be used here is the use of high-end electron microscopes for atomic imaging that can only achieve their theoretical resolution if placed in a purpose-built building with extremely low vibration and electrical noise.

Fundamentally, the best protection of the Hi Fi electronics is achieved by supporting them using materials with excellent damping properties over the frequency range created by the Hi Fi system. Damping properties are very material dependent and rely on the material to dissipate/absorb mechanical vibration. In other words, a material with excellent damping properties for a Hi Fi rack can effectively convert the energy from mechanical vibration created by the music and the equipment into some other form of energy like heat. As a first rule, damping properties are highest for material that are not particularly stiff (note that stiff is not equal to strength). The stiffest materials we know are ceramics and glasses followed by metals. Hence, those materials are least suited for efficient damping. Structural materials, i.e. materials that can support loads, with very low stiffness are timber, polymers and polymer-based composites. For example, if we said the stiffness of a typical metal is 200, timber would have a stiffness of around 10, i.e. 20 times lower. Interestingly, polymers tend to have a stiffness that is only half or even less than timber.

However, stiffness is not the only factor. Another very important aspect is the creation of many interfaces within a material that can act as an internal sink for the mechanical vibration. The most effective interfaces for absorbing energy are interfaces of different materials, which is the architecture of a composite. Typically, composites are made from two different materials and with that they might create a particular type of interface that enhances the damping properties of the material compared to a monolithic material within a frequency range that might not cover the entire relevant frequency spectrum. Hence, the ideal material for a Hi Fi rack is made from a multi-material composite that has many different types interfaces and therefore a wide range of frequency damping, while it also provides a low stiffness. However, it also needs to be sufficiently strong to safely support heavy electronics.

Based on the theory described above and 20 years of intense listening and research into isolating electronics from their environments, AcouPlex has emerged. The initial starting point was based on acrylic due to its combination of optimal stiffness, lack of high Q resonances due to good self damping properties. The search for better materials continued and a large step change happened in the use of a polymer/carbon composite that consists of 4 components, a high strength engineering polymer called PEEK mixed with short carbon fibres, graphite and PTFE (better known as Teflon™). Each component has very different properties creating a composite with highly complex and diverse interfaces. However, the costs of this material prohibited the manufacture of sheets and was only used for uprights while the shelves were pure acrylic. In order to improve the acrylic, a powder of the polymer/carbon composite was mixed into the acrylic, which was the birth of AcouPlex™. AcouPlex was never predicted to perform better than the polymer/carbon composite. However, the resulting material was far more effective at linear noise reduction than the polymer/carbon composite on its own, rendering silences that had never been achieved before with any other material. Moreover, the linearity of the material in the frequency domain meant that musical integrity was preserved. Lastly, unlike the case elastomer type damping, a characteristic of AcouPlex is that any energy reaching the equipment appears to be fed back quickly, and in time with the musical event, minimising time smearing. The result being that this material is now not only used for the shelves but can also be used to great effect other components of Hi Fi isolation.

Today, AcouPlex can be used as shelf replacements for existing Hi Fi racks resulting in significant improvements in musicality of the system by reducing resonances. It lowers the noise floor without introducing aberrations that make the performance less musical. For the ultimate experience, however, complete AcouPlex Hi Fi racks are available that provide unmatched performance for any given intrinsically musical system. Other AcouPlex

components are also available in the form of support cones, isolation spikes, interface pucks, and cable lifters / dampers.