

Culminating Experience The Acoustic Chair

Introduction

My project is building a chair that solves problems related to inconsistencies within acoustic spaces. With this product you will be able to listen to your monitor speakers with the best possible response in any space.

Detailed Description

This project will be based on acoustic and architectural research, making sure that your ears are placed in a correct acoustic environment. To achieve this, I will be following some principles of physics such as “the head should not be situated in a space with parallel walls, to avoid frequency cancelation issues”, “the correct placement of acoustic absorption materials” and “The Lyon method of measured acoustic reflections”.

The chair has the following physical characteristics:

- The chair should be big enough to make sure that everybody can use it regardless of height or width.
- The chair should be able to surround the listener’s head, specifically the ears in order to achieve the best acoustic conditions.
- Attention should also be paid to the design, the shape and the color in order to make the product attractive to customers.
- The chair will contain controls for software. (mouse, keyboard)
- The chair will have extras, such as a Presonus Faderport (DAW controller) and a Sub Pack to feel the bass frequencies in your back.
- The chair should be comfortable and create a great listening environment.
- The chair should have wheels so it gives you the availability to move around the room.

The aim of this product is to allow everyone to have an accurate listening experience in different environments, for example the recording studio. The advantage of the chair would be in not having to change the current state of the room and saving a large amount of money in acoustic design. With this chair you will also get the most of your speakers in every situation.

This product would be perfect for home studios, professional recording studios, live concerts, and many other situations.

Work in that project has not being an easy thing to do; the first part was finding an inexpensive chair that also had the characteristics that I needed (be on wheels, be comfortable, be able to recline and be easy to modify).

Once I selected the chair, then the next part was to construct a an attachment with more wood to make the back part of the chair bigger so it could surround the users head. I then cut the acoustic material, in this case Rock Wool (fiber glass). This needed to be done with great care, as it is hazardous to touch with your bare hands and needed to be cut to exact dimensions. The chair has 4 separate layers of rock wool.

With all that done the next steep was to upholster using a fabric that has the ability for the sound waves to pass through it and arrive to the absorbent material.

The last part of the process was constructing a small table that attaches to armrest to put all the electronic products on the top of. This attachment is able to turn so you can easily sit in to the chair and then put the shelf back in place.

To end with the construction I installed the Sub Pack, Faderport, Trackball, keyboard (with Pro Tools commands), USB ports and AC power with long cables so you can be able to move around and be controlling your computer in the most comfortable position

Innovative aspects of the work

I came up with this idea when I was studying the principles of acoustic architecture. I thought why not come up with an idea to make those room improvements portable and not specific to the users space. With this thought the idea of the acoustic chair was born.

The idea is a completely new and innovative concept, because nothing similar exists currently in the market. It also using new technology and products that are in the market such as; the Sub Pack and/or the Presonus Faderport that when used in combination gives the chair more innovative characteristics.

In conclusion, the acoustic chair is a new product using old acoustic principles and new electronic technology products to create a new concept and design.

New skills acquired

- More knowledge about acoustic theory and how to treat acoustic rooms.
- Better use of tools to build cut and construct things with wood, rock wool, and fabric...
- Learned how to use Room EQ (software for room frequency response measurements)

- Better perspective of thinking and planning a new project
- Big improvement of presentation and organizing skills
- Improvement of my English

Challenges, both anticipated and unexpected

One of the main challenges was in the design of the armrests. When I envisioned the design for the chair I pictured one large surface on each arm. Once I tried this, it became clear that this would be too big and the chair could not move comfortably. I then modified the design for one surface that would pivot to provide easy access for the user to get in and out of the chair.

The other challenge is moving the chair from home back to Berklee for the presentations. I always need to call a taxi company asking for a van taxi.

Future ramifications and/ or work plans

The acoustic chair is a product with a big potential for the future if a company and/or an expert in building furniture could improve the design. In my initial research this seems like it would be extremely expensive project, however if given the right investor it could be possible.

The future of this product goes beyond audio engineers; I also envision this being sold to movie theatres, gamers, and HiFi enthusiasts.

The concept moving forward would be to market the product without the added electronics so the user could customize the chair with the controls needed for the use. For audio could be a controller or keyboard, for gamers this could be a game controller, for HiFi listeners a remote for their stereo.

Conclusion

The acoustic chair really creates an environment that makes you want to mix. It accomplishes providing a good sounding and comfortable space to work in.

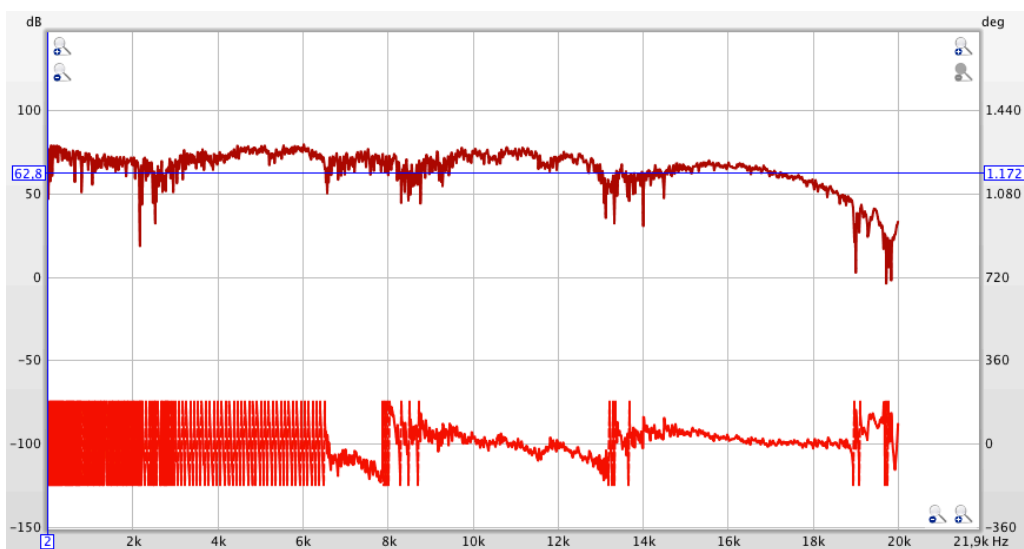
In the initial acoustic testing that I performed in my own studio space, I found that the acoustic chair improved the frequency response of the room and created a flatter response.

Please see the example graphs below.

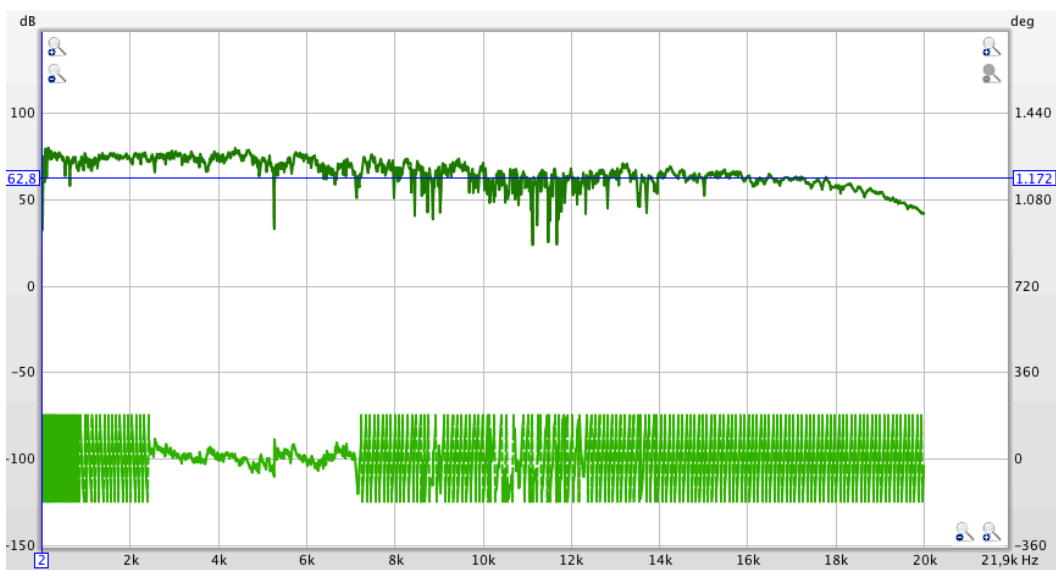
The graph represents the following variables:

- On the X axis the frequencies from 20Hz to 20kHz
- On the Y axis the dB response
- On the bottom the phase

Without the acoustic chair:



With the acoustic chair:



We can really see the improvements that the chair make to the room and the environment, so we can demonstrate that having an acoustic chair in your studio will make a good listening experience and will make the difference needed to control your space.

Also with the technology added to it, the Sub Pack that makes you feel the really low frequencies so you do not need to have a sub speaker in your studio and if you already have it will give you a completely new experience with your low end.

With the Presonus Faderport you can control the faders on your mixes and give you the ability to write animations in a most creative way and with more control.

Being able to control your computer from the chair gives you all the comfort that you are looking for and if you are in a big studio you do not need to come back to the computer when you are moving around a big mixer.

Being able to customize the chair with the things you want is a key part of the product and would allow you to have a flexible setup. The idea of a portable controlled acoustic space makes the chair a new and innovative idea for mixing in less than ideal spaces.

All these things make The Acoustic Chair a great product for a wide range of customers that would be interested in listening in a better and more comfortable environment.