

# Designing the casing of an audio amplifier

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**Topic:** Designing the casing of a demo audio-amplifier for Axign

**Company:** Axign is a company located in Enschede that develops chips for audio-amplifiers. These chips are sold to manufactures of audio-amplifiers. The chips are really convenient for amplifiers since it replaces a lot of traditional component making it cheaper but also giving it a better quality when it comes to sound. To convince manufactures of the quality of their chips Axign have developed an demo-amplifier. At this moment this is only the mechanism but it lacks a casing.

**Relevance:** A casing is convenient for Axign since it gives a professional feeling when the chip is already placed in –what looks like – a consumer audio-amplifier. But it also makes it easier to carry the demo-model around.

**Objective:** A prototype should be designed to find what design the demo-amplifier of Axign needs

To create the 'best' casing for the demo-model, the restrictions, requirements and wishes need to be obtained. First of all a list of functional requirements need to be stated to make sure that the casing is part of the system of an audio amplifier. It needs the right functions. It needs to hold certain components and it should interact properly with the mechanism. The mechanism is obtained with research of the amplifier. The ways in which the casing interacts with the mechanism of the amplifier is that the mechanism produces heat that need to be dissipated by the casing. Since the mechanism will not produce a heat warmer than 60°C, air holes on the casing are sufficient enough to not overheat the mechanism. It also interacts with the mechanism in a way that it should keep in produced radio-frequencies. The mechanism produces –unwanted- frequencies that need to stay inside the casing because these will interact with other products (such as a radio). It turns out metal is the best material to keep in radio-frequencies. The other requirements are that it should hold different components that were given by Axign.

The style in which the amplifier should be designed was selected by showing Axign different style mood boards with products that have nothing to do with audio amplifiers. They were asked about their opinions and their favourites. The conclusion is that the casing should be designed in a futurism/simplistic style. The casing should not be build up out of weird/unusual shapes but rather out of simplistic shapes such as rectangles. However the design should not be to ordinary and should be refreshing.

The design of the casing should be in a style that Axign likes but also resembles Axign and its vision. Axign is a brand that delivers premium hardware so the casing should give this premium feeling as well. To find out which features give a premium feeling for audio amplifier an analysis was done; multiple high-fidelity amplifiers were compared and different features were ranked on presence on those amplifiers. It turned out that a hi-fi amplifier needs a big circular volume button and is made of metal parts.

To select the perfect design the sketching phase started with a lot of amplifiers drawn in a simplified way. These were presented to Axign and their favourites were selected again to recreate but this time in different versions and with more detail. These were presented again and these phases were done three times until it was narrowed down to four concepts. The final concept was selected by letting the staff of Axign each divide three points among the concepts/iterations. The concept with

the most concepts won. Another method was to let the potential end-user select by putting a poll on an online forum for audio-amplifier users. From both methods the same concept was the favourite (figure 1).

The concept was further detailed to create a physical prototype. However since it was not possible to create a working screen in a 3 month period the user interface was made virtual with Axure. The front side of the amplifier is shown and a user could interact with the buttons and get feedback from the screen. (figure 2)

The prototype was made mostly out of stainless steel and was created as a building kit with bending edge on every side so that screws can assemble these components. All though the intension was to create the front layer of aluminium in the end it was made of several layers of a plastic called PMMA. This component got a sticker layer, giving it the impression that it was made of aluminium.

Since there was no screen available with the desired dimension, a solution was found where the screen is actually build up out of several smaller screens, behind a dark transparent glass, to make it difficult to see that it consists of smaller screens. However in the prototype the screen could not be implemented because it was difficult to program this screen.

The prototype was showed to Axign and they were overall satisfied. Because the prototype is not fully working not every requirement could be tested such as safety. All the components fit however. To create a fully working casing, the front side should be made of aluminium instead of PMMA and buttons should be implemented. (figure 3)



Figure 1: sketch of the final concept

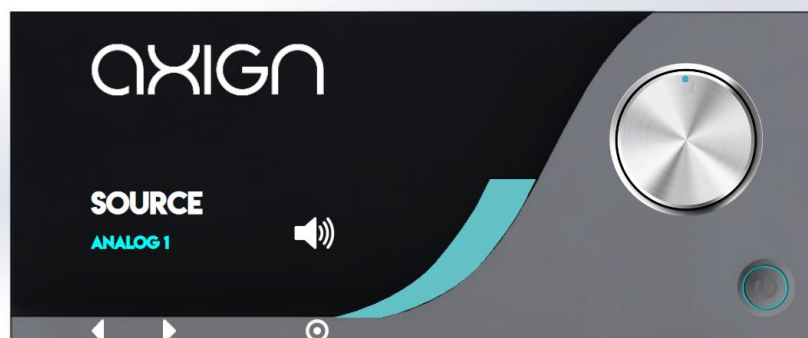


Figure 2: Mock-up of user interface

(718 words)



Figure 3: prototype of the demo-amplifier casing