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Subject: Aluminium vs plastic horns, third-order vs fourth-order crossovers...

Posted by [Magnus](#) on Wed, 20 Aug 2003 11:13:20 GMT

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Wayne and the rest of the board!! know this has been up before but anyway. Do cast aluminium horns have any sonic advantages (besides mechanical and esthetic) over plastic ones (ABS+fiberglass)? (I can see a potential "ringing" resonance problem with aluminium horns which maybe can be fixed with sufficient damping or????). My project at hand is upgrading a pair of speakers (Eminence Kappa 12 + Motorola KSN-1141) with a compression driver and horn. I have been eyeballing the P.Audio BMD-440 ([http://www.paudio-europe.com/products/db\\_product\\_2\\_6\\_bm-d440.htm](http://www.paudio-europe.com/products/db_product_2_6_bm-d440.htm)) paired with a B&C ME45 horn (<http://www.bcspeakers.com/compproducts/horns/me45.htm>). The choice of driver and horn in this case is limited to what physically fits my boxes (the CD must have a diameter of less than 120 mm, the horn have to fit nicely on the baffle). Does anyone have comments on P.Audio stuff or even the CD/horn combo? I was thinking of using a third or fourth-order network around the recommended crossover frequency of 2.2 kHz. It seems to me like most people are using third-order rather than fourth-order networks for this kind of thing. As an engineer but with limited actual audio experience I can see the time-domain benefits of 18dB/oct compared to 24dB/oct and also the potential problem of matching 2 coils and 2 caps in the latter but from an experience point of view, what tends to be the best for most applications and why? The woofer LP network is an impedance corrected ("Zobel") 12dB/oct Butterworth @ 2kHz. Thanks Magnus

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Subject: Re: Aluminium vs plastic horns, third-order vs fourth-order crossovers...

Posted by [AstroSonic](#) on Wed, 20 Aug 2003 13:55:12 GMT

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Magnus, Cast aluminum horns are generally much more resonant than properly designed horns made from less resonant materials (like plastic and wood), and will usually benefit significantly from efforts to damp them. Once damped, aluminum horns have a sonic signature that is a function of the horn shape/flare, the compression driver and the interaction of the two, just like good plastic and wood horns. I would suggest that you stick with horn/driver combinations that have an established reputation for performing well, and that will meet the particular needs of your application. Is this for a home music system or a commercial pro-sound application? How much amplifier power will be used? If this is for a home system, you might consider a simpler, lower order network. At your crossover frequency, the Eminence horn/driver combination used in the Pi Theater 4's would work quite well at relatively low cost. Unless you are into head banging or live level train/helicopter sound effects, this combination can be used safely with a second order network (at 2 kHz). On the other hand, if you are more interested in getting there and less interested in how you get there, you could just use the Pi network that is the closest match to your drivers and adapt as needed with help from the folks on this forum. Regards, AstroSonic

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Subject: Re: Aluminium vs plastic horns, third-order vs fourth-order crossovers...

Posted by [Magnus](#) on Wed, 20 Aug 2003 19:11:36 GMT

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AstroSonic, thanks for your thoughts. I originally designed these speakers like 5 years ago as my "party speakers" for moderate SPL:s. I mostly use them for home listening and thus normally just a few watts of power at its most. However now and then a friend borrows them for his band, but I would no, rarely if ever are they cranked up all the way like pro speakers. I have looked at the Pi series (looks very nice, but perhaps not available in Sweden!) the problem in this case is that the Eminence driver will not fit. That is because the boxes are divided into two sections with separate LF and HF chambers and the HF chamber is only 120 mm high so any CD must have a diameter of less than that. But well I guess you are right, sticking with a proven driver/horn combination would of course be the best. Regarding crossovers, as an electrical engineer that is the part of speaker construction I like the most. I usually use MATLAB/SPICE for simulation and a spectrum/network analyser for verifying the results so building a very accurate high-order crossover with any characteristics is no problem (and actually, part of the fun!) although at my normal power levels I guess a second-order network would perhaps be enough. /Magnus

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Subject: Re: Aluminium vs plastic horns, third-order vs fourth-order crossovers...

Posted by [ToFo](#) on Wed, 20 Aug 2003 20:55:40 GMT

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Hi Magnus, Accounting for your size issue I think you may have picked some of the best parts for the job. While I have no experience with the parts you are considering I have considered this combination myself. Both companies have detailed documentation describing product performance, a very good sign. The parts perform well on paper. They show a fairly smooth and extended frequency response with the expected moderate roll-off at the top of the band. These seem to be well behaved parts designed to cover the appropriate frequency range. With proper damping and compensation they should sound great. I can't get too technical about crossovers, but I can tell you that 2nd order w/ zobel low pass and third order high pass w/ compensation is working great for me. I get great summing and can sit, stand, or walk around with good sound. Since you choose parts that have classic normal behaviors, and since you use spice, you do not have to worry as much about going with unknown combinations. Please let us know what you learn. It is always good to know about great working horn and driver combinations. As for the aluminum horns, they are strong and look great, so stick some damping sheets on the back, they will be fine. Thomas F.

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Subject: Some answers.....

Posted by [Adrian Mack](#) on Wed, 20 Aug 2003 20:57:39 GMT

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Hey Magnus, From what I remember reading - there's no sonic advantage to aluminium. Some do ring, and they should be heavily damped. But not all do, such as when the manufacturer has made the mechanical resonance lower than the flare rate. The P.Audio stuff is pretty damn good IMO. I own a pair of P.Audio PA-D45's, and I love em. Even though I haven't compared to other comp drivers - only direct radiators, I can say they really are great. The BM series you're looking at is also one that's very good for a "flat and open" sound using those descriptive words, but nonetheless that's what you'll get. I doubt you'll be disappointed. Sorry I don't know anything about the B&C horn. Perhaps do a search of this forum I think I remember seeing it somewhere before. High order networks reduce destructive interference between point sources. The odd ordered ones tend to minimize anomalies caused by the time domain, but there's nothing wrong at all about 4th, 6th order networks etc. Just keep them high order and don't worry about phase shift too much from these as the max phase shift is when driver is already offline. Hope I've been able to help out some. Adrian

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Subject: Re: Aluminium vs plastic horns, third-order vs fourth-order crossovers...  
Posted by [Magnus](#) on Sat, 23 Aug 2003 12:58:55 GMT

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Adrian and Thomas, thanks for your thoughts! I think I give it a try. Flat and open sound is precisely what I want. I just found that the B&C ME45 + DE25 (mylar CD, but will unfortunately not fit my speakers) got excellent reviews a couple of years ago in a German (HiFi!) magazine. Magnus

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