Subject: Is Neo really the One? Oracle Cleo wouldn't tell me...
Posted by Duke on Tue, 25 Jan 2005 00:41:16 GMT
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I've been reading good things about Neodymium as a magnet material, namely that it has some of the desirable properties of Alnico (such as low flux modulation) at a much lower cost.Now from what I gather reading some of the dialogue between Earl Geddes and Wayne Parham, one of the nice things about Alnico is that it's conductive, so that in effect it is its own "shorting ring". Does Neodymium have this self-shorting properly like Alnico? Or, in order to approach the low distortion performance of say a JBL driver, would a Neo driver need its own shorting ring? Thanks!Duke

Subject: Re: Is Neo really the One? Oracle Cleo wouldn't tell me...
Posted by Bill Martinelli on Tue, 25 Jan 2005 03:54:15 GMT
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There are more neo driver I like over any other type. Scientifically It would seem flux in the gap is flux in the gap. The flux measurments of neo drivers is more often higher than ceramic counterparts. Subjectively, I like the sounds of neo drivers over the ceramic counterpart. Cant say the ame about alnico. I havnt fooled with the sheilding properties in a while but alnico definately sheilds itself and I think the neo drivers are the same. I'll have to make a test.Bill

Subject: Re: Is Neo really the One? Oracle Cleo wouldn't tell me...
Posted by Wayne Parham on Tue, 25 Jan 2005 04:13:56 GMT
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Here's a link to a discussion about neodymium magnets in the Speaker forum:
Alnico verses ferrite verses neodymium

Subject: Re: Is Neo really the One? Oracle Cleo wouldn't tell me...
Posted by Duke on Tue, 25 Jan 2005 05:23:23 GMT
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I appreciate your taking the time to reply, Bill.When you say you like the sound of Neos over their ceramic counterparts, are you referring to compression drivers, or cone drivers, or both?Thanks,Duke

Subject: Re: Is Neo really the One? Oracle Cleo wouldn't tell me...
Posted by Duke on Tue, 25 Jan 2005 05:24:46 GMT
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Thanks for posting the link, Wayne. Interesting discussion.Duke

Subject: Re: Is Neo really the One? Oracle Cleo wouldn't tell me...
Posted by Bill Martinelli on Wed, 26 Jan 2005 00:27:56 GMT
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Hi Duke,Both compression drivers and cone drivers with neo magnets have become my drivers of choice. For compression drivers I have only heard BMS with neo magnets I like to listen to the sound better and they measure smoother/flatter and more bandwidth. For cone drivers The Eminence Deltalight series, BMS, 18 sound and BC drivers all offer neo and there are many others too. Another great feature is weight savings. Both in moving/handling and shipping.Bill

Subject: Re: Is Neo really the One? Oracle Cleo wouldn't tell me...
Posted by Earl Geddes on Thu, 27 Jan 2005 12:58:57 GMT
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DukeMost of the important points have been covered but one very important one was not even mentioned.First ALNICO does have the lowest flux modulation, followed by Neo and ceramic is pretty bad. But this problem can be fixed with a "good" shorting ring.BUT what was never mentioned is the thermal changes. ALNICO, owing to the fact that it is a hot cast material, has no change of flux with temperature thus it has the lowest possible thermal compression. Neo is pretty bad in this regard, but ceramic is really bad. A ceramic magnet can loss as much as 40% of its flux when heated to a typical temperature in higher output situations.We discovered this when making a speaker for an active exhaust system that got to about 150 c°. We found that at operating temperature the ceramic magnet had almost no B left. ALNICO was the only choice in this application.Of course the very best magnet, Symarium Cobalt, is just too expensive to even consider.

Subject: Thanks, Earl!
Posted by Duke on Fri, 28 Jan 2005 15:33:57 GMT
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I appreciate your taking the time to describe what's happening to the flux as the temperature goes

up.Now from what I gather, with a ceramic magnet motor a good shorting ring effectively minimizes flux modulation, while as long as the temperature doesn't go up too much the flux remains high. If indeed pro-sound drivers barely even "break a sweat" in a home audio application, in your opinion is the real-world performance difference between ceramic (with shorting ring), neodymium, and alnico fairly insignificant, at least in an application like your home theater room?Thanks!Duke

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Subject: What about field coil drivers?
Posted by Arturo on Sat, 29 Jan 2005 10:07:50 GMT
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http://www.audioasylum.com/forums/hug/messages/83429.html
http://www.audioasylum.com/forums/hug/messages/83429.html

Subject: Re: What about field coil drivers?
Posted by Wayne Parham on Sat, 29 Jan 2005 11:22:42 GMT
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That's an excellent mention. One certainly has some flexibility when using field coil speakers that isn't there with fixed magnet speakers. You can energize the field coil enough to saturate the magnetic circuit and maximize flux in the gap. Or you can reduce field coil strength to change electro-mechanical parameters of the speaker. You can even modulate the field coil, perhaps making it opposite to the voice coil drive. Then again, since the field coil is an inductor, the ability to modulate its magnetic strength diminishes as frequency rises. It will tend to filter the signal and average the flux.There are two things I'd like to point out. First, a constant-current supply has high source impedance, so it isn't what those guys are thinking about. Constant-current supplies limit current so that even when the load fluxuates, the current flowing is the same. But this means that as the load impedance fluxuates, the voltage across it does too. Constant-voltage supplies maintain a constant voltage regardless of the load. Automobile batteries are a good example, pretty much constant voltage even at high current levels. I think that's what those guys meant when they said they wanted constant-current supplies. They probably really wanted a constant-voltage supply capable of unwavering high current levels. They wanted consistent flux.The second thing I wanted to point out is that the speaker's magnetic circuit can be put into saturation. The pole pieces and the magnet form a circuit, and when the circuit is saturated, it doesn't matter if you add magnetic energy, very little additional magnetic flux is added to the gap. So you can increase magnetic strength from zero to saturation, but if the circuit is already saturated, you cannot add more. What that means, is that if you want to modulate the field coil, it must be done at levels under saturation.

Subject: Comparison of alnico and ferrite magnets, with and without shorting rings
Posted by Wayne Parham on Sat, 29 Jan 2005 12:03:16 GMT
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Here's a good article that compares speakers with alnico magnets to similarly built speakers with ferrite magnets, with and without shorting rings.
Magnet Structures

Subject: Re: Comparison of alnico and ferrite magnets, with and without shorting rings
Posted by Duke on Sat, 29 Jan 2005 15:02:42 GMT
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Thank you, Wayne. I'm pretty much sold on shorting rings for ceramic magnet drivers. JBL uses shorting rings in their prosound woofers, and Eminence does in their Magnum series. I think B&C and Eighteensound use them in some of their top models as well. Nick McKinney did in his Lambda woofers, sadly no longer available. Do you know of any other high-efficiency woofer manufacturers that use shorting rings? On the subject of power compression, I recall reading a paper written by JBL engineers in which they compared the power compression of several different 15" woofers under very high input power. The JBL design won, which was hardly shocking. What was, at first glance, shocking was how poorly the Alnico magnet woofer did - it compressed by something like 7 dB at the tested power levels, while the JBL woofer's compression was maybe 2 or 3 dB. But, what they did was overheat the Alnico magnet and force it into partial permanent demagnetization! Basically, they chose an input power level high enough to ruin the Alnico woofer, and then compared it with their woofer. I though that was unethicial, and couldn't help but wonder why they chose to do that. Could it be that at lower (i.e. sane) input power levels their woofer didn't compare as well with the Alnico unit? Hmmmmm....

Subject: Re: Comparison of alnico and ferrite magnets, with and without shorting rings
Posted by Wayne Parham on Sun, 30 Jan 2005 05:13:15 GMT
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Hi Duke,I think that most home hifi systems probably don't require as much power, but I'm working on a cooling system to reduce compression and increase power handling for systems that are pushed hard. There are some illustrations at the link below for proposed ways to cool the voice coil and magnet.Basically, I propose a system that makes the speaker more effective as a pump. Right now, most speaker vents basically just move the same hot air back and forth, hoping for some turbulence and convection to carry heat away. It works a lot better than earlier unvented speakers, but it isn't very efficient. What I'm hoping to do is to make the speaker a better pump, and to use this to carry heat away.The trick is introducing unidirectional flow without introducing

pneumatic asymmetry. I'm woking with an ME, and he has come up with excellent schemes that make he speaker a very good pump. The problem is that the obvious pump configurations basically use single-cycle valves that introduce uneven pressure. That makes 'em great pumps, but increases even harmonics so that's not a good solution. One way to get around that involves reworking of the speaker motor itself to seal the vent and voice coil gap from the rear of the speaker cone.But I'm interested in making a device that can be press fit into existing vents and ducted to an intercooler. We have a proposed solution, and we're working on the details now. I am confident it will provide improved cooling over a non-ducted vent and that it will not introduce pneumatic asymmetry. I am making this an open project and posting my results so that any interested DIY builder can do the same thing.Wayne
Loudspeaker Venting and Cooling Techniques

Subject: Re: Thanks, Earl!
Posted by Earl Geddes on Mon, 31 Jan 2005 01:30:44 GMT
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DukeThanks for the question.You are absolutely right to ask about "scaling the effect". So many of these discussions go on and on about thgings that don't amtter at all. Like arguing over the differences in second haramonic for different motor structures - and then finding out that we can't hear second harmonic distortion. In my book I put audio BS into two categories 1) there are just wrong 2) they are absolutely correct, but it is irrelavent. Another example of the second is the skin effect in wire. Sure it occurs but "So what?"I thknk that a lot of arguments would not get as heated if we always classified the significance of the effect.Now back to your original question. Yes would lean towards your being correct that pro sound drivers in homes would rarely see enough energy to heat them up. But, in some cases the speakers are on for a very long time so the magnet will heat.I read on some of the other answers a discussion of power compression. I think it worth noting that the vast majority of power compression comes from the voice coils resistance change with temperature and not the magnets. Further, since the voice coil heats almost immediately - it has a very low thermal time constant - it will heat almost independent of how good the structure is cooled. There are two types of power compression - the long term and the shot term. We usually see data only on the long term one and tend to forget about the short term one.Incidentally it is an easy matter to elliminate the short term power compression. Simply wind the voice coil with copper wire with about 5% nickel in it (also called Constantin) because it has almsot no change in resitance with temperature. Unfortunately it also has a higher resistivity to begin with. A double edged sword.Ciao

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Subject: Re: Thanks, Earl!
Posted by Wayne Parham on Mon, 31 Jan 2005 11:11:56 GMT
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Do you think that cooling vents are worthwhile for removing heat from voice coils? Do you have

any data that quantifies the thermal performance, perhaps a comparison of vented and unvented speakers?I think that you're probably right that the voice coil heats pretty quickly after power is applied. But I also think that anything that removes heat will help. I imagine that the whole idea of venting was to carry some of the heat away, and as inefficient as it is, I expect it probably provides some benefit. I also imagine that if the pumping action of the vent were improved, the thermal performance would also be improved, compression reduced and power handling increased.What say you?

Subject: Re: Thanks, Earl!
Posted by Earl Geddes on Mon, 31 Jan 2005 12:38:10 GMT
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WayneCorrect, anything that helps cool the voice coil helps the situation. I was mostly refering to the fact that it is the wire heating that accounts for most of the compression.Vents help a lot esspecially when high power is an issue. But as Duke points out, heat in a home system (using pro speakers) is not really an issue. Few people realize however, how much difference there is in the effect of heating between a smaller wide band driver (like the typical 6 1/2 inch woofer) and a large band limited pro driver. Under normal conditions heating of the pro driver is not an issue,but it is a big issue in the small driver even at normal listening levels.There is a very good paper on driver heating in the JAES some months back. If I find it, I'll let you know.

Subject: Re: Thanks, Earl!
Posted by Wayne Parham on Mon, 31 Jan 2005 13:08:26 GMT
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Sounds good, thanks!
