Subject: horn surfaces
Posted by Floyd Andrews on Fri, 31 Dec 2004 16:48:19 GMT
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Do the interior surfaces of my horns have to be smooth, or can I spray them with a textured paint such as "Soundcoat" or a similar vibration damping surface finish?

Subject: Re: horn surfaces
Posted by Wayne Parham on Fri, 31 Dec 2004 18:30:12 GMT
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It depends on the frequency, and surface irregularities are a matter of scale. At low bass frequencies, even a very rough stair-step curve for a flare wall surface is fine. Bass wavelengths are measured in dozens of feet, so deviations on the surface can be several inches and not matter. But at 20kHz, the wavelength is about an inch and a half, so I would rather have a pretty smooth tweeter flare.

Subject: Thanks, Wayne! (nt)
Posted by Floyd Andrews on Tue, 04 Jan 2005 00:33:25 GMT
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NT

Subject: Re: horn surfaces
Posted by Earl Geddes on Sat, 08 Jan 2005 19:19:30 GMT
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But Wayne, you have to admit that there is no data for this position. I have often thought about the effect of rough walls and cannot conclude that it is possitive or negative. As my new speakers how I do the heresy of putting foam in the waveguide!!! It works though, and there is a very good reason for it. Some things are not always what they seem.

Subject: Re: horn surfaces
Posted by Adrian Mack on Sun, 09 Jan 2005 00:04:06 GMT

Im sure what Wayne is referring to is possible unwanted phase changes caused by irregularities in the surface of a rough horn wall, causing frequency response abberations. As to foam in the waveguide, the foam would be absorbing the high frequencies (depending on how high you use them), and changing the frequency response more or less to your liking. In designing a horn you generally assume smooth wall's as it would not be easy to accurately model horn surfaces with random rough walls. On that note rough walls could be used to ones benefit but would probably take a lot of measurements and trial and error, and theres usually better ways to fix a problem such as rough frequency response than this.

Subject: Re: horn surfaces
Posted by Wayne Parham on Sun, 09 Jan 2005 09:31:49 GMT

You know Earl, you may be right about the absense of data to support a claim that a rough-walled horn is equal in performance to a smooth-walled horn used at low frequency.But it does stand to reason.I think though, that there is some indirect evidence of this fact. Folded horns use straight sections, each one expanding a little more than the one preceding it. This only approximates an exponential flare, yet the performance is similar to what is expected from a purely exponential flare.The conclusion is easy to draw that the coarseness of the curve has little effect because it is small in relation to wavelength.Wavelenghth can be scaled down to treble frequencies and horn flares with rough sand-grain texture become similar irregularities. Wavelengths are large compared to the grain of the horn surface, so my assumption is that it doesn't matter in the passband. But I guess a real test might be worth doing, to sand one smooth and compare the difference.

Subject: Re: horn surfaces
Posted by Wayne Parham on Sun, 09 Jan 2005 09:40:04 GMT

I think if surface aberrations are small enough, they won't matter. But if they're large relative to wavelength, then they will alter wave propogation and have an effect.Where there are places in a horn that flare angle changes rapidly, diffraction causes a change of wave propogation. This can be at the throat, the mouth or anywhere in between. If the diffraction causes two wavefronts to be generated and to co-mingle, there can be interactions and possibly destructive interference which cause response irregularities. Even without interactions, rapid changes in directionality cause uneven response due to the fact that the driver's total energy is focused more when DI is high and spread out more when it drops. At the mouth, dispersion control is ultimately lost at some low frequency as the sound bends around it.There are a variety of methods used to combat these kinds of irregularities, and to reduce anomalies in dispersion and resoponse. Some use radiused

transitions. Some use absorbent foam at transitions. Some use hybrid horn shapes. These things are used in an attempt to reduce ripples in response and directivity and other anomalies like pattern flip and astigmatism.
 Diffraction Applet

Subject: Re: horn surfaces
Posted by Earl Geddes on Sun, 09 Jan 2005 18:35:40 GMT
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WayneAgreed to your post. IF the wall roughness is small relative to the wavelength then it will not be much of an effect.I was thinking more about how one could use a deliberate roughness at the wall to shape the wavefront by creating a boundary layer effect. from my book it is obviuos that one wants the wavefront to diminish at the edges of the waveguide.Also, please remember that I do not use waveguides or horns at LF. They need to be too big to do any real good. Sure they offer some gain, but remember that I always use big high performance drivers for directional reasons and so gain is not really very important to me. (True unless I am doing a pro sound system, but then the waveguides can be big.) I use waveguides strictly for their directivity qualities, not for their loading ability. SO when I think about horns or waveguides I never think about low frequencies. In essence, if the wavelength is bigger than the waveguide dimensions then the waveguide is no longer a directional control device and I don't really consider it.

Subject: Re: horn surfaces
Posted by Earl Geddes on Sun, 09 Jan 2005 18:41:27 GMT
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You will have to be clearer on what you mean by "phase changes caused by irregularities"Of coarse the foam absorbs high frequencies, but ALL CD devices have to be EQ anyways so I just EQ in this loss. No problem.I believe that I could model he rough walls. I know that I can model, and have done so, an absorptive wall, as well as an absorbtive internal medium. A rough wall just have a different kind of boundary condition.You will also have to be more specific about "theres usually better ways to fix a problem such as rough frequency response than this". I am not new to waveguide design and usually know all of the techniques involved, but I am not sure what you are refering to here. If you are refering to the use of the foam, I strongly disagree that there are better ways. If there were then I would use them and not have to "invent" the better solution.

Subject: Re: horn surfaces
Posted by Wayne Parham on Sun, 09 Jan 2005 18:58:17 GMT
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Agreed, 100%.

Subject: Re: horn surfaces
Posted by Criminy on Tue, 11 Jan 2005 00:55:29 GMT
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Hello again, Earl.You said, "... if the wavelength is bigger than the waveguide dimensions ..." Would you explain what it is you mean by this? The only thing remotely similar I have read is that for proper loading, the mouth should be at least one wavelength in circumference at the desired cutoff frequency.

Subject: Re: horn surfaces
Posted by Earl Geddes on Thu, 13 Jan 2005 02:53:42 GMT
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Once again, you have to remember my bent. Waveguides are for directivity control not loading. If the waveguide is smaller than the wavelength then it cannot control the directivity at all. It will still load, but at these frequencies the "flare rate" is virtually irrelavent as any shape (that is increasing in area) with the same throat and mouth areas will load just about the same.At higher frequencies, the shape becomes everything in directivity control, but is still only marginaly a factor in loading.

Subject: Re: horn surfaces
Posted by Criminy on Thu, 13 Jan 2005 03:50:25 GMT
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Sorry, I really do understand your bias towards directivity control; didn't mean to distract with the mention of loading. Let me rephrase the question. At what point does the wavelength become larger than the waveguide? When it is larger than the diameter of the mouth? than the circumference of the mouth? than the axial length of the waveguide? None of the above?

Subject: Re: horn surfaces
Posted by Earl Geddes on Thu, 13 Jan 2005 13:01:55 GMT
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Sorry, but this seems pretty obvious to me. All of the above.