Subject: Re: 2Pi Towers - potential mods
Posted by Wayne Parham on Wed, 10 Jun 2009 16:58:49 GMT
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There are two issues, which I'll describe in more detail below. One is the cabinet size and the other is the position of the port and woofer relative to the cabinet walls. Cabinet size sets Helmholtz frequency, as does port size. That determines bass response down low. Position of the port and woofer sets the position of internal standing wave nodes. Changes here will have more impact in the upper midbass and midrange, although they can have an effect in the deeper bass too.

My gut feeling is that since the box you want to use is pretty close in size and shape, it probably makes sense to use it. It will probably work. I also think that the port size for the standard box might be just about right, in that it will tend to shift box tuning lower when the box is made larger. This is probably what you want, although too low Helmholtz frequency makes the box lose some bass, acting more like a sealed cabinet. I do think you'll want some shift downward though, because it will reduce the possibility of peaking.

I don't think 5.6ft3 is too large, but it's getting close. Because of that, I'd probably be inclined to tune the Helmholtz frequency a little low, probably 35Hz to 38Hz, something like that. The stackup of tolerances could shift your alignment towards a peak otherwise. What I mean is even if the models show a nice flat curve, those models assume electro-mechanical parameters that shift with power levels, suspension age, etc. So I'd tend towards a conservative alignment, and the cabinet size is already pretty aggressive. Bottom line, tune on the low side.

There is another problem too, potentially worse. Large cabinets develop internal standing waves in the passband. More to the point, the standing waves are in the upper bass and lower midrange, below the point where the acoustic insulation is able to do much good. They're sort of like room modes within the box. So the standing waves are a potential problem in larger cabinets and make port and driver position fairly important. You don't want to put either in a node, because response will be adversely affected.

I suggest modeling the box with Martin King's spreadsheets, or something like them. You'll want to put the port and woofer in positions where amplitude response is smooth. Put one of them in the wrong place and you'll see spikes and notches in response. So manipulate the positions in the model until you get the least ripple. After that, confirm with actual measurements.

I think with cabinet dimensions being fairly similar, you may be OK by leaving the woofer and tweeter in the same positions relative to the top of the cabinet. Then again, the tower height is different so standing waves will line up differently inside. As I said earlier, it's probably best to at least have a look at the new box with Martin King's spreadsheets.

tested. For each new design like this, for best results, you really need to do a lot of analysis first, finding a model that has good response and where driver layout is appropriate. Then you have to build a cabinet and test it, sometimes more than one if unexpected things come up. By the time you're done, you will have done a whole lot more work than just building a single box from plans.