Composting Head Review by Ben Okopnik

I spoke with Ben today and got his permission to post this article here. He told me that since this exchange of letters with Natures Head that they have modified the design in some respects to address some of the issues he had brought up here and that they had swapped out his old head for one of the new models and that he is really happy with it. My understanding is that on average the solids tank needs to be emptied about once a month for them "two adults and two children living aboard full time" If they spend much time off the boat or use restroom facilities elsewhere much it extends this time. Ben also mentioned to me that it is vital that you have a working fan or vent to continuously vent the head or it will build up odors. He recommended that I purchase a spare fan to keep on board for the unit.

My Nature's Head Rant

(If you're looking for a balancing viewpoint, that comes later. No, seriously; I forwarded this stuff to NH, and they replied) Well worth reading.

Pros and cons:
I'll start by saying that, overall, this is a great option for a marine head; with a little familiarization and practice, it does exactly what it should, exactly as advertised. That's a huge deal, given the cost of holding tanks, the hassle of finding pumpouts, the ever-present smell associated with typical marine heads, the ability to eliminate two through-hulls, etc. On the other hand, the bits that are badly done *really* grate; given the price of this unit (about $900 including shipping and an extra urine tank, which I strongly recommend), the time that it's been around, and the feedback that I'm sure the company has received from the owners, those problems should have been fixed by now. Given how modular and simple this unit is in the first place, those changes would cost either nothing or a few bucks at most, and it offends me all the more for that reason. A list of stuff, good and bad, follows.

WARNING: This is being written by a cranky and opinionated engineer before he's had his morning coffee. Put on a pair of dark sunshades, zip up your anti-radiation suit, and set your phasers to "stun".

Here's the Real Poop

- First, kudos to the company for their very friendly and open support. The guy I was talking to (I think it was the owner of NH) was very helpful and knowledgeable, and was willing to... erm... deal with my crap when I told him that I managed to grow some mold on it (there hasn't been any repeat of that, fortunately.) Heck, he actually asked me to email him *pictures* so he could figure out whether it's something they need to deal with or if it's a one-time problem on my end. This kind of thing makes a big difference when you're making this big of a change - using a composting head requires thinking differently, so it's really a change of head space as well as a change of head. His attitude helps a lot, and I consider this to be a big, **big** hidden plus when you buy a Nature's Head.
- Just as a general design idea, for a big guy like me, making the bowl about 2" longer would result in much cleaner operation; wiping the back of the bowl after using it wouldn't be as necessary - but I suppose this would inconvenience the smaller folks (like my wife). Sliding forward about that much is a little less comfortable but makes a huge difference: usually, no wiping at all is necessary (I do use a spray bottle to wash off the traces of urine, as usual.) Much of this is due to the large-enough opening to the main compartment, something other designs haven't done quite as well. Speaking of other designs - I saw an AirHead the other day, and was completely unimpressed by the quality. The owner of the AirHead, after seeing the NH, really regretted not getting one.
- The separation method used by NH works very well: the main compartment stays relatively dry, and the urine goes exactly where it should. Other designs often use a tall riser between the front and the back, or a lip around the main opening; in using the NH, I don't find them to be necessary.
- The NH has a small muffin fan (Evercool EC4010M12C, about $4 online $12.99 at Radio Shack if you need one **right now**) built into the filter housing on one side of the unit. These work great at moving the air over the compost... not so great when the vapors condense in the hose (this happens when you heat the boat in the winter), run back down the hose, and short out the fan. Replacing it involves soldering, which in turn requires unscrewing the power jack in the filter housing; overall, an annoying and unnecessary procedure. It would have been much better for NH to put the fan into the top hose fitting (i.e., the one at the top of the hose, where it passes through the overhead) and avoid the problem.
- Sometimes, you see people give up on what they were doing, go off and do something else, and forget about the half-done failed idea. In the NH, this is represented by a long, skewed, badly-glued foam gasket lining the edges of the main compartment. This contributes nothing useful (there's a high lip that prevents spills molded in) and in fact *creates* leakage by collecting any drips! Once you get rid of the thing, you'll actually see decent design under it: there are drain holes for any liquid that does manage to accumulate, which go right into the main compartment. It's as if a professional started designing this unit, and 90% of the way through, turned it over to high-school students whose main concern was waiting for 4:20 pmto come around. Fortunately, this is easily and quickly remedied.
- The opening flap mechanism is very poorly made: it requires disproportionate force to open it, slams loudly, can't be

used at all when sitting on the head (it jams solid), and creaks - loudly - while being used. It's not like spring-loaded toggled flaps are unusual or difficult, guys... I've seen $8 plastic waste baskets that do a great job of it. In addition, the latch handle - another piece of stainless rod - is at just the right height to scratch little kids' faces (we've got a 2-year old curtain climber aboard.) A rubber Superball takes care of that, but... really, the customers shouldn't have to deal with that kind of stuff.

- The compost-turning handle is just **awful** in every way, design-wise. The skinny SS rod makes it hard to grip and turn (how about a **handle** to fit over it, huh?) The threaded fitting for the crank, according to NH, is supposed to be locked with LocTite (???); this would allow it to turn in either direction, which is not the case with the unit as assembled. How difficult would it have been to drill the SS sleeve and put in a locking pin instead of threading the rod? Next, the rod simply goes through the walls of the main compartment, with only an SS washer on the inside. Take a wild guess at what happens if you let the compartment get half-way full (which is the height at which the rod comes through) and the compost is less than perfectly dry? Fortunately, the liquid that comes out doesn't stink - but it's an unhygienic mess, and not something you really want to deal with. If they had used a simple plastic bushing on the end away from the crank - no need to punch a hole in *that* compartment wall, people! - and a $2 rotary shaft seal on the crank side, the unit would *instantly* have almost twice the capacity. It's this kind of stuff that sends people like me up the wall.
- For some reason (perhaps to minimize the amount of hardware on the main compartment, to make it a little less awkward when it's being dumped?), the latches on the sides are mounted upside down - which means that when you sit down on the head, they lose tension and fall open. A minor thing, but another annoyance. NH suggests bending the bail on the latches to make them tighter; a poor solution, in my opinion, since it results in too much tension when it's not in use which will eventually result in distorting the plastic. Standing the latches off by 1/4" and spacing them apart a bit would move the cam-over point further out, letting them stay latched under pressure and keeping the "not in use" tension low.
- The hold-down knobs on the sides could definitely stand some improvement: as mounted in my head, one side of the NH is hard to see (as I suspect is the case in many mounting situations), and remounting the head has to be done by feel - and since there's nothing to tell you whether the slot in the bracket is lined up with the screw hole or not, hunting for it can be a real pain. Allowing the threaded receiver in the body to stick out by a 1/16" would allow you to feel it "register" in the slot as you aligned it - in fact, it wouldn't slide past the slot anymore - and would make it much, much easier to remount.

Having said all of that...

...I wouldn't trade my NH for any other head. It suits my requirements exactly, and I can live with its quirks. No smell, relatively easy to service, and - hell, if I get *really* annoyed at the above bits, I can spend another $100 or so to fix most of it myself. Someday, when I have the time, maybe... For now, it works for me.

-- Ben Okopnik, 2/16/2009

Thanks to a gentle prod from one of the folks on the LiveAboard list, I forwarded a link to this page to the Nature's Head people (shame on me for not doing that myself... I thought about it at the time, and then just lost track of doing it.) Eventually, I got this thoughtful and well-considered reply, to which I replied in turn.

This is a reply to a posting written by Ben Okopnik concerning Nature's Head. We at Nature's Head are always evaluating our product and making improvements. We have consulted with physicians, engineers and some cruisers that use our product for their input. Our toilet is used for many applications, not just boats. Our largest sales are for cabins, cottages and homes. Other uses include, military, semi's, motor homes, campers, and farms. There are reasons we did some things with our design that may raise questions with one application but makes sense when applied to a different use. I will try to address each point or concern of Ben's.

The first point he raised was that he felt the bowl should be 2 inches longer. The bowl and seat area is of commercial size and definitely larger than a marine or Rv toilet. Many applications require a small footprint.

He states that the separation of the urine was good. We have recently changed the mold in the urine area to allow the liquid to flow to the bottle much more quickly and to accept larger volume through the spigot.

As regards the fan concerns, if you have a problem with the fan, a replacement will be provided at no cost to the customer with the housing ready to bolt on, no soldering for two full years. If it were to fail After two years you can purchase one complete with housing for $20.00. Additionally, the fan is mounted on the toilet for many reasons. One is the convenience to the customer for installation with no unsightly wires to run to the top of a cabin, RV, etc. For applications that use the 110 to 12 volt transformer it is a simple plug and play. Some customers use the toilet as a portable unit, or switch it from their boat to a RV. The fan housing has a gasket so the toilet can be used in a toilet-shower combination. The fan can be switched to either side for customer's application. Additionally if the fan was at the end of the system it would be exposed directly to the elements which could also shorten its life or lead to it being exposed directly to water.

As far as condensation in the vent hose, heating an uninsulated boat, especially with propane will promote condensation. The simple solution would be to allow the vent hose to dip or have a low spot when exiting the toilet. This would allow any water that did occur to accumulate there. Since the hose we use is clear you could see any water that was accumulating and drain it from time to time. The fan is blowing out of the hose so it would not try to draw the water in. The Use of a nicro day-nite solar vent will eliminate the necessity for the built -in fan. As suggestion for heating a boat in the winter; we do this. If you are dockside for the winter use home baseboard heaters; they are efficient and safe, and keep the boat dry. We use the 220 volt, which is available at most marina power boxes, but please consult your marina. There is a company manufacturing 110 volt units that are reportedly as efficient.

Regarding the gasket area between the base and bowl, In most boats the toilet is located in with the shower. The gasket is necessary in these applications to make sure that there is not an ingress of water into the main tank if you spray it with a full stream of water. The drain holes are located in the corners rather than under the gasket in order to allow drainage of shower water out of the lip. The lip around the base is there and not on the bowl due to manufacturing concerns. If it were on the bowl, inability to remove the part from the mold would result.

So far as the opening flap--or as we call it, trap door. Some earlier ones were harder to open when sitting on the seat. I have one of the earlier one and I weigh 240 lbs and it works fine. We have since tweaked the machining program to make this easier. It is slightly harder than if no one is sitting on the unit. In reference to the eight dollar trash can, I don't suppose it works at all with a 250 lb person sitting on it.

At Natures Head we are always looking for ways to improve on an already great product .As to the trap door arm, Mr. Okopnik has a point. We are currently looking to add a knob that will cover the arm for safety, and that could be easily installed on existing units. We are also considering a handle that will rotate on the crank handle. One of our chief concerns is not adding something that could break under duress in some of the harsher environments that some of our customers and toilets see.

The elongated nut which attaches the handle to the agitator was used for a couple of reasons. It facilitates assembly / disassembly by the customer, and it allows for relocation of the handle to the opposite side of the toilet without the difficulty of messing with a drift pin or similar pin. The use of a drift pin would also weaken the shaft area and most likely the pin would fail the first time someone tried to turn it backwards through compost that had dried out too much. Also, some applications such as catamarans, campers, may not have room for a crank handle. In these applications they use the elongated nut with a box ratchet wrench instead of the long handle.

We do not see a need for seals around the agitator shaft. Most rubber seals would fail from dirt (compost) in a

short amount of time. The agitator has an industrial plastic flanged bushing and a stainless steel washer on each side inside the compartment. The only way you could have an issue with leakage is if excessive amounts of water have been added or urine has been allowed to enter into the compost area. The peat moss or coconut fiber is to be moist, not wet. No standing liquid should be allowed to accumulate in the compost compartment. One customer had this problem and it was found that their three little boys were peeing in the peat moss with the trap door open. The solids tank is not designed to hold a gallon of urine that is why we separate the urine to the front container. Mr Okopnik also mentions that we should not have drilled through both walls of the solids tank. By drilling through both walls we allow the customer to put the handle on either side of the toilet. It is just a matter of turning the agitator around. In regards to capacity, the unit holds SEVERAL months worth of occasional usage (weekends) or at least a month of full time usage. We even have some customers that remove about 20 percent of the compost and add a little new each week. They have not completely dumped the unit in over a year. Overfilling the solids tank would allow the agitator to sling compost into the upper section creating a mess.

A few of the early units did have the latches unlatch when sitting on the unit. We do not have an issue with these now. It was a matter of locating the placement that will work with the various dimensional differences. We have 7 plastic parts that must function together. These parts are created by rotational molding. Every part is a bit different due to thickness and a shrinkage factor of as much as 4% The latches are placed in the present fashion (upside down) to allow for emptying the base without tangling or tearing the plastic bag.

Hold down knobs. We feel what we have works, but I understand his point. One concern would be that with the inserts sticking out, it may make the base hang up on the L brackets when removing it for emptying. It would also mean that the bracket and nut would only be tightening up against the insert, possibly allowing the toilet the ability to rock. I suppose there are some minor issues either way.

After all that I have stated, we feel we have a good product and will continue to consider suggestions regarding improvements to our product in order to offer the best composting toilet available.

Please feel free to call or email any questions or concerns.

Regards, Larry Stearns Nature's Head Inc. www.natureshead.net sales@natureshead.net

My response follows.

Hi, Larry -

On Mon, Aug 24, 2009 at 04:15:40PM -0600, sales@natureshead.net wrote: > > Ben, I have attached a reply to your evalution. We are in agreement on > some things, while on some points, I hope I have explained our > rationale. > I would be happy to discuss any of this with you anytime.

Thank you; I appreciate that. If you don't mind, I'll convert this to HTML and add it to my web page as a balancing viewpoint.

In much of what you've said, it appears that we got a model that was badly assembled (e.g., the half-glued, crookedly-attached gasket); fortunately, this was not a key factor. Also, the fact that we like to wash the entire unit when we empty it out makes a difference - this is where not having to remove the fan housing, etc. would come in handy.

Our toilet is used for many applications, not just boats. [...] There are reasons we did some things with our design that may raise questions with one application but makes sense when applied to a different use.

This is a valid point, and I admit that I had neglected to think of it when writing my critique; however, the fact that I need it to work well for my specific application is also important. If the compromises made for the sake of accomodating variation are so large, then perhaps making several models available would be a better approach.

As regards the fan concerns, if you have a problem with the fan, a replacement will be provided at no cost to the customer with the housing ready to bolt on, no soldering for two full years.

This, I'm afraid, is not made clear anywhere. It was not on any paperwork, and I didn't find it in searching any of the NH websites. Perhaps a feature this important should be made much more explicit - especially since after-purchase service is so bad with most products these days.

After two years you can purchase one complete with housing for $20.00.

I will definitely be purchasing a spare, since the fan going out becomes an emergency problem very quickly - at least for anyone who has to live in the same space with that head.

Additionally, the fan is mounted on the toilet for many reasons. One is the convenience to the customer for installation with no unsightly wires to run to the top of a cabin, RV, etc.

If you provided an inline fan instead - in other words, essentially the same housing that you now use, except with a hose barb on both sides - then it could be mounted at either end of the hose, and make the head itself completely waterproof (i.e., nothing could be damaged by liquids, showers or otherwise.) The customer could always decide on placement, either right at the head as it is now (e.g., one of the barbs could be removed and the housing bolted to the head), in the middle of the hose, or at the top of it (e.g., if you have a solar-powered vent.) This would allow it to be much more adaptable at minumum cost (i.e., just another flat plate with a barb on it.)

Some customers use the toilet as a portable unit, or switch it from their boat to a RV. The fan housing has a gasket so the toilet can be used in a toilet-shower combination. The fan can be switched to either side for customer's application.

The change I've suggested would still allow all of the above, and would add more flexibility to the system.

Additionally if the fan was at the end of the system it would be exposed directly to the elements which could also shorten its life or lead to it being exposed directly to water.

I did not, of course, intend for the fan to be exposed to weather; I don't think that anyone would expose the end of the hose to the sky, since that would fill up the head (and drown the fan no matter where it was mounted) during the first rain. On my boat, for example, I have a standpipe on the deck with the hose attached to the inboard end; other people might use a solar-powered vent. The fan would be mounted immediately below the vent, standpipe, deck, or cabin-top for anyone who wanted this kind of functionality.

As far as condensation in the vent hose, heating an uninsulated boat, especially with propane will promote condensation. The simple solution would be to allow the vent hose to dip or have a low spot when exiting the toilet. This would allow any water that did occur to accumulate there.

That's exactly what I did; however, the capacity of that bend in the hose is very limited - and the water accumulates constantly. The result was a drowned fan. Mounting the fan up high would avoid that completely, and obviate the need for any hose bending or messy draining.

The Use of a nicro day-nite solar vent will eliminate the necessity for the built -in fan.

I agree; however, if the need for a $160 Nicro-Vent can be bypassed by adding a <$1 hose barb, that would be a valuable feature to offer to your customers.

As suggestion for heating a boat in the winter; we do this. If you are dockside for the winter use home baseboard heaters; they are efficient and safe, and keep the boat dry. We use the 220 volt, which is available at most marina power boxes, but please consult your marina. There is a company manufacturing 110 volt units that are reportedly as efficient.

Ah, but we're not at a marina. Like many people who use your product, we are full-time cruisers. My wife and I both subscribe to a large list of people like ourselves (the LiveAboard list) where questions about heads come up all the time. I've been an enthusiastic proponent of the Nature's Head - which is one of the reasons that I'd like to see it become as good of a product as possible.

Regarding the gasket area between the base and bowl, In most boats the toilet is located in with the shower. The gasket is necessary in these applications to make sure that there is not an ingress of water into the main tank if you spray it with a full stream of water.

Given the poor quality of assembly on our unit, as well as the fact that the gasket was much too long to fit inside the lip (swelling from some sort of chemicals, maybe?), it wouldn't have done anything useful. Fortunately for us, it wasn't an issue - we don't have a combined head/shower.

The drain holes are located in the corners rather than under the gasket in order to allow drainage of shower water out of the lip. The lip around the base is there and not on the bowl due to manufacturing concerns. If it were on the bowl, inability to remove the part from the mold would result.

That lip actually one of the better features of the NH. It helps contain the peat, and the holes are exactly where the should be for most effective drainage.

So far as the opening flap--or as we call it, trap door. Some earlier ones were harder to open when sitting on the seat. I have one of the earlier one and I weigh 240 lbs and it works fine. We have since tweaked the machining program to make this easier. It is slightly harder than if no one is sitting on the unit.

My wife is a rather small woman; if she's sitting on the head, she cannot open the flap at all. The same is true for me, but I'm bigger. Even without anyone sitting on it, it's quite difficult to open - and I'm pretty strong. Possibly, there's a problem with the unit that I have - although I can't see anything obvious.

In reference to the eight dollar trash can, I don't suppose it works at all with a 250 lb person sitting on it.

[smile] I did mention the "cranky engineer before the morning coffee" part, yes? Your point is well taken, of course - but those mechanisms work smoothly and well without anyone sitting on them, while the one in the NH does not. That was my point.

At Natures Head we are always looking for ways to improve on an already great product .As to the trap door arm, Mr. Okopnik has a point. We are currently looking to add a knob that will cover the arm for safety, and

that could be easily installed on existing units. We are also considering a handle that will rotate on the crank handle. One of our chief concerns is not adding something that could break under duress in some of the harsher environments that some of our customers and toilets see.

A ball made out of the same material that you use for the head, possibly screwed (or pinned with a SS roll pin) onto the end of the handle? It wouldn't even need to rotate; gripping it loosely while turning (essentially the same thing you have to do with the bare handle now) would be easy and much more comfortable.

The elongated nut which attaches the handle to the agitator was used for a couple of reasons. It facilitates assembly / disassembly by the customer, and it allows for relocation of the handle to the opposite side of the toilet without the difficulty of messing with a drift pin or similar pin. The use of a drift pin would also weaken the shaft area and most likely the pin would fail the first time someone tried to turn it backwards through compost that had dried out too much. Also, some applications such as catamarans, campers, may not have room for a crank handle. In these applications they use the elongated nut with a box ratchet wrench instead of the long handle.

You have a point. Several good ones, actually. Even though it's a bit of a pain as it is, I withdraw my criticism - although it's a part of the design that should be revisited with an eye to improvement once in a while.

We do not see a need for seals around the agitator shaft. Most rubber seals would fail from dirt (compost) in a short amount of time.

Of course; that's why I didn't suggest rubber seals. Typically, an industrial liquid-proof bushing/rotary shaft seal would be composed of Teflon and stainless steel - and they're very inexpensive ($2-3) and available in many sizes. I even provided a link to a source in my original post.

The agitator has an industrial plastic flanged bushing and a stainless steel washer on each side inside the compartment. The only way you could have an issue with leakage is if excessive amounts of water have been added or urine has been allowed to enter into the compost area. The peat moss or coconut fiber is to be moist, not wet.

No, actually if the peat moss is even damp and comes up above the level of the hole, the liquid seeps out. There's nothing to stop it from leaking out - it's a hole.

No standing liquid should be allowed to accumulate in the compost compartment. One customer had this problem and it was found that their three little boys were peeing in the peat moss with the trap door open.

Not the situation with us - both of our children are still in diapers.

Mr Okopnik also mentions that we should not have drilled through both walls of the solids tank. By drilling through both walls we allow the customer to put the handle on either side of the toilet. It is just a matter of turning the agitator around.

Again, you have a point in that - although the right solution in that case would be a rotary shaft seal on both sides.

In regards to capacity, the unit holds SEVERAL months worth of occasional usage (weekends) or at least a month of full time usage. We even have some customers that remove about 20 percent of the compost and add a little new each week. They have not completely dumped the unit in over a year.

That's a really good idea! Perhaps you could create an FAQ on your site containing tips like this one? I'm sure that you have many of them based on your experience, and they would be incredibly useful to any new NH owner. I guarantee you that this would improve customer satisfaction, at least to some degree.

If you need help with that, please feel free to call on me - among other things, I'm a professional web designer

Overfilling the solids tank would allow the agitator to sling compost into the upper section creating a mess.

True enough - and raising the top higher would be a bad idea for other reasons (the unit is tall enough already!)

A few of the early units did have the latches unlatch when sitting on the unit. We do not have an issue with these now.

But we do. :) Until I get around to fixing it, our NH stays unlatched - it becomes so as soon as one of us sits on it, every time.

The latches are placed in the present fashion (upside down) to allow for emptying the base without tangling or tearing the plastic bag.

Well, I did note that it was only a minor annoyance. If you ever revise the molding plan, adding something like a heavy plastic "loop" to the top and the bottom and providing a pin that slides into those loops, locking the two together would prevent having to mount that set of latches on the NH - and would be much more reliable to boot. If I haven't made myself very clear, what I mean is something similar to a flat door-bolt arrangement with everything except the bolt being molded as part of the NH unit.

Hold down knobs. We feel what we have works, but I understand his point. One concern would be that with the inserts sticking out, it may make the base hang up on the L brackets when removing it for emptying.

By 'stick out', I meant about 1/16" - just enough to feel it "register", not enough to hang up on anything.

It would also mean that the bracket and nut would only be tightening up against the insert, possibly allowing the toilet the ability to rock.

Not at all - the insert would fit inside the slot.

After all that I have stated, we feel we have a good product and will continue to consider suggestions regarding improvements to our product in order to offer the best composting toilet available.

You do indeed have a good product; I'm all for it. I'd be glad to see improved as much as possible, though.

*Best regards, -- * Ben Okopnik * Editor-in-Chief, Linux Gazette * http://LinuxGazette.NET *