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Filters

Plugged Filter, Or How I Got Into the Filter Business, and Learned to Love It

In 2011 I was gainfully employed by Intuitive Surgical, making more money than I ever thought possible about 50 years ago when I was thinking about becoming an Engineer because I understood they might make as much as \$10,000 a year.

At the time I was planning on retiring when I reached 70 in 2013. Just two more years.

Everything was going just great except my dream pond had developed a bad case of string algae which was slowly driving me nuts. The advice on building a pond is fairly standard.

- Talk to Lots of People With Ponds

Ideally join a Koi Club and Pay Close Attention.

- Visit as Many Ponds as Possible

Pond tours are a great way to do that. We just happen to have one coming up in July.



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- Research Ponds Online

There are lots of forums available with lots of experience represented. Maybe too many. It is easy to get overloaded.

Peter Waddington had some good advice. He said, “The cheapest possible way to build a koi pond is to build it once, but build it properly.”

Good advice indeed. Too bad I ignored it.

- Bottom Drains

No way I’m cutting a hole in the bottom of my pond.

- UV

Phawsh! No way I need a UV. Turns out this may be correct, but it took many years to get to that point.

- Aeration

Never heard of it.

- No Rocks in the Pond

What sort of artificial looking pond that would be. Any fool can see that every stream and lake has rocks on the bottom.



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- No Plants in the Pond

Ridiculous. I'm all about adding beauty to my garden.

And so I discovered Aquascape and fell for their story of an easy to take care of, natural pond, hook line and sinker.



Pond Number 1



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It turned out pretty well I thought, of course like so many Aquascape ponds it was a buffet for egrets, notice the netting.



A verdant paradise where you could sit and relax except when pruning the plants, pulling the slimy algae that clung to each stem and skimming the flowers and leaves that were constantly falling into the pond.



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Other than that you'd probably have 15 minutes a week to just sit and enjoy it.

Until...



Your Fish Get Sick



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Bare in mind this was only about 8 months after starting up the pond. Fortunately, I had at least joined a koi club so I called on Sanjiv for help and we nursed all but one of my fish back to health.

I learned the necessity of aeration and the process of using potassium permanganate to keep the bacteria at bay.

And so I started taking advice. I removed the tons of rock from the bottom of the pond. Excellent exercise. Must of been my plan all along.

I'd had it with most of the plants. I removed everything except the water lilies. I wanted to increase the volume and make it more difficult for the birds to snatch my fish.



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I thought I could remove the first step without changing the liner. I got this far before I gave up.



The Weight of the Water Was Too Much



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So after some consideration I decided to do the pond over from scratch. This time the right way, but being the stubborn individual I am, I was determined to do it my way.

Standard procedure would be to pour a concrete ring at the perimeter of the pond to support the liner and prevent the wall from caving in.

I probably could of done that myself, but decided to support the wall with internal masonry. I was sure I could do that.

Given a few minutes of thought I should have realized this was a crazy bad idea, but it was my idea, so I didn't give it that thought.

By now I understood the importance of a bottom drain, aeration, UV and superior filtration. The space I had available was pretty constrained so I selected a packaged bead filter system with Turbo Vortex mechanical filter.

Turbo Vortex sounds cool doesn't it!



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Here you see the filter house, the bottom drain and the new liner.



Loosely is Certainly the Word



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Correctly installing a liner is not that easy I found. It takes a lot of skill not to wind up with unsightly folds all over the place. It was also difficult to secure the skimmer and bottom drain without stretching the liner. I had to backfill areas behind the liner to prevent this.

One step was removed to increase the volume and make the water at the edge deeper. I managed to set the skimmer incorrectly so the volume wasn't as much as I wanted. Why I didn't remove the second step, I'm not sure.



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Rose colored cobbles were used to line the pond. Didn't look bad, but semi lethal for koi. Especially when spawning!!



Cobble Wall In Place



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Vaunted Bead Filter and Turbo Vortex



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This Rube Goldberg contraption was another area where it would have been prudent to seek some advice. Running the skimmer and bottom drain both into the filter was a bad idea.

After months of work the new pond is finally running. A significantly different look from the original.





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For some time, I was pretty happy. Maintenance wasn't too bad. I flushed the filter once a week. It took about 45 minutes usually. The constant battle with leaks that plagued the first pond were a thing of the past.

Water quality was good. The koi were happy. I got to show it off on the 2009 Pond Tour.

And then...



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In the summer of 2011, just three short years after starting it up the string algae returned. This had been the bane of my existence with my first pond. It quickly became that again.



A Plugged Up Turbo Vortex



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With a reasonable load of debris the Turbo Vortex was pretty easy to backflush. You simply ran water backwards through it until it ran clear. I used this water to irrigate my bamboo grove.

Once the algae reached epic proportions, this no longer worked. Now I had to remove cover pick the algae out by hand and then backflush. It quickly plugged up the pipe I laid in my bamboo grove so I had to run the waste to a wetlands I had some distance away.

Now I could no longer backflush once a week. Two days were max before the flow dropped to almost nothing. Backflushes now stretched to an hour and the water used was immense.

I was not a happy camper. It was back to the internet to look for a better solution. Here I discovered the ERIC filter. ERIC stands for Endless River in Concrete, since the first one was built in place out of concrete.

The filter was developed by Peter Waddington in the UK. It was an updated version of his “Bargain Filter” that he had developed many years ago.

Peter concluded that upflow filters, which is what most filters are, would never work correctly due to channeling. Everyone knows that water takes the path of least resistance.



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This was something I wondered about back when I had my first pond with the wonderful Aquascape waterfall filters filled with sacks of lava rock. It didn't take a scientist to see that this didn't present a very uniform barrier.

After a short while of operation you could clearly see the areas of channeling demonstrated by the difference in coloration on the surface of the filter bags.

In my second pond I still used waterfall filters to assist the bead filter, but I replaced the bags of lava rock with Metala panels about a foot wide and placed in the enclosure sideways forming a sandwich with the finest media in the center, then medium mats and coarse mats on the edges.

This was idea I got from a Metala ad that recommended this configuration. This explicitly recognized channeling. The idea was that as the finer mat became clogged the flow would spread to the outer mats.

Aside from the fact that Metala is a crappy media, I'm sure this concept would have driven Peter bananas. His whole point was that channeling only allows a small portion of the media to be effective.

The ERIC filter was based on the concept of a river. In a river water flows horizontally. Because of boundary effects there is still channeling as anyone that has looked at a stream has observed.



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The water at the edge is stagnant, moving slowly, if at all. The center channel is flowing quickly.

Peter went to great lengths to avoid this making the cross section of the filter uniform, installing a diffuser panel in front of the bio section and most importantly using multiple air diffuser bars in the bio section to create turbulent flow so that all of the water contacts all of the filter media. The added oxygen is also crucial to the growth of the bacteria that perform the bio conversion.

The ERIC filter looks very simple and externally appears very similar to certain other filters, but there is really no other filter using these principals.

And...

The most important concept is the filter is designed to be very easy to flush and flushing is encouraged very often. Peter originally specified daily flushing, although the actual period depends on the time of year, fish load and amount of feeding.

Even if it is daily, the flush consumes much less water than most other filters. Most other real filters I mean. If you have a waterfall filter and only clean it once a year, you're obviously not using much water to flush.



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Hopefully you are doing some sort of water changes. Flushing the ERIC takes care of water changes. It is especially effective if you use a constant trickle so that the filter is filled to capacity by the time it is ready to flush.

This provides optimal water quality and eliminates problems with chlorine poisoning if you do a large water change and happen to forget to turn off the water or if your autofill malfunctions.

It appears to me that people either “Get” the ERIC concept or they don’t. Unfortunately for me, most Americans “Don’t”. I’m not positive why, perhaps it’s just because I’m a lousy salesman.

I think it’s because they look so simple and they use what most folks might think of as primitive technology. The mechanical filtration is with brushes. Been in use since the beginning of the hobby.

The bio media is a type of Japanese Mat. Again, this has been used for many years and the way it is used in the ERIC is not what most of us expect. And then there is the cost.

Every other filter I can think of are made of a molded plastic housing. They are made by relatively large quantities and sold in relatively large numbers. The ERIC



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filters are made by a very small company and sold in small numbers so the cost is relatively high.

I think most people take a look at it and say “I make could something like that way cheaper.?”

“Good luck”, I say.

Anyway in the Fall of 2011, I was falling for the ERIC story. My first thought was to see if I could import a couple, but figured transportation would be outrageous.

Then I started to think...”I wonder if ole Waddy would let me build these in the States”. “Naw” I thought never going to happen.

But what if he did...Finally I said, “What the heck, let’s find out so I can move on to something more practical”.

And so I sent him an email. To my amazement a few days later I got an email back from Japan suggesting I visit him in the UK to discuss and learn how they are made.

Wow!! That was a surprise. Hadn’t expected that. My first thought was I can’t just fly of to Britain.



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But then I realized I was thinking about quitting my job and starting up a new company. Flying to England was no big deal, and so I did.



My Hotel Near Peter's Home in Bury, UK



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Peter Sitting by His Pond Wearing His Beloved Shintaro Jacket



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Original ERIC Pond

This was the original ERIC installation. Concrete filters are located under the floor of the azumaya.



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Formal Pond With ERIC Filters



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Filters Under Covers

This owner uses the flush to water a grove of trees in his garden.



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Pond in UK Using 12 ERIC Four Filters



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The Control Room



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The Filters



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The amazing thing about this pond is that it was built in 2014. The owners recently sold the house and the new owners decided to fill in the pond.



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Peter Showing Me How to Build EMAT Modules



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Shipment of ERICs Arrive



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I built my third and final pond as a demonstration/test pond for the filters.



New Pond Early 2013



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My idea was to find a local fabricator that could weld the polypropylene filter boxes. Then I would assemble them and sell them to happy customers.

I found a good fabricator and they built a filter for me. I have it installed on my pond now. It was the first ERIC built in the US.

There was only one problem. What they charged me for fabrication was more than I planned to charge for the finished filter. My business plan was in tatters.

For several weeks I was despondent. Peter wanted to ship me a container load of filters. Since I hadn't sold any at that point, I wasn't too crazy about that idea.

I almost gave up this crazy idea. I was almost 70, I could retire.

But then I thought. Hey, welding plastic isn't rocket science. I bet I could learn to do that.

I found a welder supplier that offered training. Off to Chicago to become a welder. I spent several days with Patty Zitkus learning the basics of plastic welding and I ordered several thousands of dollars worth of welding equipment.

Back at the ranch I welded up a waterfall box and a skimmer. Both are now installed in my pond.

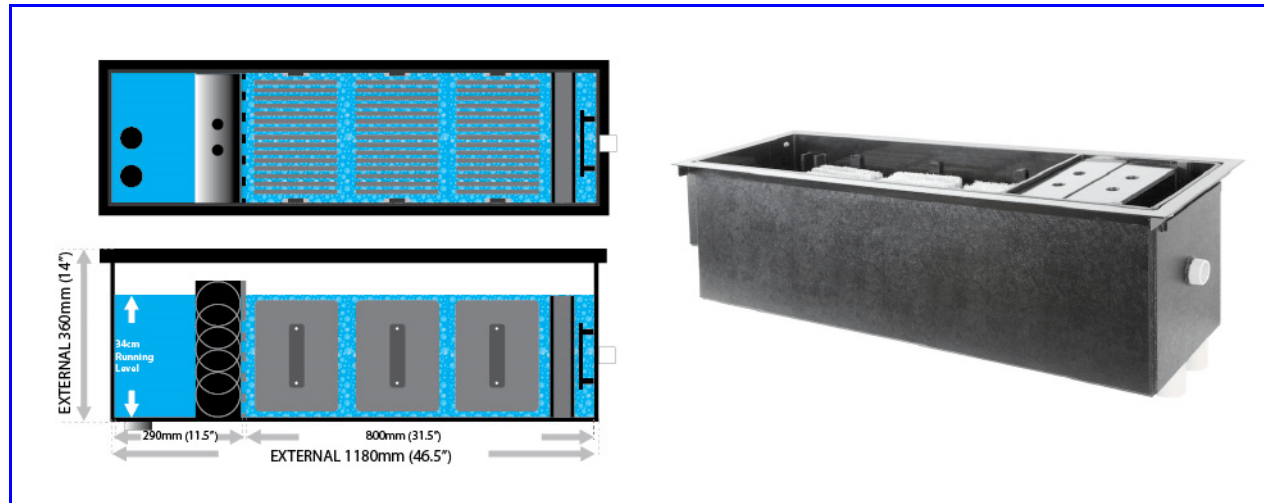


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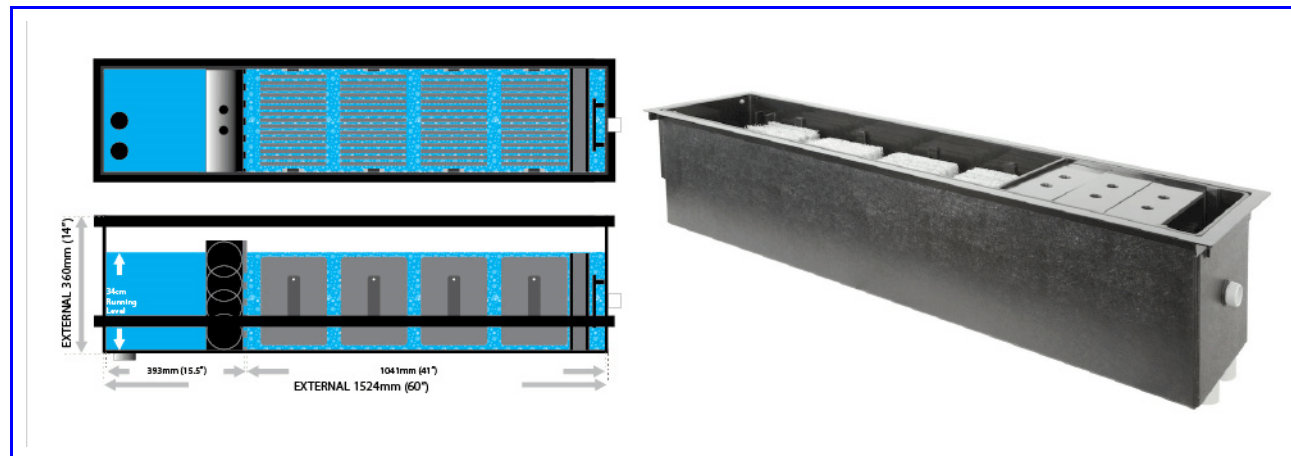


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About this time Peter came up with the ERIC One. A crazy idea I thought. My ERIC Two could barely deal with my 600 gallon QT.



ERIC One



ERIC Two



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But a several enthusiasts volunteered to test it and it worked very well. I decided to add it to my product line.

During the online discussion of the testing a gentleman by the name of Michael Toft suggested to Peter that he should try his Biohome filter media. Peter didn't think very much of this idea since the EMats are really the only proprietary component of his system.

But I was intrigued and contacted Michael and ordered some Biohome BioMotion media.



BioMotion Media



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I figured if it was as good as Michael said, I could get by with even a smaller volume of media than Peter was using so I created two perforated plastic boxes about the same size as Peter's EMat Modules. Therefore what I called my ERIC 1+ was just a bit smaller than Peter's ERIC One.

I put it into operation on my QT in Sept, 2013 with a very heavy fish load. I was very concerned that the extremely small ER 1 would not be able to handle this load under any circumstance.

I was very pleased to see that NO₂ was being produced after one day of operation. Ammonia and NO₂ increased steadily over the next three days and then ammonia began decreasing. NO₂ remained nearly constant at 2 ppm.

Ammonia reached 0 on the 10th day. Regular feeding began on 17th day. Ammonia remained at 0 as feeding was increased to .05% of body weight.

By the 25th day NO₂ began to decrease and quickly fell to zero. Feeding was gradually increased to .29% of body weight at which time NO₂ increased to .2 ppm.

Based on these results I decided to use Biohome media in my filters from then on. This brought my customer relationship with Peter to an end and I agreed I would no longer refer to my filters as "ERICs". I've renamed them Endless River Filters.



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From my testing I've learned that Filter Effectiveness Is Heavily Dependent Upon Water Temperature And Feeding.

My pond serviced by two ERIC Three filters began to show nitrite (.25 ppm) when feeding reached .46% of body weight and temperature dropped to 70°F.

The newly renamed ER 1 on my QT began to show nitrite (.2 ppm) when feeding reached .29% of body weight and temperature reached mid 60s.

The decision to change media turned out to be a brilliant move as I became the exclusive dealer for Biohome media in the US. Over the past year I've sold thousands of dollars worth of media to aqurists all over the US and Canada.

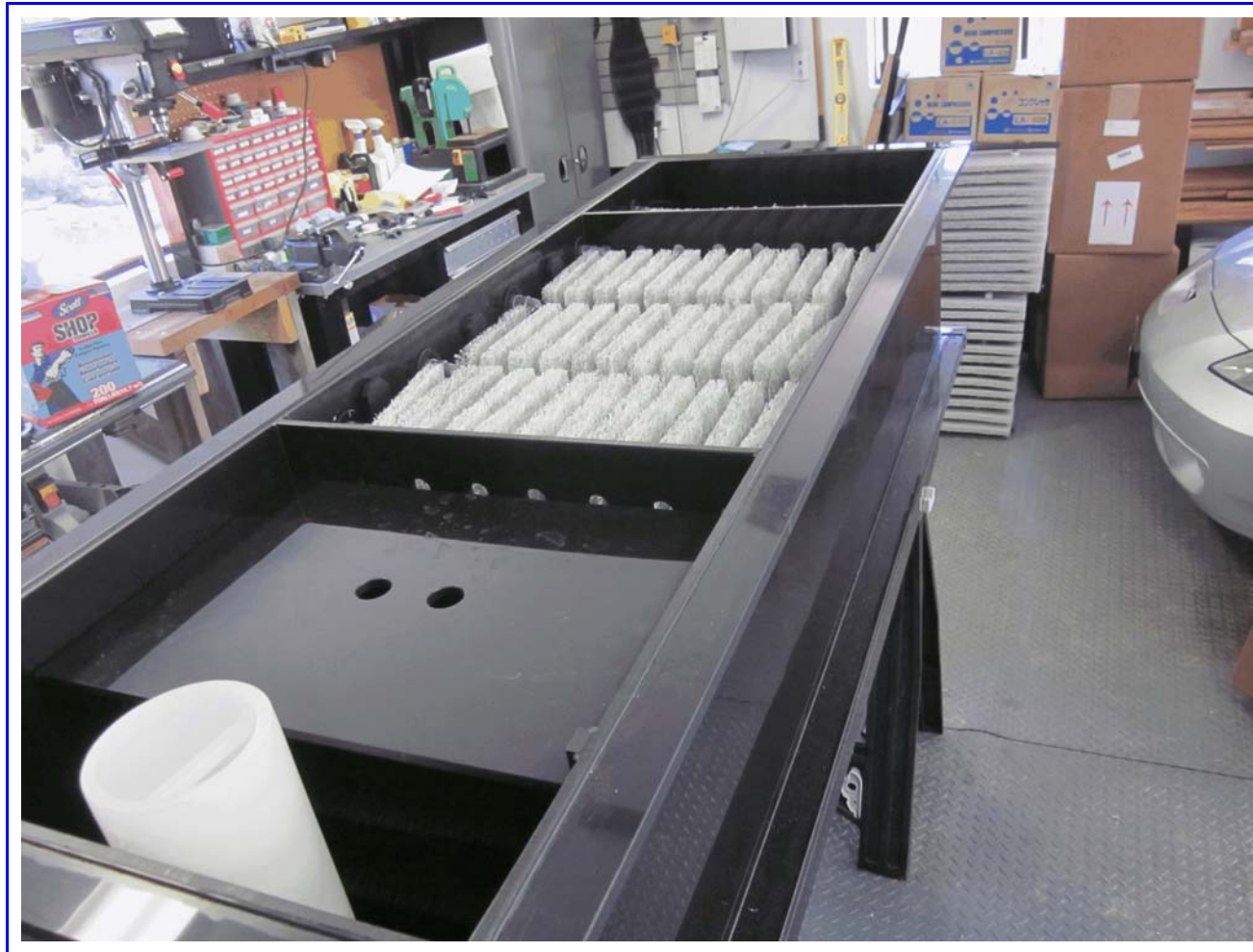
Since I started selling filters in 2012 I've sold two.



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First US ERIC 3



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The Latest, ER 3D



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Drum Mechanical Filter



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Peter's Pond