Background
According to the Alternative Farming Systems Information Center, USDA: Aquaponics is "a combination of fish and plant production using aquaculture and hydroponics systems." Aquaculture is "The farming of finfish, shellfish and other aquatic animals." Hydroponics is "Growing plants in a nutrient solution root medium."}

Problem Summary
- Aquaponic system not converting larger solids into useful nutrients
- Current filters undersized
- Pre-filter now prevents clogging but removes potential nutrients
- Fecal matter and feed floating throughout fish tank result in low water quality

Design Constraints
- No use of powered components
- Must be able to be cleaned without replacing parts
- Decomposes waste faster than it builds up

Potential Impact
- Lower inputs and less space while having higher food production
- Lower carbon footprint than other methods of agriculture

Alternative Designs
The designs were combined to make a comprehensive hybrid that uses all their best features to create a better final design.

Corner Filters: Bio-filter using air through biomedia to lift and aerate water and breakdown of ammonia in fish tanks.

Venturi Injector: Sucks fertilizer or air into moving water stream due to pressure difference.

Screen Filter: Particle filtration method where screen catches particles and either blocks ones that are oversized or resizes them as they shear through the screen.

Final Design
Features:
- Air injection venture for maximizing dissolved oxygen in water pre-filtration
- Screens placed inside ball valves and outside inlets for sizing soft particles
- Biomedia tank with reservoir for decomposition of fish waste
- Welded perforated barriers between inlets and fish (not shown)

Economics
<table>
<thead>
<tr>
<th>Item</th>
<th>Cost Estimate (Retail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC Pipe</td>
<td>$30.00</td>
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<tr>
<td>PVC Fittings and Glue</td>
<td>$175.00</td>
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<tr>
<td>Welding Supplies</td>
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<tr>
<td>Perforated Aluminum</td>
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<tr>
<td>Tanks</td>
<td>$250.00</td>
</tr>
<tr>
<td>Total</td>
<td>$545.00</td>
</tr>
</tbody>
</table>

From: http://www.theaquaponicsource.com/
From: http://www.aquananos.com/
From: http://industrial.rainbird.com/
From: http://www.ozonesolutions.com/

Title: Aquaponic Bio-Filtration.
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