



SAN DIEGO STATE  
UNIVERSITY

Mechanical Engineering  
College of Engineering

# Fall 2020 Virtual Senior Design Day

**ZODIAC**  
FLUORPA  
**Total Dissolved Solids Filtration System**  
Nick Aiello, Alejandro Del Castillo, Brian Milner, Alex Smith  
Sponsored by Zodiac Pools

**The Team**  
Team Lead: Brian Milner  
Team Members: Nick Aiello, Alejandro Del Castillo, Alex Smith

**Project Overview**  
TAC media is a new technology previously used for home water softeners. We have leveraged the ability of the TAC to crystallize calcium into calcium carbonate, a much larger compound which can be filtered out much easier.  
When water flows through the filter head, it flows by the TAC media, crystallizing calcium ions until the calcium crystals get too large and break off. After the crystal sheds the housing, it is blocked by the 5 micron filter located in the vertical T section preventing the calcium from leaving our system. Water will continue to flow through the system with the calcium now blocked. Once flow through level one is affected to lower flow, the calcium will fall to the bottom of the enclosed pipe in the poolhead. Currently the only way to remove the calcium buildup is clearing the pool and manually scrubbing it off. Our goal is to develop a filtration system that can be integrated into a pool system in order to remove calcium from the water pipes in the system.

**Problem Statement**  
Over time, calcium builds up in the pipes and on the walls of a poolhead. Currently the only way to remove the calcium buildup is clearing the pool and manually scrubbing it off. Our goal is to develop a filtration system that can be integrated into a pool system in order to remove calcium from the water pipes in the system.

**Fabrication**  
This system utilizes mostly PVC piping as well as custom parts made in-house designed by the team and manufactured by J&B. All parts are secure and water-tight and a requirement given to the team was for the total cost to be under \$300, which the team achieved using readily low cost parts and materials.

**Results**  
A bar chart showing flow rate over time.

**Acknowledgements**  
The team would like to thank Dr. [Name] for his instruction as our professor over the course of this project, along with those being Brian Boudreau and Derek Williams for providing engineering guidance and during our time together.

**Future Work**  
The team would like to continue testing the effectiveness of the TAC and calcium removal under a wide variety of conditions that would be expected in the pool. Additionally the TAC step would be implemented in the filter into an actual pool system, and then testing in real conditions.

**Summary**  
The team started with creating a pool filter to remove calcium from pool water and decided to use TAC media to assist in removal of calcium, and then developed a filter to catch the crystallized calcium while still allowing water flow through the system. Although the team was unable to finish the project, testing of the filter yielded very promising results.

Spring 2020

Alejandro Del Castillo  
Nicholas Aiello  
brianmilner  
Alexander Smith

**Mo Pills? No Problem.**  
Pill Dispenser  
Sponsored by Quality of Life Pills

**Project Description**  
This device will assist individuals with disabilities by providing the ability of dispensing pills of various medications and quantity into specific doses a weekly pill dispenser. Changing the quantity of medication will be done by the user. The device will have the ability to be used by individuals with disabilities.

**User Instructions**  
1. Plug a weekly pill container in the top of the device.  
2. Turn on the device.  
3. Press the button to dispense the pill.  
4. Check the quantity of pills in the container.  
5. Press the button to dispense the pill.

**Goal**  
Helpful tools of existing devices and ideas for the user's needs will be gathered for this device. The device will be designed to be used by individuals with disabilities.

**The Team**  
Team members: Erica Antonio, Kiana Markle, Kiana Markle, Kiana Markle, Kiana Markle, Kiana Markle, Kiana Markle, Kiana Markle.

**Acknowledgements**  
The team would like to thank Dr. [Name] for his instruction as our professor over the course of this project, along with those being Brian Boudreau and Derek Williams for providing engineering guidance and during our time together.

Erica Antonio  
Kiana Markle  
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Please join us for our Fall 2020 Virtual Senior Design Day on **Thursday, December 10, 2020, from 1:30pm – 4pm**. This event will be held via Zoom. At 1:30 pm, we will be having an introductory Zoom webinar with opening remarks from the Mechanical Engineering Department Chair, Dr. John Abraham: <https://sdsu.zoom.us/j/83878992321>

After the introduction, we invite everyone to visit individual projects. Zoom links to interact virtually and ask questions of our students regarding their projects will be provided at the webinar and also on the Department website just prior to the event. Please visit our [Fall 2020 Senior Design Day website](#) for more information about individual projects.