Lab Scale Anaerobic Digester
Group A3

Keith Allard, Cathal Cullinan, Jack Crowley

Aim of the Project

The Aim of the Project was to design, manufacture, assemble and test a Lab Scale Anaerobic Digester in partnership with Shannon ABC. This was a completion project from a previous year.

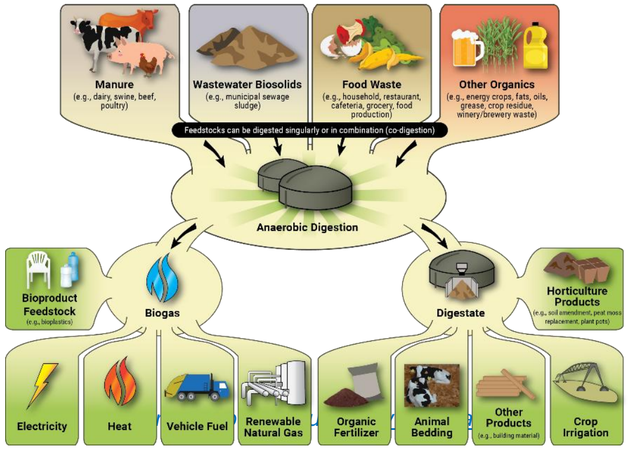
Objectives

- Research area of anaerobic digestion with focus on how they work, the main components of the previous group's design, their use in industry, and all engineering standards related to design and use.
- Review previous groups design of Lab Scale Anaerobic Digestor.
- Investigate all existing components and their operation, manufacture or order any replacements if at all necessary.
- Assemble Anaerobic Digester using optimized design.
- Perform a series of tests to characterize the anaerobic digestor's capability.

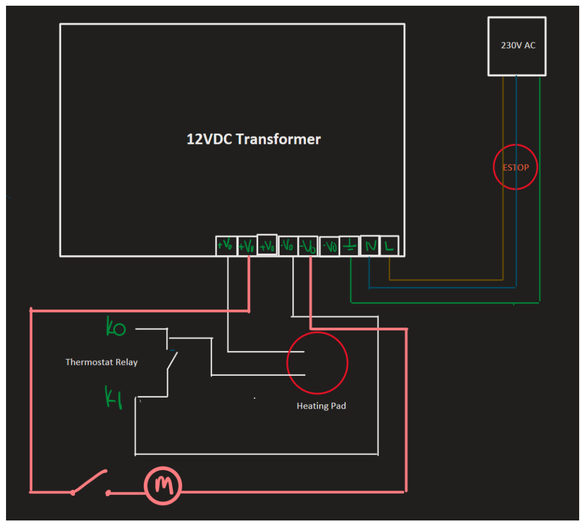
Background

An Anaerobic Digester (AD) is a mechanical assembly that processes organic matter – i.e. slurry, wastewater and food waste using bacteria, without the use of oxygen. It must be done in a reactor, which is pressurized. It is constructed based on the needs of the firm / operator and the feedstock of the reactor.

Design & Function

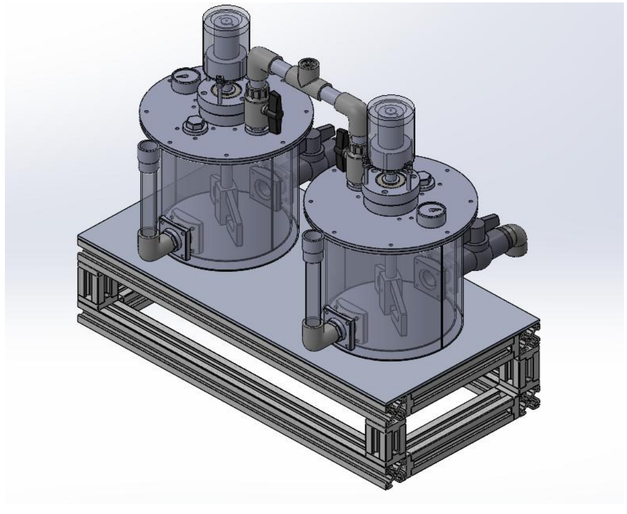


Controls & Electronics



The controls are housed in the base with 3D printed panels attaching them to the base. The wires then feed from the back of the panel to the tank and the transformer. The transformer is fixed to the top of the base enclosed for safety.

Manufacture & Assembly



This project was a mix of CNC, 3D printing and manual manufacturing.

CNC Machining

The Lid Insert, Mixer Blade, Shaft Support, Lid Insert Cap

Manual Machining

Shaft, Shaft Support, Lid Insert Cap, Lid Insert

3D Printing

Control Panels, Outlet and Inlet Plugs

- Every component is designed to fit into each other to allow an airtight seal.
- The Lid Insert bridges the gap between the old design from last year and the new design. It is crucial for assembly function.
- Deciding how to mount shaft and motor proved a difficult task. Holes were drilled in the lid that weren't being used, as well as a large hole in the middle to facilitate the previous group's design.
- The tanks were an aspect that could not be remanufactured. This left the problem of clogging those holes to ensure everything stayed airtight.
- This is where the Lid Insert was introduced, the lid insert sits under the main slotting into the large hole left from the old shaft design. With the help of gasket tape, the Lid Insert gets pressed up int the main lid sealing everything in the process.

Conclusion

- The area of Anaerobic Digestion was exhaustively researched.
- A review was made on the previous group's Lab Scale Anaerobic Digestor design and changes were made where necessary.
- Investigation of all the useful components occurred.
- The optimized design was assembled, and was to be followed by a series of simple tests to characterize the anaerobic digestor's capability
- Unfortunately, due to time constraints on the project, not all the aims could be achieved.
- The aims of the project had to be changed midway through to better reflect realistic goals.

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