



SENIOR DESIGN ORGANIZATION SYNOPSIS – SPRING 2013

BIODIESEL FEEDSTOCK PRE-TREATMENT STATION

SPONSOR: GREEN BIO-FUELS

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Summary

The elaborate design of this Waste Vegetable Oil purification station for biodiesel production is prepared following every professional and ethical engineering requisite. By focusing on our sponsor's concern, Green Biofuels, we've developed a rough mechanical system design which is potentially the solution for their existing problem. Green Biofuel's Biodiesel processing plant is technically limited to the amount and type of WVO they can process hence purchase. Our design, the Biodiesel Feedstock Pre-Treatment Station is capable of removing the residual water and organic debris from the WVO prior to its delivery into the plant. This preliminary cleaning stage for the existing plant takes hold and is finalized while leaving small room for error as the biodiesel production will not allow for much water or bio-solid contents in its treatment. The end product follows strict quality control tests in order to provide the best results and meet our sponsor's conditions.

Project Platform

Fossil fuels have become expensive and undesirable pollutants around the world, pushing energy developers to exploit new sources of fuels. Our sponsor, Green Biofuels, specializes in producing Biodiesel from used vegetable oil. They are a South American entity, and have exported their Biodiesel production to South Florida, creating a good use to Waste Vegetable Oil which would otherwise pollute waters and impair sewers. Our design considerations were prepared following biodiesel composition guidelines set forth in ASTM D 6751 and from agreed conditions from our client. The delivered oil for biodiesel processing has to be of a water and organic-solid content less than 500 and 5000 ppm. A higher contamination than the previously stated would seriously interfere in the plant process and the fuel properties of the Biodiesel produced. The proposed design which would ensure the quality of the feedstock is to be depended on specific mechanical systems. First, at the storage stage of the design, after macro-filtering the raw material with screens upon pouring into the receiving tanks, these holding tanks serve as a sedimentation juncture, where after a yet undetermined period of time, the usable oil will be removed leaving behind a great amount of the unwanted water and solids. This process is accelerated by slight heating through an "Oil Pan Heater". A transfer pump delivers the sought content into a centrifuge unit which performs most of the separation of the debris and resting water from the oil. Successively, the fluid travels to a finite filter element assembly, finalizing the pretreatment station process. The end product is then tested on its proposed terms, maintaining a thorough analysis in the design proposition.