Design and Fabrication of Pilot Biodiesel Reaction Vessel.

The University of Idaho has been a pioneer in biodiesel research for the past 30years. The BAE department currently has two demonstration pilot reactors a 500gal and 300gal reactor. These reactors are used for the conversion of vegetable oils and waist vegetable oils to biodiesel for the BAE Diesel fleet and Vandal Trolley. The biodiesel industry has rapidly grown to utilize triglyceride and lipid sources. The objective of this team will be to design and fabricate a state of the art pilot scale biodiesel reactor to address challenges for industrial partners. This system will handle reagents such as methanol and liquid sodium methylate.

Primary objectives:

- Design an enclosed reactor system for safe operation of base transesterification
- Size and design a condenser to capture and reflux alcohol back into the system
- Design a system for thorough Agitation of reaction vessel.
- Design a system for temperature control of the reaction

The expected features include:

- Compliant with all local, state, and federal codes and regulations
- Enclosed explosion proof reaction vessel
- Explosion proof Agitation (recirculation, stirring)
- Heating (steam, electric, and/or heating fluids)
- Reproducible and controlled temperature and agitation controlled with Process Logic Controller (PLC)
- Data acquisition system
- Continuous observation and sampling ports
- Utilization of Sonication for accelerated mixing and reaction rates
- Clean in place built into the system for easy of cleaning after use
- Feedstock introduction, reagent introduction and mixing system.
- Optional cooling of reaction vessel.
- Ability to remove liquid and solid foreign maters by decanting.
- Enclosed inline strainers and/or filtration of process oils/fuel.
- All materials used for the reactor, pumps, gaskets and fixtures must be chemically compatible.

The design team will have access to the BAE metal shop fabrication space.
The design team will have access to the existing biodiesel reaction vessels and associated explosion proof pumps, hydraulic agitation and other hardware.