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# Separation Technologies of Base Oils: The Optimization of an Anaerobic Thermal Desorption Unit

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Sponsor: RLC Technologies

Sponsor Advisor: Anthony Dollins



# Separation Technologies of Base Oils

*The Optimization of an Anaerobic Thermal Desorption Unit*

CAPSTONE DESIGN  
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## Background

Waste management generated from oil exploration efforts have become an increasing concern. Current remediation technologies, while cost effective and simple, are highly inefficient and pose risk to the environment. As the number of oil wells continue to grow in the US and globally, more efficient means of remediation are in order.

The anaerobic thermal desorption unit (ATDU) manufactured by RLC Technologies provides an environmentally safe and sustainable process through indirectly heating the waste materials and recovering the base oils in the process. Through treatment by the ATDU, once inaccessible base oils can be properly recycled or sold off rather than put to waste.

## Specific Goals

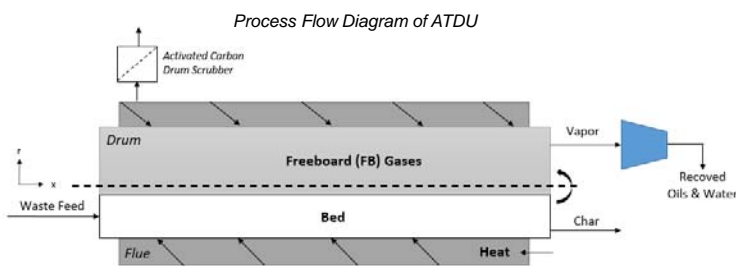
- Develop & perform a DOE on a bench scale model of an ATDU
- Utilize a computer simulation software (Aspen Plus) to compare results between models
- Construct a pilot-scale version of the commercial ATDU to confirm bench scale results & study the effects of scale up

## Methods

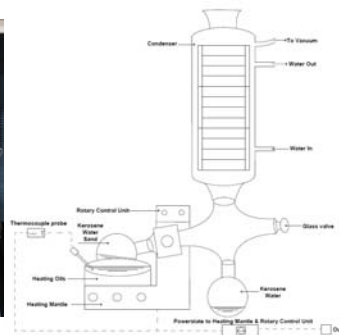
Process conditions considered are temperature, rotational speed, and water content of the waste at the bench model and temperature and water content for the Aspen model. Variables were tested at high, low, and mid values to ensure accuracy.



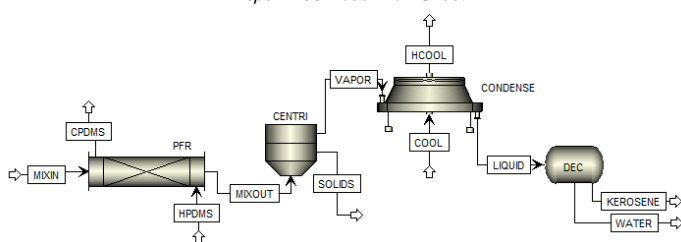
DOE Parameter	Minimum	Maximum
Temperature (°C)	150	170
Rotational Speed (rpm)	15	40
Water Content (vol%)	15	25



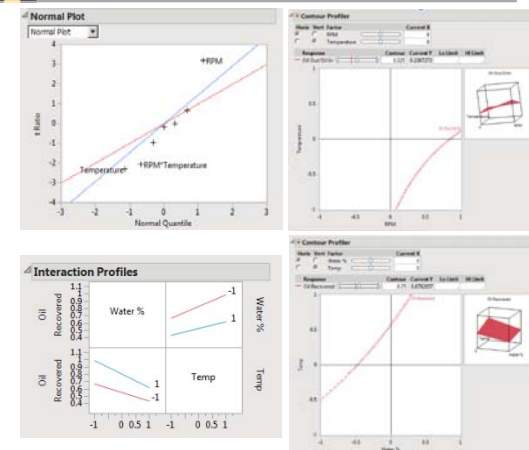
Picture and Process Flow Diagram of Bench Scale Model



Aspen Plus Model Flow Sheet



## Results & Conclusion



JMP Results for the Bench Scale (top) and Aspen Plus (bottom) Models

Optimal Operation Conditions for Bench Scale and Aspen Plus Model

Model	Temperature (°C)	Rotational Speed (rpm)	Water Content (vol%)
Bench	150	40	15
Aspen	170	-	15

## Future Work

- Operate and analyze pilot scale
- Measure the effects of scale up from bench to pilot plant
- Expand upon Aspen model to accommodate rotation & pilot scale operation
- Explore additional DOE parameters

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