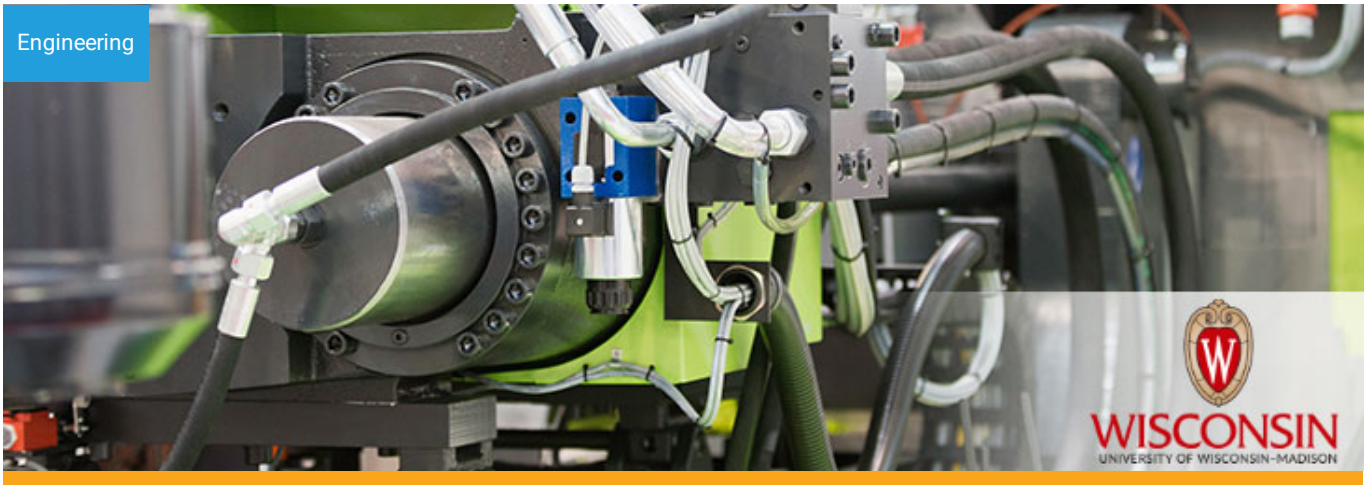
Engineering



New Rheometer and Method for Efficiently Measuring Yield Stress in Biomass

View U.S. Patent No. 9,116,092 in PDF format.

WARF: P110311US01

Inventors: Daniel Klingenberg, Joseph Samaniuk, Thatcher Root, Charles Scott

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a device that could improve the efficiency of biomass processing.

Overview

The finite nature of fossil fuels along with rising oil prices has prompted a need for alternative fuel sources. One alternative involves the conversion of biomass materials into biofuel. But current processes for converting biomass materials are difficult and expensive and require the biomass to flow through a series of treatments.

To reduce costs, industrial processes and equipment must be designed so the biomass flows with a high concentration of solids. High solids concentration results in complex rheological properties that make the biomass more challenging to process. Accurate measurements of the rheological properties of biomass flow, particularly yield stress, are needed.

Current methods of measuring rheological properties are slow and inefficient, taking approximately 1.5 hours, and use expensive equipment. Additionally, existing methods for measuring yield stress can result in inaccurate characterization of biomass material due to complications including wall slip, sample ejection, stresses exceeding sensor capacity and sample separation into multiple phases.

The Invention

UW–Madison researchers have developed a device and a method for measuring rheological properties of fluid that will effectively determine the yield stress of biomass materials. These measurements do not alter the material sample prior to measurement, allowing for more accurate data results and characterization.

The device comprises a cavity for receiving the fluid, an auger connected with an axial shaft, and a load cell sensor connected to the auger. The sensor measures the force on the auger from the fluid as the auger moves up and down. A linkage interconnected to the sensor translates motion to the auger.

Applications

- Directly measures yield stress of fluids, particularly biomass
- Also can be used for measurements and characterization of other types of fluids
- May aid in the design of equipment and processes to better convert biomass to biofuel

Key Benefits

- Successfully measures yield stress within minutes
- Can be fabricated for less than $1,500
- More accurate than current methods

- Simple to operate

Additional Information

For More Information About the Inventors

- Daniel Klingenberg

Tech Fields

- Clean Technology : Biobased & renewable chemicals & fuels
- Engineering : General engineering technologies

For current licensing status, please contact Mark Staudt at mstaudt@warf.org or 608-960-9845