

Bio-Fuels and Alternative Fuels Research Systems



Custom Reactor Systems like the above Bio-Fuels Research System are a product of collaboration between the researchers and the Engineers at Parr Instrument Company.

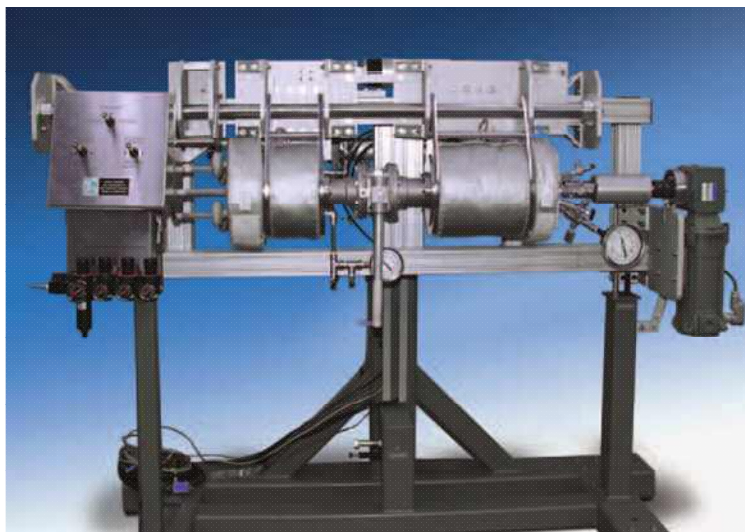
Parr Instrument Company manufactures non-stirred vessels for the decomposition of biomass in ammonia and steam. Parr stirred reactors, including a new horizontal reactor technology, have been designed for research processes that include hydrogenation, isomerization, and metathesis reactions. In addition, fully customizable continuous-flow tubular reactor systems have been developed with continuous reactant feed and product handling capabilities.

The above photo illustrates a complete pilot scale plant used for hydrogenating feedstock that originates from a proprietary fermentation process. The system is used to develop and optimize the process conditions necessary for a much larger demonstration-scale system,

ultimately leading to full-scale production of renewable fuels.

The system is comprised of five major subsystems: from left to right, a gas and liquid feed system, the jacketed tubular reactor module including a reactant pre-heater and circulating bath, product recovery and backpressure control, an auto-sampler and a Parr 4871 Control System (not pictured). The system is completely automated and includes an auto-sampling subsystem that periodically samples the reactor output stream in order to accurately monitor product quality.

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The reactor shown in the two images above and right has a five gallon capacity, and is used for stirring horizontally. Pneumatic controls on the left can tilt the system upright to open the bottom drain valve. The product is filtered and collected in the lower heated sample collection vessel. This system is used for making fabric from biomass. Most synthetic fabric is made from oil.

Horizontal Reactors

Stirring biomass such as straw or grasses is not easy to do in a vertical reactor. A new technology has been developed to do it horizontally. In the system pictured to the right, a 1 liter reactor can be disconnected to tilt vertically for loading or tilt horizontally for stirring. A heavy-duty stirring motor and double anchor stirrers are used. Another option would be to tilt upside down for discharge. A 4848 controller monitors the temperature and pressure and controls the stirring speed. A flexible mantle heater (not pictured) is used to obtain temperatures up to 350 °C. Maximum pressure is 1900 psig for this system.



Parr Horizontal Stirred Reactor System, 1 liter Fixed Head Vessel, shown with 4848 Reactor Controller with optional expansion modules.