Many companies that process biofuels are looking into ways of replacing high-cost raw materials with alternative low-cost feedstocks. It is now possible to turn animal fats, used cooking oils and low-quality raw materials into biofuel, using a straightforward, cost-effective process that employs flash vacuum deacidification technology.
More than the sum of its parts

Combined advantage
Alfa-Laval has combined a series of tried and tested processing technologies and equipment into a unique configuration, in order to undertake the flash vacuum deacidification of low-quality oils and fats. The Alfa-Laval flash deacidification system is able to process a wide range of different kinds of triglyceride oils and fats with a wide fat acid (FFA) content of up to 50%, providing an output in which the residual FFA content is approximately 1%, depending on specific operating conditions.

This unique Alfa-Laval technology set-up is easily scalable and can provide a wide range of processing capacities.

Typical flow diagram for flash deacidification system

Typical system layout

Deaerator

Heat recovery

Optimized final heating

Vacuum system much smaller

Because the stripping stream used in traditional systems is not needed, the vacuum load is reduced by 50%. Several alternative vacuum systems can be supplied, depending on the utilities available on site.

Vacuum system much smaller

Because the stripping stream used in traditional systems is not needed, the vacuum load is reduced by 50%. Several alternative vacuum systems can be supplied, depending on the utilities available on site.

Capacities and utilities requirements

A range of different capacities and installation layouts are available, making it possible to fit the equipment into any appropriate space in the least possible way. For small processing capacities, conventional solutions are also an option.

Even though this unique Alfa-Laval flash vacuum deacidification system requires high temperature and deep vacuum, it is a highly versatile set-up that can be used with a wide range of available utilities. For example, the replacement of steam with electricity for heating and vacuum duties is very much possible. The availability of utilities opens means flexibility in site location, investment costs, waste management and operation.

The advantages of versatility

• If no high-pressure steam is available, it is possible to switch to thermal or even direct electrical heating.

• If medium pressure steam is available, a vacuum system is usually possible to use.

• The vacuum load from the Alfa-Laval flash deacidification system is only 15% that of a traditional stripping solution.

• The Alfa-Laval flash deacidification system can even operate in installations in which there is no steam available.

• The system ensures water consumption is kept to a minimum, on account of effective heat recovery and an extremely small load on the vacuum system.

• It is not necessary to upgrade the waste treatment plant to deal with greater effluent amounts from the process.

• If there is limited space available for installing new systems, the Alfa-Laval deacidification system is ideal as it has a small footprint and each unit is in height. Systems with small capacities can even be containerized.

The fatty matter vapours enter a two-stage condensing system, consisting of the economizer and a water-operated trim cooler. The economizer alone provides full condensing and sub-cooling of the fatty matter distillate, while the trim cooler adjusts the outlet temperature to the desired level, independently of the feed temperature. It also takes over during shut-down.

Deacidification

This feed oil, which is still hot, is transferred through heat exchangers into a deaerator, where dissolved air and moisture are removed under moderate vacuum.

Heat recovery

Heating to deacidification temperature is carried out by an oil/condenser economizer and trim heater. The trim heater provides heat during the start-up procedure, when there is no heat available from the economizer, in order to ensure proper deacidification. The trim heater also provides additional heating, if the FFA content of the feedstock is low and the heat recovered from condensation is insufficient to reach the required deacidification temperature.

Optimized final heating

The deacidified oil is then heated to flashing temperature by a trim economizer and a final heater, before entering a special flash vessel. This final heating can be done by direct electrical heating, high-pressure steam or using thermal oil.

Flashing

The required flashing temperature depends on the specific FFA levels in the inlet flow, the desired residual FFA content and the vessel size. The flash vessel is heated for a short time, and flashing takes place immediately thereafter. This limits the time the feed is exposed to high temperature to less than one minute, thus improving the quality of the treated product.