

Lasers in Harsh Environments

Melting tanks



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01
Beef tallow tank with steam and agitation

02
LLT100 with air purge mounted to melting tank

Introduction

The process of making tallow involves melting down the beef fat and removing any impurities to produce a pure, high-quality fat that can be used in a variety of ways. At the rendering facility, the beef fat is first ground and heated in large, steam-jacketed vessels known as rendering kettles. This primary process involves agitation, internal heating coils, and steam injection. The heat causes the fat to melt and separate from any solid materials such as meat or bone. The melted fat is then filtered to remove any solids or impurities, leaving a clear liquid known as “yellow grease.” This yellow grease is then cooled, causing the beef tallow to separate and solidify on the surface.

To produce a clear, high-quality beef tallow, the solidified fat is then melted again and filtered through a series of fine mesh screens or centrifuges. This removes any remaining impurities or solids and produces a smooth, uniform product. In addition to its culinary uses, beef tallow is also used in various industries, including biofuels, soap making, candle making, and cosmetics.

Challenge

Because quality control in food processing is critical to adhere to strict FDA guidelines, instrumentation must be reliable and robust to withstand daily clean-in-place procedures and complex measuring environments. The melting kettle for tallow is on the extreme of level measurement limitations.

Agitators, internal coils, and steam injection create a

Laser replaces ultrasonic level for food industry tallow tanks

Measurement made easy

foggy and turbulent environment inside the kettle. This process, combined with high heat, causes many level measurement technologies, such as through-air radar and ultrasonic, to drop signals and fail in a very short time.

ABB Solution

The [LLT100](#) is able to solve issues with this measurement due to its small beam divergence of $<0.3^\circ$, allowing it to be installed on the outside of the tank and near the edge for ease of reading and maintenance. Additionally, software algorithms mitigate false readings of the agitators and high steam concentration. These features, coupled with a proper installation, overcome the internal conditions happening inside the melting kettles. Previous technology that was internally mounted required troublesome maintenance due to its mounting location and internal mounting requirements.



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01
LLT100 lens without
air purge

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02
Failed internally mounted
ultrasonic transmitter

Rationalization

As a best practice, whenever steam may be present, the use of an air purge is necessary to clear the space in front of the measurement lens. Depending on the amount of steam, pressures can range from under 10 to 25psi. Nozzles are also encouraged for the laser, as they act as an area of positive displacement for instrument air to force out the melting tank's environment.

To address the agitator blades, most manufacturers offer software features like dampening for mitigating high levels when the blades are "seen". ABB brings simplicity to the equation with median filtering in addition to traditional dampening. Measurements from 2 to 25 are kept in internal memory and the sensor returns the median value of the group by taking a series of readings, aligning them in ascending numerical order, and picking the middle number.



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