

Control of Heat Transfer in Fluid Storage and Transport

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Reference: Tank Baffle

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Overview

Auburn University is seeking a licensee or development partner for a device used to control heat transfer in storage vessels containing heated or cooled fluids. The addition of a thin baffle to the interior of a storage container has the ability to alter the fluid dynamics in such a way as to significantly modify natural convection. For example, it is estimated that such baffles can reduce heat absorption by as much as 37% in liquid natural gas (LNG) transport systems. This significantly lowers the energy needed to maintain the desired temperature, and in some applications can reduce the loss of product.

Advantages

- Increases control of heat transfer, reducing energy costs and/or loss of product
- Can be applied to a wide range of different shapes and sizes of containers
- Can be used effectively in: LNG storage containers at sea or on land, hot water heaters, boilers, cryogenic gases, etc.
- Simplicity of design makes the baffle an easy addition to existing or new equipment

Description

Many fluids are transported or stored at temperatures significantly above or below ambient temperatures. Examples include liquid natural gas (LNG), hot water heaters, boilers, and cryogenic gases such as liquid nitrogen. Despite insulation and other measures, heat transfer is inevitable. This results in energy required to maintain the desired temperature and/or avoid a loss in product (e.g., through LNG "boil off"). In the case of sea-borne LNG transport, as much as 2%-5% of the total load can be lost during shipment.

By controlling the heat transfer in tanks, these resulting losses and expenses could similarly be reduced. By introducing a baffle into the interior of a storage container, the fluid dynamics can be significantly affected. Natural convection is modified, and the thermally-stratified core is disturbed. This results in a significant alteration of heat transfer. This could translate to saving a few dollars per month on a homeowner's hot water heater or saving tens of millions of cubic feet of LNG in a single large shipment.

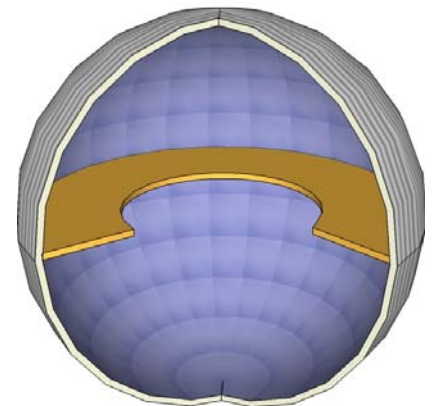
This technology can be applied to a variety of different shapes and sizes. The simplicity of the design should enable relatively simple implementation and retrofitting.

Status

- US and Canadian Patent Applications have been filed
- Extensive theoretical confirmation has been performed
- Prototype development for a hot water heater application is ongoing

Licensing Opportunities

- This technology is available for exclusive or non-exclusive licensing
- Joint development opportunities include funded research or a joint venture



Schematic of baffle placed inside a spherical tank.