



News release

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FOR IMMEDIATE RELEASE
May 2011

Houston inventor offers superior product for use in open top storage tanks

BAY AREA HOUSTON, TEXAS – A Houston man has designed a device which has the potential to return an immense amount of money to the coffers of oil companies worldwide. For over 20 years, Russell Curtiss worked for a company that provides various types of tank products globally to all types of end users and contractors. He used his knowledge and experience to improve upon the existing swing joint drain systems for open top storage tanks.

Open top storage tanks are found in most sectors of the petroleum industry. These include exploration and production, refining, and pipelines. Some storage tanks need a floating roof in addition to or in lieu of the fixed roof and structure. This floating roof rises and falls with the liquid level inside the tank, thereby decreasing the vapor space above the liquid level. Floating roofs are considered a safety requirement as well as a pollution prevention measure for many industries including petroleum refining.

Floating roofs require drain system

When it rains, water drains to the center of the roof into a well or water trap, also known as a sump. The sump is fitted with a flexible pipe that runs through the inside of the tank. The bottom end of the drain line is connected to an outside valve which is normally left open. The underside of the roof is fitted with support legs in order to leave space between the roof and the tank bottom when the tank is empty, which allows for maintenance.

Although many other factors must be taken into consideration, this is the basic anatomy of a liquid storage tank. The flexible pipes that are inside of these open top storage tanks are part of a

floating roof drain system, and swing joints are utilized throughout the industry that allow the sections of pipe to raise and lower along with the floating roof.

Almost all current floating roof drain systems employ standard swing joints. This design has a continuous slope that gives a constant gravity drain; however, due to the design of this type of joint, the roof only lowers to approximately 48 inches, or higher depending upon the size of the drain system and other factors, from the floor of the tank. This is referred to as the low leg position.

Designs a better system

As a designer, Curtiss knew there must be a way to gain access to the thousands of barrels of product remaining in that approximately four-foot space between the floating roof and the tank floor. Eventually, he invented a flat swing joint system that has a low leg position of just 18 in. or less. On a 100 ft. diameter liquid storage tank, the difference between a regular swing joint system and a system utilizing his flat swing joint system is about 2 ft. 6 in. or more depending upon the size of the piping. This represents a savings of approximately 3,000 barrels of product each time the tank is emptied and filled, which is normally once or twice each week. According to his research, there are roughly 100,000 open top storage tanks in the United States alone. With crude prices at or above \$100 per barrel, oil companies don't need an accounting firm to realize the tremendous cost savings that the flat swing joint system can provide.

SATOP engineer solves inventor's dilemma

As is the case with many inventions, his initial designs were good, but not good enough. He had made dozens of blueprints and built several models for his moveable swing joint pipe system. When put under stress, however, the joint experienced torque of movement to one side.

Curtiss learned about the Space Alliance Technology Outreach Program through his membership in the Houston Inventors Association. SATOP is administered by the Bay Area Houston Economic Partnership. It is a NASA and State of Texas funded initiative designed to transfer the knowledge and technology of the U.S. Space Program to small businesses, at no charge to them, to solve technical challenges they are unable to solve themselves. He submitted a Request for Technical Assistance in late summer 2003. A SATOP project engineer with BAHEP spoke with Rock Desilets, an engineer at Design by Analysis, Inc., a SATOP Alliance Partner in New Britain, Conn., who expressed an interest in working on the problem. After several phone calls and emails back and forth between Curtiss and Desilets, the torque issue was solved.

Curtiss finalizes design and obtains patent

More than two years ago, Curtiss was forced into retirement. This gave him the free time and opportunity to finalize his designs and to go through the application process for a patent on his floating roof drain system, which he formally received at the end of March 2011.

He has no doubt about the superiority of his product over the standard swing joint drain system. Curtiss talked about its three advantages saying, "It goes lower thereby nearly eliminating the dead area under the floating roof, can be connected to the outlet nozzle anywhere on the tank shell, and the drain pipe does not go under the sump eliminating this safety hazard."

Plans for the future

Curtiss, who will celebrate his 67th birthday in July, is seeking to form an association with an oil storage tank manufacturer to market his invention or to sell the patent outright. He has formed

his own design firm where he has other ideas and hopes to bring them to the market place shortly. Curtiss is very thankful, though, for the help he received from SATOP, acknowledging that it's an extremely valuable resource for struggling inventors.



Russell Curtiss



According to his research, Russell Curtiss estimates that there are 100,000 open top storage tanks in the United States. Shown here are tanks at the Port of Houston. (Photo courtesy of the Greater Houston Convention and Visitors Bureau)

The Bay Area Houston Economic Partnership is a member-driven organization that provides the leadership to stimulate regional economic development and employment in southeast Texas. Its members include more than 260 investor companies, business professionals, local governments, and educational institutions encompassing 13 cities, Galveston and Harris counties, and the Port of Houston Authority. Visit www.bayareahouston.com.

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