More on Methane

Last in a series by Al Rutan,
the Methane Man

First published in Home Power #40 • April / May 1994

In previous articles, I discussed a low pressure storage tank, tank insulation, pH balance, animal treatment, and heat retention. I'd like to share some new information I have learned since then. Some things worked and other things didn't, but all facts whether positive or negative are part of the mastering process.

Currently, my methane demonstration is being upgraded. I am discarding the plastic tank that served as a digestion vessel for the last year in favor of a metal tank. Why the change? For several reasons. First, the problems.

Bonding Difficulties

The primary difficulty is maintaining a vapor tight seal between the fill and overflow pipes and the tank. The plastic tank didn't cost much when new, so it was too tempting to pass up. But experience has shown that it was not a good choice. The tank material is polyethylene and the pipes are PVC plastic. While it's possible to weld polyethylene with heat and produce a bond, it isn't something that an amateur can do easily. I attempted to produce a vapor tight seal with various types of glues and epoxies, which was achieved with some success.

But the tank was often moved from one location to another by the trailer on which it is mounted. The sloshing within the tank caused the pipes to break the bond with the tank.

A second reason for replacing the plastic tank is that it is too short; the tank is three feet in diameter and only five feet long. The best proportion for a tank is three to five times as long as the diameter. This rule of thumb became obvious when new material was introduced into the tank at the fill pipe. What exited through the overflow was working nicely, still bubbling like crazy.

Slurry Still Working

The supposed "waste" or "spent" bucket wasn't spent at all, but continued to be active after it had been forced out of the tank. A short tank is truly an inefficient design. The fill and overflow pipes are just too close together. Also, the fill and overflow pipes should not be in line with each other. One should be at either the right or left side of center and the pipe at the opposite end of the tank should be on the other side of center. It doesn't make any difference to which side of center the pipes are placed. But it's important that the pipes at the ends of the tank not be in line with each other. Such a placement of the pipes provides another important advantage — the best position for the stirring mechanism. On the plastic tank, the stirring mechanism was vertical with a crank at the top. After a short time, I learned that this was a poor design for a stirring device. The seal at the top is difficult to keep vapor tight. If the bearings for the stirring mechanism are below the water line, then any leakage is no more than a little moisture, but not vapor.

When the Tank Gets "Cranky"

Also an oversight in the vertical stirring device design was the omission of a bearing point at the bottom end of the shaft. It was left to "float". With the resistance of the material within the tank, the pressure on the one bearing at the crank end of the shaft tended to distort the cover of the tank as the crank was turned.

Ideas that Worked — the Heat Bath

That's the bad news. So what's the good news? The water bath for providing heat to the tank. I originally thought that this would be an effective way to transfer heat from whatever source to the tank. In actual operation, the concept worked even better than anticipated.

Heat is supplied from a two foot square hot water box placed below the level of the water bath. The placement of the source of hot water under the water bath allows the water to circulate via a thermosiphon: hot water rises in a closed circuit of water. The connecting pipes are two inches in diameter — one for supplying warm water and another for the return of the cooler water. The pipes from the hot water box connect to an 18 inch deep metal water bath underneath the tank. The tank is placed on supports six inches above the floor of this water bath.

Al Rutan
RIP