

# Self-Service Fuel: Airport Money-Maker

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**Introduction** - When was the last time a gas station attendant fueled your car? Unless you were around in the 1970s when full-service stations disappeared as a consequence of the oil crisis, chances are the answer is never. With nearly all of America's 110,000 gas stations offering 24/7 credit-card, self-service pumps, isn't it odd that only about 1/3<sup>rd</sup> of our nation's 3,600 airports do the same? After all, if Jay Leno can pump gas into his priceless Duesenbergs, why can't pilots be trusted to top off their own aircraft? To make matters worse, many pilots only have time to fly evenings and on holidays, when many FBOs are likely to be closed.

**Pros and Cons** - Consider the many benefits of a modern self-service fuel station:

- Available 24/7, convenient, safe, and pilots prefer it.
- Self-service fuel generally sells for less than full-service, good news for pilots.
- Reduces fuel theft through sophisticated pump controllers.
- Web-based tools allow owners to monitor fuel operations 24/7 from any hand-held device.
- Allows private or public cards as well as proximity keys for authorization.
- Significantly lowers personnel and fuel vehicle costs.
- Pre-engineered and pre-fabricated to lower engineering, site prep, & installation costs.
- Modest-capacity systems sized for GA are highly affordable.
- Strong cash flow makes private financing possible and allows quick amortization.

Given these benefits, why doesn't all GA airports have self-service fuel stations? Here are some of the arguments FBO managers have given in the past:

- "We don't have \$150,000 for a new fuel station."
- "Our state won't fund any revenue-generating airport improvements."
- "We can't use them to fuel jets."
- "We prefer fuel trucks."

While some of the above opinions were true years ago, aviation has changed.

- Small systems start at around \$35,000, which is less than a ramp truck.
- State funding is not needed, as private financing is generally available
- Private jets and turbo props do use properly positioned fuel systems, when available.
- Trucks are very expensive and require trained personnel to operate them.

With airports struggling with dramatic reductions in overall flying activity, a plethora of new regulations from TSA, EPA, state and local authorities, one would expect airport management to focus on those things that lower costs and/or increase revenue. Self-service fueling does that.

Add to this the growing popularity of unleaded aviation fuels such as ethanol-free autogas and 94UL, and the timing for the investment in such systems seems right.

**History** - The first self-service fuel station for aviation was developed in 1987 by Michael Webb, private pilot, aircraft homebuilder, and owner of Oshkosh Aero, an FBO once located at Wittman Field in Oshkosh, WI and later acquired by Basler Flight Service when Webb founded U-Fuel ([www.ufuel.com](http://www.ufuel.com)) to support his growing business in fuel equipment. Since installing the first such fuel station, U-Fuel has introduced a variety of systems, from small “Mini-Fuelers” to large multi-fuel installations serving autogas, avgas and jet fuel. U-Fuel products are now found at airports, marinas, private vehicle fleets and in mining operations around the world. Images of typical aviation self-service systems are found below.

**Safety** - Since we're dealing with highly flammable liquids, built-in safety features for a modern self-service fuel station are absolute necessities. At U-Fuel, these features include double-walled fire resistant tanks (stainless steel or internal epoxy lining in the case of jet fuel), emergency vents, a fire valve, normally-closed solenoid valves and various other components required by fire safety regulations. Popular options to enhance usability and safety include lighted covers, “kiosks” - small built-on enclosures that provide a dry environment for transactions, electronic fuel level & leak monitoring systems, an automatic fire suppression system over the pump, listed tanks, and vehicle collision protection through crash posts/bollards or concrete partitions/dividers.

**Site preparation & installation** - Just as most commercial buildings these days are pre-engineered and pre-fabricated, so to are modern fuel systems. Site preparation consists typically of a concrete pad with phone and power hookups. 110V single-phase power is sufficient for most fuel stations found at GA airports. In fact, the low power requirements make the use of DC systems connected to a small wind turbine or solar panel possible in many instances (see below). Installation involves the rental of a crane for a few hours and simple electrical connections and petroleum equipment checkout, which however must be performed by a licensed installer and electrician. Since U-Fuel's systems are designed for use in a wide variety of applications, they typically meet all conceivable fire, safety and environmental codes, making permitting relatively simple and inexpensive. A local fire marshal or similar licensing authority will have to make a final inspection before operations can begin.

**Economic aspects** - While convenience stores can afford to sell fuel at small margins since they make their profit once the customer enters the store for a \$5 cup of flavored coffee, airports are often dependent on the 50-75 cent margin per gallon that is typical for fuel sales. In most instances, the federal government's Airport Improvement Program (AIP) excludes funding of revenue-generating facilities such as hangars and fuel stations. Therefore, the Total Ownership Cost (TOC) of a self-service fuel station must allow quick amortization of loan costs and have minimal operational and maintenance expenses. The following table presents an estimate of the return on investment of \$60,000 for a 3,450 gallon capacity self-service fuel station.

**Initial Investment**

|  |                    |
|--|--------------------|
| Station<br>(3,450 Gallon with card reader) | \$ 55,000.00       |
| Installation & permit costs                | <u>\$ 5,000.00</u> |
| Total                                      | \$ 60,000.00       |

| <b>Operating Costs</b> | <b>Monthly</b>  | <b>Annualized</b> |
|------------------------|-----------------|-------------------|
| Electric               | \$ 100.00       | \$ 1200.00        |
| MC/ Visa               | \$ 100.00       | \$ 1200.00        |
| Maintenance            | <u>\$ 50.00</u> | <u>\$ 600.00</u>  |
| Total                  | \$ 250.00       | \$ 3,000.00       |

**Annual return on \$60,000 investment assuming margin of \$ .50 per gallon**

| <b>Gallons per Month</b> | <b>Gross</b> | <b>Net</b>  | <b>Return</b> |
|--------------------------|--------------|-------------|---------------|
| 1,000                    | \$ 6,000.00  | \$ 3,000.00 | 5%            |
| 2,000                    | \$ 12,000.00 | \$ 9,000.00 | 15%           |
| 3,000                    | \$ 15,000.00 | \$12,000.00 | 20%           |

**Annual return on \$60,000 investment assuming margin of \$ .75 per gallon**

| <b>Gallons per Month</b> | <b>Gross</b> | <b>Net</b>  | <b>Return</b> |
|--------------------------|--------------|-------------|---------------|
| 1,000                    | \$ 9,000.00  | \$ 6,000.00 | 10%           |
| 2,000                    | \$ 18,000.00 | \$15,000.00 | 25%           |
| 3,000                    | \$ 27,000.00 | \$24,000.00 | 40%           |

**Financing** - Unlike most other capital equipment acquisitions at airports, self-service fuel stations are revenue generators and as such are generally excluded from state and federal funding programs, like for instance the federal Airport Improvement Program (AIP). Due to the strong cash flow (as shown in the ROI analysis above), self-service fuel stations are excellent candidates for private financing, allowing airports to acquire systems far sooner than through traditional bureaucratic channels. For instance, at current (10/2011) interest rates, a 60-month loan for the \$60,000 system described above results in payments of approximately \$1,200 per month or \$14,400 per year. With modest annual sales of 24,000 gallons of fuel at a net margin of 75 cents per gallon, loan payments will be completely covered. After five years, the loan is retired and the system is generating even more profit. Not included in these calculations is the greater volume of fuel that is sold since the system is available 24/7, and the savings incurred from lower personnel and fuel truck costs. U-Fuel has partnered with **American Equipment Finance** ([www.aefllc.com](http://www.aefllc.com)) to offer its customers highly attractive terms to lease or finance its systems.

**Volume production reduces costs** - If General Aviation is to grow, costs need to be further reduced. One of the best means to achieve this is to tap into volume production from other market segments. For instance, auto engine conversions as powerplants, commodity hand-held devices as navigation instruments, autogas as an aviation fuel, and standard components found in fuel systems used at our nation's 110,000 gas stations. One example of the latter point is the Exacta line of pump controllers from MultiForce of Princeton, NJ. Incorporating a credit card reader in the face of a conventional pump, these controllers have allowed a significant reduction in the cost of self-service aviation fuel systems and provide better isolation of the card reader and sensitive receipt printer from the environment, which can be harsh on airport ramps.

**Fuel Station or Fuel Truck?** - Despite the flexibility they offer, fuel trucks (also called refuelers) are very expensive due to an array of safety equipment they must include, for instance:

- Trucks must include an interlock system that automatically locks the brakes when the pump starts. If these systems fail you cannot move the truck, even if everything else works.
- The exhaust system must be rerouted to prevent ignition of fuel vapors or leaked fuel.
- Overflow prevention valves are needed to stop filling before the tank reaches its capacity.
- Roll-over protection that includes emergency venting that closes, should the truck overturn in an accident.
- Electric reels must be coupled to an interlock system to prevent operation when the truck is in motion.
- A thief pump and fuel filters, for both in- and off-loading, are needed.
- Deadman controls, shutting down the system in case of an explosion.
- A variety of DOT-mandated equipment, air brakes, switches, lights etc.

For these reasons, a new fuel truck with small capacity tank will cost at least \$50,000. Larger trucks can cost upwards of \$150,000. According to U-Fuel's president Michael Webb, who maintained a large fleet of fuel trucks at his former FBO, Oshkosh Aero, "Maintenance and personnel costs of fuel trucks can be very substantial. For instance, cold weather can cause the vacuum interlock systems to freeze up, or even a small speck of dirt will clog up the overfill protection. I used to have nine ramp trucks for the EAA AirVenture show and one mechanic dedicated to keep them running. If you own a FBO, I guarantee that much your profit will go to amortize or repair your trucks and to pay the driver."

**Self-service and jet fuel** - General Aviation has seen in recent years the growing popularity of light turboprop- and turboprop-powered aircraft that can operate from airfields as short as 3,000' where in past only autogas and avgas have been available. With the inevitable demise of leaded avgas looming, many current high-performance piston engine aircraft operators will switch to turbines; this is already the case for those who fly in developing countries where autogas and Jet-A are the only two aviation fuels available and affordable. While self-service fueling of turbine aircraft poses no major challenges for self-service fuel stations, there are a few important differences compared to autogas or avgas, which increase costs somewhat:

- The weight of turbine aircraft often requires tow tugs for ground handling, which are rare at GA airports,
- Jet aircraft are normally parked 90 degrees to the pump allowing for straight departure.
- Greater wingspans require longer hoses (75' - 100') to reach tip tanks on the far wing.
- Larger aircraft fuel tanks require a larger pump with higher flow rate, 50 gpm instead of 22 gpm for autogas/avgas.
- Self-service systems equipped with Single Point Fueling require interchangeable nozzles.
- Jet fuel requires that the inner tank of a fuel station should be made of stainless steel or be epoxy-coated for microbial protection, while the outer tank is made of carbon steel.
- Misfueling by pilots is eliminated as they are intimately familiar with their aircraft.

**Insurance** - Anyone operating an aviation fuel system should obtain liability coverage for fueling operations. Most publicly-owned airports in fact cover aircraft fueling as part of the facility's overall liability protection. In some instances, insurance coverage is part of contractual arrangements with the aviation fuel provider. Since, at the time of this writing (10/2011), no major avgas supplier offers autogas,

airports that wish to sell the fuel need to obtain separate liability protection. Fortunately, policies are widely available for a modest annual premium. U-Fuel has partnered with the **Aviation Unlimited Agency** ([www.avaonline.com](http://www.avaonline.com)) for those in need of such insurance protection.

**The future is now** - At U-Fuel, we have been working hard the past few years to lower the cost of self-service fuel stations and provide a broader spectrum of products with tank capacities beginning as small as 1,000 gallons. To best accommodate the evolving mix of fuels, these systems can handle two, three or even four different fuels, for instance autogas/avgas/94UL/Jet-A, all in one integrated fuel station. In order to further reduce the installation and operational costs as well as allow complete portability, we have recently developed wireless communication, solar- and wind-powered options, allowing our customers to place or reposition these systems anywhere on their airports. Evolving from our "box stations", created for remote mining and oil/gas exploration, is our "FBO in a Box" concept, which provides basic services including fuel, restroom and office facilities, phone, Internet and vending in a robust, climate-controlled enclosure. Delivered by truck, hoisted in position with a crane, connected to power and phone lines, these systems are up and running within a few hours. We all know of airports whose FBOs are manned by people with little to do for many hours of the day. Reducing airport personnel costs without curtailing essential 24/7 services can only enhance an airport's bottom line, lower costs to pilots and help General Aviation grow.

**Summary** - Modern self-service fuel stations offer airports many benefits, the most important one being the bottom-line return on investments starting at \$35,000 for a single-fuel system with 1,000g tank capacity. Borrowing from commodity production of fuel equipment in other markets, U-Fuel has lowered the cost of acquisition of such systems in recent years while making numerous advances to safety, reliability and convenience. With its new "FBO in a Box" concept, the company now offers a solution to airports seeking ways to offer necessary services to pilots without incurring high personnel and equipment costs.

## Testimonials

"Self-service is very important - about 30 % of our non-jet fuel sales are outside of working hours. At Barnwell, self-service is available 24 hours per day, 7 days per week. Pilots rely on being able to get fuel at any time and don't have to rush to make it in time."

*Cal Hoffman, Manager, Barnwell Regional Airport (KBNL), Barnwell, SC*

"I believe that self-service fueling is very important, since it allows for 24 hours a day fueling. Pilots stop by our airport to buy autogas or avgas, then stay for lunch at our restaurant, helping to keep it in business."

*Kent Marshall, Manager, Suffolk Executive Airport (KSFQ), Suffolk, VA*

*The author is an aviation sales representative for U-Fuel of Elk Mound, WI ([www.ufuel.com](http://www.ufuel.com)). A pilot since 1973, he is a director of the Aviation Fuel Club, sponsored by U-Fuel ([www.aviationfuelclub.org](http://www.aviationfuelclub.org)), co-author of the GAfuels blog for [generalaviationnews.com](http://generalaviationnews.com), and president of EAA Chapter 1114 of Apex, NC ([www.eaa1114.org](http://www.eaa1114.org)). His first job in aviation was at age 15, pumping fuel into aircraft at Kentucky Flying Service, Bowman Field, Louisville, KY.*

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## Images



If Jay Leno can fuel his priceless Duesenberg, pilots can fuel their own airplanes!

# Typical Aviation Fuel Station

Card reader system  
with online management

20 GPM aviation dispenser  
Aviation H<sub>2</sub>O absorbing filter  
50'x1" API 1529 hose  
spring rewind reels, fuel/gnd



Fire-rated double-walled tank  
skid-mounted on concrete pad  
protected by bollards per local regs



Electronic tank monitoring system  
with fuel level sensing & leak detection  
Thief pump, manway, high quality coatings in/out

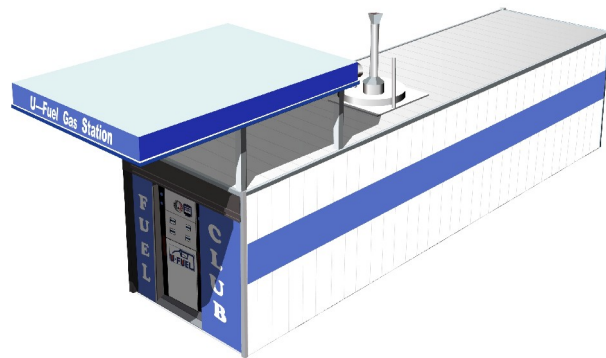
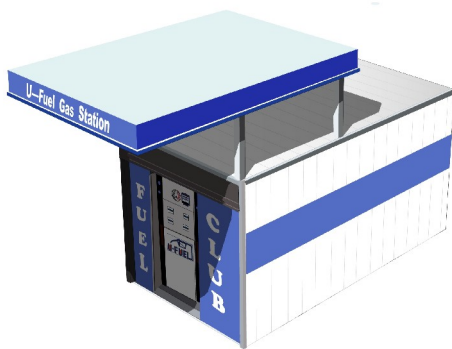
Bottom fill or top load system  
Automatic fire suppression system  
Emergency vent, mechanical level gauge  
Leak containment chamber under tank

## Types of Fuel stations offered by U-Fuel:

- Classic single and dual-fuel stations
- Box Stations
- Sport Fuel Station
- Mini-Fuelers
- Fuel Islands



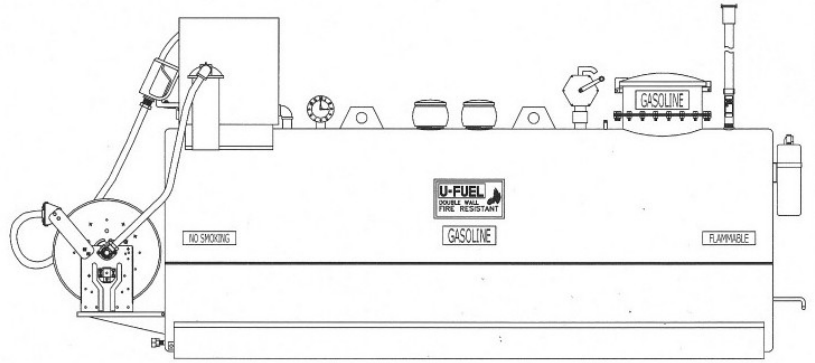
**Classic** dual-fuel (Avgas/Jet-A) self-service fuel stations with twin 5,000g tanks.



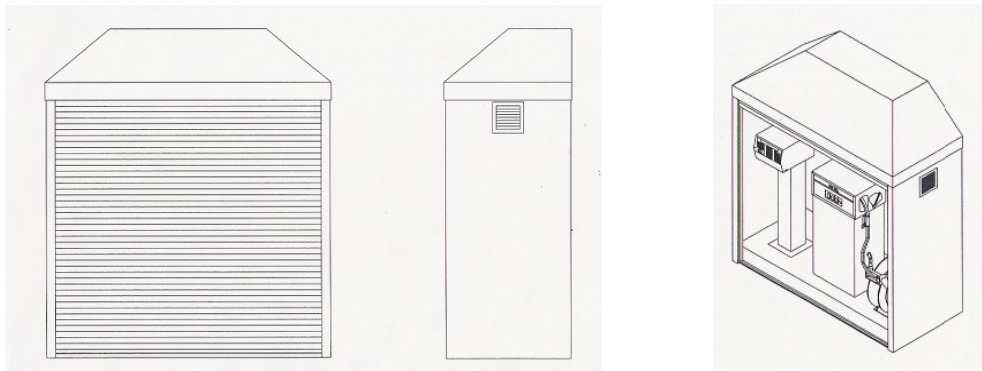
Self-service **Box Stations** with 1,500g - 4,000g (left) and 6,000g-10,000g (right) capacity tanks.



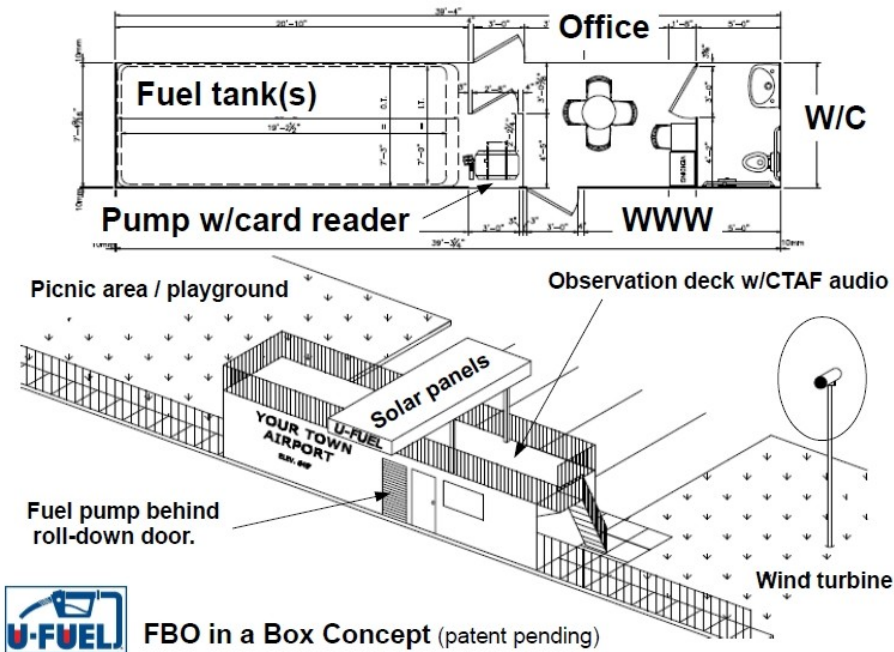
3,450g **Sport Fuel Station**. Image right shows the first such system on display at the CIGAC show in Xi'an, China, October, 2011.



Left: Dual-fuel 2 X 1,000g **Mini-Fueler**. Right: 1,000g single-fuel **Mini-Fueler**.



Self-service **Fuel Islands** for existing fuel tanks.



FBO in a Box Concept (patent pending)