A Simplified Guide to Jet Aviation Fuel Farm Design

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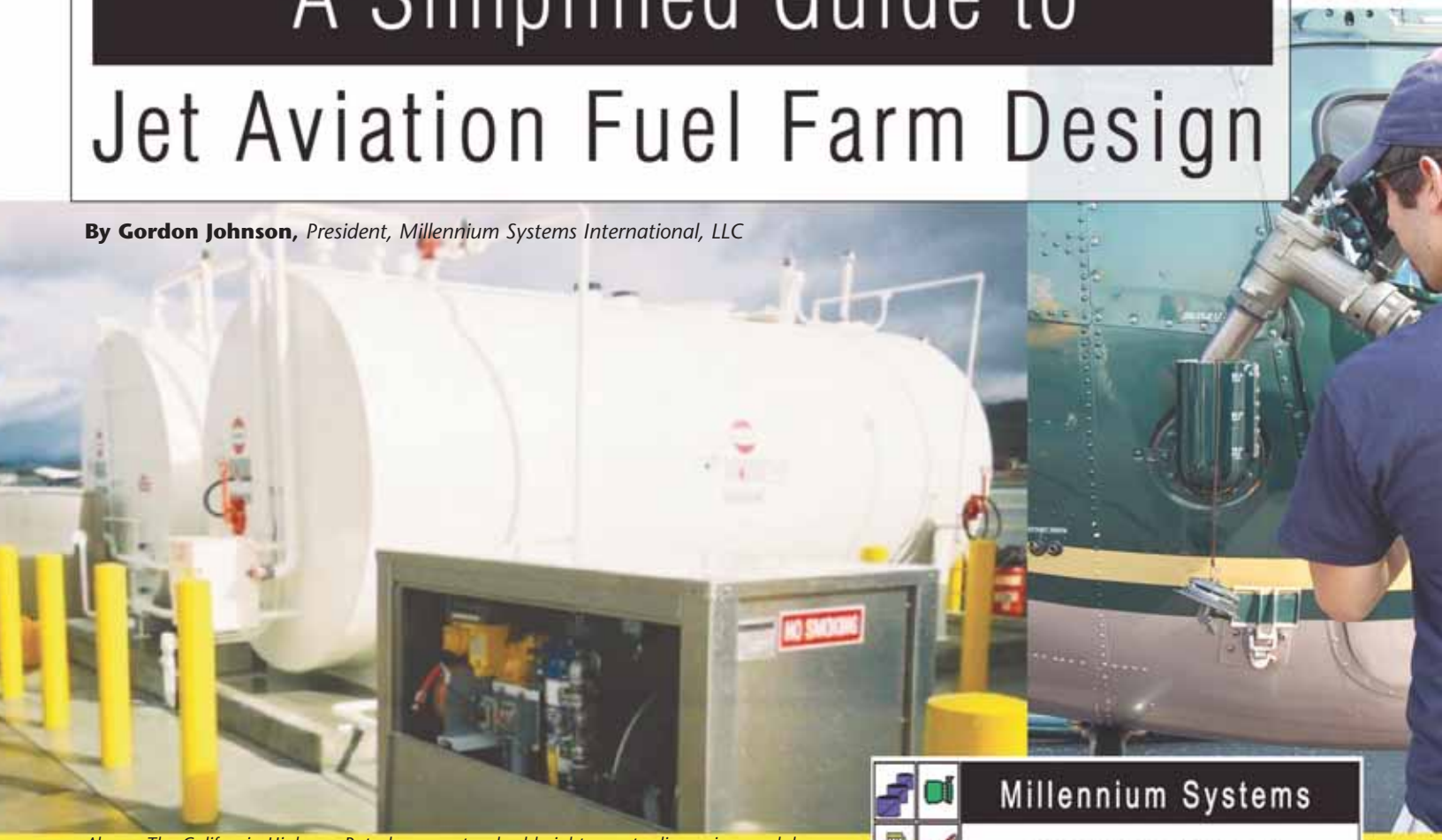

Above: The California Highway Patrol uses a standard height remote dispensing module.

Millennium Systems International

Designing a new aviation fueling facility can be a daunting task, particularly in today's heavily regulated business environment. Compliance with both government and industry regulations and standards can consume an inordinate amount of time and resources.

The list of organizations and regulatory bodies that have established standards and specifications include your local fire marshal, the Federal Aviation Administration, American Petroleum Institute, National Fire Protection Association (NFPA), Air Transport Association and Energy Institute, to name only a few.

But specifying and purchasing the right jet aviation fueling system for your airborne law enforcement agency is a process that can be made simpler and more efficient if the following design considerations are incorporated into your decision-making process.

Shown are the Anaheim (CA) Police Department's Jet-A receipt and issue tanks with pump and filter modules.

Find the Right Size

What size jet fuel storage tank does my unit need?

- How much fuel do I use per month?
- How frequently (or infrequently) do we want to reorder product?
- How reliable (and timely) is the fuel supplier?
- Is the fuel usage large enough to justify tank wagon (7,000-8,000 gallons) purchasing? This would require a minimum 10,000-gallon tank capacity to ensure both a cushion if fuel delivery is delayed and capacity to receive a full load.
- What kind of growth in fuel usage do we expect within the next three to five years? It is less expensive to purchase a slightly larger capacity tank today than to purchase an additional tank a few years down the road.

Always remember that jet fuel should settle for at least one hour per foot of product delivered before dispensing into aircraft. The U.S. military always provides for separate "receipt" and "issue" tanks for jet fuel.

Type Matters

What type of aboveground jet fuel storage tank and accessories are needed?

- Is a U.L. 142 (double-wall steel tank) or U.L. 2085 FireGuard (double-wall steel tank with cement interstitial lining) storage tank needed? Typically, FireGuard tanks are required near large metropolitan areas but not in rural areas. Consult with your local fire marshal to confirm local regulations.
- Should my steel tank have an epoxy lining? Steel tank linings are always required for jet fuel. New stainless steel primary tank liners eliminate the need for internal epoxy linings but cost more.
- How about a floating suction? Floating suctions are always recommended for jet fuel, but not for avgas.

A fuel tank should be equipped with a hand pump (water scavenging), fusible link valve, anti-syphon valve, clock gauge, overfill valve and properly-sized vents (working and emergency type).

Operational Efficiency

What fueling operations do we need to support?

- Most fixed-based jet fueling systems should be designed to perform the following functions:
  - Offload transports into storage through filtration at 200 gpm.
  - Recirculate stored fuel through filtration at 200 gpm.
  - Overwing refuel of rotary and fixed-wing aircraft at 20-35 gpm.
- What fueling configuration do we need? In some cases, the fuel storage tank must be located near a roadway where the tank can be resupplied by fuel transports. Actual fuel dispensing activities may be separated from the offloading and recirculation functions performed by a pump and filter module. In these cases, a remote dispenser (RDS) module is recommended. RDS modules are available in both standard and low profile configurations. Low profile RDS modules, such as the one pictured, reduce the risk of tail rotor incidents. Special flush deck RDS modules are available for rooftop or marine heliports.

Be Well Equipped

What type of fueling equipment should be installed in the fueling system?

- Pump: The only type of pump suitable for inverted "U" suction piping (which is common to all aboveground tank systems) is a positive displacement type, such as Blackmer. Self-priming centrifugal pumps, such as Gorman-Rupp, cannot move air trapped in the inverted "U" and are not covered by manufacturer warrantee.
- Filter: Filter/monitors with water-absorbing elements can only be used if jet fuel is not premixed with fuel system icing inhibitor. Otherwise, the filter must be a coalescer/separator type built in accordance with API 1581 5th Edition and furnished with a water defense system. Facet and Velcon are the two major U.S. aviation filter manufacturers.
- Hose: All aviation fueling hoses must comply with API 1529 and shall be tested, certified and serialized per NFPA 407.
- Piping: At a minimum, all piping upstream of the filter can be carbon steel, while all piping downstream of the filter to the aircraft should be stainless steel. No red metals or galvanized piping is allowed for use with jet fuel.

In developing your plans for a new jet aviation fueling system, always consult with an experienced supplier and work closely with your local fire marshal. You should also purchase and review the following industry standards for a more comprehensive look at aviation fuel farm design requirements: NFPA 30, NFPA 407 and ATA 103.

Shown is the U.S. Border Patrol's U.L. 2085 Fireguard tank with accessories and fueling module.

The Anaheim (CA) Police Department uses this low profile remote dispenser fueling module.