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Cap-Ex, Op-Ex, and Energy Savings by Using an Automatic Transfer Switch (ATS) instead of an UPS



Abstract

In applications where there is more than one AC power source, automatic transfer switches (ATS) can be used as a battery-less UPS system. It will provide higher reliability AC power to mission-critical loads at substantially lower cost compared to a traditional UPS (interruptible power supply) system that uses batteries.

Background

Automatic transfer switches act as a redundant AC power source for protecting mission-critical equipment. TSi Power's ATS line of automatic transfer switches, with its ability to switch both in-phase and out-of-phase AC power sources, is designed for situations that can't tolerate downtime from a power outage.

Advantages of an automatic transfer switch over a traditional UPS with batteries

1. Because ATS is a 100% solid-state device and does not depend on a battery, it is inherently more reliable than a traditional UPS system which must rely on failure-prone batteries as the backup power source.
2. ATS is only a fraction of the size, weight and cost of a UPS system of equal capacity; therefore significant Cap-Ex savings can be achieved by using ATS instead of large, heavy and expensive UPS system with batteries.
3. TSi Power's new ATS line of automatic transfer switches with relay are approximately 99.7% efficient, while a typical double-conversion online UPS is about 90% efficient. This results in substantial Op-Ex savings due to reduction in wasted electricity over the lifetime of the ATS.
4. Unlike a UPS, ATS does not require periodic maintenance and battery replacement, which also provides substantial Op-Ex savings over UPS system with batteries.
5. The higher reliability of ATS means lower system down times for the protected mission-critical equipment. This results in substantial improvements in productivity and quality-of-service, as well as improved customer satisfaction and customer retention rates.



FIGURE 1. Left, ATS-1000E-30A (19" rackmountable, height: 2U, and weight is about 7 kg)
FIGURE 2. Right, 10 kVA online UPS system (typical standalone cabinet, weight is about 150 kg with a 8–10 minutes battery bank)

An example of successful automatic transfer switch application

For a new major international airport expansion project in Asia, TSi Power was asked to supply over 300 of its ATS-1000E automatic transfer switch (230 V, 50 Hz single-phase inputs, 30 A output) units for protection of over 300 PLC cabinets used throughout the new airport terminal.

After installing more than 300 systems in 2009 and 2010, everything is working well after nearly three years of operation. The ATS-1000E were chosen over traditional UPS systems because airports are always protected by at least two autonomous AC power sources. In fact, some airports have three or more AC power sources, including dual power grid power or multiple backup power generators which provide emergency power as protection against unexpected natural disasters and accidents.

In addition to achieving improved reliability and higher system uptime percentage, the following financial benefits were realized by using 300 ATS units instead of 300 UPS units.

Cap-Ex savings

- Each UPS would have cost around \$8,000
- Each ATS-1000E automatic voltage regulator costs approximately \$1,000
- Cap-Ex savings was \$7,000 per PLC x 300 = \$2.1 million

Op-Ex savings

UPS systems typically require a 20% annual maintenance contract, which includes battery replacement. Automatic transfer switches need only about 5% per year budgeted for repairs.

- Maintenance and repair costs for 300 UPS systems over 15 years of operation:
 13 years (the first 2 years could be covered by warranty) x \$1,600 per unit per year
 x 300 units = \$6.24 million
- Maintenance and repair costs for 300 ATS-1000E units over 15 years of operation:
 13 years (as first 2 years are covered by warranty) x \$50 per unit per year
 x 300 units = \$0.195 million
- Op-Ex savings of using automatic transfer switches instead of UPS over 15 years of operation: over \$6 million

Energy savings

The typical online UPS efficiency is about 90%.

- At an average load of 4 kW, each UPS will use an extra 0.4 kW x 365 days/year x 24 hours/day x 15 years x \$0.15 per kWh of electric power x 300 units = \$2.37 million

TSi Power's ATS-1000E automatic transfer switch is about 97% efficient (note: new generation of ATS-1000E to be introduced in mid-2013 will be about 99.7% efficient).

- At an average load of 4 kW, each ATS will use an extra 0.12 kW x 365 days/year x 24 hours/day x 15 years x \$0.15 per kWh of electric power x 300 units = \$0.71 million
- Total energy savings (over 15 years of operation) will be: \$2.37M - \$0.71 = \$1.66 million

Total Savings (over 15 years of operation with 300 ATS units instead of UPS)

\$2.1 million (Cap-Ex) + \$6 million (Op-Ex) + \$1.66 million (Energy Savings) = \$9.76 million

Cost of ownership comparison over 15 years of operation (in millions of dollars)

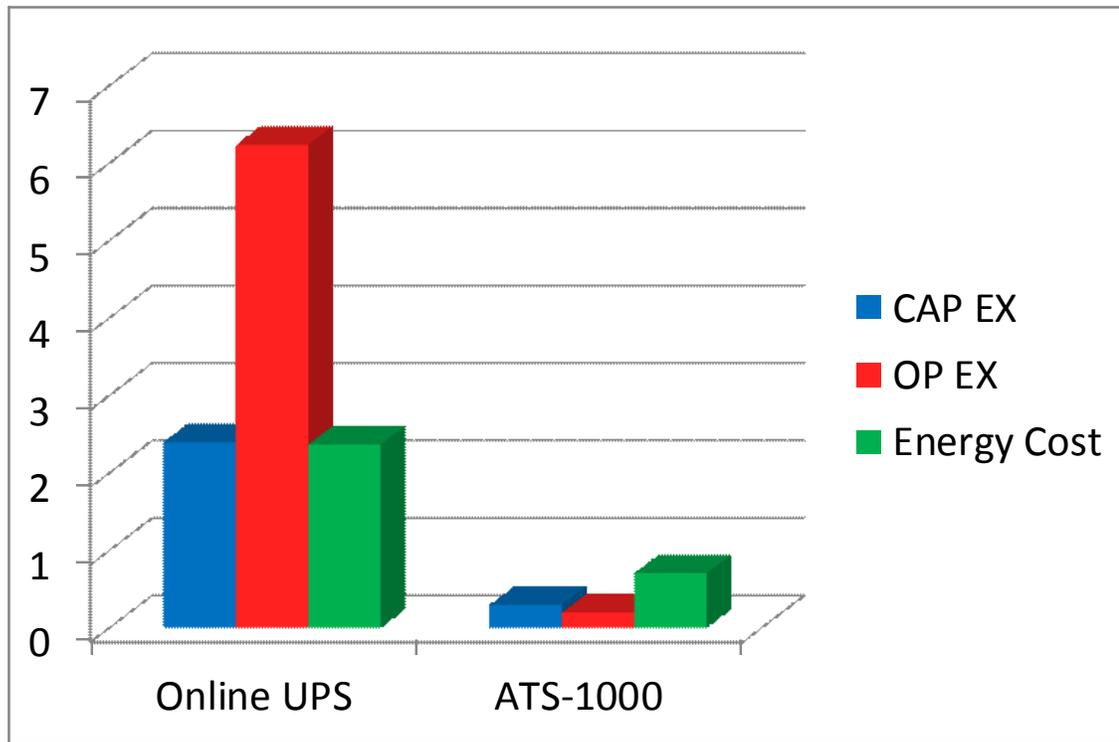


FIGURE 3. *Online UPS:* 300 units of 10 kVA (7 kW) UPS systems
ATS-1000: 300 units of ATS-1000E-30A (6.9 kW) automatic transfer switch

Conclusion

It has been clearly demonstrated that automatic voltage transfer switch (ATS) units can be used to provide highest quality and availability AC power to mission-critical equipment at a substantially lower cost compared to traditional UPS systems.

About the author

Nam Paik is director of sales at TSi Power. He has over 25 years of experience in the power protection industry and began his career at TSi Power designing UPS products. He can be reached at: nam@tsipower.com.

TSi Power is a manufacturer of UPS, line conditioner, precision automatic voltage regulator, automatic transfer switch and DC-AC inverter products designed to operate in even the most challenging telecom, security, industrial, outdoor and/or international applications.



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