

2011 Case Study

Bombardier Learjet

Intern: Donald Ronck
Major: Electrical Engineering
School: Kansas State University

Wichita, Kansas



Company background

Bombardier is a world-leading manufacturer of planes and trains, employing more than 65,000 high-skilled workers on five continents. Bombardier acquired Learjet on April 9, 1990. Learjet started operations in Wichita, Kansas, in 1962 and has been a pioneer in the business-jet industry ever since. Learjet invented the concept of the business jet, and continues to this day to be one of the premier worldwide leaders in business-aircraft manufacturing.

Project background

The host company realized the intern was interested in energy efficiency and allowed him to explore the plant and work independently. His goal was to continue a decline in energy usage through means of energy efficiency and reduction, leading to less environmental output. He found three different lighting projects that accomplish this, which included daylight harvesting in aircraft hangars, using occupancy sensors in work areas, and upgrading existing metal halide fixtures to new LED technology. Also, Donald worked on fixing air leaks and improving the compressed air system that is currently in place.

Incentives to change

Bombardier Learjet is constantly trying to find ways to become a more energy-efficient and environmentally friendly company. In a world of rising energy costs and strict environmental regulations, the host company has decided to work alongside the Pollution Prevention Institute at Kansas State to reduce its overall impact.

Projects reviewed for E2/P2 potential

1. Daylight harvesting

He noticed large quantities of daylight being let in the workplace by the hangar doors, and yet the lights remained on. He used a data-logging light meter to take measurements of this extra sunlight. Then he turned these recordings into accurate evaluations of how many light fixtures can be turned off at different

times of the day depending on the angle of the sun. His calculations for harvesting daylight revealed a possible savings of 258,260 kWh of energy, or \$15,495 annually.

2. Occupancy sensors

The second lighting project researched was implementing occupancy sensors to machine shops, work rooms, and storage areas of a particular building. Many of these rooms were observed to be unoccupied for long periods of time. Having these sensors will reduce the electricity wasted when the rooms are not in use and minimize the error of forgetting to turn lights off when employees leave for the day. The intern found an annual savings of 29,000 kWh of energy, or \$1740.

3. LED lighting upgrade

The third lighting project proposal was upgrading current 460-watt, metal-halide fixtures with new, more efficient LED lights. The intern calculated that by switching to the new technology of LEDs, a total of 108,326 kWh, or \$6,500, could be reduced from the host company's energy usage annually. Also, an additional savings of \$16,800 could occur due to not having to replace the old metal halides every year.

4. Air-compressor upgrade

The intern found two different types of compressor motors being used. A 250-hp variable-frequency-drive (VFD) motor and a 300-hp, fixed motor. After learning that a VFD motor saves a lot of energy compared to a fixed motor, he researched how to reduce the 300-hp motor's energy usage. To do this Donald recommended installing a separate 150-hp VFD compressor that would run during the off hours of the day and weekends rather than the 300-hp motor. This alone will save 253,424 kWh of energy, or \$15,205 annually.

5. Fixing air leaks
 The intern acquired a previous airflow audit and found there to be a 120-cubic-foot-per-minute (CFM) leakage rate for one of the buildings. This is equivalent to running an extra 30-hp motor at all times

to compensate for the leaks. Therefore, he calculated how much energy it takes to run a 30-hp motor and found they could save 119,679 kWh, or \$7,180 annually by fixing the air leaks.

Summary of 2001 E2/P2 intern recommendations for Bombardier Learjet

Project description	Annual estimated environmental impact	Annual estimated cost savings	Status
Building 14 LED light upgrade	\$6,500	108,326 kWh	In progress
Daylight harvesting	\$15,495	258,260 kWh	Recommended
Occupancy sensors	\$1740	29,000 kWh	Recommended
150-hp air compressor	\$15,205	253,424 kWh	Recommended
Air-leak audit	\$7,180	119,679 kWh	Recommended
Total savings *	768,689 kWh	\$46120	
GHG reductions *	546.01 metric tons CO2e		

* Does not include projects that are “not recommended” or “further research is needed.”