

Case Study



Lighting Retrofit

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Like many companies, Hachette Book Group began to look at ways to save energy and become more “green” in their distribution centers about 2 years ago. One of the biggest energy expenses at the centers was electricity. Hachette engaged Exceed Consulting to examine lighting power usage and potential alternative solutions.

Selection Process

The main distribution center was examined first. The center has two sections. There is approximately 500k ft² in the original building and 300k ft² in the expansion area. The original building deployed 400 watt metal halide fixtures and the expansion used 1,000 watt fixtures. The lighting levels varied greatly from area to area as noted below.

Area	Light Level
Orig. Building – Very Narrow Aisle (VNA)	7-8 foot-candles
Original Building – Open Areas	18-20 foot-candles
Expansion Area – Open Areas and VNA	40-50 foot-candles

After evaluating the light levels there were two primary design goals in addition to energy savings: to raise the lighting levels in the VNA areas of the original building and make the other areas more consistent. Several alternatives were generated using different mixtures of fixture types and manufacturers. Photometric drawings were created for each of the alternatives. Each drawing had an associated energy savings and payback calculation. Three solutions were selected as finalists for further evaluation.

In one of the VNA aisles, a test environment was set up by installing the three final fixtures being considered. Warehouse associates were asked to use the aisle and determine which of the fixtures they preferred. The same fixtures and test method were used in an open test area. Installing the fixtures allowed the maintenance staff to evaluate ease of ongoing maintenance and build quality of the fixtures. In addition, it allowed for some real world validation of the photometric calculated light levels. The operators and maintenance staff picked the same fixture type and manufacturer for both open and VNA areas and the light levels were in line with calculated values.

Installation

The installation of the approximately 1,200 fixtures began on the second shift to reduce the impact upon ongoing operations. A decision to convert power at the panel to 277 volt made the installation easier and overall solution much more cost

effective. Installing transformers at the 480 volt electric panels allowed the installers to free up panel positions and not have to make any modifications at the fixture.

The response from VNA aisle operators in the original building was immediate and unanimous. They loved the new lighting due to it almost doubling the light level in the aisles. In the open areas, there were some hurdles to overcome. Although the light levels had remained the same in most areas, the color of the light made it appear different. This had been anticipated since it is a normal part of the transition process. Operators were also asked to be patient and allow for the transition to take place. After approximately a week or so, the operators were fine with the light levels. Additional lights were added in some key visual inspection areas to further increase the foot candles.

In the expansion area the issue was quite different. The light levels were dramatically reduced after the installation when compared to the original 40-50 foot candles. Again, time took care of the majority of the issues. In one small open area where assembly of product took place, it was decided that it would be easier to allow the original 1,000 watt fixtures to remain and that the lost savings was not significant enough to jeopardize employee morale or productivity with a reduced light level.

Below are the before and after pictures of the VNA aisles in the original building.



Before



After

The lighting installer also handled the responsible disposal of the original lighting fixtures. The entire installation took approximately 3 weeks.

Payback

During the selection phase, payback numbers had been calculated. The energy savings from the new fluorescent fixtures was calculated to be approximately 65% overall. The savings have now been tracked for nearly a year. The payback is tracking very close to the original estimate of 18 months.

In addition, the project was eligible for the Energy Policy Act (EPAAct) – Commercial Building’s Tax Deduction. This deduction enables Hachette Book Group to claim the accelerated commercial buildings tax deduction. The EPAAct program allows for the

owner/taxpayer of the retrofit equipment to receive a dollar amount deduction per square footage of the commercial building. The dollar amount varies based on the type of building method along with the type of fixtures installed and is considered a tax deduction based on the taxable income of the owner. All the documents required for the deduction were provided to Hachette.

Many local and state governments as well as utility companies offer incentives for these types of retrofits. In some cases, the incentives can virtually pay for the vast majority of the project. Unfortunately, these incentives were not available to Hachette.

Some of the environmental impacts of the project were also calculated. These kinds of calculations can make the savings much more understandable. The project decreases air pollution and environmental damage by the following amounts each year:

- ~ 3 million pounds of Carbon Dioxide
- ~ 5 million grams of Sulfur Dioxide
- ~ 11.5 million grams of Nitrogen Oxides

By removing these quantities of pollutants from the air, the project had the same affect on the environment as:

- Planting 359 Acres of Trees
- Removing 277 cars from the road each year or
- Saving 178,020 gallons of gasoline each year

These impacts, in addition to the financial savings, allowed this to be an easy decision for Hachette management to pursue this solution. The success of this first installation has allowed Hachette to pursue installing this type of solution at their second distribution center with similar results.

This retrofit has allowed Hachette to make a significant step forward in their efforts to be more energy efficient. If you have metal halide fixtures in your facility, you would be wise to follow in their footsteps.