CASE STUDY 1
Delamping classrooms

Introduction

Many schools have more fluorescent tubes fitted in lights than are required to meet Australian Standards (AS1680.2.3). Delamping is a strategy which school's can utilise to reduce energy consumption used for classroom lighting. All old or inefficient fluorescent tubes are removed and replaced a reduced number of high efficiency triphosphor lamps. Fewer tubes can be used because triphosphor lamps have a higher light output, a longer life and do not degrade over time. A lux (light) meter is used to establish the correct and even levels of illumination. Typically 30% less tubes are required to maintain or even improve light levels. Savings are made from both the lowered energy consumption and reduced maintenance costs.

Case Study:

A Melbourne secondary college comprising 4 light timber construction (LTC) classroom blocks delamped their school. There were 3 different types of classrooms each requiring an appropriate new lighting layout to be set up using the lux meter. A number of issues were considered in determining the number of tubes to remove:

- For what purpose the room is used (ie - type of activity)
- When the room is used (is it used at night?)
- How the light fittings are arranged, the number of tubes in each fitting, and how the artificial light will best be distributed with a reduced number of tubes

For the general purpose classrooms (GPC's) in one block it was established that the rooms were never used at night. On the most overcast days it was expected that natural daylight would provide about light to a minimum of 100 lux. Artificial light therefore only needed to contribute about 140 lux to give a total of 240 lux. (Australian Standard for GPC lighting)

Each of these rooms contained 6 triple tube light fittings. Initially one triphosphor tube was placed in each triple fitting and the light level measured. With the sloping ceiling the light on the corridor side of the room was insufficient. With 2 tubes in the higher fittings near the corridor and one tube installed in fittings near the windows a net light level due to the lamps was 200 lux. This provided for about 300 lux in dull days, exceeding the required standard.

Over all, 200 tubes were removed from the GPC's in classroom Block A and only 102 installed in their place

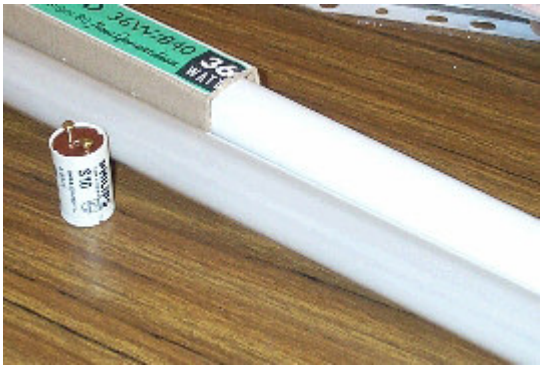

Figure 1:
The high quality triple coating of a triphosphor lamp crates a higher light output compared to standard lamps

Figure 2:
One of the classrooms after delamping. In each section, 6 fluorescent tubes were replaced with 3 triphosphor tubes.
(Note: These rooms have excellent natural lighting and are never used at night.)

Costs and Savings

Philips TLD triphosphor tubes were purchased for $2.95 each. In addition a new starter was installed costing 39cents each. Cost (excluding labour) was $340.

Labour cost was $250 resulting in a total cost of $590.

Savings achieved by delamping was calculated as follows:

Annual Savings ($) = (**N** x **P** x **H** x **T**) / 1000

where:

N = number of tubes removed

P = power rating of tube (plus ballast – about 9W for 36W tubes)

H = number of hours usage per year

T = electricity charge per kWh (tariff)

Assuming 200 days use for 6 hours per day the savings were:

Cost savings = (98 x 45 x 1200 x .17)/1000

= **$880 per year**

Energy savings: = **5292 kWh**

Greenhouse Savings = **7.31 tonnes**

Return on investment (Payback) = **150% (8 months)**

Note: These calculated savings do not include the costs incurred in the ongoing replacement of those tubes removed.

If delamping is continued throughout the college, annual savings would be well over $4000 and greenhouse gas emissions would be reduced by close to 30 tonnes per annum.

(Calculation based on an electricity tariff of 17 cents per kWh and greenhouse gas emissions of 1.381 kg(CO2) per kWh.)