Innovation Project Energy Efficiency Work
All Saints Catholic School Mansfield Nottinghamshire
"Energy Make Over"

Following an energy audit carried out in July 2006 a report was made to the school and a presentation made to the head of the school and the site manager. The problem being addressed was the poor energy performance of the mobile classrooms high energy bills very uncomfortable conditions with lack of proper heating controls. Also the class rooms were dull and uninspiring for teaching or learning in.

The challenge was to carry out an energy make over but one that left in its wake a transform classroom where lighting levels were improved the walls and ceilings insulated and decorated and the acoustics improved. The implementation works commence on site during the term break on the 23rd October 2006. Two of the mobile classrooms were taken out of school use to allow for the energy make over scheme to take place.

X5 Classroom

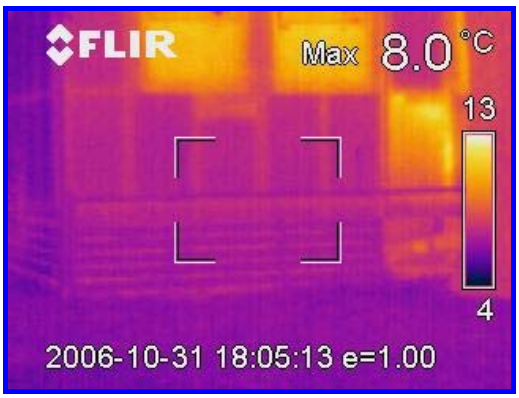


Image of thermal losses

The above images shows the mobile before improvements works and from the outside nothing can be seen to be wrong but with thermal imaging it is possible to see where heat loss is passing through the building. The brighter the colour the more heat loss, obviously windows are high energy emitters but it can be seen that fabric losses are also taking place.

X4 Classroom insulation work

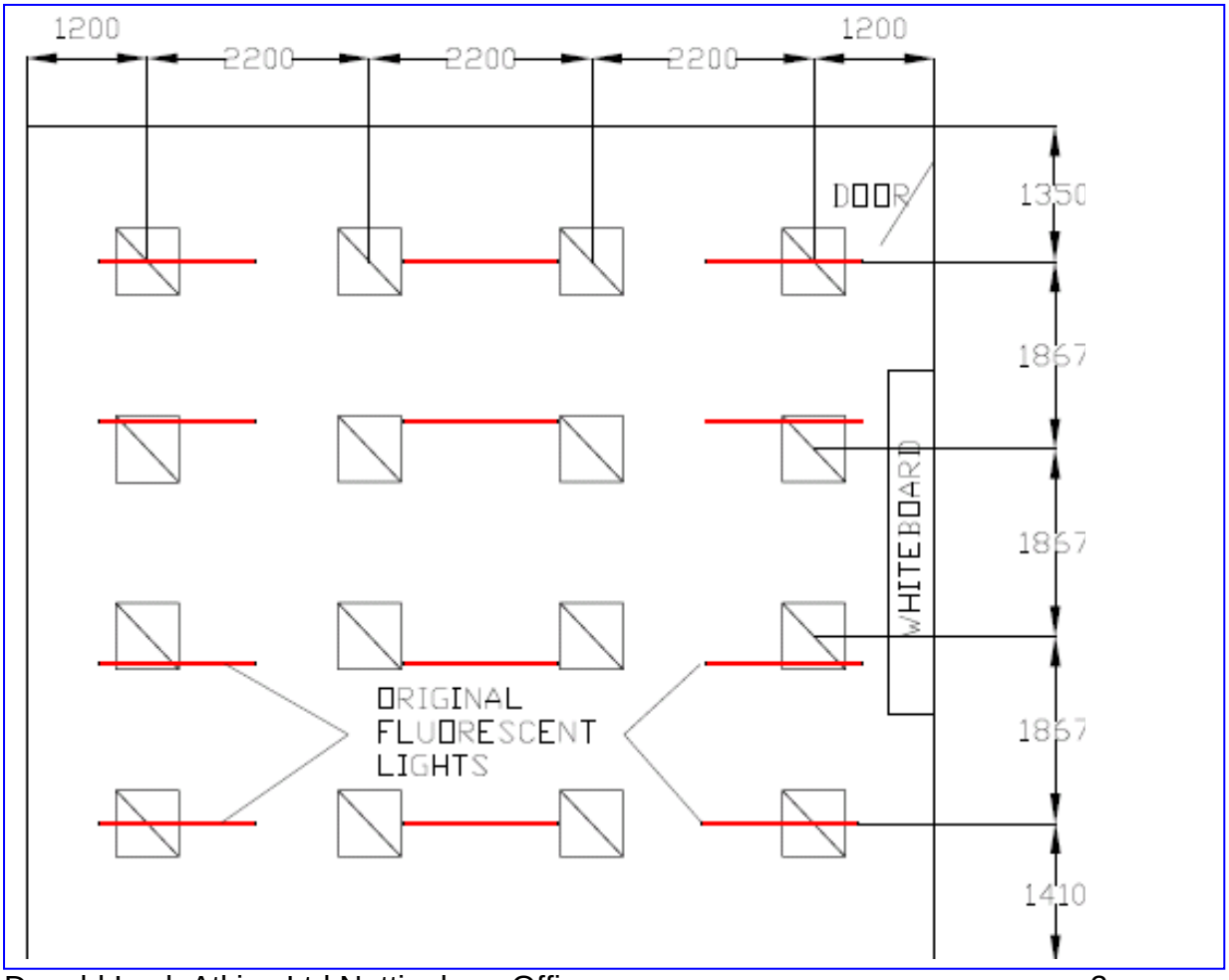
X5 prior to any works lights removed.

The insulation levels are being improved to the ceilings and the walls by installing SAMPATAP which is a lining that has been developed specifically to thermally insulate wall and ceiling surfaces. The increase in surface temperature will inhibit the formation of condensation it is economical and as easy as wallpaper to apply. The thermal improvement will increase room temperatures and provide more comfort in winter but will also reduce solar thermal gain in the summer and make the classroom cooler and more comfortable.

X4 showing finish walls & ceilings

X4 New LED Lighting installed

The major improvement to the lighting system in the two mobile classrooms will be achieved utilise light emitting diodes LEDs which have longer life and are 20 time more energy efficient then traditional fluorescent lighting. The existing lighting levels when surveyed were found to be low and of poor distribution around the classroom with very little light falling on the write board at the front of the classroom. The poor paint finish on the walls left the units rather dark and dull places with little to create a light and comfortable place to teach or learn in. The drawing below shows the lighting survey prior to the work and the levels of light fallen on the desks.



New LED lighting layout is shown replacing old lights in the above site drawing. (Proposed fig 1)

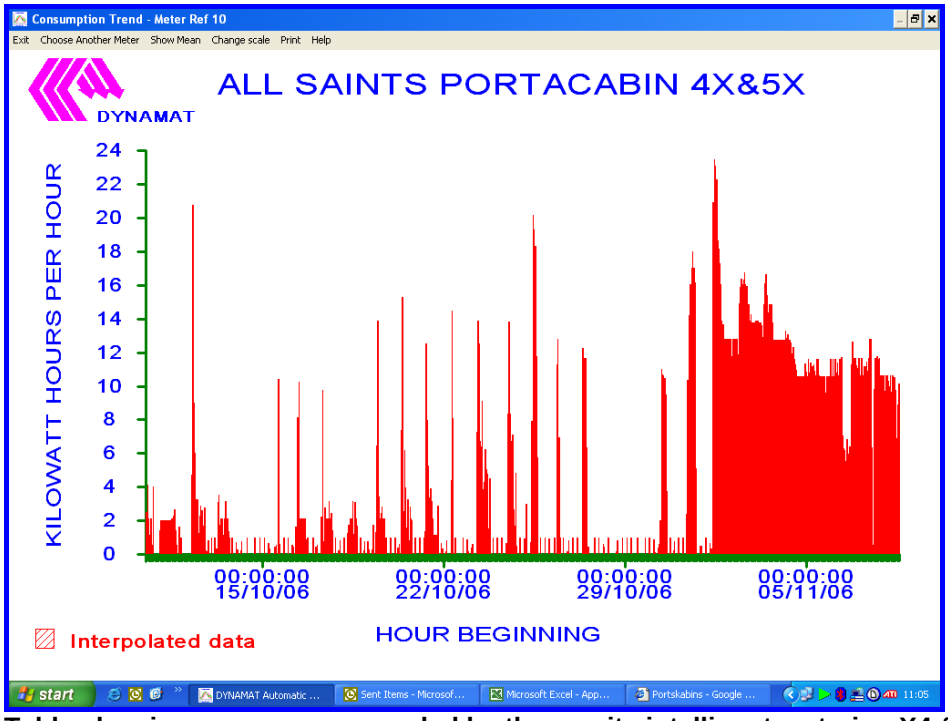


Table showing energy use recorded by the on site intelligent metering X4 & X5 (fig 2)

Prior to the commencement of the energy works at the above site an intelligent meter was fitted to record half hourly energy data on the electrical supply to the distribution board on X4 and X5. The chart commences recording weekending 15th of October and has continued every week. The data shows that the electrical heating was turn on during the cold spell during the weekending 5th November. This chart reflects the poor level of control that these mobiles have over the electrical heating system with just one stat to control two classroom and two office areas. The new controls will be completed on the 20th November and the next chart will show the change and better control.

Led Lighting in operation in class room X4 is providing a uniformed level of light.

Very positive customer feed back from the teacher.

Electrical testing

Prior to the commission of the new lights full testing is carried out on the existing wiring and lighting switches and the lighting is certificated.

Photo 9

Whiteley Electronics Ltd of Mansfield have taken significant interest in providing All Saints school with an innovated LED lighting scheme to be one of the first within the UK to try out the benefits of this technology. The managing director Dennis Lockwood (on the right in photo 9) and sales and marketing manager Mark Major personally got involved with the Atkins designed energy project and have sponsored the manufacture and supply of these lights as a demonstration of the technology now readily available.

External trials of the LED replacement.

The lighting levels obtain in the class room X4 from the old lights is shown in the following chart figure 3 below and this indicates the levels at the desk and notice boards around the classroom.

The readings for the new LED lighting is recorded on the chart in figure 4 and this shows a more uniform distribution but its noticeable that this light is a better quality and more like daylight effect across the room.

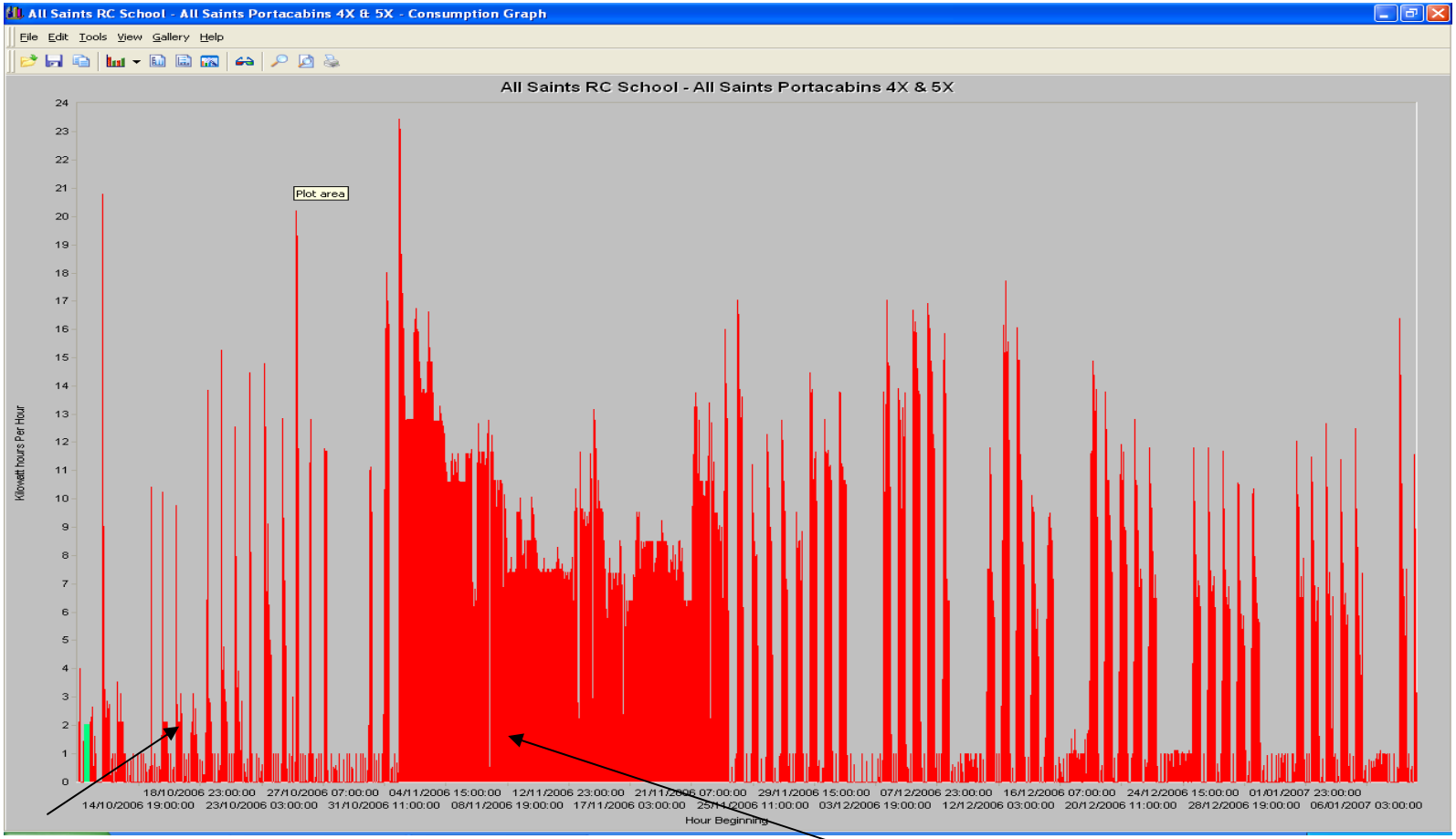
Client feedback has been very positive from the teaching staff and we are monitoring the impressions from both staff and students and will include this in the follow up report July 2007.

Conclusions:

- The improvement in energy efficiency is starting to be reflected in the data being recorded now that the cold winter period has arrived. This can be seen in the final chart submitted at the end of this application.
- Comfort levels in the classroom have improved and the heating appears to far more effective.
- Wellbeing with the staff is greatly improved and a feel good factor has been achieved.
- The new LED lighting has been welcome by the school in the two trial classrooms and is a great improvement on the previous lights.
- Infrared photo clearly show the heat loss from the building prior to the Samatap insulation being fitted.
- The metering and monitoring is on going and will reflect the new levels of controls. This will be validated in a follow up report which will have six months of monitoring data to work from based on half hourly recorded information on site.

WINDOW
MAX 285
MIN 221
DAYLIGHT
BACK ROOM TABLE
MAX 213
MIN 195
MAX 249
MIN 247
MAX 202
MIN 205
LIGHT WITH DIFF.
MAX 243
MIN 267
DIFF.
MAX 328
MIN 313
DIFF. CLEAN
MAX 302
MIN 287
NO DIFF.
MAX 323
MIN 292
MAX 265
MIN 255
DIFF. DIRTY
MAX 411
MIN 323
CLEAN DIFF. NEW
MAX 411
MIN 323
CLEAN DIFF. NEW
MAX 327
MIN 305
MAX 242
MIN 239
MAX 383
MIN 138
MAX 311
MIN 303
DOOR
MAX 157
MIN 112
LAMP NOT WORKING
MAX 127
MIN 121
AT DESK
176 MAX
151 MIN
DIFF. DIRTY
MAX 290
MIN 252
DIFF. DIRTY
MAX 285
MIN 246
WHITEBOARD
MIN 78
MAX 216
TEACHER'S DESK
MAX 325
MIN 309
OVER DESK NEAR TEACHER
MAX 386
MIN 221
1410
1867
1867
1867
1350
1200
2200
2200
2200
1200
BENCH BY WINDOW
DESK HEIGHT
BLIND DRAWN
MAX 200
MIN 180
ALL SAINTS SCHOOL
MANSFIELD
EXISTING CLASSROOM
SHOWING LIGHTING LEVELS
AT DESKS FROM OLD LIGHTS
16-11-06
FLUORESCENT TUBE
LUX LEVELS AT DESK HEIGHT
AS EXISTING

NOTICE BOARD ABOUT 120 AVERAGE BACK OF ROOM
245
191
215
212
253
227
245
289
290
229
270
316
300
260
273
287
327
265
270
280
320
260
281
321
245
250
250
250
WHITEBOARD
MINIMUM 70
FLAT 240
VERTICAL 129
TEACHER'S DESK
249
DOOR
1200
2200
2200
2200
1200
1410
1867
1867
1867
1350
ALL SAINTS SCHOOL
MANSFIELD
PROPOSED CLASSROOM
LAYOUT USING 16off
WHITELEY 32 WATT
SURFACE MOUNTED
CEILING LIGHTS
16-11-06
32 WATT CEILING LIGHT
LIGHT READINGS AT DESKS
LUX LEVELS AT DESK HEIGHT



Work is started on site no heating in this period.

Poor control period typical of what was happening in the mobiles before the works were done, when heating is on.

The chart shows the mobile classrooms X4 and X5 Electric heating prior to the new controls being fitted and it is now clear that we have full control and have made a significant reduction on the base load and peak loading which will be reflected in lower chargers to the school. Obviously the chart reflects only X4 and X5 but will be reflected in the other classrooms.