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The influence of the preset level to the preferred illuminances in the industrial environment

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1. Abstract

To test an assumption that preset lighting level influences the used lighting level switch on level of the dimmable task lighting system was varied. Test area was real industrial assembly area and there was no daylight available. The result showed that switch on level of the system had only very small effect to the selected illuminance and even the direction of the effect was different per person.

2. Introduction

A dimmable task-lighting system was installed at 10 assembly workstations in a luminaire factory in southern Finland. The dimmable system (4*49 W, T5, 4000 K) in these workstations replaced non-dimmable task-lighting luminaires (1*58 W, TLD). There was no daylight available in the test area. The luminaires were group controlled with one two-button infrared remote control, and they were glare protected (less than 200 cd/m² above 65 degrees all around the luminaire). Figure 1 shows an example of a workstation. The general lighting provided a constant illuminance of between 100 lux and 380 lux, depending on the workstation. The lighting was switched off automatically during the breaks. Installation was made at the beginning of the 2003. Between August and December 2004 two switch on levels was used. Approximately every second week switch on level was 100 % and every second 10 %. Users were free to control the light up or down.

The products assembled were different for the different workstations, but the tasks that had to be performed were similar for all workers. Subjects put together luminaire components such as a frame, the gear, and optical parts, and sometimes a cover. Connecting the wires was the most visually demanding part of the work. The tasks were mainly in the horizontal plane. For this kind of work the European standard EN 12464-1 (2.6 electrical industry, 2.6.2 assembly work, medium) requires 500 lux (maintained illuminance).



Figure 1: One of the workstations in the study area.

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3. Results

During this measurement period, 11 persons were working in the test area for long periods. Figure 2 shows the average illuminance chosen by the workers during both switch on settings. Average of the averages of the persons was 1370 lux when switch on level was low (0,1 x maximum) and 1340 lux when it was high (maximum). Difference is statistically significant ($p < 0.05$), but still very small. As can be seen from figure 2 differences in used values are also very small per person.

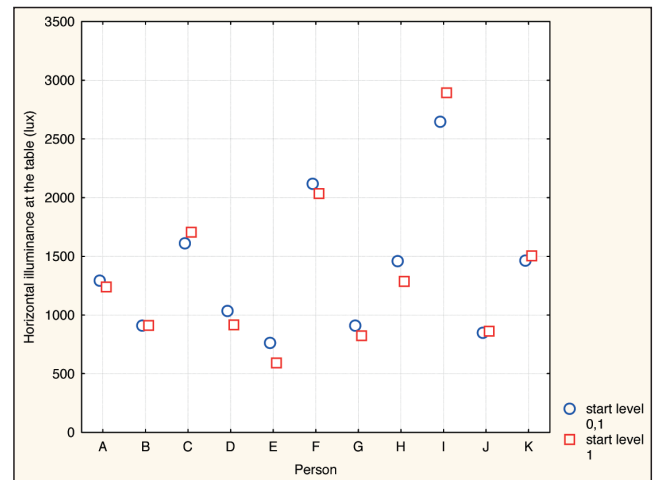


Figure 2: Horizontal illuminance at the working plane per person during both switch on settings.

4. Discussion

Results show that users were aiming to the certain preferred levels. Starting level had only limited influence. Workers were used to use the system already almost two years. Since general lighting was low and there was no daylight they felt always essential to use task lighting. The results show that these workers had preferred lighting levels and it was not possible to influence their behaviour by manipulating switch on level of the system.