ELECTRIC LIGHTING
PERSONAL CONTROL
Talking Points

Keywords: Electric Lighting, Personal Control, Advanced Lighting Controls, Maintenance, Satisfaction, Controls, Comfort

Personal control of an individual's lighting system leads to higher satisfaction and typically a reduction in energy consumption

- Participants with personal control expressed significantly higher satisfaction (Newsham et. al., 2009).
- Participants with personal control expressed significantly lower distraction from changes in temperature and acoustic conditions (Newsham et. al., 2009).
- The use of personal controls reduces energy use of building services 10% (Newsham et. al., 2009).
- In Escuyer and Fontoynont's [16] study, the main reasons participants mentioned that they preferred manual over automatic lighting controls were to benefit from daylighting, reduce energy, and to relieve their eye-strain caused by a high lighting level (Gilani & O'Brien, 2018).
- Based on the meta-analysis, the best estimates of average energy savings potential are 24% for occupancy, 28% for daylighting, 31% for personal tuning, 36% for institutional tuning, and 38% for multiple approaches (Williams et. al., 2011).

A controls-based dynamic lighting control system can realize significant energy and maintenance savings and help boost employee satisfaction

- In the current research, 24 of the 26 study participants did not express discontent with the adjusted lighting control system (i.e. manual-on/vacancy-off-30). Gentile et al.[22] also stated that occupants were much more satisfied with the manual-on/vacancy-off lighting control system (Gilani & O'Brien, 2018).
- The after LED fixture and after tuning bars represent the reduction in maximum lighting power with new LED fixtures and light levels adjusted to occupant needs. The LPD reduction across all zones going from fluorescent to LED lighting is 53% (0.86 W/ft2 to 0.41 W/ft2) of the original lighting power (Myer, 2018).
- Numerous post-occupancy evaluations have determined that employee satisfaction with their work environment is based on thermal comfort and the ability to control their visual comfort through lighting (Doulos et. al., 2020).
- Secondary benefits of lighting controls such as occupancy analysis allow for more insight into how much a space is utilized (Davidson, 2016).
- Task Tuning can provide a large opportunity for energy savings, often greater than occupancy and daylight harvesting (Richman & McIntosh, 2018).
- Advanced control systems can provide a more uniform and smoother transition from occupied to unoccupied lighting levels and back again, promoting better quality lighting for work environments along with granular sensing and automatic-on features (Richman & McIntosh, 2018).

Talking Points

Improved lighting design within a workplace can boost alertness and increase productivity

- Increasing the illuminance levels can boost office productivity, especially during the winter months. At 1200 lux, the speed of manual assembly was higher than at 800 lux. The effect was a 2.9% increase of production speed in the summer and a 3.1% increase in the winter (Juslén et. al., 2007).
- The amount of light that is best differs from one person to another as well as the tasks they want to get done. That's why the best solution is to opt for variable or flexible lighting, which allows one to dim overhead lights as well as provide individual light and lamps that can be turned on or off based on a person's preference or task (Luenendonk, 2019).

KEY REFERENCES

Primary Research

- Newsham, Guy, Mancini, Sandra, Veitch, Jennifer, Marchand, Roger, Lei, William, Charles, Kate, and Arsenault, Chantal. 2009. "Control Strategies for Lighting and Ventilation in Offices: Effects on Energy and Occupants." Intelligent Buildings International (London) 1 (2). Taylor & Francis Group: 101–21. doi:10.3763/inbi.2009.0004.

- Gilani, Sara, and O'Brien, William. 2018. "A Preliminary Study of Occupants' Use of Manual Lighting Controls in Private Offices: A Case Study." Energy and Buildings 159. Elsevier B.V: 572–86. doi:10.1016/j.enbuild.2017.11.055.

- Williams, Alison, Barbara Atkinson, Karina Garbesi, and Francis Rubinstein. 2011. "A Meta-Analysis Of Energy Savings From Lighting Controls In Commercial Buildings". Ernest Orlando Lawrence Berkeley National Laboratory. https://eta.lbl.gov/sites/default/files/publications/a_meta-analysis_of_energy_savings_from_lighting_controls_in_commercial_buildings_lbnl-5095e.pdf.

- Myer, Michael. 2018. "Evaluation Of Advanced Lighting Control Systems In A Working Office Environment". Gsa.gov. https://www.gsa.gov/cdnstatic/Applied_Research/PNNL_Evaluation_Advanced_Lighting_Controls_11-2018.pdf.

- Doulos, Lambros T, Tsangrassoulis, Aris, Madias, Evangelos-Nikolaos, Niavis, Spyros, Kontadakis, Antonios, Kontaxis, Panagiotis A, Kontargyri, Vassiliki T, et al. 2020. "Examining the Impact of Daylighting and the Corresponding Lighting Controls to the Users of Office Buildings." Energies (Basel) 13 (15). MDPI AG: 4024. doi:10.3390/en13154024.

- Davidson, Michelle. 2016. "Case Study: IoT Lighting System Cuts Energy Costs, Improves Productivity." Network World. Network World. July 26. https://www.networkworld.com/article/3099682/case-study-iot-lighting-system-cuts-energy-costs-improves-productivity.html.

- Juslén, H. T, Wouters, M. C. H. M, and Tenner, A. D. 2007. "Lighting Level and Productivity: a Field Study in the Electronics Industry." Ergonomics 50 (4). ABINGDON: Taylor & Francis: 615–24. doi:10.1080/00140130601155001.

- Luenendonk, Martin. 2019. "How Lighting Affects Productivity And Mood". Cleverism. https://www.cleverism.com/how-lighting-affects-productivity-and-mood/.

- Richman, EE, and McIntosh, JA. 2018. "Advanced Lighting Control System Performance: A Field Evaluation Of Five Systems". Designlights.Org. https://www.designlights.org/default/assets/File/Lighting%20Controls/DLC_Advanced-Lighting-Controls_Final-W.