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Summary

**Executive Summary**

The Helsinki Ice Hockey Hall organization had a goal to upgrade all of the traditional luminaires in their main and practice halls to new, energy efficient and user-friendly alternatives. Objectives were:

* Lighting uniformity
* Energy savings
* Ease of maintenance
* Better quality of ice

Negotiations resulted in using latest LED lighting technology from Easy Led Oy. Some key points for choosing LED luminaires from Easy Led:

* Long life time expectancy of 80 000h+
* Over 70% calculated energy savings
* Latest Flicker Free technology that allowed the use of high speed cameras for the first time in indoor sports with dimming capabilities
* Use of premium quality optics made possible to have the light where its mostly needed and with as little light waste as possible
* Excellent Correlated Color Temperature and Color Rendering Index ensured best possible visual performance to the users as well as viewers

Use of smart control systems which allow to select different lighting situations to different sports or other events

**Measurements and Methodology**

Mitaten Oy performed luminance measurements before the replacement of luminaires from several locations around the hall to have comparable measurements. Measuring device was Konica Minolta CL-200A. Easy Led provided all their luminaire test reports with individual measurements of CCT, CRI and Luminous Flux.

**Luminous Flux (lumens, lm)**

Total amount of light emitting from a light source.

**Luminous Intensity (candelas, Cd)**

Light Energy in a given direction.

**Illuminance (lux, lx)**

Amount of light on a surface area.

**Luminance (Cd/m2)**

Amount of light leaving the surface area.

**Luminous efficacy (lm/W)**

Amount of light that is generated per Watt used in a luminaire.

**Correlated Color Temperature (CCT)**

Color of the light emitting from the light source. Warm light 2700K-3000K, Cool light 4000K-6500K

**Color Rendering Index (CRT)**

Ability of a light source to reproduce the colors of various objects.

**Results**

**Before:**



|  |  |  |  |
| --- | --- | --- | --- |
| Point of Measurement | Illuminance (lux) | CCT(K) | CRI |
| 1 | 902 | 6469 | 87 |
| 2 | 966 | 6039 | 87 |
| 3 | 828 | 5921 | 90 |
| 4 | 666 | 5974 | 89 |
| 5 | 1058 | 6127 | 88 |
| 6 | 977 | 6044 | 88 |
| 7 | 908 | 6188 | 87 |
| 8 | 956 | 5867 | 90 |
| 9 | 1066 | 6193 | 87 |
| 10 | 956 | 6138 | 89 |
| 11 | 845 | 5804 | 90 |
| 12 | 951 | 5985 | 87 |
| 13 | 855 | 6227 | 87 |
| 14 | 959 | 6182 | 88 |

**After:**

Immediately after the installation of the new luminaires new measurements were taken with even more points of measurement:

|  |  |
| --- | --- |
| Point of Measurement | Illuminance (lux) |
| 1 | 1212 |
| 2 | 1535 |
| 3 | 1622 |
| 4 | 1507 |
| 5 | 1267 |
| 6 | 1626 |
| 7 | 1630 |
| 8 | 1443 |
| 9 | 1524 |
| 10 | 1780 |
| 11 | 1930 |
| 12 | 1617 |
| 13 | 1310 |
| 14 | 1500 |
| 15 | 1490 |
| 16 | 1580 |
| 17 | 1476 |
| 18 | 1575 |
| 19 | 1250 |
| 20 | 1358 |
| 21 | 1557 |
| 22 | 1490 |
| 23 | 1109 |





**Main Hall**

**The new setup:**

* 84 pcs PRO 12X Oslon 360 HD-FF DEG 60 Main ice rink lighting
* 6000K
* 375W
* 1.6A
* = 31500W & 134.4A
* 1344kg
* 4 pcs PRO 12X Oslon 360 HD-FF DEG 30 Bench areas
* 6000K
* 375W
* 1.6A
* = 1500W & 6.4A
* 64kg
* 2 pcs PRO 8X Oslon 240 HD-FF DEG 80 Mediacube
* 6000K
* 250W
* 1.1A
* = 500W & 2.2A
* 20kg
* 8 pcs PRO 12X Oslon 360 HD-FF DEG 60 Concert lighting
* 6000K
* 375W
* 1.6A
* = 3000W & 12.8A
* 128kg

**Totaling: 36500W & 155.8A and 1556kg**

**Dimmed: 11000W**

**The old setup:**

* 71 pcs Thorn Mundial 1000W (with ballast losses 1350W)
* 6000K
* 1350W
* 5,9A
* = 95850W & 418.9A
* 2982kg
* 21pcs Thorn ODW Halogen 1500W
* 3000K
* 1500W
* 6,5A
* = 31500W & 136.5A

**Totaling: 127350W & 555.4A and 3059.7kg**

62 pcs of old light rails were also removed a´ 10Kg

**Savings: 65%**

**Watts: 62350W (62.35kW)**

**Current: 555.4A**

**Weight: 2310.5kg**

**Practice Hall**

**The new setup:**

* 104 pcs PRO 3X Oslon 90 HD-FF DEG 150 Main lighting
* 6000K
* 105W
* 0.46A
* = 10920W & 47.84A
* 416kg

**The old setup:**

* 104 pcs 400W Mercury (real measured consumption 570W)
* 4000K
* 570W
* 2.4A
* = 59280W & 249.64A
* 832kg

**Savings: 81%**

**Watts: 48360W**

**Current: 201,76A**

**Weight: 416kg**

**Total savings of 139210W (139.2kW) = 74.5%**

These calculations are only the direct savings, they don’t include indirect like the amount of power needed to keep the ice frozen, or the need of Air Conditioning.

Luminaires were installed into 5 different groups as the customer wanted

All groups can be dimmed with 1-10V control

Installation height about 12 meters

**Overall uniformity level was 0.90** with average of 1600lx during the Competitive lighting mode -> Provides more safety to the players by removing excessive shadows and glares from the surface of the ice.