

Case Study

Introduction

The installation is located in the restored Gallery in the new wing within the Vatican Museums. Based on the customer requirements, the design of the lighting system started by try-out tests which took place on site. The requirements were double types:

- 1) indirect illumination of the gallery by directional reflectors placed on the ledges focused on the vaults/dome;
- 2) indirect illumination of niches containing works of art.

These requirements were completed with the need to illuminate the central area, specific niches and side vaults in case of special events.

Description of the area

Exhibition with a total surface of 710 m², height 11 m in the centre of the vault, installation height of luminaires is 7 m. The existing installation was realised with 110 adjustable 70W metal-halide luminaires (consumption 85W) designed for direct illumination of the corridor and niches.

Static lighting

The new installation was implemented using 110 LED luminaires 53 W and 48 LED luminaires 2 x 5W.

In order to meet the customer's requirements, the new installation consists of two types of luminaires:

- The lighting of the gallery has changed from direct to indirect, through

110 adjustable 53 W Zoom LED luminaires positioned on ledges (not visible from the bottom). The luminaires are suitably distant and inclined to illuminate uniformly the vault and the dome: to optically support the height of the inner space and creates an impression of the natural lighting;

- direct illumination of the niches is realised through 48 adjustable 2 x 5 W Zoom LED luminaires, also installed on ledges and projections, oriented to illuminate each niche from two sides.

The total power of the new installation is 6.31 kW (8.89 W/mq) with an estimated consumption of 15,775 kWh/year (approx. 2,500 h/year of operation), the energy savings were estimated at 2,668.00 Euro/year (energy costs approx 0.17 Euro/kWh).

Dynamic lighting

This installation could be integrated into a system that allows controlling specific light scenarios, such as reducing light emission by external lighting intensity detection or creating an atmosphere for festive events.

Activation of various scenarios (lighting modes) may be local, via switches or radio switches connected to the central unit, or remote via SD Manager software directly from a tablet or smartphone. A wide range of lighting settings allows dividing the luminaires into groups that can be switched on and off remotely as needed.





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COMPARISON BETWEEN DIFFERENT TYPES OF INSTALLATIONS	EXISTING LIGHTING	STATIC LIGHTING properly designed (in accordance with EN 12464-1)	DYNAMIC LIGHTING properly designed (in accordance with EN 12464-1)
Objects	Adjustable metal halide lamp. Exhibition space means lighting up to about 2500 hours per year; the aim was to develop an efficient solution that reduces energy and maintenance costs.	Adjustable LED luminaire with static driver to reduce power and maintenance costs.	Adjustable LED luminaire with dimmable driver and radio module connected to the central control system. This system allows to reduce energy and maintenance costs (while extending the life of the installation), at the same time, this system could create different lighting sceneries and thus offers flexibility based on requirements.
Characteristics of installed technologies:			
Source typology	Metal-halide	LED	LED
Installation performance	85 W	53 W + 2 x 5 W (63 W)	34 W medi + 2 x 5 W (63 W max)
Number of devices	110	110 + 48	110 + 48
Luminous flux	3 575 lm	3 550 lm + 730 lm	3 550 lm (dimmable) + 730 lm
Lighting control system	None	None	Dimmable LED Driver + Wireless control system
Device efficiency	42 lm/W	68 lm/W	68 lm/W
Colour temperature	3 000 K	3 000 K	3 000 K
Colour rendering	80	90	90
Average illumination (lux) depending on the visual function	150 lux gallery 150 lux niches	200 lux gallery 300 lux niches	200 lux gallery 300 lux niches
W/m ²	13,17	8,89	4,22
Emissions CO ₂ /year	7,02 tons	4,74 tons	3,17 tons
Total power consumption	9,35 kW	6,31 kW	4,22 kW
Estimated annual consumption	23.375 kWh	15.775 kWh	10.550 kWh
Estimated annual costs	3.974 euro	2.682 euro	1.793 euro