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**LIGHTING SYSTEM ANALYSIS IN
THE UNIVERSITY BUILDING**

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The bases for this presentation were measurements done by Michał Bernacki in his diploma work (B.Sc.).

The aim of the work was analysis of the lighting system efficiency in the Faculty of Electrical Engineering of the Silesian University of Technology

Building of the Electrical Engineering Faculty of the Silesian University of Technology

- 1963 construction,
- 5 storey building (one from the four identical buildings),
- seat of the Faculty Administration, Institute of Power Systems & Control, Department of Power Electronics, Electrical Drives and Robotics, Institute of Physics, auditoria and laboratories,
- about 2500 users (students, staff).

Silesian University of Technology

Faculty of Electrical Engineering, South-East facade



Silesian University of Technology

Faculty of Electrical Engineering, auditorium

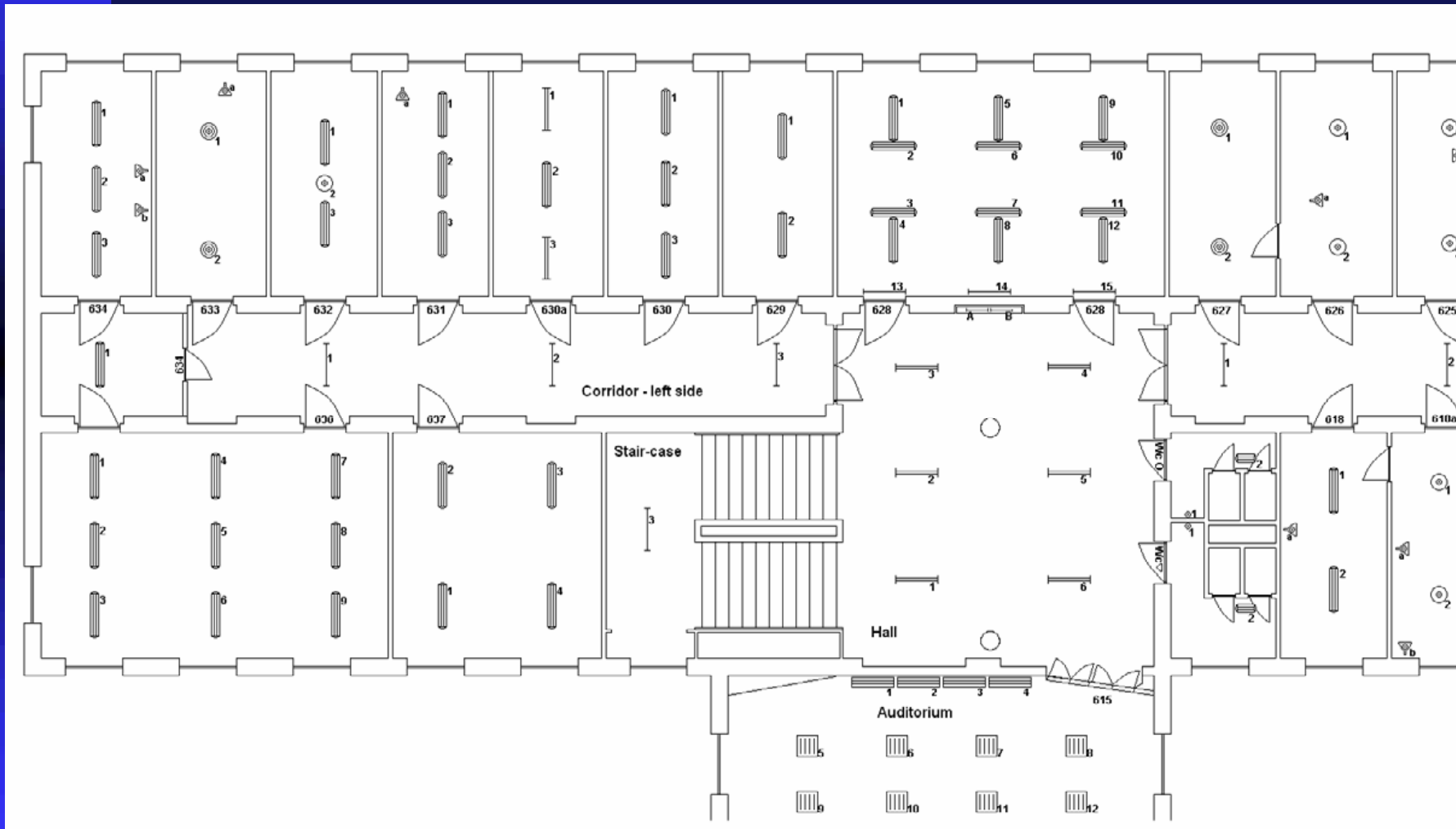


Silesian University of Technology

Faculty of Electrical Engineering, classroom



Luminaires positions on the 3-rd floor, left side



Daylight

- South-East rooms are very well illuminated with the daylight, the average illuminance in the work plane is about 600 lx; in the biggest auditorium 180-420 lx; the artificial light is usually switched off in the daytime,
- in every South-East room there are blinds,
- North-West rooms are dark and it is necessary to use artificial light all the day,
- number of users: about 1000 students and 100 lecturers.

Light sources

- 1029 linear fluorescent, installed power 39470 W (with electromagnetic ballast 2W)
- 54 compact fluorescent, installed power 1193 W,
- 126 incandescent conventional, installed power 19800 W
- 32 halogen, installed power 2630 W
- 3 reflector incandescent, 130 W
- 8 mercury and sodium (outside), installed power, 1910 W

TOTAL INSTALLED POWER: 65 193 W

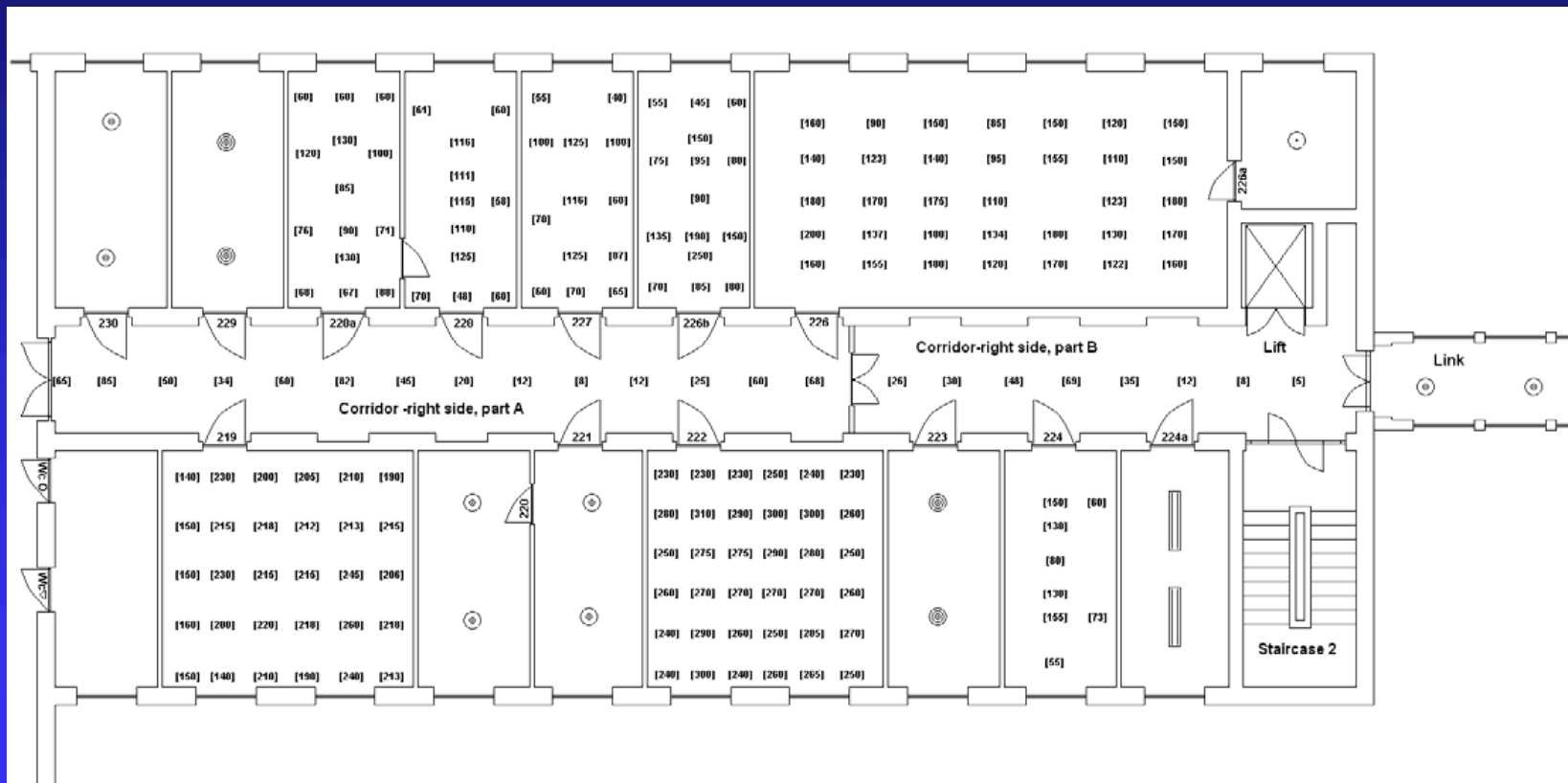
Luminaires in building



Luminaries in building

- very simple luminaries with incandescent lamp,
- fluorescent lamps with electromagnetic ballasts (2 W/lamp) – in corridors without reflector, in classrooms raster,
- compact fluorescent lamps, halogen lamps
- no dimming,
- power densities from 2,33 W/m² (some corridors) – 22 W/m² (rooms with incandescent lamps).

Illuminances on the work plane, 1-st floor, right side



Illuminance measurements

- in the most of rooms the illuminance is below standard,
- the best situation is in the classrooms and auditoria, but in the workers rooms it is necessary to use additional local lamps,
- uniformity ratio in the most of rooms: 0,5-0,7,
- the most of luminaries should be exchanged into more efficient.

Working time

- 9 month observation (2005/2006),
- the most of rooms and classes are occupied since 8.30 am to 6-8 pm except weekends,
- in the nights (10p.m.-8a.m.) and holidays/weekends the selected lamps in corridors are switched on.

Energy consumption

- total energy consumed in the building – 99,4 MWh/year,
- energy consumed for lighting – 37 % of the total electric energy used in the building (37,45 MWh/year)
- fluorescent lamps with ballasts 22,66 MWh/year – 60,5%,
- sodium and mercury lamps 7,28 MWh/year – 19,44%,
- incandescent lamps 7,51MWh/year – 20,05%

Energy saving potential

- exchange of the incandescent lamps into compact fluorescent ones - about 6,44 MWh/year,
- exchange of the old fluorescent lamps (\varnothing 38 mm) into new \varnothing 26 mm – 1,44 MWh/year,
- exchange of the outside lamps (mercury, sodium) into more efficient – 3,93 MWh/year,
- total energy saving potential: 11,81MWh/year (31,5% of the total electric energy consumed for lighting),
- the real total energy saving potential might be lower because of the not enough illumination in many palces and to low uniformity value,
- exchange of the nonefficient luminaires is the must.

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