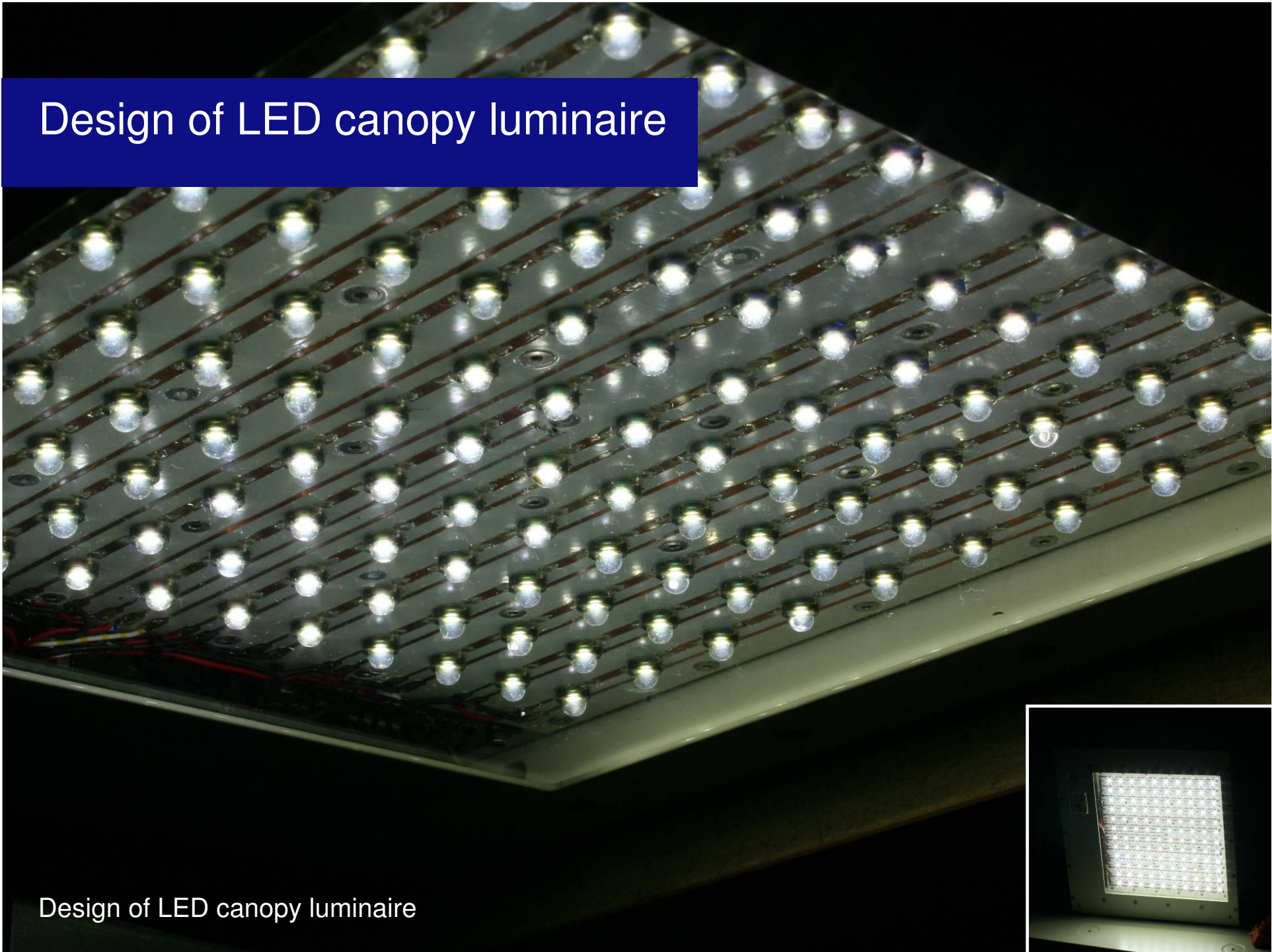


# Design of LED canopy luminaire



Design of LED canopy luminaire



# Design consideration

- Light output & LED choice
- Motion detection
- Thermal management & lifetime
- Mass production & assembly



# Light output & LED choice

- Maximum 'plug' power *200W*
- Required intensity:
  - Ground surface within canopy *300 +/- 100 lux*
  - *150 lux* at pump handle
- Available for mass production
- Good reliability data

## Current choice:

- No additional optics → lower cost  
→ better efficiency
- 120 LEDs driven at ~ *400 mA*
- Seoul P4
- Combination of large (*120°*) and medium (*90°*) beam angle





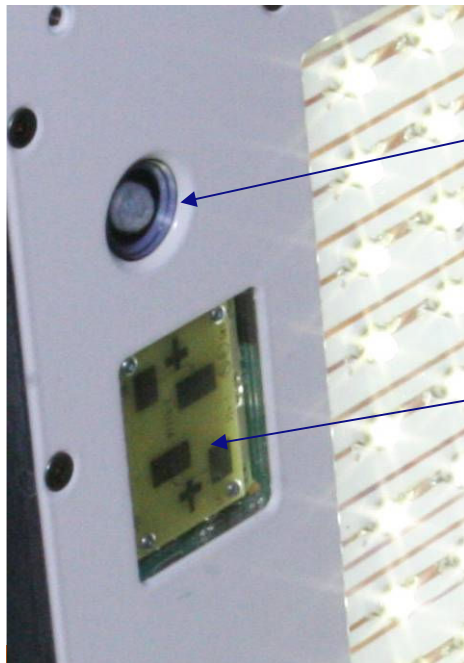
# Motion detection

Energy saving in low-power mode at pump vacancy

- 2 min. without moving cars/persons → 30% light output → 60 W
- Motion detection → 100% light output

False detections reduce energy savings

→ dual motion detector required



Passive infrared (PIR)  
*false det. on warm  
air movements*

Microwave radar  
*false det. on cold  
moving objects*

Combination in  
'AND-circuit'  
rules out false  
detections

# Thermal management & lifetime

- Lifetime is determined by internal LED temperature
- Passive air cooling is required by application
- Cooling is critical factor for lifetime
- Large heat sink required → maximize area, large fins
- Maximum cooling area per LED → distribute over available area

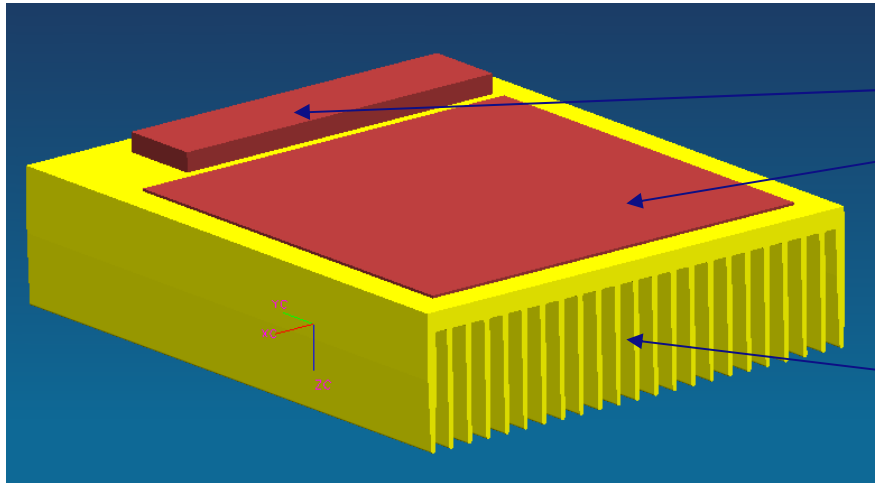
At 400 mA and 120 LEDs

Air temperature [°C]	LED internal temperature [°C]	Lifetime [hours]
5	41	>70000
20	56	>70000
40	76	60000

# Mass production & manufacturing

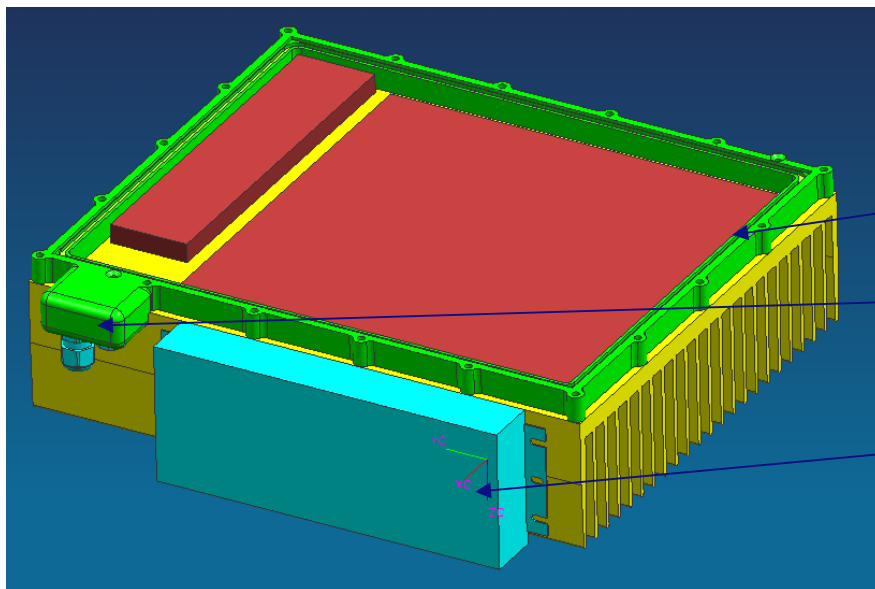
- All parts should be suitable for mass production
- Simple assembly





LED PCB & sensitive electronics  
direct on heat sink  
LED PCB with hot-embossing

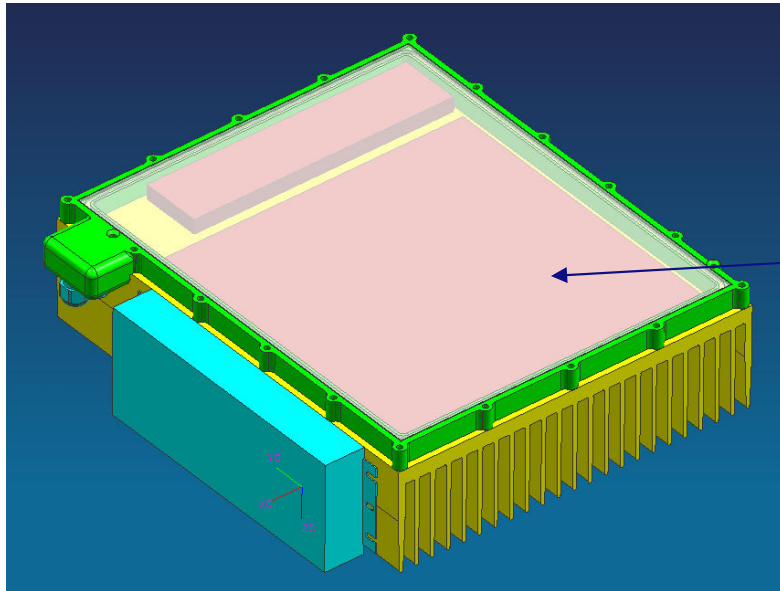
Large heat sink, maximum area  
Aluminum extrusion



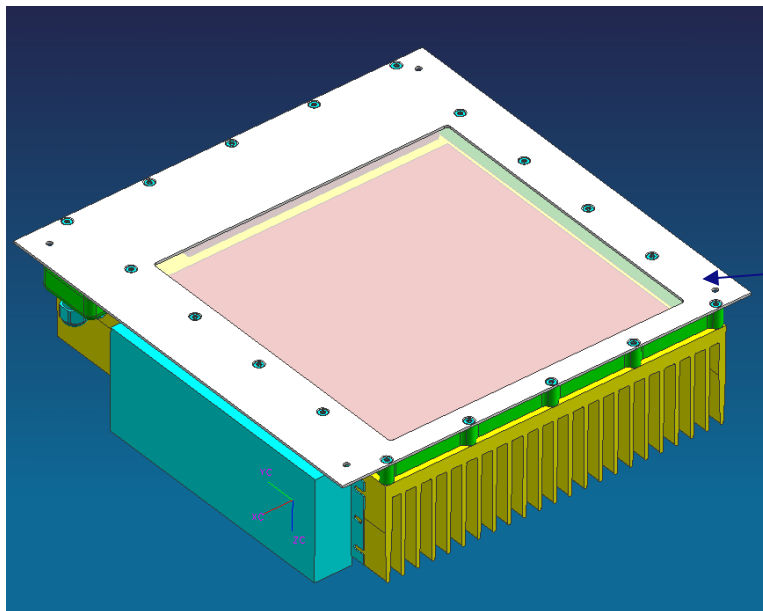
Watertight rim with O-rings  
Suitable for injection molding

Watertight cable glands

External IP65 DC power supply



Flat polycarbonate window



Final coverplate  
Powder coated steel



