

## July 2004 Report on Project 2.3 Low Profile LEDs for Elevators Lighting Research Center

The first prototype of the LED fixture and the LED rings were received by the LRC on July 1. The following pictures show the different components of the fixture.



**Figure 1.** Mounting plate and additional heatsink (left and center), and side view with LED heatsink mounted in place (right).



**Figure 2.** Top, side, and bottom views of the LED heatsink.



**Figure 3.** Top view of reflector (left), LED ring with six 3-W Luxeon emitters (center), and bottom view of reflector.



**Figure 4.** Bottom view of the mounting plate with LED heatsink in place (left), LED ring mounted to the heatsink (center), and bottom view of the complete fixture (right).



**Figure 5.** Bottom view of the heatsink and reflector with LEDs turned on during temperature measurement.

To date, the following tests have been performed on the LED fixture:

- a. The maximum temperature of the LED board during operation in open air (26°C ambient) measured after 2 hours of continuous operation was 54°C.
- b. The efficiencies of five reflectors were measured:
  - i. Reflector 1: 74.0%
  - ii. Reflector 2: 78.1%
  - iii. Reflector 3: 75.6%
  - iv. Reflector 4: 74.9%
  - v. Reflector 5: 79.6%

The measurements were conducted with the reflectors in the condition as they came from manufacturing. Reflector 3 then was polished in three steps using polishing compounds of different grades. The whole process of polishing took approximately 8 hours. After two more measurements, we found that polishing did not increase efficiency significantly, as it ranged only between  $\pm 2\%$ .

- c. The candlepower distribution of Reflector 3 was also measured. The half beam angle measured was 21 degrees, only 2 degrees wider than expected. Measurements of the rest of the reflectors will follow in the coming two weeks.

On June 25, we received a notice from RPI stating that we could not use the elevators in the CII building due to a malfunction of one elevator. We visited 12 buildings on campus and resubmitted our request to use an elevator at any of 8 alternate locations. We finally received approval from RPI on July 8 to use the elevator at any of these locations. Unfortunately, none of these buildings has two elevators side by side; therefore, the experiment will be carried out showing one condition (incandescent lighting, LED lighting) at a time. Also, the options that seemed more suitable for the experiment involved elevators built by Schindler, although they are all serviced by the same OTIS personnel we have been in contact with. The elevator selected will involve the least amount of modifications to the ceiling frames that we had built previously.