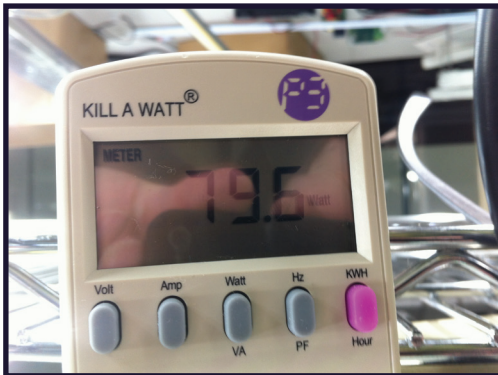


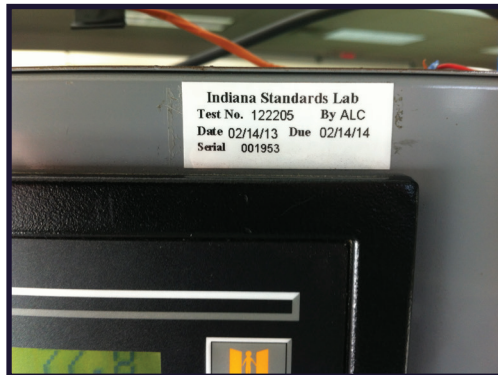
LINEAR HIGH BAY DUST COLLECTION THERMAL TEST

The Horner linear remote phosphor high bay lighting provides numerous advantages over both florescent and other LED lighting systems. The minimalist design has many advantages including lower cost, better thermal performance and reduced shipping weight. Unlike florescent fixtures that collect dust on the top of the tube, the “half tube” remote phosphor light engine does not have a horizontal surface to collect dust. In florescent systems, dust collection results in reduced light output and higher bulb temperatures, ultimately reducing the life of the bulb.

The Horner linear remote phosphor high bay lights have aluminum heat sinks with fins on the top surface to aid in cooling. Several customers expressed concern that dust collecting in the fins would significantly affect thermal performance. To test the thermal performance, we ran tests to simulate years of course and/or fine dust accumulation. In the first test, we filled the fins with a wood and plastic dust mixture to simulate course dust. In the second test we coated and filled the fins with flour to simulate fine dust. In both cases the temperature rise was insignificant. Details of the tests are shown below.



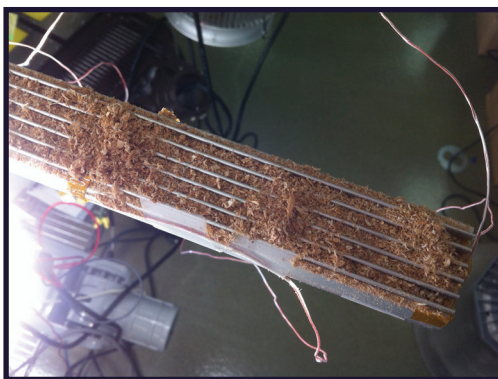
In this test, a single four-foot section was tested. The section was run at 79.6 watts representing the typical high output version of the linear remote phosphor high bay. The reflectors were left off for this test as a worst case. Installing the reflectors typically reduce the system temperature by an additional 10°C.



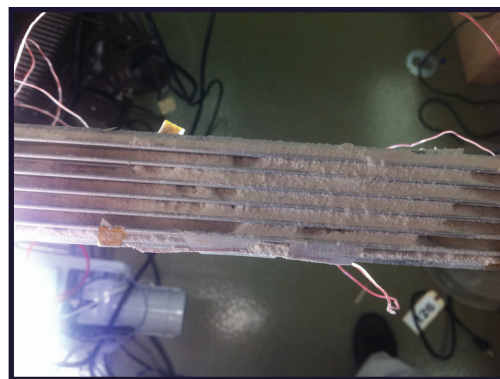
All temperature measurements were performed with a third party calibrated thermocouple temperature monitor. Probes were placed on the LED solder point, the phosphor tube and the metal extrusion. Ambient temperature was 22°C.



Initially with no dust, measurements were recorded after approximately 1 hour of run time and temperatures were stable. LEDs = 77.2°C, Phosphor = 51.5°C, Housing = 52.8°C



The housing was completely filled with saw dust consisting for cedar, pine and acrylic plastic. The light was allowed to run for 3 hours and measurements were taken. LEDs = 78.6°C, Phosphor = 52.2°C, Housing = 55.5°C



The housing was completely lightly misted with distilled water and coated with flour to simulate fine dust. After running for 3 hours the following measurements were taken. LEDs = 77.4°C, Phosphor = 51.6°C, Housing = 52.4°C

In conclusion, our tests show that both course dust and find dust have minimal impact on the thermal performance of the Horner linear remote phosphor high bay fixtures. Neither light output nor expected lifetime should be impacted by normal dust accumulation.