

WAREHOUSE APPLICATIONS

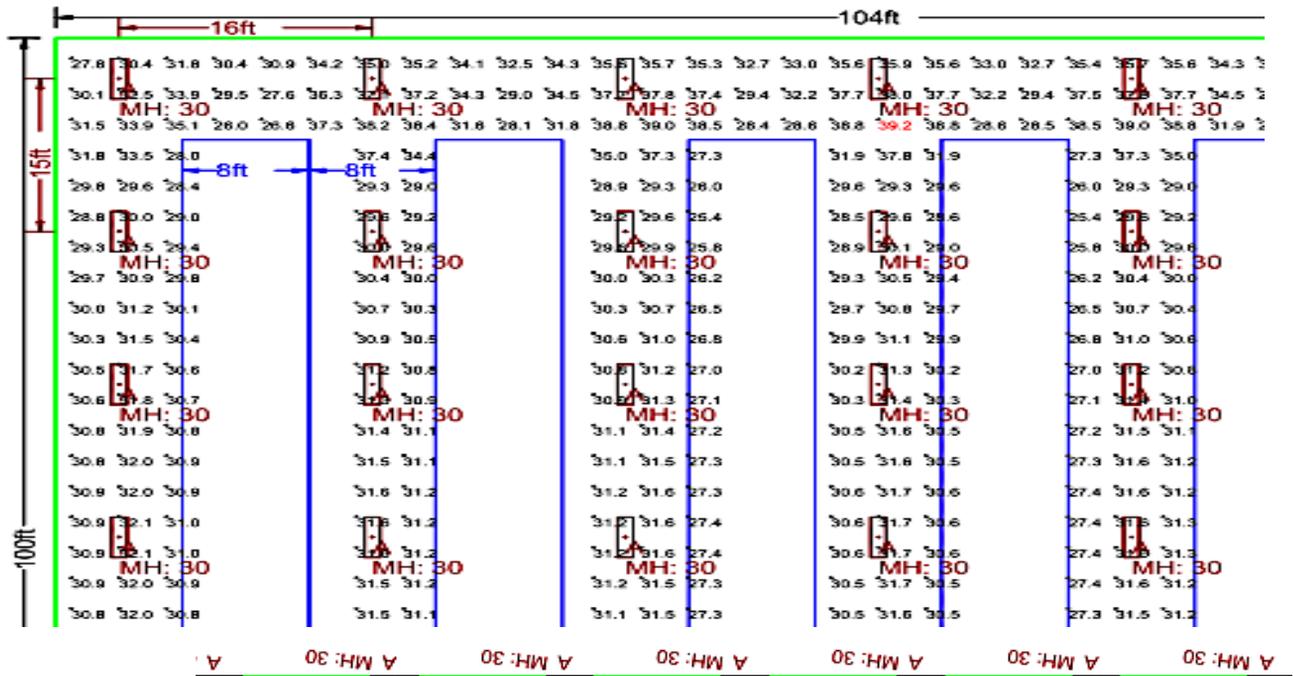
Technology is our specialty: Warehouse lighting by LaserLight Inc.

Warehouses and distribution centers can be fully automated, or several levels of manual operation. Lighting is always required when manual/human activity is involved. Illumination recommendations can be found in IES RP7-13. Warehouse space that is not divided up by vertical surfaces or walls of any kind may be lighted much the same as an open industrial area.

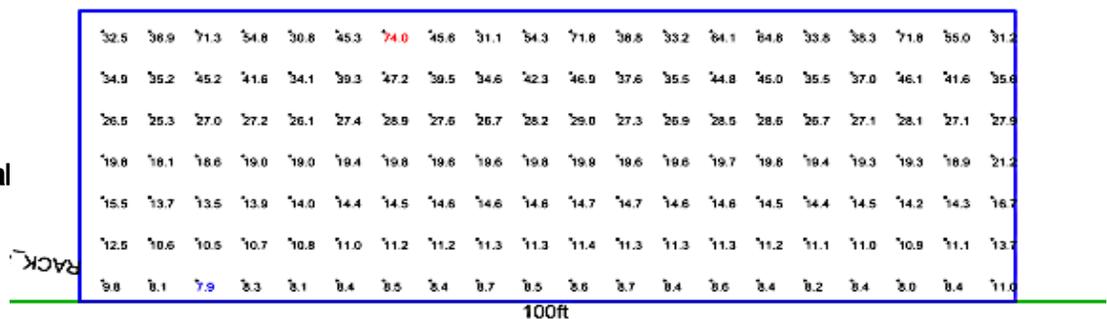
Warehouses with "rack" architecture require specialized light distributions, given that racks may be only ten feet apart, leaving a distance of five feet to distribute light evenly. This "grazing" of light will help reduce the amount of light usually seen close to the fixture locations. A wide lateral distribution is also required to reduce dark areas between fixtures.

Glare is experienced when a very bright light (or reflection) makes it difficult to see other objects or workers. In warehouse aisles, glare is an issue when merchandise is pulled from an upper-rack location that coincides with fixture location. The operator in the "picking equipment" looks directly up into the light fixture. With fluorescent sources, the image is well spread out, allowing a lower surface-brightness compared with point-source HID. Nonetheless, glare is experienced to some degree when looking up at the top rack in a warehouse. White painted ceilings can help by minimizing the contrast between luminaire and the ceiling behind it.

Plan view of Warehouse Aisles, Laserlight HT6 luminaires and horizontal illumination



Elevation view of typical Warehouse rack, Laserlight HT6 luminaires and vertical illumination on rack.



Because you don't need ALL the lights on ALL the TIME

Flexibility makes a difference. Here's how controls are used.

Lighting controls save the most energy in warehouse applications when aisles are not occupied and lights can be turned off or dimmed. Fluorescent systems work well with periodic times of use, allowing them to be turned completely off when no activity is being performed under particular fixtures, and providing light instantly when the area is active. This is usually done via motion sensors.

Motion sensors are a heat-sensing device that reacts to motion across "sensing zones" by activating a switch or signal. Several different strategies can be employed when using motion sensors: Motion sensor at entrance to aisle which activates all other fixtures in that aisle; Motion sensor on each fixture in aisle, so that lights are ON only as far into the aisle as the worker goes.

There are times where motion sensors can increase the energy being used. Lighting controls which can set and remember "scenes" can provide a "night-light" scene which would not want interruption by motion sensors. Then, motion sensors signals should be "ignored" for those periods, which the control system could be instructed to do.

Energy Savings Calculation

Warehouse Energy Calculator				Cost of Energy (\$/kWh)	\$0.12		
WITH NO CONTROLS (100% or OFF)				3-step dimming With Controls (80/20 rule)		4-step dimming With Controls (80/20 rule)	
Lighting Equipment	Present Lighting HID HighBays	LaserLight Luminaires T5 High Bays		LaserLight Luminaires with Point/Dim controls			
number of lamps/fixt	1	6		6			
Maintained Lumens per lamp	23500	4420		4420			
Lumens per Fixture	23500	26520		26520			
Average Illumination	49	51		variable			
Number of Fixtures	100	100		100			
Cost per fixtures	\$0.00	\$250.00					
Total number of lamps	100	600		600			
Total number of lumens	2350000	2652000		2652000			
Fixture Efficiency	0.889	0.969		0.969			
Effective Lumens to floor	2089150	2569788		2569788			
Watts per fixture	455	356		356/118		356/27	
Total Watts	45500	35600					
Number of Hours/year	7200	7200	energy saved	variable	Energy Saved	variable	Energy Saved
Cost of Energy	\$39,312.00	\$30,758.40	\$8,553.60	\$14,273.28	\$25,038.72	\$7,983.36	\$31,328.64
Cost of Equipment	0	\$25,000.00				\$43,400	
Years to pay back			2.9		1.7		1.4

