



Luminaerospace LLC



## Pavement Edge Light Safety System, PELSS Visual Enhancement to Airfield Lighting

For over 60 years, boundary edge lighting has been limited to a single point of illumination. The taxiway Pavement Edge Light Safety System provides a much needed improvement to the traditional “nodes of light” by adding an illuminated horizontal linear bar that is aligned with the pavement edge. Individual nodes of light can become confusing at night, during reduced visibility periods or when approaching the lights from an angle out of alignment with the runway or taxiway. At larger airports, these lights may appear as a “sea” of random lights which may not provide adequate visual cues for pilots to safely navigate around the airport. The addition of a linear light source to existing taxiway light fixtures provides information related to both the location and the orientation of the pavement edge.



The National Transportation Safety Board has identified situational awareness of pilots about an airport as a main contributor to runway incursions around the world; in 2012, this issue topped the NTSB “Most Wanted” list. The number of incidents, accidents, incursions, and excursions that occur each year would be greatly reduced by improving the ability of pilots to quickly recognize safe runway exit locations and to better recognize the runway/taxiway intersections they are approaching.

Individual points of light have offered a foundation for situational awareness. In order for them to more effectively represent edge lines they could be placed much closer together, like the pixels on a video monitor. Research with regard to utilization of line segments, instead of continuous pixels, on video displays is in agreement with the feedback received from pilots and ground personnel who have viewed a demonstration of PELSS. The research has shown that short sequences of discontinuous lines allow the brain to efficiently interpolate line sequences and create a complete representation of an image without using a continuous line.

Linear lighting segments provide an additional visual cue related to the orientation of the boundary or pavement edge. Overall situational awareness is improved by allowing the pavement boundaries to be recognized quickly and easily. Although subtle, from a distance the human brain can interpolate the actual boundary edge from this additional visual cue.

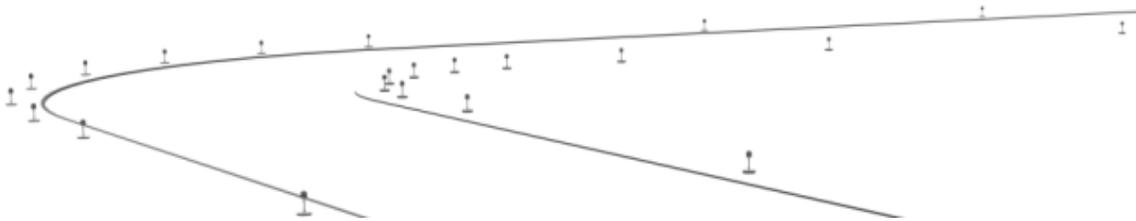


Luminaerospace, LLC began testing this new lighting fixture at Ohio's Cleveland Hopkins Airport (CLE) in February of 2013. The enhanced design provides more than just single blue lights at the edge of taxiways. Instead, PELSS incorporates a pair of illuminated arms extending from both sides of the existing blue light that are aligned with the direction of the taxiway. This allows pilots to intuitively recognize the actual pavement edges at night and/or in inclement weather. The new lights improve pilot

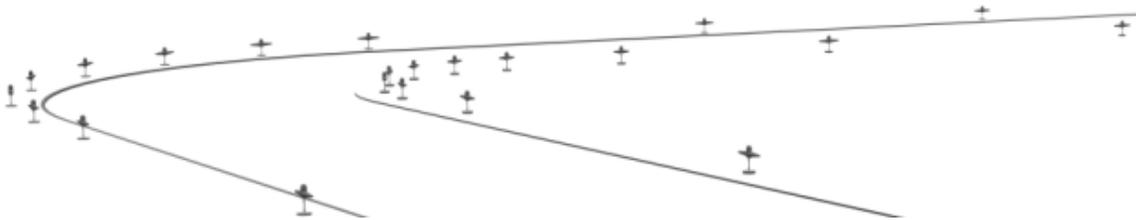
situational awareness even in good weather.

Airport Operations staff at Cleveland Hopkins International Airport has been working with Luminaerospace, LLC to quantify the benefits of this new linear lighting concept for taxiways.

The traditional view is this:



With PELSS it looks like this:



Two dozen enhanced LED lighting modules have been installed at Cleveland Hopkins Airport for the test. The industry has already set a course to replace existing incandescent lights with LED's; the lighted bar also uses significantly less energy than the traditional incandescent light. During the winter months, several modules were installed in the de-ice pad area and a few other non-movement area locations. In the spring, all modules were relocated to a non-movement area along the apron of Concourse D in a continuous row.



Everyone is encouraged to provide their feedback through participation in a three-minute survey (<http://surveymonkey.com/s/GQGHP9H>). Your willingness to participate in this survey may influence regulatory approval and has the potential to improve operational safety in our industry.

Members of Luminaerospace, LLC are comprised of both aviation professionals and experienced passengers who recognized the need for improved boundary recognition. Luminaerospace, LLC was founded in 2010 as an intellectual property holding company for the patents related to elevated linear lighting segments. The original United States Patent with priority back to 2009 has been allowed with additional protection pending in Europe, Asia and the Americas. The need for an improved boundary edge light has been recognized by pilots, airport personnel and passengers. The enhancement of this Pavement Edge Light Safety System has been embraced by the aviation community.

This safety improvement is currently available for aprons (ramps) and other pavement areas not governed by FAA specifications. It is the mission of Luminaerospace, LLC to license this technology to existing airport lighting manufacturers and to pursue FAA approval of practical elevated linear lighting specifications.

