Air and Ground Retro-Reflective Bead Evaluation

Research and Development

Presented to: ICAO Workshop

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Federal Aviation Administration

Air and Ground Retro-Reflective Bead

Three Tasks Performed

1. Ground based testing of 3 approved beads and 2 new beads.
2. Airborne test to determine the relative conspicuity of Type I and Type III retro-reflective beads.
3. Airborne test of Type I and Type III beads installed side by side for direct comparison of conspicuity.

✈ Ground based testing of 5 types of beads:

1. Type I Approved standard
2. Type III Approved standard
3. Type IV Approved standard
4. 3M New proposed bead
5. VisiMax New proposed bead

Gradation for Type I Beads

		Type I	Type I	Type I	Type I
U.S. Sieve #	Microns	A Min	A Max	B Min	B Max
20	850	100	---	---	---
30	600	80	100	---	---
40	425	---	---	---	---
50	300	18	35	---	---
70	212	---	---	100	---
80	180	---	---	85	100
100	150	0	10	---	---
140	106	---	---	15	55
200	75	0	2	---	---
230	63	---	---	0	10

Gradation for Type III and IV Beads

		Type III	Type III	Type IV	Type IV	Type IV	Type IV
U.S. Sieve #	Microns	Min	Max	A Min	A Max	B Min	B Max
12	1700	---	---	100	---	100	---
14	1400	---	---	95	100	---	---
16	1180	100	---	80	95	95	100
18	1000	---	---	10	40	---	---
20	850	95	100	0	5	35	70
30	600	55	75	---	---	0	5
40	425	15	35	---	---	---	---
50	300	0	5	---	---	---	---

Pavement Test Facility

✈ Purpose

- The objective of this project was to determine the type of retro-reflective bead that would increase painted surface marking conspicuity over the useful life of an airfield marking and thus aid in the prevention of runway incursions.

✈ Research

- **Retro-reflective beads were tested to determine their properties of:**
  - **Chromaticity**
  - **Retro-reflectivity**
  - **Friction characteristics**
  - **Adherence to the airport surface**

✈ Research

- **Paint application thickness:**

Type of Bead	Thickness
no bead	14 mil
Type I	14 mil
Type III	14 mil
Type IV	18 mil
3M	25 mil
Visi Max	25 mil

Surfaces:

New Hot-Mix Asphalt
Aged Hot-Mix Asphalt
Aged Portland Cement

✈ Schedule

- Installation of Test Markings 07/15/08
- Data Collection 07/15/09
- Final Report 05/25/10

✈ Airborne Test To Determine The Relative Conspicuity Of Type I And Type III Retro-reflective Beads.

- Surfaces:
  - Type I installed on one end of runway 13/31 at ACY.
  - Type III installed on the of end of runway 13/31 at ACY.
  - Applied to:
    - Threshold Markings
    - Threshold Bar
    - Runway Designation Number
    - Center line
    - Touchdown Zone
    - Aiming Point
    - Edge

✈ Schedule

- **Installation of Test Markings** **11/08**
- **Data Collection** **12/09**
- **Final data Analysis** **01/10**
- **Final Report** **04/10**

✈ **Airborne Test To Validate the Relative Conspicuity Of Type I And Type III Retro-reflective Beads compared side by side.**

Savannah Hilton Head Airport (SAV) test site

- Paint runway markings on Runway 9 from the runway threshold up to Taxiway A as follows:
- One side of centerline with Type I retro reflective beads and the other side with Type III applied to: Threshold markings, Aiming Point markings, Touchdown Zone markings, Runway Edge markings.
- The Runway Centerline stripes would alternate Type III and Type I for the total length painted section starting with Type III at runway Threshold.
- After completion of testing (approximately 3 months), remove markings with type III beads and replace them with Type I beaded markings.

- **Airborne Test To Validate the Relative Conspicuity Of Type I And Type III Retro-reflective Beads compared side by side.**

- **Schedule:**
  - Complete Installation by September 2009
  - 8 week data collection
  - Report April 2010

Questions or Comments?

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