Head-Up Display (HUD) Technology & Trends

June 7, 2012
Agenda

• Industry Commitment to Head-Up Displays

• Exclusive HUD minima worldwide

• Enhanced Flight Vision Systems (EFVS)

• Synthetic Vision System (SVS) on HGS

• Suggested Next Steps for China
Industry Commitment to Head-Up Displays

• First dual standard HUD airliner in service

• Aircraft manufacturers are offering HUD options on all next generation aircraft in development

• Flight safety benefits are a key value of HUD
Exclusive HUD Minima Worldwide

- Lower landing minima granted to HUD users around the world

- Types of operations benefited by exclusive HUD minima
  - CAT I ILS approaches
  - Hybrid CAT III approaches
  - Low Visibility Takeoff

- Other special authorizations for HUD users
Enhanced Flight Vision System (EFVS)

- EVS sensor generates a real-world video image of scene ahead displayed on HUD

- System utilizes at least one wave length sensor usually positioned in the airplane radome
Multi-sensor Image Fusion

SWIR + LWIR = Fused
EFVS Video

CL605 EVS Video
Flight Phase = Approach 2
Weather = 1/4 Mile Visibility
Fog (Credit)
Time = Night
Place = KEUG

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Synthetic Vision System (SVS) on HGS

- Computer generated world view from pilot’s perspective

- SVS database consists of 3 layers
  - Terrain
  - Obstacle
  - Airports & Runways
Head-up Vision System / Combined Vision

- Combines EVS and SVS images together on a Head-Up Display
  - Size of EVS Image Inset is a function of altitude
  - Pilot can select display source; EVS, SVS, or combined

>1000’: SVS Predominant

< 200’: EVS Predominant
Combined Vision Video
Suggested Next Steps for China

- Continue implementation of minima outlined in AC91-FS-2010-03R1 at additional airports
  - Special CAT I
  - CAT II on Type I

- Evaluate merits of HUD safety benefits specific to Chinese airlines

- Develop criterion and regulation concerning EVS, SVS, and combined vision certification and lower minima in China
谢谢