Enhanced Vision Systems

MAX • VIZ

HEMS Weather Symposium, March 2006

Questions to Address today

- What is Max-Viz and who is Bob Yerex ?
- What is EVS, and how does it operate ?
- How can EVS help with EMS safety ?

What is Max-Viz ?

- Founded in 2001, based in Portland OR.
- A team of over 30 of the foremost experts in EVS sensor technology.
- Sole mission is to enhance the situational awareness of flight crews and existing mission flight safety.

Who is Bob Yerex ?

- Retired Military helicopter pilot.
- Extensive background in flight safety.
- 4 years in commercial airlines.
- 2 years flying in an SPIFR EMS program.
- Relatively new to Max-Viz.

Why am I here ?

- I know what you do, and what it is like operating in the EMS environment.
- I understand the available technologies, and how they can assist in mitigating operational risk.
- I sincerely believe EVS can answer many of the questions on how to improve safety.

What is an “Enhanced Vision System” ?

- EVS is a situation awareness tool.
- EVS enhances day / night operational safety and situational awareness in many limited visibility environments.
- EVS uses an infrared sensor, the same FLIR technology that has been proven useful in military and law enforcement applications for decades.
- EVS generates a “black & white” TV image, based upon the infrared (thermal) characteristics of the scene.

Sample Video, Sun Valley Idaho, Night Approach, Max-Viz Cessna 421, Test Bed System (2 sensor)

(witness camera view added in the insert)

Max-Viz EVS-1000

EVS-1000

- Most Performance for the Dollar of any EVS System on the Market.
- 80% Less Expensive than Competitive Systems.
- High Reliability, no closed-cycle cooler.
- Long-wave IR sensor.
- Uncooled Technology, Allows for Very Small and Light Package (<5 lbs.)

Max-Viz Product Technology

Uncooled Microbolometer Infrared (IR) Detectors

Small and Light Weight

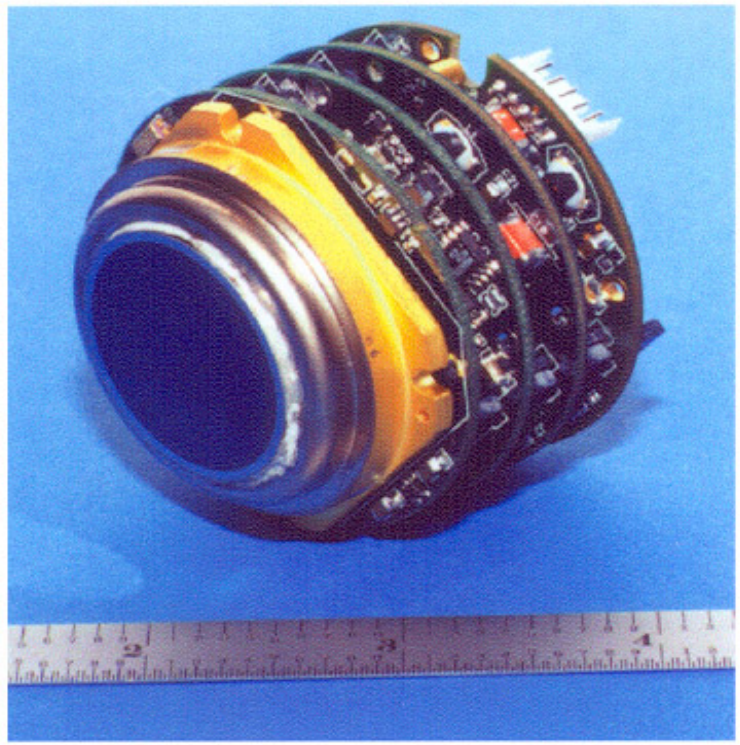
- Easy, flexible installation
- Less impact on payload
- 5 lbs w/ power supply

Higher Reliability

- 15,000+ Hour MTBF
- No Mechanical Moving Parts
- Less Maintenance

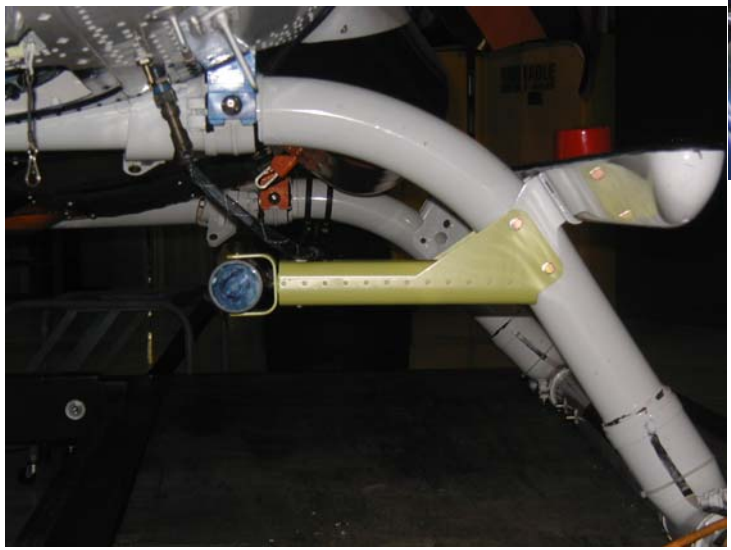
Less Expensive

- Lower Acquisition Cost
- Lower Installation Cost
- Lower Maintenance Cost



Microbolometer IR Sensor Head

EVS-1000 on Eurocopter EC-145



EVS-1000 on Bell 412

EVS-1000 on Sikorsky S-76

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A-109 E Power

Bell-212, San Diego Fire & Rescue

AS-355 Installation

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Enhanced Vision Systems

The Solution…EVS-1000 Enhanced Vision

Enhanced Vision Systems (EVS) by Max-Viz

Provide day-like vision in:

- Darkness
- Poor visibility
  - Smoke
  - Haze
  - Smog
  - Dust
  - Light Fog

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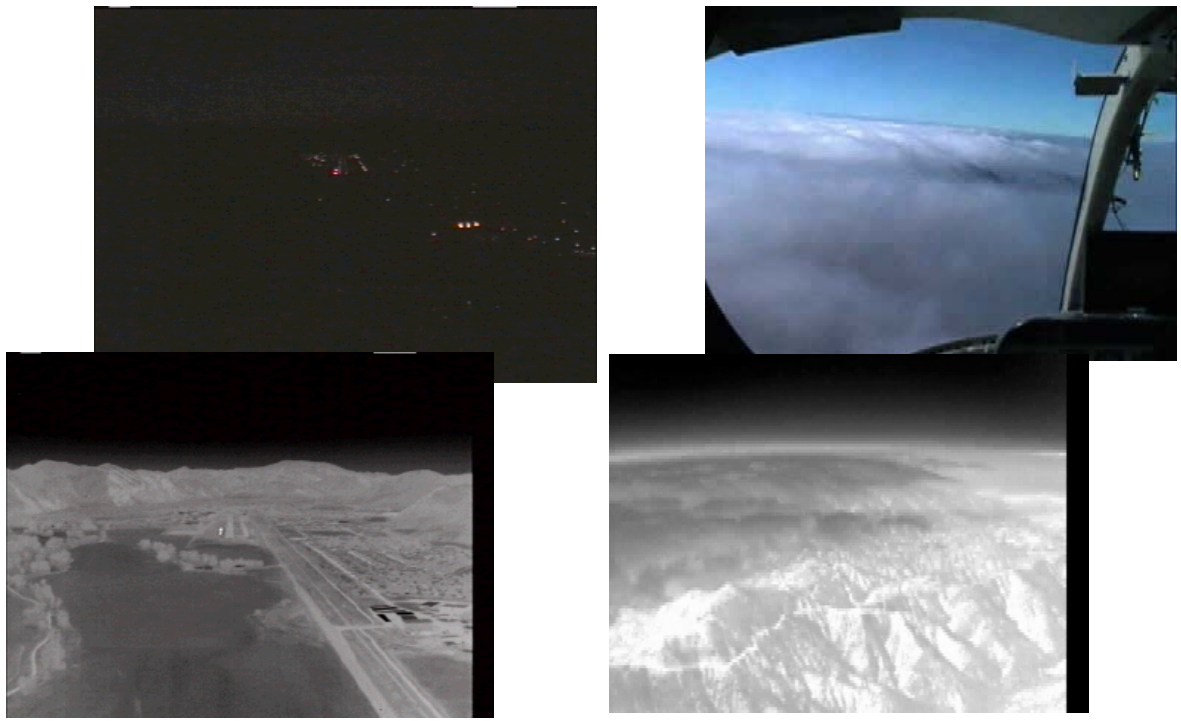

*Greater distance through light fog than human vision, depending on conditions…

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Energy and Atmospheric Attenuation

- Electromagnetic Energy can be attenuated (absorbed and scattered) by the air itself, moisture in the air and/or particles in the air.

- Particles in the air typically attenuate wave-lengths of energy that are smaller than the particles size.

- EVS-1000 is sensitive to energy that is in the 8-14 micron range.

Energy and Atmospheric Attenuation

- EVS-1000 will typically image through smog, smoke and dust particles that are LARGER than 1 micron, and smaller than 8-14 microns.

- Many helicopter accidents occur in “brown-out” landings. The EVS-1000 images through brown-out conditions providing a clear view of the real horizon & aircraft attitude.

Rain, Snow, Clouds and Fog …

- As droplet sizes become larger than 1 micron, the naked eye will begin to shut down, as will an NVG scene. When droplet sizes grow larger than 12-14 microns, the LWIR window will begin to close down.

- Light fog/clouds are often smaller droplet size than LWIR, affording the pilot with a view of targets and terrain through the light fog.

Rain, Snow, Clouds and Fog …

- Heavy clouds / fog will attenuate LWIR (you can profile clouds or fog, enhancing avoidance or abort decisions prior to encountering IIMC conditions).

- In all cases, targets in any fog environment will generally be visible at 4x to 10x greater distance on EVS than with the human eye. EVS can be used to provide verification of targets in thick fog in ground operations.

Example….Heavy and Light Obscurants

- Look closely
- Heavier Clouds are behind the ridge
- Lighter clouds / smog / haze are in front of the ridge…

Human Factors….Depth Perception

- EVS-1000 is a 53 degree wide by 40 degree vertical field-of-view. Minimal training and experience is necessary to avoid “objects can be closer than they appear” problems.
- In a 50 foot approach, the EVS image (at 5 degree look-down) will present a 550 feet wide display of the LZ area.

The Problem….Operational Risks

- **Controlled Flight Into Terrain**
  - Loss of Situational Awareness.
  - Unfamiliar Approaches & Terrain.
  - Operating at very unforgiving altitudes.
- **Inadvertant IMC**
  - See the weather or terrain before it becomes a problem.
  - Enhanced ability to avoid areas of IFR or low visibility.
  - Enhancement to early and appropriate abort decisions.

Why should EMS be interested in EVS ???

- " From 1978-1986, NTSC found that EMS helicopter accident rates were 3.5 times higher than other Part 135 operations…..1980-86…13.42 accidents per 100,000 flight hours" *(safecopter.arc.nasa.gov).*

- " A disproportionate number occurred at night…38% of flights were at night, and 49% of the accidents occurred at night….with 36% during cruise…" *(Air Med Physicians Handbook, Nov 02).*

Why should EMS be interested in EVS ???

- "88% of weather-related accidents occurred at night, with 77% of these involving fatalities…. *(AMPH Report , Nov 2002).*

- "Helicopter EMS death rate is nine times greater than the riskiest occupations…..3.8/100,000 for all industries, 21.2 for agriculture, 22.5 for mining, 192 per 100,000 projection rate for EMS operations"…

  (AMPH Report, Safety & Risk Assessment in AMT, Nov 2002).

What are the Operator Benefits with EVS ?

EVS Benefits

Enhances:

- Situational Awareness.
- Terrain Avoidance.
- Aircraft Attitude Reference.
- Early Visual Acquisition of Runway in IMC & MVFR.
- Operations in Unfamiliar Areas.
- Early Detection of Runway / LZ Incursions.
- Marginal VFR Operations.
- Ground & Taxi Operations.

Ground & Taxi Operations

Taxiway / Ramp, or LZ Hazard Avoidance

- Aircraft
- Vehicles
- Humans/Animals
- Debris
- Pavement Edges

Unfamiliar Airports / LZs at Night

Enhances:

- Ability to see runways vs. taxi-ways.
- View of airport surface.

Unforgiving Environments

Penetrates

- Dust
- Smoke
- Smog
- Blowing Sand

Conclusion

- I am here for the entire symposium.
- I am anxious to meet with any of you to discuss EVS technology.
- EVS technology will make a difference in EMS safety.
- Our mission is to help you mitigate risk, and enhance the safety of your existing operations.