


Economics of Safety *Using Situational Awareness Tools*



Aviation Insurance Association (AIA)
May 3, 2014

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Agenda

- > Rockwell Collins
- > Head-up Vision Systems
- > Implementation
- > Advantages – Safety and Economics

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Who we are



Rockwell Collins is a pioneer in the design, production and support of innovative solutions for our customers in aerospace and defense.

Working together, our global team is committed to helping customers succeed every day.

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Our products provide superior situational awareness

- Advanced display solutions
- Head-up guidance systems
- Hand-held global positioning systems
- Weather radar and hazard detection systems



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Our products keep customers connected and informed

- Networked communication systems
- Information management
- Broadband connectivity solutions




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Our customers rely on us for global service and support

- Global customer service and support network available 24/7
- Advanced simulation and training
- Comprehensive maintenance and repair



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Rockwell Collins Safety Products

- Head-up Guidance Systems (HGS™)
- Enhanced Vision Systems (EVS)
- Synthetic Vision Systems (SVS)
- MultiScan™ Weather Radar
- Traffic Collision Avoidance Systems (TCAS)
- Terrain Avoidance Warning System (TAWS)

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Regulatory Momentum

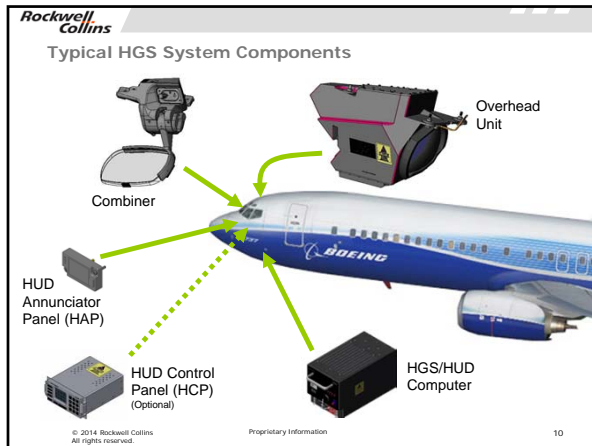
- Manual flight proficiency of pilots (SAFO Document)
- Automation integration and awareness
- Low Visibility operations
- Enhanced Flight Vision Systems (EFVS)
- Research initiatives: FAA simulator dual HGS with EFVS and SVS
- NextGen Airspace Modernization - Head-up displays are significant

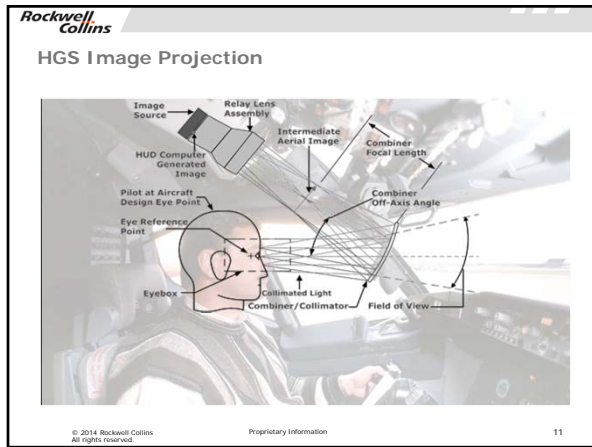
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HEAD UP VISION SYSTEMS

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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

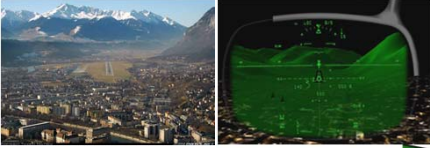
The images show the EFVS sensor mounted in the radome of an aircraft. The resulting HUD display shows a green-tinted video image of the scene ahead, overlaid with flight data and symbology.

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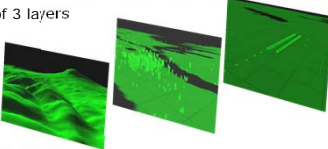
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Synthetic Vision System (SVS) on HGS

- Computer generated world view from pilot's perspective



- SVS database consists of 3 layers
 - Terrain
 - Obstacle
 - Airports & Runways



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IMPLEMENTATION

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HGS Customers

 Airline	 Corporate	 Military
<ul style="list-style-type: none"> • 39 Airlines • 23 Countries • Examples: 	<ul style="list-style-type: none"> • Hundreds of business jets worldwide • Examples: 	<ul style="list-style-type: none"> • U.S. and foreign • Examples: 

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HGS Symbolism – Flight Path Indicator, Guidance Cue and Boresight

Flight Path Indicator
 - Inertially derived
 - Instantaneous indication of where the aircraft is going

Guidance Cue
 - Uses electronic landing aid (Flight Director, ILS, GLS, FMS) and IRS to compute & position cue

Boresight
 - This is the projected centerline of the airplane that represents the attitude of the airplane

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HGS Symbolism – Energy Management/Precise Airspeed Control

- Acceleration Caret
 - Instantaneous energy state of the aircraft
- Speed Error Tape
 - Actual vs Selected airspeed
 - Bar above wing = fast
 - Bar below wing = slow
- Precise Airspeed Control
 - Use acceleration caret vs. speed error tape to manage airspeed

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Stabilized Visual Approach – at 1000'

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Unstabilized Visual Approach – at 500'

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Unstabilized Visual Approach – at 200'

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Unstabilized Visual Approach – at 120'

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Unstabilized Visual Approach – at 25'

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HGS in use

Approach Symbology

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EVS in use

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SVS in use

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Safety and Economics

ADVANTAGES

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Flight Safety Foundation – Safety Benefits of HGS Technology
November 2009 Report

New Study Parameters

- Modern civilian aircraft
 - MGTW 12,500 pounds and greater
 - Type entered service in 1980 or later
 - Glass Cockpits
- Worldwide accidents 1995 through 2007
 - World Aircraft Accident Summary (WAAS)
 - Flight Safety Foundation Database
 - Runway Safety Initiative Runway Excursion Database
- Scale of rating accidents for possible HGS influence
 - **Highly Likely** HGS could have prevented the accident/incident
 - **Likely** HGS could have prevented the accident/incident
 - **Unlikely** HGS could have prevented the accident/incident
 - **Highly unlikely** HGS could have prevented the accident/incident
 - **Unknown**

FLIGHT SAFETY FOUNDATION

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Flight Safety Foundation – Safety Benefits of HGS Technology
November 2009 Report

Total Accidents Investigated 983

Takeoff & Landing	341
Undercarriage	207
Loss of Control	123
Miscellaneous	110
Environment	50
Propulsion	48
Collision	19
Explosion & Fire	19
Mechanical Failure	17

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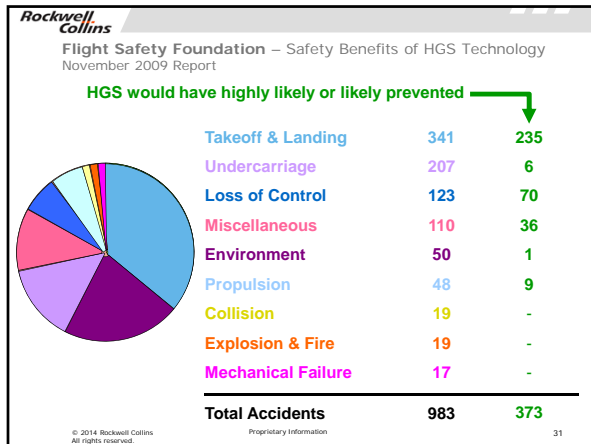
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Flight Safety Foundation – Safety Benefits of HGS Technology
November 2009 Report

HGS would have highly likely or likely prevented

Takeoff & Landing	69%
Loss of Control	57%
Other	11%

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HGS Operational Benefits – Lower Operating Minima

CAT	EU		USA		China	
	Autoland	HGS	Autoland	HGS	Autoland	HGS
I	400m	400m	1800'	1400' DH 150'	550m	450m DH 45m
II on Type I	350m	350m*	1200'	1200'	550m	350m
II	300m	300m	1000'	1000'	300m	300m
III	200m	200m	600/400'	600/400'	-	-
Takeoff	125m	75m	600'	300'	-	-

Notes:
 * No C/L Lights Req'd
 • Hybrid CAT III

HUD minima also approved by:

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In Summary

- Many of your customers are investing in safety solutions from Rockwell Collins
- The aviation industry is recognizing the merits of HGS, MultiScan, and other safety tools
- There is an economic impact to the insurance industry whether operators choose to equip or not

To learn more about Rockwell Collins, HGS, MultiScan, etc. please visit our booth or contact:

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