KOLLMORGEN
Electro-Optical

360° Situational Awareness and Slew-to-Cue Integrated on CROWS II

Tim Eagleson

25 MAY 2011

KOLLMORGEN
Electro-Optical

Executive Summary

- **Problem: Even with the advent of the Remote Weapon Station, Warfighters remain exposed in threatening environments to achieve situational awareness**
  - Existing Systems offer too narrow a field of view or imagery without positional context

- **Solution: Add 360° SA with Slew-to-Cue onto the RWS**
  - 360° imaging increases the operational effectiveness of the Warfighter by allowing the Soldier to see the entire battlefield instantaneously and continuously while to remaining under armor
  - Slew to Cue and other system integration (ASD, Muzzle Flash Detection) complement the CROWS II and make the Remote Weapon Station (RWS) operator more effective.

CROWS II

- **The Color Daylight camera on CROWS II provides a field of view up to 45 degrees**
  - With a 45° Field of View camera you are only able to observe where the RWS is pointed leaving over 80% of the Battlefield unseen
    - The platform is open to an attack from the unseen battle space
  - Soldiers experience a “Soda Straw” effect, forcing them to constantly slew the RWS resulting in increased operator fatigue.

Protector M153 – CROWS II

What 360° Brings to the Fight

- **The addition of a 360° Sensor brings new capabilities to the Warfighter:**
  - Complements existing CROWS II by expanding the Soldier's FOV = *Improved 360° Local Situational Awareness*
  - It allows the Soldier to observe and interrogate targets of interest *without pointing a weapon = Reduced Escalation of Force*
  - It provides weapon Slew-to-Cue and other sensor integration = *Improved Lethality*
  - Integrated through existing CROWS slip ring = ***Back Fit Ready***

KOLLMORGEN
Electro-Optical

Protector O·N·E· 360 Video

KOLLMORGEN
Electro-Optical

Target Interrogation *Without* Pointing a Weapon

An integrated *Staring* 360° system with a selectable zoom window allows the Soldier to:

- Interrogate a target without the visual cue of rotating the sensor in its direction
  - The target is unaware that it is being observed
- Maintain the weapon in a safe direction and only bring it to bear on target if necessary
- Have superior close-in Reconnaissance, Surveillance, and Target Acquisition (RSTA)
- Engage targets directly with the CROWS *And* continue to observe the battle space around him

Human Machine Interface (HMI)

- **To be effective, the 360° image must be stabilized and have azimuth orientation correction applied to the entire image**
  - The center of the image will always be the vehicle 12 o'clock position.
- **The Soldier is able to maintain positional context while the vehicle is moving or RWS is slewing**
- **The 360° sensor display must make the Soldier aware of all systems and their position in the battlefield**
  - Intuitive visual cues are provided on the display to ease the Soldier's job:
    - RWS Crosshairs on 360° image,
    - RWS sensor feed to the display,
    - Slew to Cue Command,
    - Vehicle indicator with weapon and RWS feed,
    - Area of Interest zoom window, etc…

KOLLMORGEN
Electro-Optical

360° Sensor Head and Image Processor

- **The Sensor Head contains no moving parts**
  - fixed cameras and optics increase system reliability and reduces system complexity

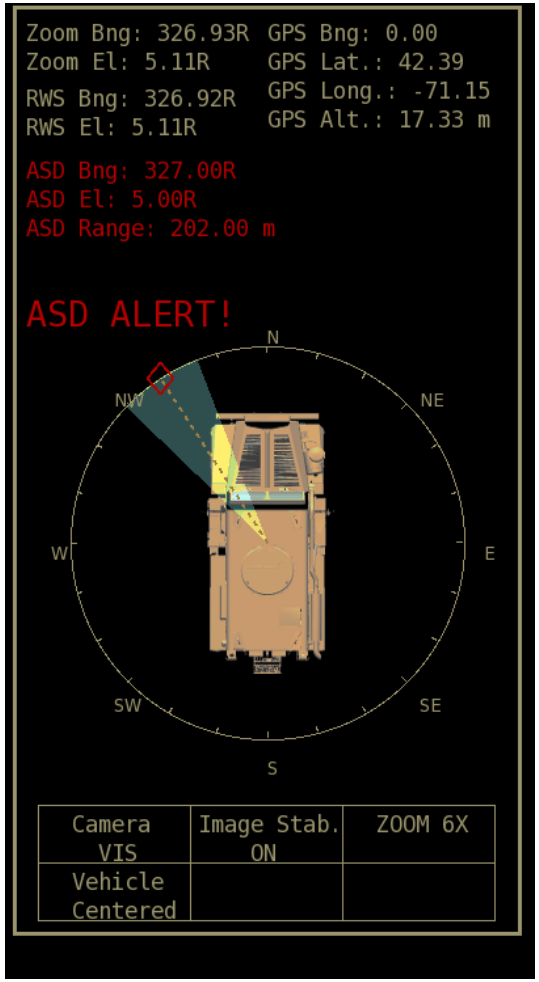
- **Digital Stabilization of the image eliminates the need for Fiber Optic Gyros**
  - Stabilization is performed using an Inertial Measurement Unit (IMU) located inside the sensor head

- **Image processing is used to present the data to the Soldier in real time (30fps at less then 100ms latency)**
  - This performance is achieved through a hardware based solution

KOLLMORGEN
Electro-Optical

Leverage Industry Advancements by Maintaining an Open Architecture

- **Systems must adhere to open standards to allow for advancements in sensor technology**
  - As Camera performance increases, system must be able to accommodate new technology without major modifications
- **Easy 3rd Party algorithm implementation**
  - To integrate evolving capabilities such as Muzzle Flash Detection, Acoustic Sniper Detection Systems, and other features such as Auto Track and Image Fusion



Acoustic Sniper Detection Integration COMPLETE

Summary and Questions

- **360° imaging technology brings enhanced capability to the Warfighter**
  - ONE360 complements the RWS E-O while not overloading the operator
  - Eliminates the “Soda Straw Effect” and opens the entire situation to the RWS gunner
    - Real time imaging (30fps) is key when operating a moving vehicle or the weapon system.
  - Requires minor modifications to the RWS to avoid a long down time and high cost of the upgrade.

Special Thanks To: KONGSBERG

KOLLMORGEN
Electro-Optical

Contact Information

Tim Eagleson
Manager, Business Development
Telephone: 413-387-1578
Mobile: 413-835-1759
teagleson@eo.kollmorgen.com

Michael Rose
Manager, Advance Development Group
Telephone: 413-387-1503
Mobile: 413-588-8661
mrose@eo.kollmorgen.com

KOLLMORGEN Electro-Optical

50 Prince Street
Northampton, MA 01060
Telephone: 413-387-1800
Fax: 413-586-1324