

PHOENIX rises to deliver enhanced range target location & engagement

By Steve Rickard, business development director, Excelitas Qioptiq

With the ever increasing requirements to engage targets accurately and effectively at greater ranges, coupled with performance developments in weapons and ammunition natures - providing the ability for trained operators to defeat targets at those extended ranges, the challenge once more reverts back to the Visual Augmentation Systems (VAS) to ensure that capability can be exploited 24hrs a day under a range of environmental conditions.

PHOENIX – The Evolution of a Game Changing Capability

Qioptiq has a rich history in the design, development and deployment of Dismounted Warfighter Visual Augmentation System (VAS) solutions covering Night Vision, Thermal and more recently, Fused technologies.

In all cases, working closely with Government R&D communities, and operators during the New Product Introduction (NPI) process ensures that an appropriate trade of SWaP-C (Size, Weight and Power v's Cost) can be carried out. Focusing on the Operator "Touch Points" ensures product solutions are integrated well with host weapon / sight systems, along with being intuitive and easy to use, providing features and capabilities to support the User.

For Qioptiq, the MWIR HOT (Medium Wave InfraRed – High Operating Temperature) Product journey started some years back as HOT technology began to evolve. Now with the emergence and maturation of a number of MWIR-HOT Thermal Sensors from suppliers worldwide, the potential to integrate the MWIR-HOT technology into a robust, reliable and SWaP traded Weapon Sight has become a reality.

Following the conclusion of a very successful DSTL Technology Demonstration Programme (TDP) looking at the potential for HOT Technology to be ruggedized sufficiently for use on Sniper Weapons, the Qioptiq team continued to develop the technology, and in particular the integration into the high shock environment of Sniper Weapons, to a point where it was time for PHOENIX to rise.

We are excited to be launching the PHOENIX Products this year. PHOENIX, is a suite of Dismounted VAS products that will provide the Warfighter with enhanced Observation,

Target Location and Target Engagement capabilities, based upon a common thermal core and operating architecture, enhanced connectivity and capability growth potential.

PHOENIX-S is our first MWIR HOT product, and we have started with our core product line of Clip-On Sights, with PHOENIX-S providing the long range observation and engagement capability - well aligned to the range capabilities of modern 0.338" and 0.5" Sniper Rifles and Ammunition, whilst still being sufficiently compact and lightweight to be utilised on 7.62 Sharpshooter / Support Weapon platforms.

The main challenge with PHOENIX-S was to engineer a solution that would prove robust and reliable when used with 0.338" and 0.5" Semi-Automatic and Bolt Action Weapons, along with ensuring boresight retention, and the ability to adapt the system for Extended Range Engagements (ERE) out past 2km. Extensive development work analysing high speed shock data captured from a range of weapon systems, coupled with proprietary shock analysis and modelling capability has resulted in a mechanical design construction that significantly reduces the amount of weapon shock that is transferred directly to the PHOENIX-S Thermal Core, Optics and Electronics. This in turn ensures that boresight retention is achieved, and overall system MTBF is improved over similar products using Cooled MWIR cores. The ERE capability is achieved by compensating the sight orientation via a simplistic control.

Another challenge was to provide the User with a good balance of Field of View v's Range Performance, and we settled on an optical solution that provides the Operator with 4 degrees Horizontal Field of View, therefore retaining a good level of Situational Awareness, even at longer ranges.

The PHOENIX NPI team spent a considerable amount of time looking at trade studies, design options and prototypes in order to get the launch variant optimised to make an impact and produce something the User will find easy to use.

We have learned a lot about image processing and image manipulation from our recent SAKER and TALON Fused weapon sight product developments, and we have applied that learning experience to the PHOENIX systems. This provides the Operators with enhanced imaging features,



including the subtle use of colour which further assists the Detection, Recognition and Identification of targets at extended ranges.

PHOENIX-S made its debut outing at the recent SOFIC Event in Tampa earlier this month where it attracted significant attention, and it will be a centrepiece exhibit at Defence Trade shows throughout the rest of the year, including DSEi in London (September), and AUSA in Washington DC (October).

PHOENIX-H sees the launch of a hand held target locator utilising common elements with PHOENIX-S, with the additional of additional capabilities in order to deliver a next generation Target Location Capability for Dismounted Operators such as Sniper Pairs, Mortar Fire Controllers and Forward Air Controllers.

PHOENIX-H shares the HOT Thermal Core and central processing with PHOENIX-S for commonality, but also features a digital day channel, Laser Range Finder, Laser Pointer, GPS and an advanced AHRS (Attitude and Reference Heading System) which provides accurate own and target location.

The thermal channel of PHOENIX-H is a true optical zoom providing the Operator with Field of View options from 16 degrees in Wide Field of View, to 2 degrees in Narrow Field of View, which results in man sized target detection at ranges in excess of 6km and vehicle sized target detection at ranges in excess of 11km. The digital optical channel is matched to the thermal channel, which provides fused imaging capability for enhanced target interrogation.

One of the main focus areas for the development of PHOENIX-H has been the AHRS module, and the development of the core module to provide reliable and repeatable data in the harsh military environments, a combination of sensor technology development and algorithms have helped to achieve this.

Connectivity is a theme that flows through the PHOENIX system concept, with the ability to share images, target information and other battlefield data between PHOENIX systems being seen as a key differentiator over existing / similar "Stand Alone" VAS products.

Collaborative Target Handoff (CTH) is a capability that will be embedded within all PHOENIX product variants. CTH provides the PHOENIX operators to share or "hand off" targeting location data between systems using a

combination of image processing algorithms and Augmented Reality (AR) in order to position target locations and other critical battlefield information within the operators field of view. All achieved by intuitive MMI without the need for verbal or radio communications, which is seen as a significant means of streamlining target identification & handoff, and therefore increasing operational tempo.

Connectivity with Battlefield Management Systems such as the Android Tactical Assault Kit (ATAK) means that PHOENIX systems can become an effective sensor node in the connected battlespace, and offer far greater utility than stand-alone systems. The potential to integrate / Interface with UAS / UGS offers great potential, along with sufficient architecture / processing headroom to incorporate auto target detection / identification / tracking capabilities.

Alongside the numerous developments focussed on enhancing PHOENIX products from the Operator / Operational perspective, the NPI team has also embraced a range of new materials and manufacturing processes, including additive manufacturing, in order to deliver lightweight & robust solutions offering excellent EMC screening, coupled with a simplistic maintenance and repair philosophy aimed at reducing system down time.

PHOENIX-H is currently in final prototype testing and will be making its debut appearance at DSEi in London (September) and AUSA in Washington DC (October) where it will join its partner PHOENIX-S on the Qioptiq / Excelitas stand.

The PHOENIX "System" approach provides the foundations for development of further product variants to support enhanced VAS solutions over the coming years, as a number of customers worldwide seek to modernise enhance their Vision Solutions. Greater range performance and enhanced connectivity are achieved by taking advantage of the rapidly developing areas of sensor development, algorithm development and artificial intelligence to provide truly connected VAS capability, and Hyper Enabled Operators with the ability out think, out smart, and out fight our enemies. As with all of Qioptiq's products, PHOENIX systems are ITAR free solutions, whilst utilising the latest in sensor and display technologies, and without compromising performance. ■

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