

## Surveillance and Target Acquisition

Optronics Capability for all Platforms and Domains



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## Surveillance & Target Acquisition

Advanced modules for airborne, vehicle, man-portable and naval applications

The Surveillance & Target Acquisition business line services the following market segments

- Soldier & vehicle systems
- Tactical missiles
- Missile warning & targeting
- Surveillance systems

### Global solution

Qioptiq is a vertically integrated organisation with manufacturing facilities in North America, United Kingdom, Germany and Singapore.

We offer state of the art design and manufacturing to provide precision solutions optimised for low cost, high volume production.

We provide a complete a complete in-house capability for the design, simulation, manufacture, test and qualification of advanced optronic modules.

### Soldier & vehicle solutions

Affordable optical modules for

- Man portable solutions
  - Thermal Weapon Sights (TWS)
  - Night Vision Goggles (NVG)
  - Observation & targeting sights
- Vehicle solutions
  - Remote Weapon Stations (RWS)
  - Drivers Vision Enhancement (DVE)
  - Situational Awareness (SA)

### Tactical missiles

Proven solutions for

- Advanced missile domes
- Missile seeker optical assemblies
- Missile seeker cameras

### Missile warning and targeting

High performance optical systems for airborne applications

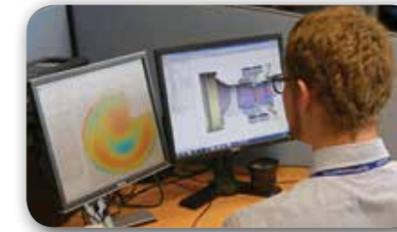
- Infrared and Ultraviolet Missile Warners (MWS)
- Infrared Search and Track (IRST)
- Directed Infrared Counter Measures (IRCM)
- Windows, domes and optics for targeting & navigation pods

### Surveillance systems

Precision zoom modules in all wavebands for

- Border surveillance
- Mast mounted surveillance
- Persistent surveillance
- Maritime surveillance

Novel & affordable solutions – engineered to perform in the toughest military environments



## Differentiators

**A unique combination of world-class design and state of the art manufacturing**

Qioptiq offers an unrivalled pedigree in the design and manufacture of advanced optronic solutions, delivering world-class performance and affordability to warfighters around the globe.

### In-house design and manufacturing software

- Optical design
  - Advanced visual analysis
  - Bespoke material library for all optical materials
    - Best in class athermalisation
    - BRDF database for stray light analysis
- Coating design
  - Custom solutions
    - Multispectral
    - Enhanced durability
    - Market leading uniformity for domes

- Finite element analysis
  - Shock simulation & modelling
- Electronic design
  - Software, algorithms & C4I
  - Servo-control

### Manufacturing control and metrology

- State of the art manufacturing facilities
  - Design for manufacture
  - Customised processes
  - Automated test
  - Unique optical coatings
- Precision polymer optics
  - Freeform surfaces
  - Coatings

### Technology management

- Delivering solutions for tomorrow

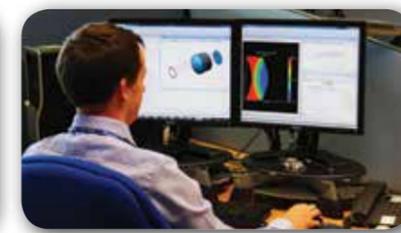
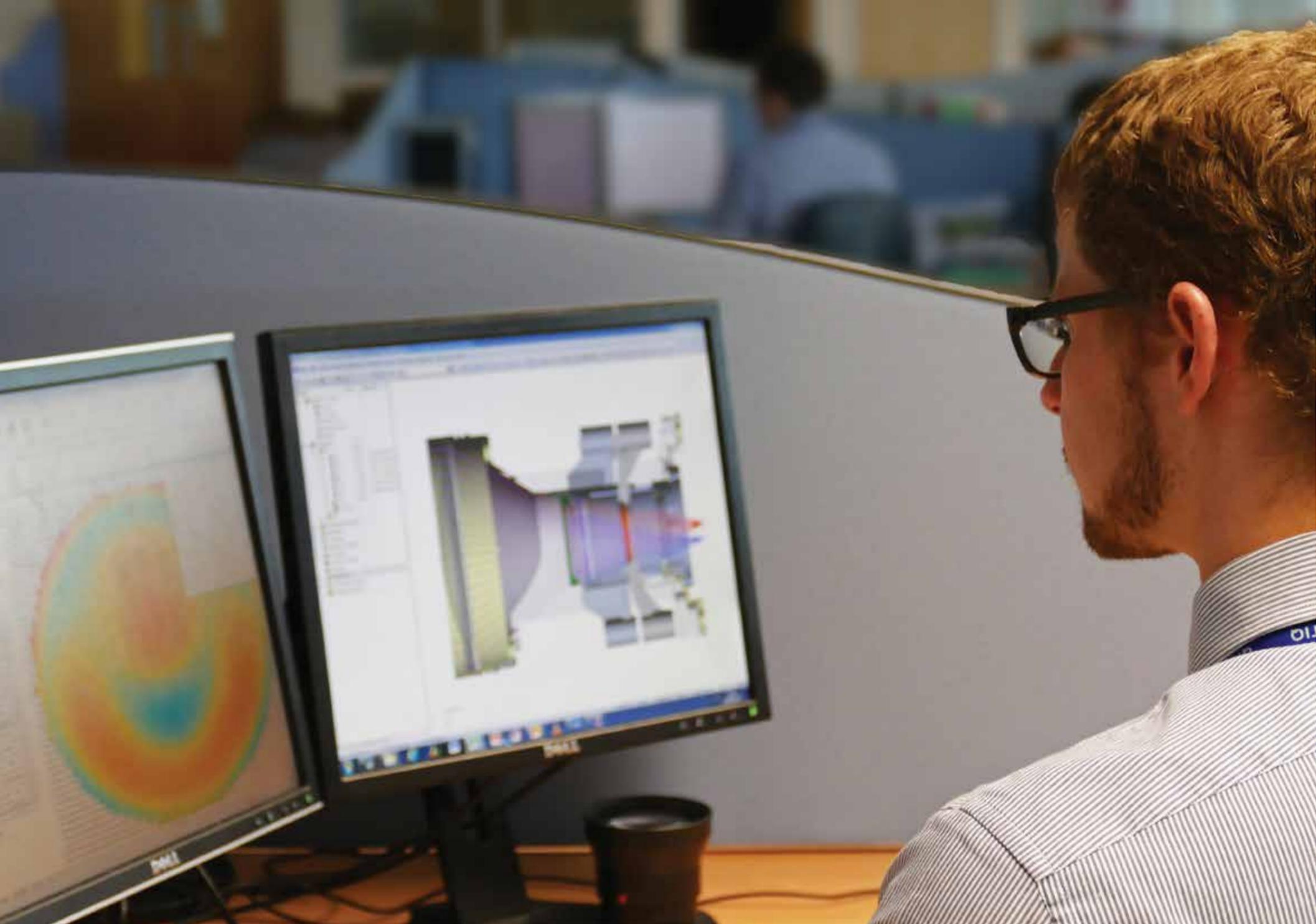
### Accreditations

- AS9100, ISO 9001, ISO14001 Certified

### Multiple manufacturing locations around the globe

- In-house, low-cost manufacturing

**Key technologies and capabilities for tomorrow's requirements**



## Design Solutions

**Complete innovative designs for all platforms and domains**

At Qioptiq we use our expert domain knowledge and defence experience to design and manufacture bespoke solutions for our customers.

We design and manufacture every aspect of the system (including optics, coatings and metalwork), so we can optimise the solution to deliver the maximum performance and affordability.

Our engagement with the end user community gives Qioptiq engineers unique insight into the key requirements for optical systems when used in theatre.

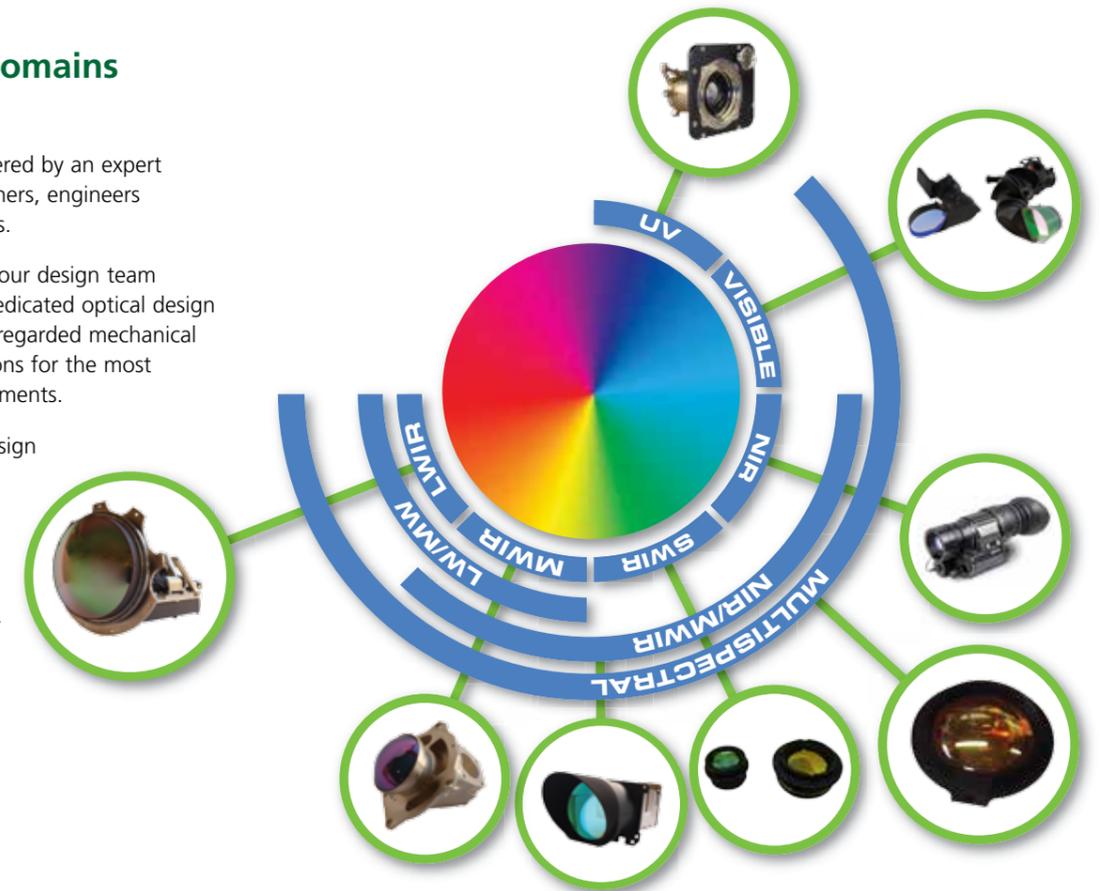
This domain knowledge is incorporated into every solution we create to deliver the best possible product for the warfighter.

We pride ourselves on our ability to design for manufacture. All of our solutions are optimised for our state of the art manufacturing processes incorporating continuous improvement activities to enhance performance and improve productivity.

Our design solutions are delivered by an expert team of highly qualified designers, engineers and manufacturing technicians.

We have world-class talent in our design team including one of the largest dedicated optical design teams in Europe and a highly regarded mechanical analysis team to deliver solutions for the most technically challenging requirements.

Our investment in bespoke design tools and software, allied with our extensive opto-mechanical materials database and weapon shock library is second to none. This capability enables us to deliver solutions that perform in the most challenging of environments.





## Manufacturing Capability

### Vertically integrated capabilities in global facilities

#### Optical materials processed

- All optical glass
- Optical plastic
  - Zeonex, Acrylic, Polycarbonate
- Infrared materials
  - Aluminum
  - AMTIR™ materials
  - BaF<sub>2</sub>, LiF, CaF<sub>2</sub>, MgF<sub>2</sub>
  - Silicon, Germanium, Gallium Arsenide
  - Gasir-1, Gasir-5, IG2-IG6 materials
  - Sapphire, Spinel, ALON®
  - Zinc Selenide, Zinc Sulphide, Zinc Sulfide
  - Multi-spectral, Tuftran®

#### Optical fabrication

- Component diameters of 10 mm to 600 mm
- Conventional polishing
- Diamond turning
- Magneto-Rheological finishing

#### Optical coatings

- Anti-reflection
- Mirrors
- Beamsplitters
- Multi-spectral
- MWIR/LWIR
- SWIR/LWIR
- Ultra-durable coatings
- Laser protection

#### Automated linespread testing

- Visible, MWIR, LWIR

#### Interferometry

- Testing
- Stitching
- White light

#### Metal machining

- Full CNC machine shop
- Metal finishing

#### Defence and aerospace global manufacturing locations



### Global infrastructure to deliver



## Soldier and Vehicle Solutions

The world's leading supplier of advanced optical modules for man-portable and vehicle platforms

### Applications

- Man-portable modules
  - Thermal weapon sight
  - Night vision and fused goggles
  - Helmet mounted displays
- Vehicle Modules
  - Drivers vision enhancement
  - Situational awareness
  - Remote weapon station cameras
  - Fire control cameras
  - Bioculars assemblies
  - Missile warning
  - Laser warning

### Capability

- Opto-mechanical design
  - Lightweight assemblies
  - High boresight retention
  - Stray light analysis
  - Finite element analysis
    - Weapon shock library
- Cost-effective, high performance IR modules
- Athermalised designs
- Advanced coatings
  - Ultra-hard coatings
  - Covert coatings
  - Laser protection coatings
- Display integration
- Sensor integration
- Optical and system testing

### Technology

- GRIN lenses
- Freeform display optics
- Multi-spectral optics

### Awards

- Raytheon Silver Award April 2015



**OVER 350,000 TWS Modules, 5200 RWS assemblies, 650,000 PVS-7 & PVS-14 DELIVERED**



## Missile Warning & Targeting

Leading supplier of advanced missile warning optics for airborne platforms

### Applications

- Infrared search & track
- Directed infrared counter measures
- Missile warning
  - Infrared
  - Ultraviolet
- Targeting & navigation PODS

### Capability

- Domes
  - Patented uniform dome coatings
  - Unique ultra-durable coatings
  - Multi-spectral
  - Sizes up to 600 mm diameter
  - Heated domes
- Windows
  - Ge, Si, GaAs, ZnS, ZnSe Tuftran® substrates
  - Sizes up to 300mm
- Missile warning optics
  - Ultra-wide fisheye optics
    - MWIR, UV
  - Athermalised
- Directed infrared counter measure optics
  - Athermalised
  - Lightweight
- Infrared search and track optics

### Technology

- Optics in the dewar
- Computational imaging
- Sintered domes
- Enhanced durable coatings





## Tactical Missiles

A complete range of optronic capability for missile seekers

### Applications

- Air to ground
- Air to air
- Ground to ground

### Capability

- Missile domes
  - Materials
    - Ge, Si, ZnS, MS ZnS, ZnSe, ALON, Spinel, Sapphire
  - Patented uniform dome coatings
  - Ultra-durable dome coatings
  - Enhanced DLC coating
  - Multi-spectral
  - Missile optics
  - Missile head sensor assemblies
  - Lightweight assemblies
  - Stray light & finite element analysis
- Cost-effective, high performance IR modules
  - Athermalised designs
  - Optical and system testing

### Technology

- Optics in the dewar
- Computational imaging
- Sintered domes

### Awards

- Outstanding performance on Javelin



**IN EXCESS OF 1,400 Javelin domes, 3000 Storm Shadow domes SUPPLIED**



## Surveillance Systems

High performance infrared zoom lenses and multi-spectral solutions for surveillance platforms

### Applications

- Border surveillance
- Optronic gimbals
  - Naval
  - Airborne
- Unmanned air vehicles
- Submarine periscopes

### Capability

- High zoom-ratio infrared cameras for border surveillance
  - 10:1 zoom ratio
    - Uncooled LWIR
    - Cooled / HOT MWIR
    - VGA and HD formats
  - Multi-spectral zoom lenses
    - MWIR/LWIR
    - Vis/SWIR
- Advanced coatings
  - Market leading salt-fog resistance
  - Low narcissus coatings
  - Multi-spectral coatings
  - Covert coatings

### Technology

- Computational imaging
- Foveal imaging
- High-efficiency diffractives
- Active boresight correction





## Ground Vehicle Systems

Key enabling technology for ground vehicle optronic solutions

### Capability

- RWS thermal cameras
- High resolution fire control thermal cameras
- Drivers vision enhancement
- Situational awareness
- Image fusion
- Biocular assemblies
- Night vision periscopes
- Laser elbows
- Periscopes
- Laser filter coatings
- Laser warning
- Windows
- In-situ alignment

