

# Radiation Testing and Support

Cobham RAD Solutions Europe

**COBHAM**

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Brochure  
September 2018

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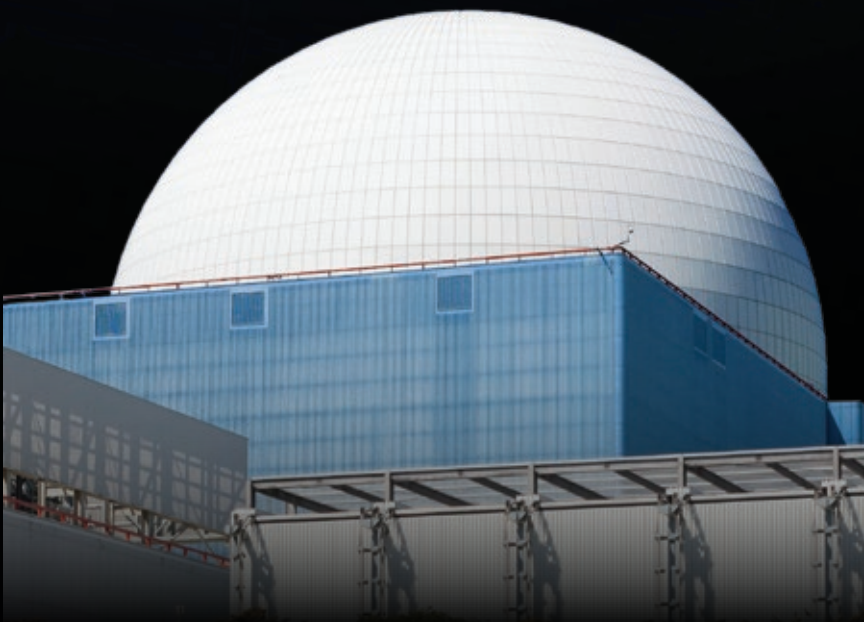
Operating in both Europe and the US

Total dose and single event effects testing

Materials and components testing services

Experts in radiation effects

ISO 9001 and DLA laboratory suitability



# Comprehensive radiation effects test and support



Since Cobham RAD Solutions was launched in Europe at the end of 2013, our comprehensive offering of radiation testing services and advice has become established in both the US and European locations. We offer a similar range of capability at both sites for customers in the HiRel, military and space sectors. This is complemented in Europe by our expertise in the civil nuclear market, covering the effects of very high doses of radiation on materials and components for routine power station operations, as well as for fuel handling and decommissioning activities. Our location in the heart of the UK space cluster at Harwell demonstrates that space is central to our business and I look forward to strengthening that position further in the years to come. – Richard Sharp, Managing Director, Cobham RAD Europe

## Experts in radiation effects

Cobham RAD Europe has knowledge and experience in the following:

- Pre-irradiation assessments
- Electronic circuit simulation
- Materials selection
- Component selection
- Cobalt-60 gamma irradiation facilities
- Electron beam irradiation facilities
- Ion beam irradiation facilities
- Database of published data on radiation effects
- Shielding/penetration calculations
- Radiation and environmental testing

## Standard test routines

A number of standard test routines have been developed for common equipment, materials and components. Examples include:

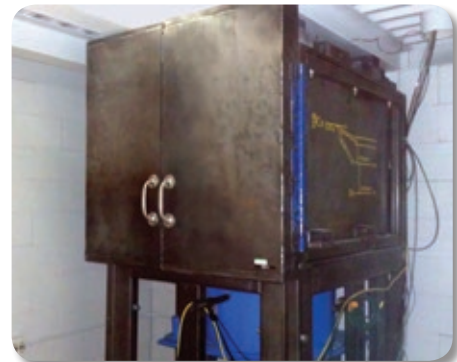
- Electronic components (ESA SCC-22900, Mil-Std-750/883 test method 1019, RLAT, ELDRS)
- CCTV cameras
- Oils and greases (ISO 2137, IP50, IP32, ASTM)
- Proximity detectors (BS EN 60947)
- Certificated to ISO 9001
- DLA laboratory suitability for Mil-Std-750/883 method 1019 and all test conditions

## Cobham RAD Europe facility

The assessment of radiation effects on materials and components normally considers several aspects of the radiation environment in turn. Cobham RAD Europe offers test facilities for total dose, electrons, protons and single event effects as follows:

- Total integrated dose: gamma radiation from cobalt-60 sources; dose rates from background to several kGy/hr; in-situ monitoring; temperature control.
- Electron irradiation: from 30 keV to 20 MeV; doses from tens of Gy to MGy; in-situ monitoring; temperature control; sample handling by conveyor or static positioning under the beam.
- Proton irradiation: displacement damage testing from 0.5 to 10 MeV and SEE testing to 200 MeV; irradiation in vacuum or air; in-situ monitoring; temperature control.
- Helium ion (alpha) irradiation: from 0.5 to 15 MeV; irradiation in vacuum or air; in-situ monitoring; temperature control.
- Heavy ions: SEE testing via third party cyclotrons and accelerators.
- ISO Class 7 (class 10,000) cleanroom available.

*The synergistic effect of irradiation and other factors can lead to more rapid degradation than the sum of the individual effects would indicate. We offer the possibility to irradiate in a range of gaseous environments and vacuum, with heating or cooling, with or without electrical stress and, e.g. for solar cells, under illumination.*



## Capability statement

### Component testing:

- Automatic DC and AC characterisation of semiconductor components
- In-situ measurement available

### Computer simulation of electronic circuits:

- Before, during and after irradiation

### Component selection:

- From our own database of test data
- Online access to NASA, JPL, MoD, ESA, etc. data

### Materials selection:

- Access to manufacturers' data
- Cross-reference of trade names against polymer types
- Comprehensive database of test data

### Irradiation facilities:

- Cobalt-60 cells
- Electron beam accelerators
- Heavy and light ion accelerators
- Neutron generator

### Equipment assessments:

- Based on collated test data and literature

### Sub-system testing:

- In-situ monitoring during irradiation
- Custom-built rigs for transducers, etc.

### Materials testing including:

- Lubricants
- Adhesives
- Cable insulation
- Connector materials
- Seals and gaskets
- Paints and coatings

### Standard test routines:

- Electronic components (ESA/SCC-22900, Mil-Std-883)
- CCTV cameras
- Oils and greases (ISO 2137, IP50, IP32, ASTM)
- Polymer and rubber samples (IEC-544, ASTM)
- Fibre optics (EIA-455-49A)

### Dose rate and lifetime total dose calculations from health physics or other survey data

### Shielding calculations:

- For new facility design
- For mission planning
- For equipment selection

## Single event effects (SEE) testing

Cobham RAD Europe has extensive experience in performing Single Event Effect tests. Many of our staff have over 25+ years of experience in the relatively unique and specialized field of single event effects in electronics. This experience, combined with the many hundreds of tests we have performed, has led to the development of a library of hardware and software techniques which help reduce the cost and time required to successfully complete an SEE test.

We offer turnkey solutions to efficiently determine heavy ion cross sections for a given component or system from diodes to FPGAs and DSPs. Our services include:

- Design and development of test hardware & software
- Optimized test planning and management for efficient use of the cyclotron
- Comprehensive SEE test reports and data collection

Tests can be designed to evaluate:

- Single Event Latch Up (SEL)
- Single Event Upset (SEU)
- Single Event Transients (SET)
- Single Event Burnout (SEB)
- Single Event Functional Interrupts (SEFI)
- Single Event Gate Rupture (SEGR)
  - EIA/JESD 57
  - ASTM F1192

SEE testing of memory devices, including NAND, SDRAM and DDR, is efficiently performed using our FPGA based test solutions. The majority of SEE tests are conducted using cyclotrons at the University of Jyväskylä, Université Catholique de Louvain, Paul Scherrer Institute, LBNL and TAMU.

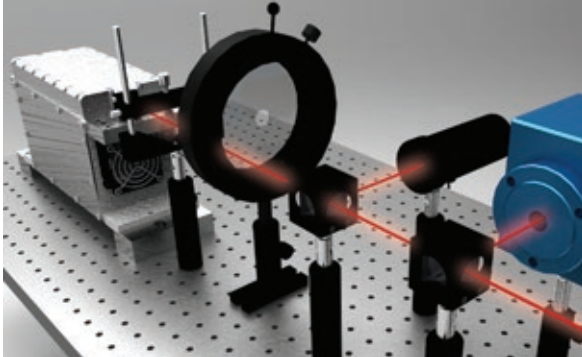


University of Jyväskylä

## SEREEL2 Laser SEE Testing Systems

Laser Single Event Effects (SEE) testing simulates the effects of space radiation by firing a laser beam at a semiconductor device and measuring the effect of each single pulse.

Companies can benefit from the SEREEL2 system to test 100s of die for Single Event Effects (SEE) in their own facility, saving test and travel costs. Once good die are obtained, Cobham RAD Europe can assist companies with confirmation testing in our facilities or arrange for testing time. Cobham RAD will assist the customer after purchase to set-up the SEREEL2 for testing and offer consultations. **A full warranty is included.**



- SEREEL2 delivers large (>100,000) laser spot arrays under laser control
  - With full registration of upsets to die locations
- Applicable to SEE screening of large numbers of devices for space programs
  - Autofocussing and levelling for speedy sample mounting
- SEREEL2 for Single Photon Absorption (SPA)
  - Simple operation, ideal for wire bonded devices, high throughput
- SEREEL2 for Two-Photon Absorption (TPA)
  - Suitable for flip chips, very high energy possible ( $\mu\text{J}$  and  $\text{mJ}$  ranges available), high throughput
- Raster Scanning
  - Basic scanning available for R&D testing or less speed-critical applications
- Spiral Scanning
  - Ultimate positional precision for high throughput screening of parts
- Maximum scanning area 100 mm in x,y,z directions
- Positional accuracy to 1 micron
- The sample orientation can be either horizontal or vertical
- Intuitive operating software is provided

Cobham RAD offers radiation test services for customers and programs outside of the US and Europe using test methods compliant to either MIL-STD-883 or ESCC Basic Specification No. 22900. Our ELDRS cell can run any dose rate from 1 to 100mrad(Si)/s to match the mission requirement.

Key benefits:

- Typical four week cycle time for RLATS
- Full complement of test capabilities
  - Neutron
  - ELDRS
  - TID high dose
  - Electrical test
  - Legacy international mission support
  - Test hardware in place for most device types
- ISO 9001 and DLA laboratory suitability

*The most important thing we build is trust.*

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