

 **NHS GREATER GLASGOW & CLYDE**

**JOB DESCRIPTION**

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| 1. **JOB IDENTIFICATION**
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| **Job Title:****Responsible to:** | Radiotherapy Systems Engineer (Specialist Clinical Technologist)Advanced Specialist Clinical Technologist |
| **Department:** | Radiotherapy Physics, Beatson West of Scotland Cancer Centre, Gartnavel & Monklands Hospitals, Diagnostic Directorate, Acute Services Division |

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| 1. **JOB PURPOSE**
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| Radiotherapy Physics provides a comprehensive clinical physics service to the Beatson West of Scotland Cancer Centre, which is one of the largest UK cancer treatment centres providing radiotherapy treatment for more than 7,000 patients per annum in the west of Scotland. Its main base is at Gartnavel General Hospital, Glasgow with a Satellite Facility located at Monklands Hospital in Airdrie. |

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| 1. **ROLE OF THE DEPARTMENT**
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| The Specialist Clinical Technologist contributes to the work undertaken by the Teams of Clinical Technologists in the Technology Services of Radiotherapy Physics of the Department of Clinical Physics and Bio-Engineering (DCPB) and contributes to the comprehensive specialist clinical technology service provided to the Beatson West of Scotland Cancer Centre  |

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| 1. **ORGANISATIONAL POSITION**
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| Based at either the Beatson, (Gartnavel) or the Lanarkshire Beatson (Monklands), the Radiotherapy Systems Engineer (Specialist Clinical Technologist), whose organisational position is shown on the attached Organisation Chart, will work between both sites according to a published rota and is: * 1. Accountable to the Chief Executive through the General Manager, Diagnostic Directorate and the Head of Radiotherapy Physics, the Dosimetry & Equipment Scientific Lead and the Technical Services Manager and associated senior management structure for specialised technical work undertaken.
	2. Responsible for contributing to the work of a Team of Clinical Technologists drawn from the Clinical Technologists’ Pool.
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| 1. **SCOPE AND RANGE**
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| The Department of Clinical Physics and Bio-Engineering’s Radiotherapy Physics staff provide a comprehensive clinical physics service to the Beatson Oncology Centre. The Beatson is one of the largest UK cancer treatment centres and provides radiotherapy treatment for more than 7,000 patients per annum in the West of Scotland. Referrals for treatment of the full range of malignant disease, originate from seven Health Boards (Argyll and Clyde, Ayrshire and Arran, Borders, Dumfries and Galloway, Forth Valley, Greater Glasgow and Lanarkshire) and for non-routine specialised treatments from all the Scottish Health Boards.* 1. Radiotherapy Physics consists of Clinical Physicists, Dosimetrists and Clinical Technologists organised in distinct groups: Treatment Delivery, Clinical Planning & Imaging, Brachytherapy Physics, Teaching & Development and the Clinical Physicist Pool. Radiotherapy Physics has its own program of ongoing scientific research and development.
	2. External beam radiotherapy treatments are provided using eleven linear accelerators at the Beatson (Glasgow) and two accelerators based in Monklands, which together with CT simulators and treatment simulators, treatment verification systems and a low energy x-ray treatment unit have a capital value in excess of £30M.
	3. Radiotherapy Physics staff work closely with Multidisciplinary Teams of Clinical Oncologists, Radiographers and Nurses. Radiotherapy Physics staff support a wide range of specialist clinical services by carrying out radiotherapy treatment planning, brachytherapy physics, radiation dosimetry, equipment management, quality assurance, medical imaging and supporting networked radiotherapy patient information systems. Staff lead and support clinical developments and research, and provide education for multidisciplinary staff, trainees and students.
	4. Clinical Technologists in Radiation Technology, led by the Technical Services Manager, provide a complete in-house service for the calibration, quality control, maintenance and repair of all the radiotherapy treatment equipment described above. These Clinical Technologists are organised in flexible Teams led by Advanced Specialist Clinical Technologists (Lead Technicians), who allocate and supervise the technical work undertaken ensuring that it is carried out efficiently and to a high standard. These Clinical Technologist Teams operate a locally agreed flexible shift system.
	5. Radiation Technology staff participate in the day to day support and development of the networked radiotherapy treatment information system (ARIA) used to record and verify radiotherapy treatment data and manage a wide range of associated medical images.
	6. Work carried out complies with the Beatson’s Quality Management System (accredited to the ISO9001:2000 International Quality Standard) and with legislation, including the Ionising Radiation Regulations (1999) and the Ionising Radiation (Medical Exposures) Regulations (2000).
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| 1. **MAIN DUTIES/RESPONSIBILITIES**
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| 1. **Managerial**

The Specialist Clinical Technologist delivers specialist technical support to the Beatson and contributes to the smooth operation of the services provided by Technology Services. The postholder:* 1. Participates in a Team of Clinical Technologists and contributes to its management by assisting his/her Team Leader including standing in for him/her when required and helping to ensure that work undertaken is carried out efficiently and to a high standard.
	2. Contributes to the technical support services provided, in accordance with local and national requirements, assists with the implementation of quality standards and helps to prepare written protocols complying with the Beatson’s Quality System.
	3. Contributes to the work undertaken to provide the wide range of specialist electromedical, electronics, electrical and computing support required to support patients’ radiotherapy treatment. This includes undertaking the technical commissioning, calibration, quality control testing, planned preventative maintenance, repair and development of the highly complex, high capital value radiotherapy systems and equipment summarised in Section 6.
	4. Contributes to one or more of the specialist areas of advanced work allocated to the Clinical Technologist Teams, as summarised in Section 5C.
	5. Contributes to the work of his/her Team according to a locally agreed flexible shift system, designed to cover extended day working, weekend working and emergency rotas to cover specialised out of hours patient treatments, including complex treatment regimes such as Continuous Hyperfractionated Radiation Treatment (CHART), as appropriate.
	6. Provides information on the clinical status of the radiotherapy machines used to deliver radiation treatment and for infusion devices used to delivery chemotherapy treatment. Participates in stock control and preparation of orders for spare parts obtained using computer-based ordering systems.
	7. Ensures high standards of communication particularly when dealing with highly complex information about radiotherapy equipment safety, fault diagnosis, repair and maintenance.
	8. Works with scientific, technical, radiography and other staff to identify safety issues, diagnose faults, undertake preventative maintenance and equipment repair, including working in clinical areas and working with equipment manufacturers.

**B. Clinical Technical*** 1. Acts as an Operator, under the Ionising Radiation (Medical Exposures) Regulations (2000), with responsibility for complying with the employer’s procedures for work with ionising radiation.
	2. Prepares highly complex radiotherapy equipment (eg linear accelerators, kilovoltage x-ray unit and treatment simulators) for daily clinical use by checking safety features, ensuring correct technical operation, calibrating radiation beams, undertaking quality assurance, writing standard operating procedures and documenting work undertaken in appropriate records.
	3. Participates in detailed preventative maintenance programmes, servicing, fault finding and repair work on the highly complex radiotherapy equipment identified above, to help ensure its continuing safe operation, accurate radiation beam calibration, stringent quality control and operational performance within manufacturers’ published technical specifications.
	4. Helps to ensure that maintenance, service and repair undertaken by his/her Team on complex medical equipment to component level, comply with extant standard operating procedures for patient and staff safety. This includes following health and safety procedures, adhering to relevant protocols and record keeping systems; and contributing to specialist technical advice provided on workshop electrical safety and on the safety of radiotherapy systems.
	5. Has responsibility for ensuring that service and test equipment used by his/her Team is properly calibrated and maintained in good condition.
	6. Supports his/her Team’s participation in the Beatson’s equipment management program and in the design and modification of electronic and mechanical systems, networked databases and other software systems.
	7. Carries out emergency preparation, calibration, quality control, maintenance or repair work on the radiotherapy treatment machines or simulators outwith normal hours as requested.
	8. Helps to ensure that work undertaken consistently meets high professional and technical standards as required by extant legislation and national quality standards.
	9. Assists with the design of new, replacement and modified mechanical systems and patient treatment aids for use with radiotherapy equipment.
	10. Assists with non-routine design and construction of electromedical devices and systems for use with radiotherapy equipment systems and in clinical treatment.

**C. Specialist Areas of Advanced Work** The postholder has technical knowledge of one or more of the systems described in Section 6 and will become a technical specialist for one or more such system. He/she also contributes to advanced areas of technical/project work allocated to the Clinical Technologist Teams. Current specialist areas include: Advanced Teaching & Training for RT Engineering, Quality System Documentation for Technology Services, Technical Support for Clinical Radiotherapy Systems and Technology Services HelpDesk. The postholder contributes to one or more such areas: * 1. **Advanced Teaching & Training for RT Engineering** – The postholder contributes with the Clinical Technologist education in Radiation Technology. This includes helping to collate suitable technical material and prepare technical lectures/PowerPoint presentations; and assisting with the arrangements for practical demonstrations. He/she also helps to maintain paper and electronic records of all staff training undertaken and uses the associated Quality Assurance Document Management Software (QPULSE) in Radiation Technology.
	2. ***Quality System Documentation for Technology***– The postholder contributes to the implementation of the Quality Management System in Radiation Technology (ISO9001:2000) and helps to ensure its smooth operation. This involves contributing to document preparation, revision, audit and maintaining staff training records. Participates in the routine work associated with the Beatson’s Equipment Inventory, including recording Equipment Calibration Certification and Hazard Notification.
	3. **Technical Support for Clinical Radiotherapy Systems** *-**ARIA* is the networked radiotherapy treatment information system used to record and verify radiotherapy treatment data and manage associated medical images. The postholder contributes to the work of the RT Network Technical Support Team which is drawn from the Clinical Technologist Teams. He/she contributes to the quality control, safety testing, preventative maintenance and development of the system and its hardware and software systems, including servers, network switches, backup devices, uninterruptible power supplies and associated computer equipment. He/she also helps to prepare system documentation and standard operating procedures.
	4. **Technology Services HelpDesks** – The postholder contributes to the specialist technical service provided for electromedical equipment including that used to deliver oncology chemotherapy treatments. Responsibilities include routine calibration, preventative maintenance, fault finding, repair and testing of patient infusion devices and test equipment. He/she also helps to develop and prepare associated system documentation and standard operating procedures.

**D. Teaching and Training** – In addition to the duties described in Section 5C above, the postholder:* 1. Helps to ensure that he/she maintains and develops appropriate experience by undertaking suitable training, work rotation, and through the Knowledge and Skills Framework (KSF), Continuing Professional Development (CPD) and Personal Development Planning (PDP).

**E. Research and Development**Research and development are essential for continuous service improvement and to ensure that the potential of complex new equipment, facilities and treatment modalities is fully realised. The postholder:* 1. Assists with appropriate research and development projects in radiotherapy as requested through his/her line management structure.
	2. Assists with the commissioning and acceptance testing of newly developed highly complex devices and systems for patient treatment including those designed and constructed in-house.

**F. Professional*** 1. Undertakes the personal development necessary to maintain the high quality of the service provided and contributes to service developments. This includes attending suitable seminars and manufacturers’ specialist residential courses in order to keep up to date with the latest electronic and technical developments and their clinical applications in radiotherapy.
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| 1. **SYSTEMS AND EQUIPMENT**
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| Specialist Clinical Technologists must have a practical knowledge and understanding of the function and broad operating principles of a wide range of radiotherapy systems and equipment. The postholder is a technical specialist for one or more of the following areas: * 1. All equipment related to high voltage radiation treatment delivery including linear accelerators with multileaf collimators, stereotaxy delivery systems, on-board x-ray imaging systems, portal imaging devices, calibration systems, radiation room safety systems, chiller systems and laser alignment systems for patient positioning.
	2. Patient radiotherapy treatment recording and verification systems, including associated networked systems used to manage patient treatment data and medical images.
	3. Other radiation treatment equipment including kilovoltage x-ray equipment, brachytherapy afterloading equipment, therapeutic radiation sources and associated handling equipment.
	4. All types of infusion devices used to deliver chemotherapeutic and other drug treatments.
	5. Equipment used in the design of patients’ radiation treatments including x-ray treatment simulators, CT simulators, diagnostic x-ray equipment, electronic contouring systems and networked computerised treatment planning systems.
	6. Radiation treatment verification equipment including beam data acquisition systems, radiation beam profilers, ion chambers, solid state dosimetry equipment and in-vivo patient dosimetry.
	7. Resilient networked computer technologies, including the radiotherapy patient information system, patient critical server hardware, PC systems, critical data archiving systems, computer peripherals, interfaces, routers, switches, network infrastructure and wireless systems.
	8. Electrical, microwave, electronic, microprocessor based test equipment and electromedical equipment, some of which operates at high voltages. Heavy lifting equipment and precision equipment including jewellers’ screwdrivers, soldering irons, power tools and mechanical tools.
	9. System support, design assistance, construction and modification of networked databases, spreadsheets and a range of quality assurance and medical equipment management software and systems used extensively by Radiation Technology (eg EQUIP, QPULSE, PECOS, H&S and Hazard Warning Systems).
	10. Networked supplies ordering systems. Software systems include Microsoft (Word, Excel, Access and PowerPoint) and CAD packages and programming tools for project design.
	11. ISO9001:2015 Quality Management System and associated documentation.
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| 1. **DECISIONS AND JUDGEMENTS**
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| The postholder, as a specialist technician in clinical radiotherapy systems and electronics is expected to prioritise action and make the decisions and judgements required to:* 1. Contribute effectively to the daily activities of his/her Clinical Technologist Team.
	2. Contribute to the analysis and advanced fault finding in highly complex situations on high capital value patient critical radiotherapy equipment within the Beatson’s ISO9001:2015 Quality Management System and Local Rules for Ionising Radiation.
	3. Support the analysis of complex data used to predict radiotherapy equipment performance.
	4. Contribute to changes to written operating procedures relevant to Radiation Technology.
	5. Provide effective support to the Team Leader and to stand-in for him/her when necessary.
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| 1. **COMMUNICATIONS AND RELATIONSHIPS**
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| The postholder, who works closely with his/her Team Leader and other Team members, communicates as follows: |
| **People/Organisation** | **Purpose** |
| Radiotherapy Physics Staff | 1. Communicates decisions often of a highly complex nature and justifies reasons
2. Involves Team members in discussions on routine and service issues.
3. Participates in Radiation Technology Meetings and communicates with Section Managers and other senior staff (including the Technical Services Manager, Deputy and Clinical Scientists) about radiation technology matters.
4. Communicates with radiation dosimetry staff on the calibration of radiation treatment equipment, quality assurance and safety.
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| Therapy Radiographers | 1. Communicates to gain a clear understanding of complex equipment problems.
2. Advises on equipment problems with treatment (patient set-up, etc).
3. Assists with technical developments in clinical practice.
4. Arranges treatment equipment handover, etc.
5. Provides training as appropriate.
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| Nursing Staff | 1. Communicates about equipment problems, faults and suppliers’ service visits
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| Clinical Oncologists | 1. May provide advice on highly complex technical matters including safety and use of equipment.
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| Students and Trainees | 1. Gives lectures, tutorials and technical advice on radiation technology to Clinical Technologists, trainees, students, etc.
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| Manufacturers’ Agents | 1. Discusses complex technical information and about radiotherapy equipment, including software and computer systems and resolves faults when possible.
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| NGD Estates Staff | 1. Communicates and collaborates about aspects of hospital plant and equipment relevant to the operation of radiotherapy equipment.
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| 1. **PHYSICAL DEMANDS OF THE JOB**
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| * 1. Frequent requirement to maintain high levels of concentration when using computers and fault finding on highly complex treatment equipment in emergency situations and during intensive electrical/electronic work which can involve risks from intrinsic high voltage electrical systems.
	2. Frequent requirement to exert moderate physical effort and for manual skills when working on treatment equipment (frequently at height), involving dismantling and manual handling of heavy equipment including treatment couches, x-ray shielding (>15kg) and linear accelerator collimator systems (> 0.5 tonne).
	3. Frequent requirement for high precision machine control checks, QA measurements and associated safety critical adjustments requiring fractional millimetre accuracy and manual dexterity.
	4. Regular exposure to potentially distressing or emotional circumstances in clinical areas where cancer patients receive radiation treatment, including occasional exposure to distressing or emotional circumstances.
	5. Regular requirement to respond to urgent treatment equipment problems and help implement essential actions which could affect patient treatment.
	6. Regular requirement to work on highly complex high power microwave, high voltage and other live electrical systems, with responsibility for own safety and that of other staff.
	7. Regular requirement to work on radiation systems when safety controls are overridden or when parts of the equipment may be exhibiting induced radioactivity.
	8. Regular exposure to compressed gases, high vacuum, high temperature components, chemical products and microbiological hazards during equipment servicing and repair.
	9. Occasional requirement for fault diagnosis and safety decisions in emergency situations requiring stressful communications with medical staff, radiographers and patients.
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| 1. **MOST CHALLENGING/DIFFICULT PARTS OF THE JOB**
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| It is vital for the operation of the clinical service that all radiotherapy equipment managed and supported by Radiotherapy Physics is maintained in a safe working condition and available for clinical use for the maximum possible time during its lifecycle. The challenges are:* 1. Contributing to the work of his/her Team of Clinical Technologists in variety of demand led situations to help achieve an effective outcome, particularly when patient safety could be compromised, when no technical equipment fault can be found and/or when clinical pressures are applied by users to prioritise clinical urgencies.
	2. Helping to diagnose and contribute to the rapid, cost-effective repair of highly complex clinical linear accelerators and other equipment such that downtime is minimised.
	3. Helping to maintain safety critical operation and reliability of radiotherapy equipment and systems in line with rapidly changing technologies, service developments and changing guidelines issued by government agencies, advisory bodies and manufacturers.
	4. Developing specialist knowledge continuously, across a broad range of highly technical areas in line with constantly changing technical developments in radiotherapy technology.
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| 1. **KNOWLEDGE, TRAINING AND EXPERIENCE REQUIRED TO DO THE JOB**
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| **ESSENTIAL****Qualifications**A Degree in Medical Technology, Electrical/Electronic Engineering or other relevant discipline is essential. An HNC/HND or equivalent qualifications in Applied Physics or Electrical and Electronic Engineering or equivalent degree will be accepted provided the knowledge, training and experience profile matches the requirements of the post.**DESIRABLE**Registration on the Register of Clinical Technologists (RCT) held by the Institute of Physics and Engineering in Medicine (IPEM) is desirable. Membership of IPEM at an appropriate level is desirable. **Knowledge and Training****ESSENTIAL**Staff at this level require advanced skills, knowledge and understanding gained by professional qualifications, training and practical experience. This will encompass:* 1. The operation, function and purpose of a significant proportion of the broad range of complex medical equipment listed in Section 6, including electromechanical systems, computer systems, electronic engineering, equipment design and construction, fault diagnosis and repair to component level using a wide range of test equipment.
	2. An advanced in-depth knowledge of radiation technology, including quality control and safety testing and a working knowledge of relevant legislation, national standards and quality systems.
	3. A high level of in-depth understanding of patient and staff risks arising from equipment failure or misuse and how these can be minimised.
	4. Policies and practices for managing highly complex medical equipment including planned preventive maintenance, inspection, testing, calibration and repair.

**DESIRABLE*** 1. Evidence of continuing commitment to Continuing Professional Development (CPD) by the ongoing attendance at relevant study days, short courses and presentations for generic and specific competency on a wide range of highly complex medical equipment and their impact on clinical management, fulfilling the requirements of the Health Professions Council (HPC) as appropriate.

:**ESSENTIAL**ExperienceA minimum of **four years** relevant post-qualification experience is required for Degree and HNC/HND holders, with at least **two years** experience, preferably as a Senior Practitioner Clinical Technologist ot equivalent experience. Relevant experience includes:* 1. Practical experience and training on highly complex radiotherapy technology including linear accelerators, treatment simulators, treatment simulators, kilovoltage x-ray equipment and the application of specialist fault finding techniques specific to computer/microprocessor control systems, high vacuum systems, high voltage and radiofrequency systems. This is evidenced through successful completion of suitable training courses and on-going in-house training.

**DESIRABLE*** 1. Experience of participating in Teams, including contributing to managing resources, effective communication, writing standard operating procedures and knowledge of working policies and procedures.
	2. Experience of the application of clinical technology to medical equipment in healthcare.
	3. Training of technical staff and/or trainees either as individuals or in groups.
	4. Giving presentations on medical equipment technology to technical staff.
	5. Knowledge of relevant legislation, national standards, professional and other guidelines, including workplace practice, quality management, health and safety legislation. This includes the: Health & Safety at Work, etc Act, 1974 [HSAW 1974], Medical Devices Regulations, 2002 [MDR 2002], British Standards for Radiotherapy Equipment, Ionising Radiations Regulations, 2017 [IRR 2017], Ionising Radiation (Medical Exposure) Regulations, 2017 [IRMER 2017], Medical and Dental Guidance Notes 2024.
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**Organisation Chart**

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