

Job Description



Job Title:	Senior Fabrication Equipment Technologist
Department:	Office of Research
Reports To:	Director, Quantum-Nano Fabrication & Characterization Facility (QNFCF)
Jobs Reporting:	None
Salary Grade:	USG 9
Effective Date:	November 2020

Primary Purpose

The Senior Fabrication Equipment Technologist is a senior level staff person essential to the maintenance of operational excellence in the state-of-the-art, ISO4-rated cleanroom nanofabrication facilities located primarily in the Lazaridis Quantum-Nano Centre (QNC). The QNFCF also operates several additional satellite labs across campus and the incumbent may be called upon occasionally to share their expertise with colleagues at these satellite labs. This position is responsible for maintaining, troubleshooting, repairing and optimizing a large assortment of complex fabrication equipment of the type commonly used by the integrated circuit (IC) manufacturing industry. This position is also responsible for the establishment and upkeep of detailed equipment repair and maintenance procedures and data logs, and is also responsible for establishing and maintaining detailed and well-structured equipment operating procedures in a format consistent with ISO 9000 quality management standards. The incumbent interacts regularly with laboratory technical staff and research personnel and provides cleanroom and equipment operator training and guidance, as well as basic silicon process technology support to graduate students and visiting scientists from across campus and Canada.

Key Accountabilities

Maintenance, Troubleshooting, Repair & Optimization of Complex Scientific Equipment

- Incumbent is responsible for a large and diverse suite of integrated circuit (semiconductor) fabrication equipment including lithography equipment (both optical and e-beam), vacuum deposition equipment, wet & dry etching equipment and several IC characterization and assembly/packing tools such as surface profilers, ellipsometers, wire bonders, etc.
- Maintains, troubleshoots, repairs, cleans and optimizes of all fabrication equipment under her/his responsibility.
- Documents and executes thorough equipment preventative maintenance and repair procedures consistent manufacturer best practices. Documentation must be consistent with ISO 9000 standards; detailed equipment servicing protocols are required across the entire toolset.
- Tracks equipment performance via the use of statistical process control charts and acts proactively to correct any drift in performance before these impact lab users. This task is performed in partnership with QNFCF process engineers and scientists.
- Logs all lab equipment performance issues, repairs, maintenance and upgrades in an online database (*Badger* or equivalent).
- Participates in the development of new fabrication processes. This includes identifying proper process parameters in consultation with QNFCF technical staff members and possibly with faculty members as required. On occasion incumbent may be tasked with carrying out equipment test sequences and for completing subsequent measurements and evaluations to verify and formally document process performance.

Job Description



- Develops/adapts/documents lab equipment operating policies and procedures (SOPs) based on evolving needs, industry best practices, university guidelines and QNFCF policies.
- Orders and maintains a traceable inventory of parts and supplies specific to each piece of equipment.
- Schedules workloads in order to meet deadlines and to maximize equipment uptime.

Mentoring, Training & Championing Safe & Professional Operations

- Incumbent acts as a mentor for the technical team and sets its day-to-day operational priorities in consultation with peers.
- Trains new technical staff members as needed via one to three day training sessions which comprise both theoretical and hands-on components. Sessions are organized and taught by incumbent; the creation of training videos may occasionally be required as appropriate.
- Delegates appropriate tasks to junior members of the technical team as appropriate;
- Instructs graduate research students in the safe and effective operation of complex lab equipment; also instructs new users on cleanroom and health & safety procedures and protocols.
- Incumbent contributes meaningfully to the QNFCF's mission of maintaining high quality and consistent operations comparable to those found in high-end, advanced integrated circuit manufacturing environments, all while demonstrating the flexibility needed to enable novel quantum and nano research initiatives to move forward quickly, effectively and consistently.

Continuous Improvement & New Projects

- Incumbent participates in new equipment installation and commissioning activities as well as new lab design and renovation activities.
- Receives manufacturer technical training on new equipment and shares new learnings with peers and QNFCF lab member community as appropriate.
- Establishes and maintains relationships with multiple lab equipment manufacturers to ensure that equipment repairs and maintenance are done in accordance with industry best practices.
- Keeps current with advancements / changes in the industry; proposes improvements and takes the initiative to implement these when appropriate, in consultation with peers on the QNFCF team.

Health & Safety

- Maintains the safety and integrity of all lab equipment and facilities.
- Actively participates in the enforcement of all health and safety guidelines in accordance with UWaterloo and QNFCF protocols & policies.

**All employees of the University are expected to follow University and departmental health and safety policy, procedures and work practices at all times. Employees are also responsible for the completion of all health and safety training, as assigned. Employees with staff supervision and/or management responsibilities will ensure that assigned staff abide by the above, and actively identify, assess and correct health and safety hazards, as required.*

Required Qualifications

Education

- Minimum college-level degree in a relevant 3-year engineering technology program (mechanical, electrical or controls) or Technical certification/diploma in a relevant field with extensive experience in industry.

Experience

- Must have proven ability, extensive experience & expertise and excellent knowledge and understanding of the operation of state-of-the-art, cleanroom-based nanofabrication facilities and the complex fabrication equipment housed in these.
- Electronics and control systems troubleshooting & repair.

Job Description



- Extensive and relevant experience (7 to 10 years minimum) servicing and repairing a wide range of semiconductor manufacturing equipment ranging from lithography, wet process, vacuum deposition dry etching, IC packaging, etc.

Knowledge/Skills/Abilities

- Excellent mechanical assembly skills complemented by basic electronics and control systems knowledge.
- Excellent grasp and use of common software platforms including MS Word and Excel.
- Experience with design software such as Solidworks, AutoCAD, etc., is an asset but not required.
- Experience with vacuum systems is an asset but not required.
- Outstanding written and oral communication and interpersonal skills.
- Ability to be firm in the application of lab protocols & policies while exhibiting exemplary tact & diplomacy in dealing with people from a broad range of educational and cultural backgrounds.

Nature and Scope

- **Contacts:** Internally: works routinely with graduate students and with his/her peers on the QNFCF team. Interacts with university departments including Procurement, Plant Operations, Environmental Waste, Chemistry Stores, etc. Works occasionally with Principal Investigators. Externally: works with visiting scientists and lab users from industry and from other universities as well as government agencies such as the NRC. Establishes and maintains relationships with lab equipment manufacturers to ensure equipment repairs & maintenance are done according to industry best practices. Keeps current with advancements in the industry by routinely reaching out to and communicating with external equipment vendors and specialists.
- **Level of Responsibility:** As a senior level staff member this position is responsible for the safe operation of specialty labs in which many dangerous chemicals and gases are routinely used. Incumbent influences capital equipment and consumables acquisitions. Incumbent provides leadership and guidance to all users of the lab, including the authority to grant and restrict lab user access as a function of eligibility, minimum training and safety policy requirements. Incumbent uses her/his extensive experience and rare expertise to coach graduate students and junior staff members on the QNFCF team. Devises and continuously optimizes equipment operator training plans and executes these plans consistently across the entire lab user base.
- **Decision-Making Authority:** Incumbent has full authority to work directly with highly specialized equipment vendors and vendor technical/engineering personnel as required to troubleshoot and resolve all manner of complex and delicate lab equipment with a combined value in excess of \$25M. Has full authority to purchase replacement components as required to return malfunctioning lab equipment to an optimal state of repair.
- **Physical and Sensory Demands:** Extensive time may be spent either sitting or standing in front of various equipment including fume hoods. Flexibility is required when servicing or repairing equipment. In the course of receiving / shipping / installing new machine components this position may occasionally require the lifting of objects weighing up to 40lbs. Much time is spent working in a cleanroom environment where cleanroom gowning (head to toe) must be worn. Extended periods of time may be spent under yellow lighting conditions in the cleanroom. Long hours are sometimes needed to repair equipment in high demand and in some cases, physical flexibility and strength is needed to troubleshoot or to remove defective components.
- **Working Environment:** There are deadline pressures, while at the same time there is a demand for thoroughness, accuracy and acute attention to detail. Some of the work can be accomplished sitting in a comfortable position with frequent opportunity to move about. The incumbent is expected to work independently in carrying out all tasks under their scope. In complex or unusual situations the incumbent is expected to exercise good judgement and attempt to respectfully and diplomatically

Job Description



resolve the situation themselves. Incumbent is expected to consult with peers and seek assistance from both within and outside the QNFCF team as required to de-escalate difficult situations.