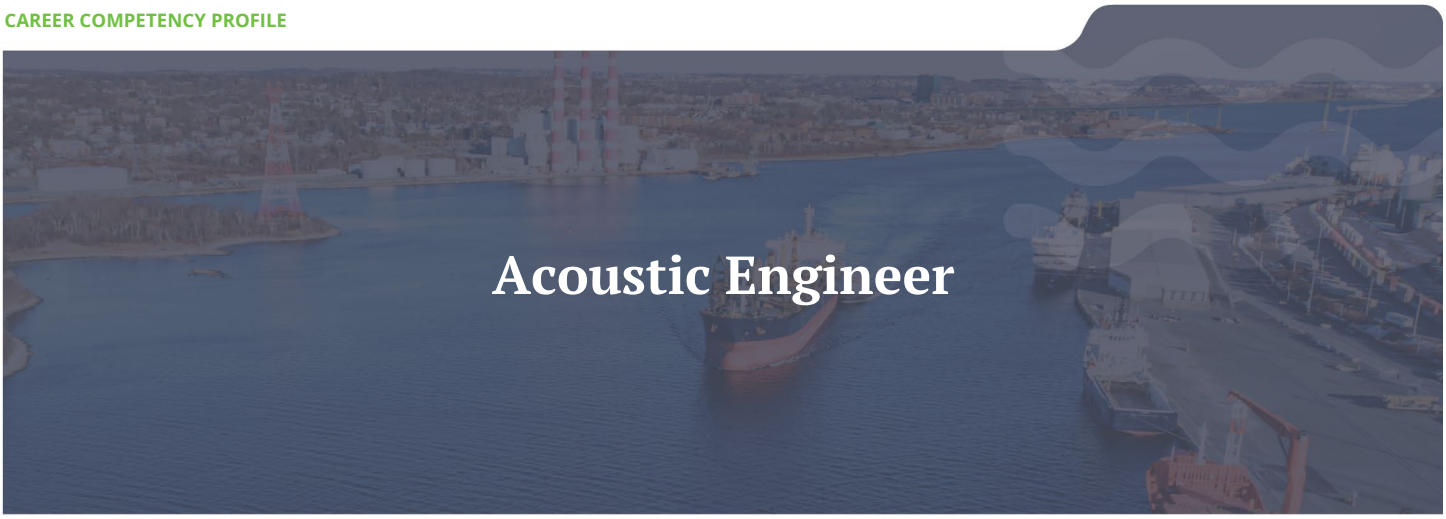

Acoustic Engineer

ROLE OVERVIEW

You are the lead technical specialist of acoustic systems and solutions.

As an acoustic engineer you study and apply the science of sound to various applications, engineering solutions to improve our knowledge of the effects of noise on aquatic life and monitoring the behaviour of the same. You are expected to be the expert on all aspects of design, development, analysis, and evaluation of technical acoustic equipment or technologies.

You may work in a variety of different areas, including the consultation of the acoustics and elements affecting the transmission of sound in spaces for performances or recording activities. You may also consult on the levels of noise contamination for those activities that require compliance with standards on that matter. As an acoustic's engineer you may also be employed to explore mineral deposits in seabed's and locate marine vessels such as submarines.

You must have exceptional problem-solving skills in addition to a high-level understanding of maritime systems or systems engineering. You will work with experts in a variety of different disciplines, collaborating in a multi-disciplinary and diverse team environment that works cohesively to design innovative solutions to complex problems.

STRATA LEVEL: 3B – Technical Specialist

Also Known as:

- Sonar and Acoustics Engineer
- Acoustical Engineer
- Acoustical Engineering Advisor
- Acoustical Technology Engineering Expert
- Bioacoustical Engineer

Education and Experience:

- A bachelor's degree in engineering is required.
- A master's or doctoral degree in a related discipline may be required.
- Licensed by a provincial or territorial association as a Professional Engineer (P.Eng.).

Associated NOC(s):

- **2132** – Mechanical Engineer

TECHNICAL

Scientific Research

Applies scientific methods and techniques using empirical and/or measurable observation in their research to improve, correct or increase knowledge in a field of study to solve specific problems.

- Conducts comprehensive review of information and publications to ensure a complete understanding of a subject prior to development activities.
- Applies appropriate research methodologies to all scientific studies to provide insights to data collection and analysis to ensure research can be reproduced and validated.
- Conducts experiments on marine ecosystems and environments to understand the relationships and human influence in a marine environment.
- Contributes to study design for marine investigative programs to address the impacts of departmental initiatives, plans and activities.
- Measures sounds and vibrations in the ocean to improve knowledge on the effects of noise and human activities to aquatic life.

Acoustical Data Analysis

Applies recognized statistical tools and techniques to interpret and analyze acoustics data for the purposes of uncovering trends, patterns, and opportunities to enable strategic decision making.

- Collects and analyzes acoustics and sonar data to understand the movement of marine species within an environment.
- Performs acoustical analysis on collected datasets to establish a product baseline for engineered designs to improve product performance.
- Prepares an acoustic assessment report and acoustic audits of a specified area to evaluate the sources of noise and vibrations.
- Uses appropriate software and tools to perform analysis and trade studies to evaluate potential technical solutions.
- Conducts noise modelling using appropriate software to assess, identify, or predict sound propagation to assess the impacts of potential developments.

Software Application Design

Transposes a series of requirements into a clear and organized software design for the purposes of creating an application or system.

- Contributes to the development or improvement of acoustic modelling software and acoustic analysis tools to study, predict, visualize, evaluate etc. acoustical phenomena.
- Uses process simulation software, flowcharting, scaling models and other tools to identify the workflow and resource requirements for a particular process to enable the creation of an application or system.
- Identifies error types and applies appropriate method or technique to debug software and correct error to maintain usability of system.
- Assists with software development throughout the lifecycle to test and integrate new developments with existing technology or applications.
- Assesses user requirements prior to undertaking projects to develop software applications or operating systems to meet user needs.
- Repairs defects identified in testing analysis to ensure accurate application outputs to ensure a functional product or system.

Engineering Review and Analysis

Reviews and analyzes relevant information pertaining to technical designs and complex systems to develop appropriate solutions.

- Assesses the functionality, replicability, costs, and other factors to be considered to develop appropriate technical solutions to engineering related problems.
- Develops realistic acoustic test scenarios to accurately test and qualify acoustic processor products.
- Works with other technical staff to conduct a performance requirement analysis of systems so that engineering solutions can be developed.
- Observes and documents the expected behaviour of new product designs in operator manuals to ensure replicability and efficient human machine interaction.
- Performs design analysis and circuit level tests to establish the thermal effects and tolerances ensure the validity and operability of designs under specific conditions.

Engineering Design

Responsible for the technical aspects of the planning and design of engineering project[s] to ensure project is constructed in a safe, efficient, and effective manner.

- Defines the engineering-related problem or opportunity and potential risk and benefits of project proposal[s] to senior management and stakeholders so that project proposal can be approved and implemented.
- Prepares complete technical drawings with sufficient details and specifications to ensure the effective and safe construction of structures, systems, and facilities.
- Proposes technical design or process changes to improve efficiency, quality, or performance of products, structures, systems, or facilities.
- Applies quality control techniques throughout the design and construction to ensure the safe construction of structures, systems, and facilities for the purposes of achieving regulatory compliance.
- Works with end users to convert user requirements into product design and development to ensure products or systems meet consumer functionality requirements.
- Applies acoustic principles to the design of new technologies to develop technical solutions to reduce unwanted noise, create applications, improve acoustics, etc.

Prototype Development

Design prototypes of products or components of products by applying design and engineering principles to showcase the future product and test potential innovations to enhance market competitiveness.

- Applies working or theoretical models throughout the design, testing, and modification process to test again product prototypes.
- Leads the development of an early model to test concepts and replicability of hardware or systems.
- Presents prototype[s] to client or key stakeholders to obtain feedback on design and expectations to improve on the working model.
- Integrates feedback form client and test data to refine prototype to improve end design.
- Conduct experimental, environmental, and operational tests on models, prototypes or on the systems and equipment itself to test their strength and capabilities under normal and extreme conditions.

Equipment Operation

Operates equipment using established processes to ensure outcomes are within allowable variances and maximizes safety and efficiency.

- Operate instruments such as transducers and sound level meters to measure noise levels in an environment in order to prevent noise pollution.
- Operate audio-signal processors to alter auditory signals.
- Works with other technical staff to install equipment to monitor and gather data from a specific location.

PERSONAL AND PROFESSIONAL

Communication

Positively directs outcomes by delivering communication that results in a better understanding of goals and objectives and that capture interest, and gain support for immediate action.

- Explains novel or complex engineering concepts and related facts in an appropriate manner to an audience to explain aspects of the design process and/or proposal.
- Actively participates in or leads inter/intra-departmental teams to generate ideas and solutions, solve problems, and improve overall organizational performance.
- Maintains communications with the team, as well as external stakeholders, to exchange information, assess progress and reassign work as needed.

Problem Solving

Identifies problems and uses logic, judgement, and evidence to evaluate alternative scenarios and recommend solutions to achieve a desired goal.

- Simplifies complex ideas and technical concepts into accessible information to communicate with stakeholders, senior management, and team members.
- Considers all pieces of information when attempting to solve problems to produce a cognisant and comprehensive solution.
- Approaches problems with a balance of logic and creativity to develop innovative solutions.
- Considers several possible explanations or alternatives for a situation and anticipates potential obstacles and develops contingency plans to overcome them.

LEGAL, REGULATORY, AND POLICY

Regulatory Compliance

Adheres to specific regulations, codes, and legislation within a defined jurisdiction to ensure the health and safety of others.

- Make sure that buildings, roads, air traffic, and events comply with local, national or international noise standards and regulations in order to minimise nuisance for the neighbouring residents.
- Assessment of noise/vibration impacts to relevant guidelines, regulations and standards and development of mitigation solutions.

ENVIRONMENTAL

Ecosystem Identification

Uses primary and secondary sources of information to identify an area's ecosystem to plan and propose development, remediation, or environmental management activities.

- Monitors and tracks marine mammal movements to document migration, timing, and presence frequencies in a specific area.
- Develop and implement long-term programs for monitoring the marine environment to oversee environmental impacts.
- Contributes to the design, development, and implementation of complex environmental studies to assess the effects of development activities to an environment.
- Identify historical changes to marine and coastal ecosystems to determine the potential effects of project on a local area.
- Identifies and interprets the ecology and distribution of organic species to understand the project location.

Marine Bioacoustic Analysis

Abides by and advocates specific workplace safe operating procedures and occupational health and safety requirements within a defined jurisdiction to ensure the health and safety of others.

- Leads the design and development of sonar systems technologies, including array design, sensor signal processing, adaptive beamforming, acoustic communications, and automated detection/ classification processing to detect, localize, and classify a sound of interest.
- Conducts marine acoustic propagation modelling for stationary and mobile noise sources in varied oceanic environments and integrate with statutory requirements and associated regulations.
- Applies appropriate methodologies to measure a marine animal's reaction to sound to study the physiological effects and behavioural changes in a species.

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