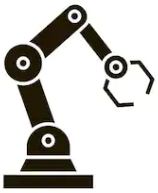


Level 5 HND in Mechanical Engineering

This advanced course provides students with a wide range of knowledge and skills relevant to mechanical, manufacture, process, and oil/gas industries. The programme aims to provide a broad understanding of mechanical engineering technologies. In addition, it develops organizational skills including project planning, maintenance strategies, methods of design analysis, leadership and interpersonal skills. Throughout the course, you will complete various units including, but not limited to, Advanced Mechanical Principles, Advanced Manufacturing Technologies and Virtual Engineering.

What does the course include?

The successful completion of this HND course will open many doors for you. Here are a few of the options:

- Progression to degree studies B.Sc./B.Eng. in Mechanical Engineering (1 year)
- Apply for the following jobs within industry:
  - Mechanical Design Engineer
  - Project Engineer
  - Manufacturing Engineer
  - Production Engineer

Where can this course lead?

Can't wait to get started? Here are some places to get you on your way:

- **Video:** 5 Important Skills for Mechanical Engineers to Succeed https://www.youtube.com/watch?v=gHSZ1S9996U

- **Book:** Basics of Mechanical Engineering http://ronney.usc.edu/AME101/AME101-LectureNotes.pdf

- **Article:** Engineering Skill for the Future https://www.raeng.org.uk/publications/reports/engineering-skills-for-the-future

Have a go!

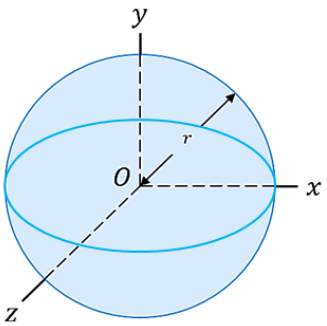
Activity – Analysis of Hydrostatic Pressure

The air around us (at sea level) presses down on our bodies at approximately 14.7 pounds per square inch. We do not feel this pressure since the fluids in our body are pushing outward with the same force. But if you swim down into the ocean just a few feet and you will start to notice a change. You will start to feel an increase of pressure on your eardrums. This is because of an increase in **hydrostatic pressure** which is the force per unit area exerted by a liquid on an object. The deeper you go under the sea, the greater the pressure pushing on you will be. For every 10.06 meters you go down, the pressure increases roughly by 14.5 psi (1 bar).

Hydrostatic pressure is one of the most elementary notions encountered in the fields of naval architecture and marine engineering. For this reason, it is important to model it and assess the physical effects it induces on parts or components designed to be used under water or any liquid.

Problem:
Consider a steel sphere submerged in water at a depth of 800m. Assume the material properties given below:

Young's Modulus: E = 190 GPa
Poisson's Ratio: v = 0.3



1. Calculate material's bulk, K. Use the following equation:

$$K = \frac{E}{3 - 6v}$$

2. Estimate the magnitude of the hydrostatic pressure, P. Use the following equation:

$$P = \boldsymbol{Water\ Density} \times \boldsymbol{Gravity} \times \boldsymbol{Depth} = \rho g h$$

Where:
P = Pressure expressed in Pascals
Water Density = 1000 kg per cubic meter

3. Find the internal strain, $\boldsymbol{\varepsilon}$, affecting the structural integrity of the sphere. Use the following equation:

$$\varepsilon = \frac{P}{3K}$$