Vacuum Engineering

Job Description

- Vacuum engineers are responsible for designing, troubleshooting, and maintaining the components in the vacuum systems at the Spallation Neutron Source. The vacuum systems are necessary in order for the Hydrogen ions to easily pass through the beam line.

Education

-Bachelor's degree in an engineering, physics, or chemistry field

-Internships in the vacuum engineering field are preferred

Approximate Salary Range

-The salary for a career in vacuum engineering can range from about $60,000-$140,000

What can I do now to prepare?

-Gain a fundamental understanding of math and science

-Enroll in courses in the physics/chemistry field in high school

-Research universities with a program in one of the fields required and determine what qualifications you need to get into those universities.

-Look for possible summer internships in the field and determine what steps to take and when you can apply.

Career Spotlight

Jeremy Price: Vacuum Systems Group Leader

Jeremy Price heads the group of vacuum engineers that design, maintain, and troubleshoot the vacuum systems in the beam line throughout the SNS. The beam is under extreme vacuum in order for the particles to pass through it. Vacuum systems in the beam line must be closely monitored to ensure that the beams are safe and reliable as they are used constantly for research. The vacuum systems have many components including the pumps that take out other gasses in the beam, the gages that are used to measure which gasses are currently in the beam, and the valves that separate different parts of the beam. When issues arise, the vacuum engineers must determine whether there is a leak, certain gasses may be the beam that shouldn't be, or a component of the system is damaged. Design is another major part of this career field. The engineers use computer software programs to design equipment for the vacuum systems. Jeremy began is career in the machining field while completing his bachelor's degree and then, through a summer internship at ORNL, became interested in vacuum systems. The internship led to a job as a vacuum technician, which then led him into a position in vacuum engineering. Price says that some key skills needed in this field in addition to the background knowledge in physics and engineering are communication, organization, a detail-oriented mindset, and the ability to be aggressive and solve problems head on.

Interview: Jeremy Price

- What is your job title?

Vacuum Systems Group Leader

- Describe your job as if you were talking to a middle schooler.

The beam line has to be under vacuum so the hydrogen particles can easily move through the machine. The vacuum system removes all of the other gasses in the beam pipe so that the hydrogen can easily flow.

- Our students will build a model of the injection region of the SNS. Did you have any role in any of the equipment (design/operation/maintaining/ control) in the injection region shown in model? Can you explain that role?

The vacuum engineer team aids in the design of the beam pipes to ensure they are conducive for vacuum. They maintain the pumps that evacuate the gasses and use gages to measure the pressure so they can achieve the vacuum necessary.

- What qualifications or education did you need in order to be hired for your position?

There isn't a vacuum engineering degree. Most people in this field have a mechanical engineering degree. General Engineering, Physics, and Chemistry are all fields that are relevant to the background knowledge needed for this position. However, to really understand the job, internships and work experience are needed.

- Did you have any other jobs before this one that led you to your position?

Internship and CO-OP at ORNL in the summer that led into a long-term position as a technician to learn how to build and troubleshoot the vacuum systems.

- Are there any other types of jobs that work in your field that are on your team or that you work closely with?

Vacuum Engineers. Controls (pumps/gages/valves are controlled by them). Mechanical Designers. Mechanical Engineering (finite element analysis to determine strenths/temperatures)

- When did you become interested in perusing a job in this field?

Through the internship (22ish) an experienced vacuum engineer explained the intricacies about how precise it must be and it was interesting.

- What does a typical work day look like for you?

Operability: Ensure that the 500 pumps are working, gages are measuring etc.

Design: If someone wants to change something about the vacuum they will redesign

Issues: When something breaks or isn't working correctly they troubleshoot to fix it

Strategic Planning: What problems to fix and when, updating systems efficiently

- What aspects of your job do you enjoy the most?

No standard day- never gets boring because each day is different

- What tools or technology do you use most in your job?

-Computer Software

- Residual Gas Analyzers- measure the atomic mass units to know what gasses are in the vacuum system and what level to help the vacuum engineers determine if there is something off from the “recipe” of the normal system for troubleshooting.

-Mass Spectrometer Leak Detector- hook to a vacuum system and spray helium on the outside and the helium goes in the leak and then you can measure the leak rate to determine how to mitigate or repair the leak.

- What skills do you think are essential in your job in order to be successful?

-Communication and Collaboration

-Organization/Detail Oriented

-Be aggressive and solve problems head on

- Why is your job important to the Spallation Neutron Source?

The hydrogen ions would not be able to move through the beam if the beam was not under a vacuum system.