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Tom Mueller: STEM Education Leads to Career in Rocket Science

4-5 minutes

SpaceX co-founder and UI alumnus Tom Mueller owes career in rocket science to strong foundation in STEM fields.

I grew up in a small town in North Idaho, and although I had an interest in science, I didn't know much about jobs in technical fields.

Early on, I decided I would be an aircraft mechanic, but in high school I took a geometry class and found that I was one of the best students in the class. My math teacher, Mr. Hines, said to me, "You're really good at math; you're going to be an engineer, right?" I said, "No, I'm going to be an aircraft mechanic."

His reply are the words that changed my life: "Do you want to be the guy that fixes the airplane, or the guy that designs it?" I thought about it for a minute and said "yeah, I want to be the guy that designs the airplane!"

He helped me get into the right college prep classes and start looking for an engineering school. I was delighted to find out that UI had an excellent engineering school just 70 miles from my hometown. The choice of schools was easy.

Before starting my studies, I had a poor understanding of what it was a mechanical engineer did. In my classes I learned how to apply engineering to real-world problems. I was amazed at the power of physics and how nearly everything could be expressed in mathematical terms. My favorite classes were the applied engineering classes like fluids, dynamics, stress, materials and thermo-dynamics. I couldn't wait to get out in the world to invent, develop and create!

When we formed SpaceX in 2002, I found myself with the most daunting engineering task of my life. As the vice president of propulsion, I had the responsibility of developing the Merlin rocket engine from a clean sheet. Booster class rocket engines are such an intense engineering problem that many believed that only governments could develop them. They have the highest energy density of any machine developed by man, releasing billions of watts of thermal energy in a small high-pressure combustion chamber. Everything I learned in engineering applied: Fluid dynamics, thermodynamics, chemistry, dynamics and vibration, stress and strain, materials and metallurgy, electrical systems, heat transfer and mechanical design.

Within a year of starting the company, we had the initial assemblies of the engine in test: the main combustion chamber and turbopump assembly. Amazingly, they worked, but there were many refinements to make. Containing 6,000-degree gases under high pressure is a daunting task, and any deficiencies in the design are immediately found. We had a saying at our Texas test site: A thousand things can happen when you ignite a rocket engine, and only one of them is good.

Early on we found a lot of the not so good things, and were constantly battling the bane of rocket engine development, the RUD — short for rapid unscheduled disassembly. Thousands of tests and many design iterations later we have the current version of the Merlin rocket engine, the Merlin 1D. It produces 170,000 pounds of thrust, is low cost, is very reliable and has the highest thrust to weight of any booster engine ever developed.

I am quite proud of what we have accomplished.

Thank you Mr. Hines for putting me onto the right path, way back in 1976!

• Tom Mueller was born in St. Maries, Idaho, and graduated from the University of Idaho in 1985 with a bachelor's degree in mechanical engineering from the College of Engineering. He is a founding employee and chief technology officer of propulsion at SpaceX.