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A Short Note on Aerospace Engineering

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Opinion Article

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INTRODUCTION

Aerospace engineering is the primary field of engineering concerned with the development of aircraft and spacecraft. It has two major and overlapping branches: aeronautical engineering and astronautical engineering. Avionics engineering is similar, but deals with the electronics side of aerospace engineering. "Aeronautical engineering" was the original term for the field. As flight technology advanced to include vehicles operating in outer space, the broader term "aerospace engineering" has come into use

Flight vehicles are subjected to demanding conditions such as those caused by changes in atmospheric pressure and temperature, with structural loads applied upon vehicle components. Consequently, they are usually the products of various technological and engineering disciplines including aerodynamics, Air propulsion, avionics, materials science, structural analysis and manufacturing. The interaction between these technologies is known as aerospace engineering.

The origin of aerospace engineering can be traced back to the aviation pioneers around the late 19th to early 20th centuries, although the work of Sir George Cayley dates from the last decade of the 18th to mid-19th century. One of the most important people in the history of aeronautics and a pioneer in aeronautical engineering, Cayley is credited as the first person to separate the forces of lift and drag, which affect any atmospheric flight vehicle

Early knowledge of aeronautical engineering was largely empirical, with some concepts and skills imported from other branches of engineering. Some key elements, like fluid dynamics, were understood by 18th-century scientists. In December 1903, the Wright Brothers performed the first sustained, controlled flight of a powered, heavier-than-air aircraft, lasting 12 seconds. The 1910s saw the development of aeronautical engineering through the design of World War I military aircraft.

Fluid mechanics

The study of fluid flow around objects. Specifically aerodynamics concerning the flow of air over bodies such as wings or through objects such as wind tunnels

Astrodynamics

The study of orbital mechanics including prediction of orbital elements when given a select few variables. While few schools in the United States teach this at the undergraduate level, several have graduate programs covering this topic (usually in conjunction with the Physics department of said college or university).

Propulsion

The energy to move a vehicle through the air (or in outer space) is provided by internal combustion engines, jet engines and turbomachinery, or rockets. A more recent addition to this module is electric propulsion and ion propulsion.

Control engineering

The study of mathematical modeling of the dynamic behavior of systems and designing them, usually using feedback signals, so that their dynamic behavior is desirable (stable, without large excursions, with minimum error). This applies to the dynamic behavior of aircraft, spacecraft, propulsion systems, and subsystems that exist on aerospace vehicles. Aerospace engineering may be studied at the advanced diploma, bachelors, masters, and Ph.D. levels in aerospace engineering departments at many universities, and in mechanical engineering departments at others. A few departments offer degrees in space-focused astronautical engineering. Some institutions differentiate between aeronautical and astronautical engineering. Graduate degrees are offered in advanced or specialty areas for the aerospace industry.

The term "rocket scientist" is sometimes used to describe a person of great intelligence since rocket science is seen as a practice requiring great mental ability, especially technically and mathematically. The term is used ironically in the expression "It's not rocket science" to indicate that a task is simple. Strictly speaking, the use of "science" in "rocket science" is a misnomer since science is about understanding the origins, nature, and behavior of the universe; engineering is about using scientific and engineering principles to solve problems and develop new technology. The more etymologically correct version of this phrase would be "rocket engineer". However, "science" and "engineering" are often misused as synonyms.