

# **Career Profile: Aerospace/Aeronautical Engineer**

An aeronautical engineer designs, develops and manufactures aerospace vehicles. Within this industry it is possible to be involved in research, design and development, management and production, or operations and maintenance. They do overlap so it is possible to be involved in all three areas.

Aeronautical engineers usually work as part of a team. The following outline of some of the specialisations within the field, show why this is necessary.

## **Structural analysis**

- analyse the static and dynamic loads acting on an aircraft or flight vehicle
- design a structure capable of withstanding these loads
- select construction materials and production methods
- analyse the performance of the completed airframe before it is released for flight, often by means of complex computer simulations

## **Aerodynamics**

- study the airflow over an aircraft or flight vehicle to work out its configuration, stability, control, as well as its performance and power requirements
- build scale models of an aircraft or flight vehicle for testing in a wind tunnel

## **Propulsion**

- become involved in computational fluid dynamics (CFD), thermodynamics, gas dynamics and the strength of materials
- design, develop, produce and test aircraft engines to ensure that they meet specified power and performance criteria

## **Systems**

- define and integrate all subsystems of an aircraft/missile to make sure they meet all requirements and function properly
- avionics encompasses aspects such as flight instrumentation, radar, computers, navigation equipment, communications systems (mechanics and electronics)
- servo-control and power systems contribute to the stability and control of modern aircraft and missiles (hydraulic and electric systems).

Aeronautical engineers spend a lot of time researching information, working with complex equations, using computers and discussing possibilities with colleagues.

# Education Requirements

## National Senior Certificate (NSC)

For a career in aeronautical engineering students are advised to select Physical Science and Mathematics, and to add to this a selection from the designated subjects. These are subjects that are particularly suitable for tertiary study.

## Bachelor Degree

### **Bachelor of Science Engineering (Aeronautical) – (4 years)**

A four year degree programme that focuses on developing knowledge and skills for entry into careers in the field of aeronautical engineering.

#### **Offered at:**

- [University of Pretoria](#)<sup>1</sup> (Department of Mechanical and Aeronautical Engineering)
- [University of the Witwatersrand](#)<sup>2</sup> (School of Mechanical, Industrial and Aeronautical Engineering)

The Department of Mechanical and Aeronautical Engineering at University of Pretoria offers an aeronautical option in the final year of undergraduate study. The option entails applying the final-year capstone courses Design and Project to aeronautical topics where possible. In addition, students take the subject Aerodynamics. Having this background, students interested in the field of aeronautics and astronautics usually follow the world-wide practice of studying for postgraduate degrees specializing in these fields.

## Registration as a professional engineer

A person who has obtained a recognised BSc(Eng) or BEng degree is eligible for registration as a Candidate Engineer. After gaining at least 3 years of appropriate practical experience an aeronautical engineer may apply for registration as a Professional Engineer under the auspices of the Engineering Council of South Africa.

## Possible Employers

- [Directorate of Civil Aviation](#)<sup>3</sup>
- [Denel Saab Aerostructures](#)<sup>4</sup>
- [Denel Aerospace Systems](#)<sup>5</sup>

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<sup>1</sup> <http://web.up.ac.za/default.asp?ipkCategoryID=2163>

<sup>2</sup> <http://web.wits.ac.za/academic/ebe/Mecheng/>

<sup>3</sup> <http://dgca.nic.in/>

<sup>4</sup> [http://www.denel.co.za/denel\\_aerostructures.html](http://www.denel.co.za/denel_aerostructures.html)

<sup>5</sup> <http://www.denel.co.za/>

- [South African Airways](#)<sup>6</sup>
- [Aerotek \(CSIR\)](#)<sup>7</sup>
- Many other smaller companies in local and international aerospace programmes
- Possibilities also exist in non-aeronautical companies

## **Find out more**

Find out more about aeronautical engineering:

- [Engineering Council of South Africa \(ECSA\)](#)<sup>8</sup>
- [ECSA's discipline specific guidelines](#)<sup>9</sup> for aeronautical engineering
- [GoStudy](#) has useful information on the aeronautical engineering
- [SA Institute for Aerospace Engineering](#)<sup>10</sup> (SAIAeE)
- [Sune Gerber](#)<sup>11</sup> was awarded a gold medal in Senior Engineering category of the National Eskom's Expo for Young Scientists in October 2009 for her 'Propeller Efficiency' project

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<sup>6</sup> <http://www.flysaa.com/>

<sup>7</sup> <http://www.csir.co.za/dpss/aero.html>

<sup>8</sup> <http://www.ecsa.co.za/>

<sup>9</sup> [http://www.ecsa.co.za/documents/DSG\\_Aero.pdf](http://www.ecsa.co.za/documents/DSG_Aero.pdf)

<sup>10</sup> <http://www.aessa.org.za/>

<sup>11</sup> <http://www.aessa.org.za/>

## Are you suited to this career?

This quick quiz can help you to identify whether you are suited for this occupation. The questions are based on interests, characteristics and values typical of people who work as aeronautical engineers.

Quiz	Yes	No
Are you fascinated by airplanes and flight?		
Do you enjoy working out complex mathematical formulae?		
Would you describe yourself as a perfectionist?		
Are you interested in solving problems?		
Do you enjoy working with the latest technology and machinery?		
Are detail and accuracy in your work important to you?		
Are you creative and do you persevere when faced with a problem?		
Can you communicate well in speech and in writing?		
Do you work well with other people and communicate clearly with them?		
Are you excited by the possibility of working closely with specialists from various fields in a dynamic environment?		

If you have mainly yes answers it may be an indication that this is an occupation to consider.