



ENSURING THE EXPERTISE TO GROW SOUTH AFRICA

**Discipline Specific Training Guide for Registration as a
Professional Engineer in Aeronautical Engineering**

R-05-AER-PE

REVISION 3: 14 February 2023

ENGINEERING COUNCIL OF SOUTH AFRICA
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DEFINITIONS

Certification: Formal recognition awarded to an education or training programme through a quality assurance procedure specifying that it meets the criteria laid down for the type of programme.

Competency Standard: Statement of competency required for a defined purpose.

Complex engineering work: This work is characterised by the following:


- (a) Scope of activities may encompass entire complex engineering systems or complex sub-systems.
- (b) The context is complex, varying, multidisciplinary, and unpredictable; it requires teamwork and may need to be identified.
- (c) It requires diverse and significant resources, including people, money, equipment, materials, and technologies.
- (d) Significant interactions exist among wide-ranging or conflicting technical, engineering, or other issues.
- (e) It is constrained by time, finance, infrastructure, resources, facilities, standards and codes, and applicable laws.
- (f) It has significant risks and consequences in a range of contexts.
- (g) Solution is not readily apparent.
- (h) The problem statement has many inter-related conditions and may require first-principle empirical judgement to create a solution within a set of originally undefined requirements or conditions.

Engineering problem: A problematic situation that is amenable to analysis and solution using engineering sciences and methods.

Engineering sciences: These have roots in the mathematical and physical sciences and, where applicable, in other natural sciences; they extend knowledge and develop models and methods in order to lead to engineering applications and to solve engineering problems.

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Flight testing: Is a specialised branch of Aeronautical Engineering that develops the specialist equipment required for testing aircraft performance and associated systems. Instrumentation systems are specifically deployed in test aircraft, using proprietary sensors, transducers, and data acquisition systems. It is a method to determine how well a flight vehicle performs in the air, and it covers a spectrum of airborne data-gathering activities, including Research and Development and verification and validation to ensure that an air vehicle and all its systems are safe to operate and are fit for purpose.


Ground testing: Is a barrage of tests that aircraft must undergo on the ground before first flight. It is mandatory for *new* aircraft, aircraft undergoing *maintenance*, and aircraft that have undergone significant *structural or systems modifications* to undergo testing on the ground before first flight. Ground testing may be performed on the aircraft's sub-systems or components in dedicated test facilities (e.g. engine test cell or avionics test laboratory) prior to installation into the higher-level aircraft system.

Ill-posed problem: A problem for which the requirements are not fully defined or may be defined erroneously by the requesting party.

Mentor: A professionally registered person who guides the competency development of a candidate in an appropriate category.

Outcome: A statement of the performance that a person must demonstrate in order to be judged competent at the *professional* level.

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ABBREVIATIONS

CEA	Complex engineering activities
CPD	Continuing Professional Development
DoR	Degree of Responsibility
DSTG	Discipline-Specific Training Guide
ECSA	Engineering Council of South Africa
IPD	Initial Professional Development
PD	Professional Development
PE	Professional Engineer
URS	User Requirement Specification

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BACKGROUND

The illustration below defines the documents that comprise the Engineering Council of South Africa (ECSA) system for registration in professional categories. The illustration also locates the current document.

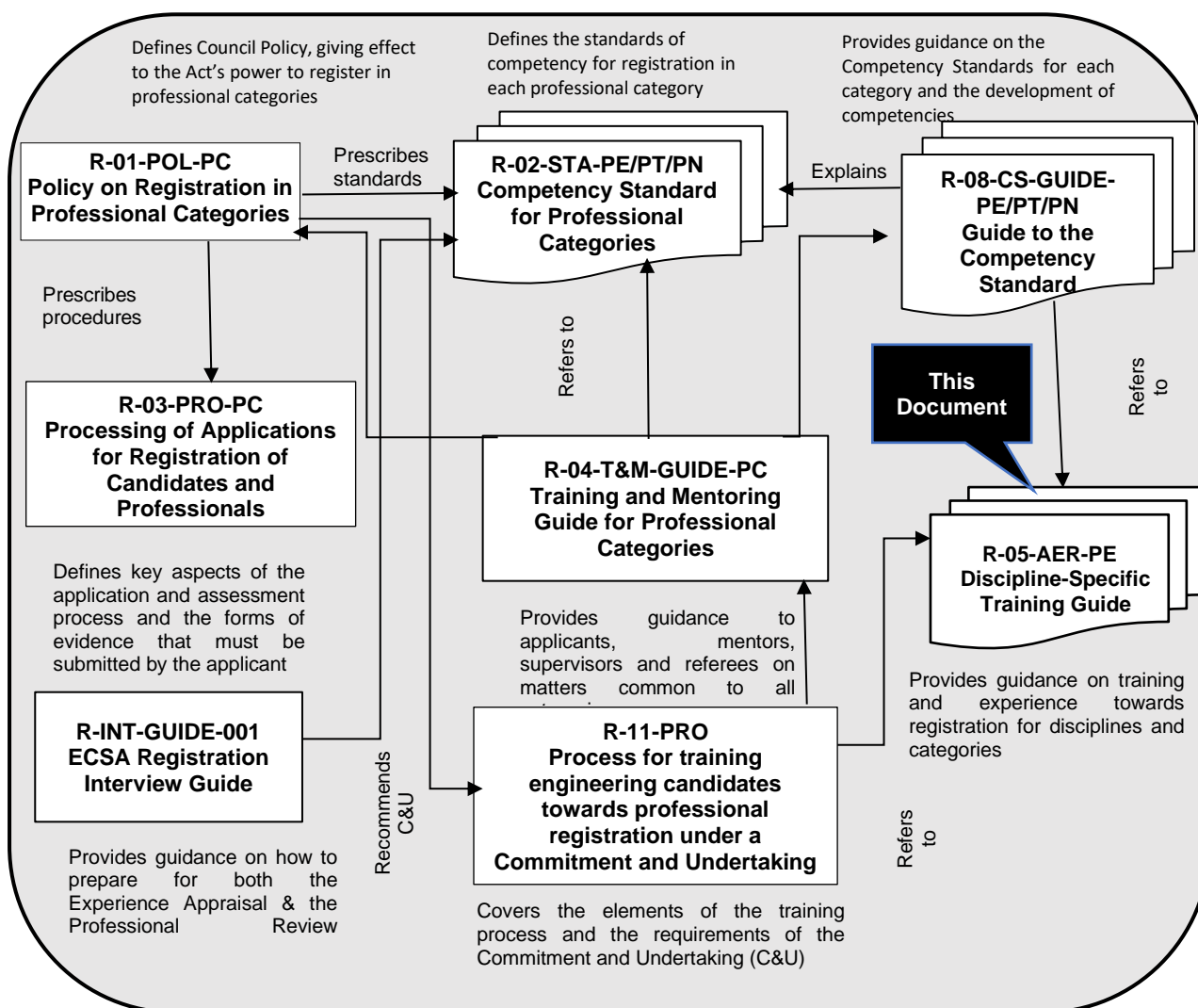



Figure 1: Documents defining the ECSA registration system.

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1. PURPOSE OF THIS DOCUMENT

All persons applying for registration as Professional Engineers are expected to demonstrate the competencies specified in document **R-02-STA-PE/PT/PN** through work performed at the prescribed level of responsibility, irrespective of the trainee's discipline.

This document supplements the generic Training and Mentoring Guide (document **R-04-T&M-GUIDE-PC**) and the Guide to the Competency Standards for Professional Engineers (document **R-08-CS-GUIDE-PE/PT/PN**). In document **R-04-T&M-GUIDE-PC**, attention is drawn to the following sections:

- Duration of training and length of time working at level required for registration
- Principles of planning, training, and experience
- Progression of training programme
- Documenting training and experience
- Demonstrating responsibility


The second document (document **R-08-CS-GUIDE-PE/PT/PN**) provides a high-level, outcome-by-outcome understanding of the Competency Standards that form an essential basis for this Discipline-Specific Training Guide (DSTG).

This guide and documents **R-04-T&M-GUIDE-PC** and **R-08-CS-GUIDE-PE/PT/PN** are subordinate to the Policy on Registration in Professional Categories (document **R-01-POL-PC**), the Competency Standard for Registration in Professional Categories (document **R-02-STA-PE/PT/PN**), and the application process definition (document **R-03-PRO-PC**).

2. AUDIENCE

This DSTG is specifically directed towards candidates who have studied Aeronautical Engineering and are undergoing in-service training as Aeronautical Engineers. The guide is also applicable to engineers who have studied other engineering disciplines but whose

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postgraduate specialisation is primarily in the aeronautical field and who wish to be assessed for professional registration based on their work in an aeronautical environment.

The guide is intended to support a programme of training and experience through incorporating good practice elements. The guide applies to persons who have

- completed the tertiary educational requirements in Aeronautical Engineering
 - by obtaining an accredited BEng-type qualification from a recognised tertiary university in South Africa,
 - by obtaining a Washington Accord recognised qualification, or
 - through evaluation/assessment,
- registered with the ECSA as a Candidate Engineer; and/or
- embarked on a process of acceptable training under a registered Commitment and Undertaking (C&U) programme under the supervision of an assigned mentor guiding the professional development process at each stage.

Note: Marine Engineering and Naval Architecture


Because of the relatively small number of candidates in the field of Marine Engineering and Naval Architecture, the Aeronautical Engineering Central Registration Committee (CRC) evaluates applications in this field. The ECSA does not have a DSTG in Marine Engineering and Naval Architecture. Candidates and their mentors may make use of the guidelines given in this document and transpose the appropriate subject matter.

3. PERSONS NOT REGISTERED AS A CANDIDATE AND/OR NOT TRAINED UNDER COMMITMENT AND UNDERTAKING

Irrespective of the development path followed, all applicants for registration must present the same evidence of competence and be assessed against the same standards. Application for registration as a Professional Engineer is permitted without being registered as a Candidate Engineer and without training under a C&U. Mentorship and adequate supervision during the period of training are, however, key factors in effective development to the level required for registration.

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If the employer of the trainee does not offer a C&U, the trainee should establish the level of mentorship and supervision that the employer is able to provide. In the absence of an internal mentor, the services of an external mentor should be secured. The Voluntary Association for the discipline may be consulted for assistance in locating an external mentor. A mentor should keep abreast of all stages of the development process.

This guide is written for the recent graduate who is training and gaining experience towards registration. Mature applicants for registration may apply the guide retrospectively to identify possible gaps in their development.

Applicants who have not enjoyed mentorship are advised to request an experienced mentor (internal or external) to act as an application adviser while they prepare their application for registration.


4. ORGANISING FRAMEWORK FOR OCCUPATIONS

An Aeronautical Engineer performs and supervises engineering work that is concerned with the design, development, manufacture, operation, and maintenance of all types of aircraft and spacecraft based on the engineering sciences underlying flight dynamics, aerospace structures, electronic systems in avionics, navigation, control and communication, and propulsion systems.

Aeronautical Engineers are generally appointed in one or more of the following positions:

- Aeronautical Design Engineer
- Aeronautical Systems Engineer
- Aeronautical Certification Engineer
- Aeronautical Flight Test Engineer
- Aeronautical Research Engineer
- Aeronautical Engineering Academic

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Practising Aeronautical Engineers generally specialise in one or more of the following expert fields:


- Aircraft design
- Aircraft structure
- Aircraft propulsion systems
- Aerodynamics
- Avionics
- Aeroelasticity
- Stability and control
- Aircraft systems (hydraulic, pneumatic, and avionics)
- Wind-tunnel testing
- Flight testing
- Aircraft performance monitoring
- Airport/Airfield management
- Certification and system safety programmes
- Flight operations and technical support

5. NATURE AND ORGANISATION OF THE INDUSTRY

Many engineers in the aerospace industry tend to specialise, particularly engineers working in a highly regulated technical environment. Engineers working in areas such as manufacture, maintenance, and project management tend to be generalists. Through their interaction in projects with persons from other specialised areas, specialist engineers, therefore, should also gain practical experience outside their specialised areas.

Aeronautical Engineers whose training has been more general should demonstrate acceptable experience in a number of specialist areas (typically five) for a minimum period of three years. Specialist Aeronautical Engineers, however, should demonstrate that they have had five years of in-depth experience in at least one area of Aerospace Engineering in addition to acceptable experience in a number of other areas.

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Because of the complex nature and long lifecycles of aeronautical systems, any given product or system usually has components designed by engineers from many specialised areas. Work done by an engineer in the field may frequently cross the boundaries between engineering disciplines and specialist areas or at least be influenced by interfaces with other disciplines.


Candidate Engineers are expected to have gained in-depth experience in at least one of the lifecycle phases of aeronautical systems such as development, design, manufacturing, operation, and maintenance. Although it is not required that all Candidate Engineers have in-depth design experience, it is required that all candidates demonstrate their ability to solve complex *aeronautical* problems, as explained in document **R-08-CS-GUIDE-PE/PT/PN**. Solving such problems typically requires the application of aeronautical engineering sciences and engineering judgement.

Since the aeronautical industry routinely involves significant risks and demands extreme safety measures, it is a highly regulated industry. All Candidate Engineers are, therefore, expected to have gained exposure to the regulatory aspects relevant to the work in which they have been involved, for example, Flight Safety. Candidates are further expected to demonstrate sound judgement in addressing and mitigating risks in an aeronautical environment, consequently not endangering users of their systems or the general public unnecessarily. Such risk considerations should specifically include situations in which the technologies (e.g. materials and control systems) are rapidly developing and the software used for design and operations is increasingly complex.

Candidates are expected to demonstrate appreciation that practising as a Professional Engineer is a life-long process of learning and improvement. Candidates, therefore, are expected to show how they improved their ability during their training period to make sound judgements and manage risks in the presence of rapidly developing technologies.

In assessing the suitability of candidates, the cross-disciplinary nature of their work is examined and the degree to which they are able to work effectively in such contexts is reviewed. Demonstration of knowing one's own limits and calling in the help of specialists, for example, illustrates this ability. In addition, candidates must demonstrate sufficient knowledge

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in understanding the influence of other disciplines and specialist areas within their work environment and in managing the risks arising from these influences properly.

To assist candidates in gaining the necessary training and experience/exposure, the following guidelines present the types of activities that should be conducted prior to registration.

These guidelines are illustrative; candidates are not expected to engage in all the suggested training activities before registration but should participate in many of them to ensure that adequate experience is obtained.

5.1 Aeronautical Design Engineers


Aeronautical Design Engineers are engineers who are involved in the design of aircraft and aircraft systems and who perform actual design such as preliminary design, performance predictions, aerodynamic design, structural design, control system design, and power plant trade-off studies. Specific investigations could include literature studies, process evaluation, defect or failure investigations, product/system performance evaluation, and manufacturing or production baseline studies. Information thus gathered may be used in design improvement; process optimisation; performance enhancement; and product, system, and plant efficiency upgrades. These are activities in which aerospace products and systems are designed to meet particular needs, specifications, and standards.

The activities presented in the table 1 are recommended in the training of Aeronautical Design Engineers.

Table 1: Activities recommended in the training of Aeronautical Design Engineers

Type of Experience	Specific Activities
Problem/requirements/definition	<ul style="list-style-type: none"> • Formulation of User Requirement Specification (URS): Generate system, sub-system or product performance specifications (Specs) • Qualification/verification matrix design <i>(Use standards, specifications, and handbooks for guidance in the preparation of the above-mentioned documents)</i>
Project planning (for design)	<ul style="list-style-type: none"> • Resource planning (computing, drafting, manufacturing, etc.)

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	<ul style="list-style-type: none"> • Time scales, Critical Path, identification of bottlenecks and critical milestones, etc.
Examination of alternatives	<ul style="list-style-type: none"> • Literature study • Identification of potential techniques, technologies, and materials • Generation of concepts • Elimination of unsuitable alternatives • Preliminary performance prediction
Trade-off studies	<ul style="list-style-type: none"> • Using decision-making tools to select viable alternatives • Examining impacts of alternatives on the ability to meet URS/Specifications • Negotiating with customers regarding requirement trade-offs and revision and updating of URS/Specifications
Detailed design	<ul style="list-style-type: none"> • Material selection • Airfoil and selection of high-lift devices • Selection of components and sub-systems • Structural, aerodynamic, and mechanical design • Performance prediction • Mission analysis • Stress analysis • Aerodynamic analysis • Stability and control analysis and design • Hazard and Operability (HAZOP) studies • Failure Modes, Effects, and Criticality Analysis (FMECA) • Updating of specifications • Aircraft and systems life-cycle management
Type of experience	Specific Activities
Design documentation	<ul style="list-style-type: none"> • Generation of drawings • Generation of design reports • Updating of documents and specifications as design progresses • Configuration control
Supervision of production	<ul style="list-style-type: none"> • Design of processes and tests • Handling of engineering queries, concessions, and deviations • Design and implementation of quality control methods • Handling of materials • Handling of scrap and re-workable items, etc.
Verification testing	<ul style="list-style-type: none"> • Qualification/verification test planning • Qualification/verification testing

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	<ul style="list-style-type: none"> • Test report writing • Commissioning of aircraft systems and equipment
Product support	<ul style="list-style-type: none"> • Support during production testing • Support during operational testing and evaluation • Management of upgrades and repairs

5.2 Aeronautical System Engineers

Aeronautical System Engineers are engineers who are involved with the specification, in-service management, and fleet engineering of aircraft and aircraft systems. Aeronautical System Engineers are typically employed by organisations who operate fleets of aircraft and are responsible for ensuring continuous airworthiness of the fleet and addressing obsolescence issues. These engineers operate subject to regulations and regulating bodies such as the South African Civil Aviation Authority (SACAA).

The following types of activities are recommended in the training of Aeronautical System Engineers.


Table 2: Activities recommended in the training of Aeronautical System Engineers

Type of Experience	Specific Activities
Maintaining airworthiness	<ul style="list-style-type: none"> • Identification and implementation of Service Bulletins • Implementation of Airworthiness Directives (ADs) • Implementation of Ageing Aircraft Programmes • Health and Usage Monitoring (e.g. HUMS) • Failure reporting and corrective action (e.g. FRACAS)
Maintenance optimisation	<ul style="list-style-type: none"> • Staggering (Fleet use and maintenance scheduling) • Negotiation with original equipment manufacturers to adapt servicing for fleet-specific requirements • Trend monitoring and maintenance adaptation • Engineering management of suppliers and sub-contractors
Logistics support	<ul style="list-style-type: none"> • Spares management and control • Logistics Support Analysis (LSA) • Reliability, Availability, Maintainability (RAM)
Fleet optimisation	<ul style="list-style-type: none"> • Fleet redesign and adaptation • Route planning for optimal fleet use

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Maintaining fleet currency	<ul style="list-style-type: none"> • Aircraft Configuration Currency Analysis • Trade-off studies between cost and return of upgrades/retrofits vs. fleet replacement • Aircraft configuration control
Acquisition/procurement/projects	<ul style="list-style-type: none"> • Definition of requirements for new products and systems • Integration of new weapons/equipment on existing aircraft • Design of review activities • Selection and implementation of upgrades (as covered under Supplemental Type Certificates) • Management of Flight Test and other acceptance-testing activities • Oversight of suppliers during development activities • Monitoring compliance with Certification Compliance Matrixes • Commissioning of ground systems and support equipment (simulators, new maintenance equipment, etc.)

5.3 Certification Engineers


Certification Engineers are engineers who are involved in ensuring that aircraft systems comply with airworthiness regulations. Certification Engineers are typically employed by the Civil Aviation Authority or by companies requesting certification of their products and thus have the responsibility of ensuring compliance with certification requirements.

The following types of activities are recommended in the training of Certification Engineers.

Table 3: Activities recommended in the training of Certification Engineers

Type of Experience	Specific Activities
Compliance testing	<ul style="list-style-type: none"> • Consultation with clients and other aviation authorities regarding airworthiness requirements and regulations • Setting up of Compliance Matrixes • Oversight of Flight Test and other acceptance-testing activities • Oversight of suppliers during development activities (e.g. weapons development)
Systems background	<ul style="list-style-type: none"> • Design and verification testing of special type certifications • Training in systems concerning one or more aircraft types • Troubleshooting and fault analysis • Use of design specifications during design and certification planning • Workshop-level exposure to all aspects of aircraft maintenance • Participation in software development and certification

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System safety analysis	<ul style="list-style-type: none"> • Training in and application of the system safety process • Application of fault tree (HAZOP, FMEA/FMECA, and equivalent safety procedures) • Design for system safety • Certification
Organisational audits	<ul style="list-style-type: none"> • Advising organisations in the creation and implementation of Manuals of Procedures • Auditing of quality systems and special processes • Periodic auditing of approved manufacturing and maintenance organisations
Monitoring compliance with ADs, etc.	<ul style="list-style-type: none"> • Ensuring approved organisations and fleet operators implement applicable Airworthiness Directives (Ads) • Auditing and monitoring correct implementation of Service Bulletins and Ageing Aircraft Programmes
Accident investigation	<ul style="list-style-type: none"> • Serving as part of accident investigation teams • Overseeing accident investigations • Reviewing and analysing previous accident investigation reports for similarities/trends • Writing accident investigation reports
Generation of regulations	<ul style="list-style-type: none"> • Reviewing existing regulations • Generating or updating regulations

5.4 Flight Test Engineers


Flight Test Engineering is a specialist field initially requiring an engineering degree and thereafter, additional training as a Flight Test Engineer at one of the Test Pilot/Engineer schools. Flight testing forms part of product development and is employed together with verification testing towards the certification of aircraft and systems.

The following types of activities are recommended in the training of Flight Test Engineers.

Table 4: Activities recommended in the training of Flight Test Engineers

Type of Experience	Specific Activities
Flight testing and ground testing	<ul style="list-style-type: none"> • Determination of relevant and necessary tests • Compilation of Test Objectives and Test Plans • Development of new testing techniques and equipment • Modifications to test aircraft (e.g. additional FTI) • Performance testing and data analysis • Flutter Clearance testing and data analysis • Cockpit evaluation

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Client liaison	<ul style="list-style-type: none"> • Negotiation in regard to flight testing • Flight Test planning • Writing of Flight Test reports • Presentation of test results
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5.5 Research Engineers and Engineering Academics


Research Engineers and Engineering Academics are engineers who are employed by universities and research organisations. The focus of Research Engineers and Academics is on the development of new knowledge, techniques, and technologies in addition to the teaching of students.

The following types of activities are recommended in the training of Aeronautical Research Engineers and Academic Engineers.

Table 5: activities recommended in the training of Aeronautical Research Engineers and Academic Engineers.

Type of Experience	Specific Activities
Teaching	<ul style="list-style-type: none"> • Reading in applicable fields of knowledge • Curriculum development • Selection and development of teaching materials • Compilation of lecture notes • Compilation of examination papers • Demonstration of application of theory in practice • Serving as supervisor for student projects
Study and research	<ul style="list-style-type: none"> • Literature study • Attainment of higher qualifications • Advancement of the current state of the art of technology • Theoretical research and development of analytical techniques • Practical and experimental research • Participation in international collaborative research

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Laboratory / experimental work	<ul style="list-style-type: none"> • Experimentation • Design and construction of laboratories • Experimental equipment design and construction • Experiment design • Development of new manufacturing techniques • Development of non-destructive testing techniques • Ground vibration testing • Wind-tunnel testing • Material and structural testing
Conferences, symposia, etc.	<ul style="list-style-type: none"> • Publishing papers (peer-reviewed journals and international conferences) • Public speaking, etc.
Consulting	<ul style="list-style-type: none"> • Consulting services for the industry to solve real problems encountered in engineering practice • Design of products, components, and systems for clients

6. DEVELOPING COMPETENCY: ELABORATING ON (DOCUMENT R-08-CS-GUIDE-PC)

Applicants are required to demonstrate insight and the ability to use and interface various design aspects through verifiable work carried out in providing engineered and innovative solutions to practical problems experienced in their operating work environments. In addition, applicants must develop the skills required to demonstrate the advanced use of aeronautical engineering knowledge in optimising the efficiency of operations or the constructability of projects.


Candidates must be able to demonstrate that they have been actively involved in an aeronautical workshop environment and have participated in the execution of practical work to the extent that they have learnt sufficient detail regarding procedures pertaining to aircraft/spacecraft to be able to exercise judgement in the workplace. Applicants must also show evidence of adequate training in this function through complex project work carried out in the analysis of problems and the synthesis of solutions.

Evidence is required in the form of a separate and comprehensive **engineering or design report** that must accompany the application. This report should describe synthesised solutions to sufficiently complex engineering problems to demonstrate that applicants have

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had the opportunity to apply their technical knowledge and gained engineering expertise through university education and practical work experience.

In applying technical and scientific knowledge gained through academic training, the applicant must also demonstrate the financial and economic benefits of engineered solutions synthesised from scientific and engineering principles at a sufficiently advanced level.

What is a sufficiently complex engineering problem?

According to the ECSA, the definition of 'complex' in complex engineering problems can be defined as follows:


Composed of many inter-related conditions, requiring first principle empirical judgement to create a solution within a set of originally undefined circumstances.

Aeronautical Engineering forms an integral part of broader engineering systems and infrastructure in technologically complex designs, manufacturing and processing techniques, aircraft and spacecraft product development, and research environments. Applicants are required to undertake aeronautical engineering projects that significantly enhance integrated engineering systems and related infrastructure. Such project work should not be stand-alone assignments but should form part of the solutions to integrated engineering systems that require a broad application of various theoretical aspects of Aeronautical Engineering.

In demonstrating advanced application of theoretical knowledge with respect to these systems, applicants must incorporate calculations with clearly defined inputs of the formulae used and detailed interpretation of the results obtained. Applicants must demonstrate how the calculated results have been used to provide the solution to the problem at hand and indicate the economic benefit to the project or the operating work environment (e.g. improved efficiency, reduced environmental footprint, capacity enhancement, simplification of system).

Problems that require a scientific and engineering approach in their solution may be encountered in any engineering work environment that consists of integrated engineering systems, equipment, machinery, and infrastructure. Candidate Engineers must obtain experience in solving a variety of problems in their work environment. The solutions to these

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problems should involve the use of the fundamental and advanced aeronautical engineering knowledge that was obtained at university. From early in their training years, candidates must actively seek opportunities to obtain experience in the area of synthesising solutions to real-life engineering problems encountered in the workplace.

6.1 Contextual knowledge

Candidates must be aware of the requirements of the engineering profession. The Voluntary Associations applicable to the Aeronautical Engineer and their functions and services to members provide a broad range of contextual knowledge for the Candidate Engineer that continues through the full career path of the Registered Engineer.

The profession identifies specific contextual activities that are considered essential to the development of competence of the Aeronautical Engineer. These include awareness of the basic aircraft workshop, manufacturing and fabrication activities, and awareness of the competencies required of the technologist, technician, and artisan. Exposure to practice in these areas is identified in each programme within the employer environment.


6.2 Functions performed

Special consideration in the discipline, sub-discipline, or specialty must be given to the competencies specified in the following groups:

- Knowledge-based problem-solving (this should be a strong focus)
- Management and communication
- Identifying and mitigating the impacts of engineering activity
- Judgement and responsibility
- Independent learning

It is very useful to measure the progression of the candidate's competency by making use of the scales for Degree of Responsibility, Problem-Solving, and Engineering Activity, as specified in the relevant documentation.

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It should be noted that the candidate working at Responsibility Level E carries the responsibility appropriate to that of a Registered Engineer except that the candidate's supervisor is accountable for the candidate's recommendations and decisions.


6.3 Statutory and regulatory requirements

Candidates are expected to have a working knowledge of the following regulations and Acts and of how the legislation affects their working environment:

- Engineering Profession Act, No. 46 of 2000 (EPA), its rules, and the Code of Conduct
- Occupation Health and Safety Act as amended by the Occupation Health and Safety Act, No. 181 of 1993 (OHSA)
- Civil Aviation Act, No. 13 of 2009
- International Regulations on Aircraft Safety and Airworthiness:
 - Federal Aviation Authority (FAA) Regulations (USA): FAR 14 CFR (Code of Federal Regulations)
 - European Aviation Safety Agency (EASA) Regulations on airworthiness (EU No. 748/2012 Part 21; 640/2015 Part 26; 1321/2014 Parts –M; -T; -66;-145;-147)
 - Def Stan 00-970: Requirements for Design and Airworthiness for Service Aircraft
 - Military Standards (Mil-Std.)
- Labour Relations Act, No. 66 of 1995
- Environment Conservation Act, No. 73 of 1989 as amended by the Environment Conservation Act, No. 52 of 1994 and the Environment Conservation Amendment Act, No. 50 of 2003

Other Acts not listed here may also be pertinent to a candidate's specific work environment. Candidates are expected to have a basic knowledge of the relevant Acts and to investigate whether any Acts are applicable to their particular work environment.

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6.4 Recommended formal learning activities

The following includes useful courses for formal learning:

- Continuing Professional Development (CPD) courses on specific disciplines
- Project Management
- Value Engineering
- Engineering Change Process
- Standard Conditions of Contract
- Preparation of Specifications
- Negotiation Skills in Engineering
- Financial Risk Analysis
- Quality Assurance Systems
- Occupational Health and Safety
- System Optimisation in Efficiency
- Configuration Management and Control
- Maintenance Engineering
- Environmental Impact Management
- Technical Report writing

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7. PROGRAMME STRUCTURE AND SEQUENCING

7.1 Best practice

There is no ideal training programme structure or unique sequencing that constitutes best practice. The training programme for each candidate depends on the available work opportunities at the time that are assigned to the candidate by the employer.

It is suggested that candidates work with the appointed mentors to determine appropriate projects in order to gain exposure to elements of the asset cycle and to ensure that their designs are constructible and operable and are designed considering lifecycle costing and long-term sustainability.


The training programme should be such that the candidate progresses through the levels of work capability described in document **R-04-T&M-GUIDE-PC** so that by the end of the training period, the candidate exhibits the degree of responsibility allocated during the particular period of training and is able to perform individually and as a team member at the level of problem-solving and engineering activity required for registration.

The mentor and the candidate must identify the level of responsibility that is required for an activity to be compliant and demonstrate the various exit level outcomes (ELOs). Evidence of the candidate's activities and their acceptance by the mentor are recorded on the appropriate system in order to meet the requirements of the Training Elements Appendix.

7.2 Realities

As stated by the ECSA, the minimum period for the Candidacy Phase is three years. The likelihood, however, is that the period of training will be longer. This time frame is determined by the availability of opportunities and the exposure to various functions in the actual work environment.

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Each candidate must undertake a unique programme in which the various activities carried out at the discipline-specific level are linked to the generic competency requirements stated in document **R-08-CS-GUIDE-PE/PT/PN**.

7.3 Guideline for orientation requirements

For the Candidate Engineer starting a career with an employer, the basic introduction to the company's functions is usually performed during the first months of employment. The induction process usually includes the following aspects:


- Introduction to the company
- Company safety regulations
- Company code of conduct
- Company staff code and regulations
- Company quality and airworthiness requirements
- Typical functions and activities
- Hands-on experience and orientation in each of the major company divisions

7.4 Moving into or changing candidacy training programmes

This DSTG assumes that the candidate enters a programme after graduation and continues with the programme until ready to apply for registration. It also assumes that the candidate is supervised and mentored by persons who meet the requirements stated in document **R-04-T&M-GUIDE-PC**. In the case of a person changing from one candidacy programme to another or moving into a candidacy programme from a less structured environment, it is essential that the following steps are completed:

- The candidate must complete the Training and Experience Summary (TES) and the Training and Experience Reports (TERs) for the previous programme or unstructured experience. In the latter case, it is important to reconstruct the experience as accurately as possible. The TERs must be signed off by the relevant supervisor or mentor.
- On entering the new programme, the mentor and supervisor should review the candidate's development while being mindful of previous experience and the


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opportunities and requirements of the new programme. At minimum, the mentor and supervisor should plan the next phase of the candidate's programme.


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REVISION HISTORY

Revision number	Revision date	Revision details	Approved by
Rev. 0: Concept A	15 Nov 2011	Initial compilation of DSTG	PAC Aero
Rev. 0: Concept B		Working document for 23 July 2012 Workshop	JIC
Rev. 0: Concept C	23 July 2012	Product of 23 July Workshop	PAC Aero
Rev. 0: Concept D	29 Oct 2012	Sections 1–3 put in standard form	JIC for submission to Reg. Committee
Rev. 0: Concept E	15 Jan 2013	Minor amendments	To Reg. Committee
Rev. 1	12 Mar 2013		Registration Committee for Professional Engineers
Rev. 2	22 Sep 2017	Alignment with DSTG Framework	G Jansen van Rensburg
Rev. 2	9 Oct 2017	For approval via round robin	PDSGC
Rev. 2	23 Oct 2017	Reviewed and checked	B Collier-Reed, TP Maphumulo, J Cato
Rev. 2	16 Nov 2017	Approval	PDSGC
Rev. 2 Draft A	22 Oct 2022	<p>The document has been reviewed to include the following new definitions.</p> <ul style="list-style-type: none"> • Engineering sciences, • Flight testing, • Ground testing <p>A section for Abbreviations was also included to ensure alignment to the DSTG framework as the previous version did not have this section.</p> <p>The document was further revised to update document numbers where the document</p>	Working Group


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		numbers referenced have changed, for consistency and to align with the internal document numbering requirements.	
Rev. 2 Draft B	27 Oct 2022	Draft sent to Registration for comments and inputs	RDDR BU and Registration BU
Rev. 2 Draft B	31 Jan 2023	Review and Recommendation for Approval	Acting RPS Executive
Rev. 3	14 Feb 2023	Approval	RPSC

The Discipline-Specific Training Guide for

Registration as a Professional Engineer in Aeronautical Engineering

Revision 3 dated 14 February 2023 consisting of 27 pages has been reviewed for adequacy by the Business Unit Manager and is approved by the Executive: Research, Policy and Standards (RPS).



 Business Unit Manager

..21 February 2023.....
 Date



 Executive: RPS

.....2023/04/14.....
 Date

This definitive version of the policy is available on our website.

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