

ATNS CELEBRATING



The Air Traffic Control Environment.

- A presentation for DAMEs.

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transport

Department:
Transport
REPUBLIC OF SOUTH AFRICA



Presentation Outline

- ❑ What is Air Traffic Control
- ❑ Types of Air Traffic Control
- ❑ Operational Considerations
- ❑ Ergonomics of the work environment
- ❑ Human – Machine Interface Design Philosophy
- ❑ Human Performance Limitations

What is Air Traffic Control?

- Air Traffic Control (ATC) is the core component of Air Traffic Services.
- Air Traffic Controllers are responsible for safe, orderly and expeditious flow of air traffic.



Types of Air Traffic Control

- a. An air traffic control service is provided according to the particular circumstances and class of airspace. Namely:
- Aerodrome (Tower) control service;
 - Approach (Terminal) control service, with or without the aid of radar;
 - Area (En-route) control service, with or without the aid of radar

Operational Considerations

- a. Physical Health and minimum requirements/attributes
- b. Training and Qualifications
- c. Ergonomics of the work environment
- d. Human – Machine Interface Design Philosophy
- e. Human Performance Limitations

Physical Health and Minimum Requirements

a. The following attributes are sought after:

- Above-average intelligence
- High motivation
- Spatial ability
- Tolerance of stress
- Tolerance of workload extremes (gross overloading or underloading)
- Emotional stability
- Attention to detail
- Teamwork – the ability to identify with a group and be loyal to it
- Basic medical fitness e.g. eyesight, hearing, cardiovascular health etc
- Clear articulation/linguistic ability

Physical Health and Minimum Requirements

- a. Administration of SHL Tests focusing on verbal reasoning, diagrammatic, numerical and Spatial reasoning, error checking and the personality profile.
- b. Medical Assessments to obtain Class III medical license.
- c. Interviews to establish organisational fit. Numerical reasoning.
- d. Minimum Age of 18,
- e. Matric with Pure Mathematics and English Level 4.



Training and Qualifications

- a. All Air Traffic Service disciplines are licensed.
- b. Disciplines are ATSO, Aerodrome, Approach Procedural, Approach Procedural & Radar, Area Procedural and Area Procedural & Radar.
- c. A rating is obtained at an ATO, in this case, the ATNS Aviation Training Academy.
- d. Practical validation is conducted in the field.
- e. A validation is unique to and only applicable to the unit and position where obtained.
- f. A rating is transferrable whereas a validation is not.

Ergonomics of the work environment

- a. Seated workstations.
- b. Console design.
- c. Horizontal wrap-around console alternatives.
- d. Vertical stacked segments for consoles.
- e. Design and arrangement of single/multi-person consoles.
- f. Lighting.
- g. Operator visibility.
- h. Glare.

HMI Design Philosophy

- a. An ATC system is a model of a human-machine system with the aim of achieving a safe and efficient flow of air traffic.
- b. Controllers also must have a firm grasp on how the system operates whilst utilising his/her own professional attributes.
- c. ATC involves a large amount of multi-tasking in which controllers must utilise all the different information available and draw on his past experiences and memory to make the right decisions under at all times
- d. The SHEL model illustrates the main interactions of humans (Liveware) with other aspects of the system such as machines (Hardware), materials/procedures (Software), Environment and with other humans (Liveware)

HMI Design Philosophy

SHEL Model



S = Software (procedures, symbology, etc.)
H = Hardware (machine)
E = Environment
L = Liveware (human)

In this model the match or mismatch of the blocks (interface) is just as important as the characteristics of the blocks themselves. A mismatch can be a source of human error.

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Human Performance Limitations

Control Positions And Their Relative Cognitive Task Parameters

Non-Radar (Oceanic Control Position)	Radar (En Route Control Position)	Radar (Approach / Departure Control Position)	Non-Radar (Tower Control Position) Good Weather/Day Time
No direct representation of the traffic situation.	Symbolic representation of the traffic situation.	Symbolic representation of the traffic situation.	Direct perception of the traffic situation.
High memory demand.	Moderate memory demand.	Little memory demand.	High memory demand.
High demand for mental simulation.	Moderate demand for mental projection.	High demand for mental projection.	Visual estimation.
High strategical planning.	Combination strategic and tactical planning.	High tactical planning.	High tactical planning.
Long delays in air-ground communications.	Normally no delays in air-ground communications.	Normally no delays in a ground communications.	Normally no delays in a ground communications.
Slow event development.	Moderately quick event development.	Quick event development.	Rapid event development.

A day in the life of ATC

Day in the life of Air Traffic Control



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Thank you!

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