Session 3

Tailoring of OLS - OFS

Obstacle Limitation Surfaces

Objectives

At the end of this module, participants will be able to

- Understand the criteria used in designing the Approach OFS
- Determine the impact when these criteria are varied. Adapt the OFS based on the revised criteria.

Background

In Session 1, participants were introduced to the different surfaces that made up OLS, their purpose and dimensions.

In addition to OLS, there are other controlling or assessment surfaces such as:

- Surfaces to protect Instrument Flight Procedures as described in PANS-OPS
- Surfaces to safeguard CNS such as the Building Restricted Areas in Euro Guidance 015
- Surfaces to safeguard ATC operations such as line-of-sight safeguarding template

Understanding PANS-OPS Surfaces

Why refer to PANS-OPS surfaces

Surfaces stipulated in PANS-Operations (Doc 8168) are important because the criteria used in designing these surfaces are referred to in the development of OES.

However, OES are not intended to replace the PANS-OPS surfaces. They have two different purposes:

- **PANS-OPS surfaces:** Used for designing instrument flight procedures (IFPs)
- **OES:** Surfaces to safeguard flight procedures established at an aerodrome

Why design OES using PANS-OPS criteria?

To allow for a more harmonized approach in safeguarding the airspace against obstacles or objects that may affect the safety of aircraft operations and the usability of the flight procedures.

Volume I – Flight Procedures

Volume II – Construction of Visual and Instrument Flight Procedures

Volume III – Aircraft Operating Procedures

PANS-OPS Surfaces

PANS-OPS Doc 8168 are divided in 3 volumes. The criteria used in designing the OES are contained in Vol II.

The design of procedures in accordance with PANS-OPS criteria assumes normal operations.

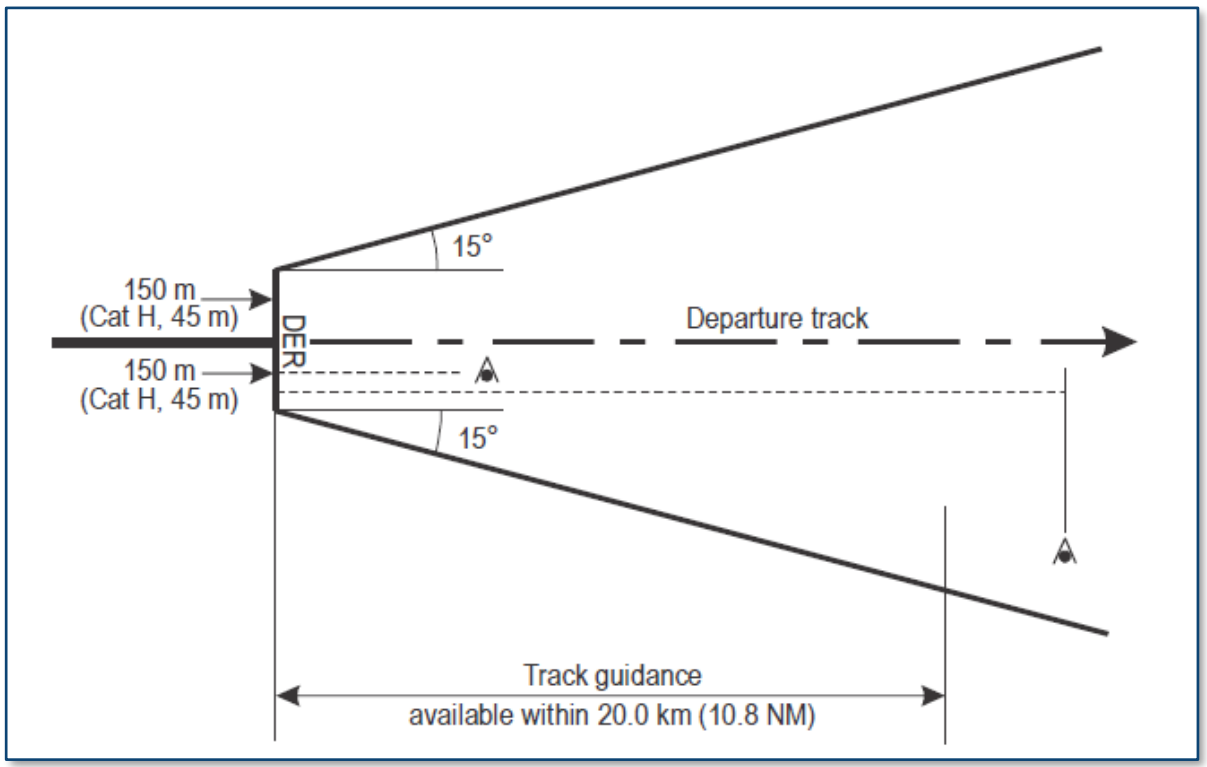
The aircraft operator is responsible to provide contingency procedures for abnormal and emergency operations.

PANS-OPS for Annex 14

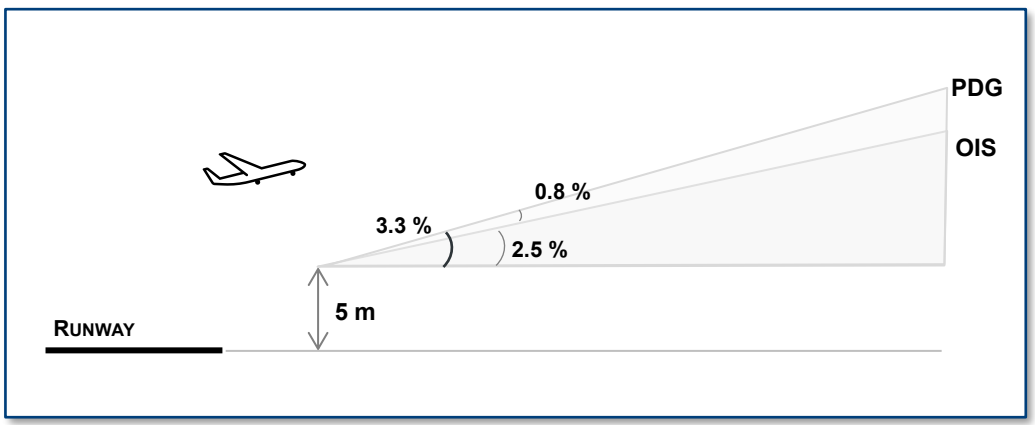
The principles of some PANS-OPS surfaces are used in the design of OLS. Such surfaces are:

- Departure
- Basic ILS
- Visual Segment
- Circling

Instrument Departure Surface

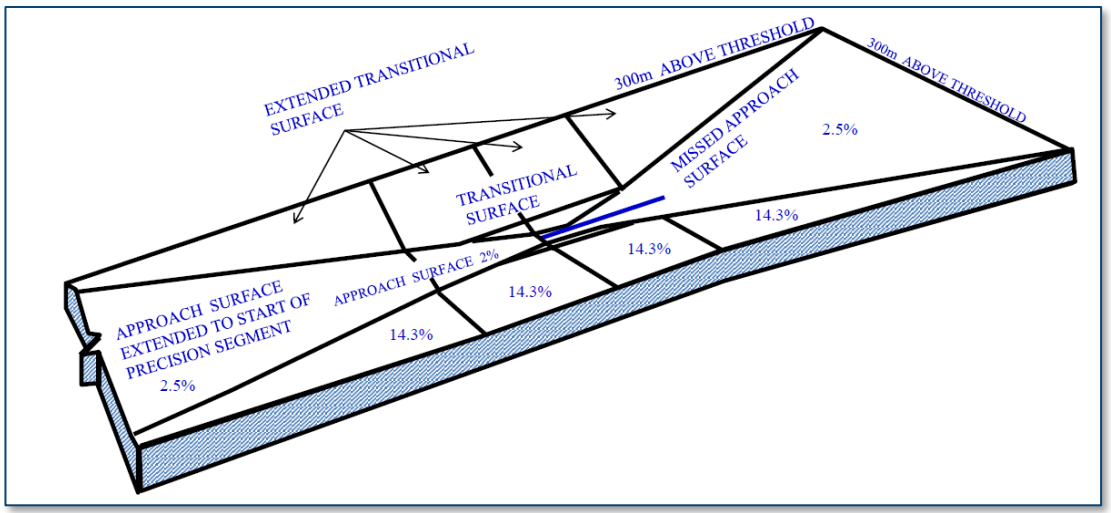


Departure Surface



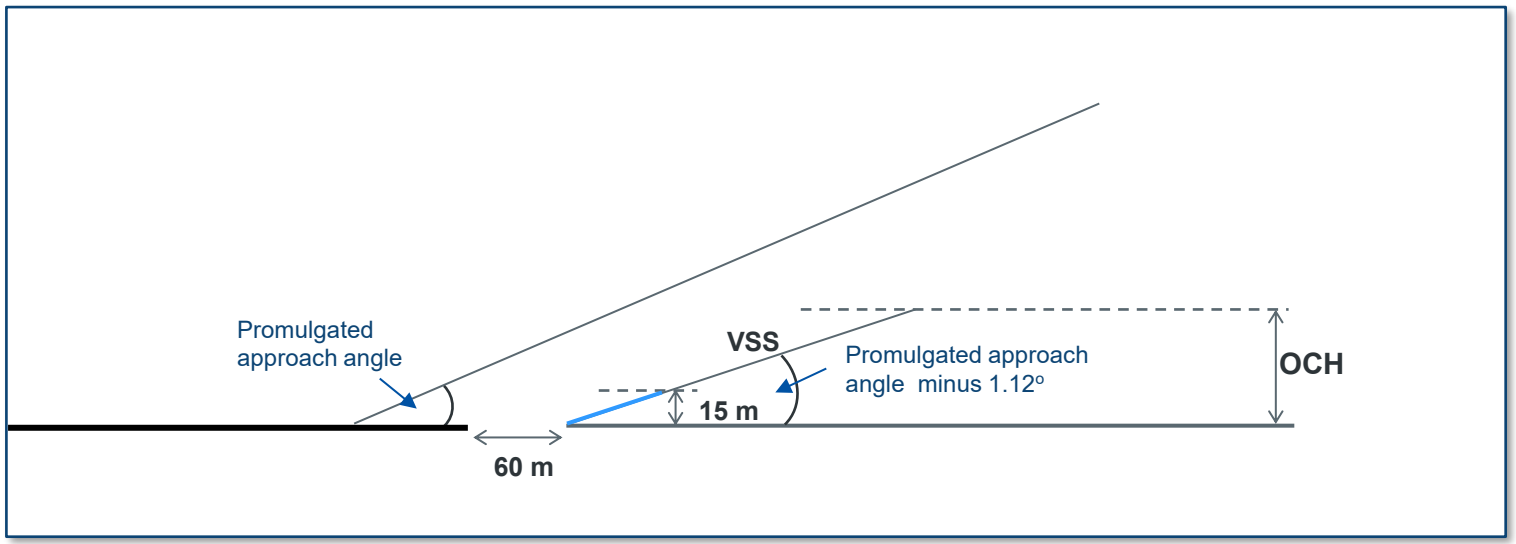
- The standard procedure design gradient (PDG) of an instrument departure is 3.3% .
- The PDG is derived by adding a minimum obstacle clearance of 0.8% above an obstacle identification surface (OIS) and for turns it is 0.8% or 75 m whichever is more. The OIS has a gradient of 2.5%.
- The surface starts at 5m above the Departure End of Runway (DER)

Basic ILS Surfaces



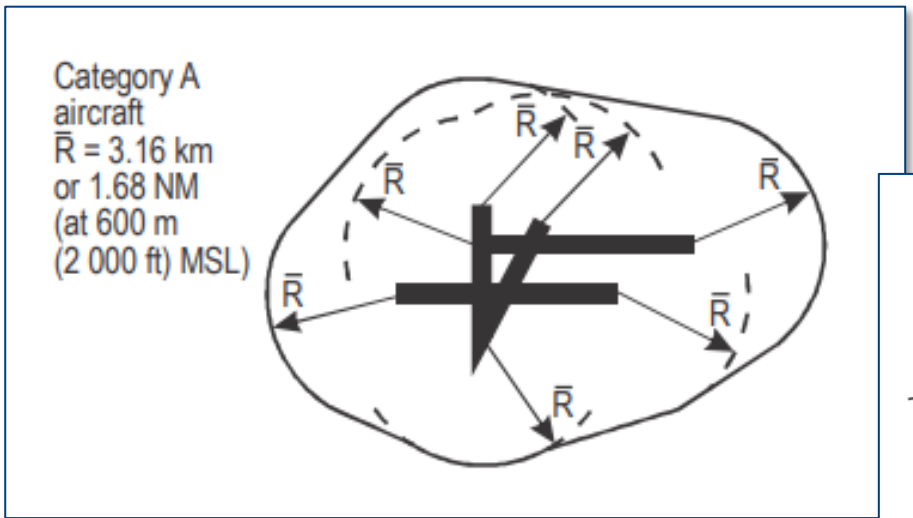
- One of the methods defined in PANS-OPS for the determination of OCH
- All surfaces are referenced to the threshold elevation
- Used in protection of Straight-In Precision Approaches

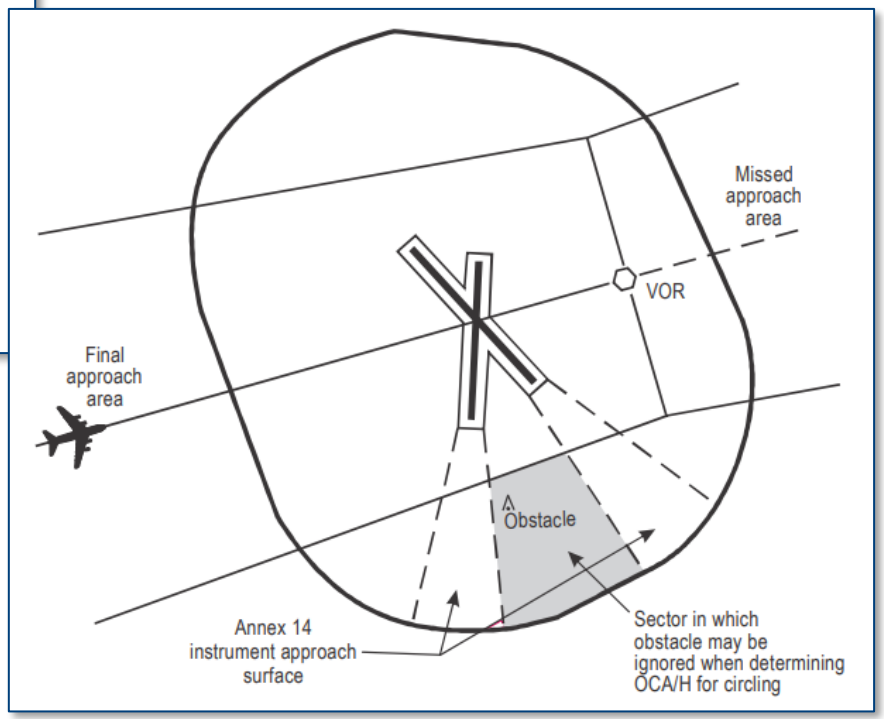
Visual Segment Surface



- PANS-OPS generally provides protection of aircraft by means of minimum obstacle clearance altitudes, but not in a visual segment of an instrument flight procedure (i.e. below minima)
- VSS has a slope of 1.12 degrees less than the promulgated approach procedure angle
- Obstacles with a height less than 15 m above the threshold may be disregarded when assessing the VSS

Circling


Category A
aircraft
R̄ = 3.16 km
or 1.68 NM
(at 600 m
(2 000 ft) MSL)
R̄
R̄
R̄
R̄
R̄
R̄
R̄


Missed
approach
area
VOR
Final
approach
area
Obstacle
Annex 14
instrument approach
surface
Sector in which
obstacle may be
ignored when determining
OCA/H for circling

Adapting Surfaces

Background

Revised OLS = OFS + OES

OFS are surfaces intended to safeguard the safety and regularity of operations on the runway

Approach OFS is designed based on a standard 3^0 approach angle

Instrument Runway - The length is calculated based on the surface reaching a height of 500ft

Non-Instrument Runway – The length is based on existing Annex 14 dimensions with adaptation made to account for differences in wingspan.

Adapting OFS: Caution

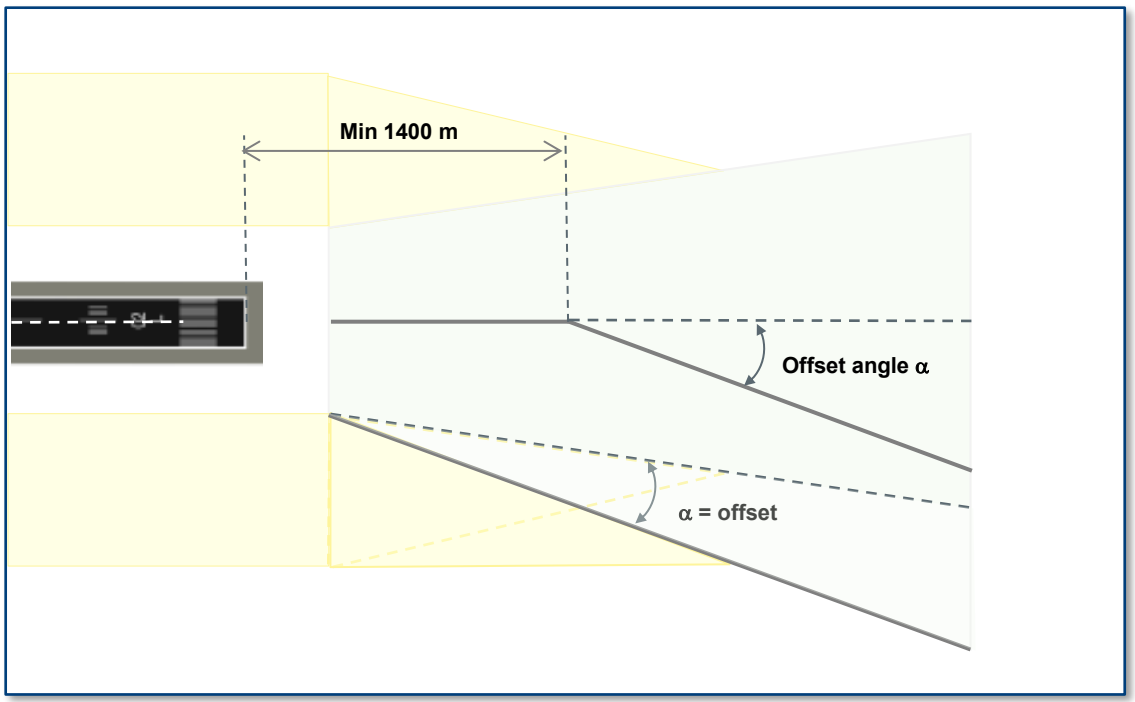
- The OFS are not to be penetrated by obstacles.
- The adaptations of the OFS are not intended to accommodate new obstacles and changes of procedures for noise abatement.
- Any alterations to the OFS due to obstacles may result in restrictions to the runway operations, impact the usability of the runway and may require physical changes to the runway physical characteristics such as the location of the threshold.
- When establishing the OFS, adaptations may be necessary to accommodate the existing obstacle environment
- The OFS shall be adapted where the characteristics and nature of the operations differ from the standard assumptions.

Adapting OFS

Adapt OFS when the characteristics and nature of the operations differ from the underlying design parameters. In particular:

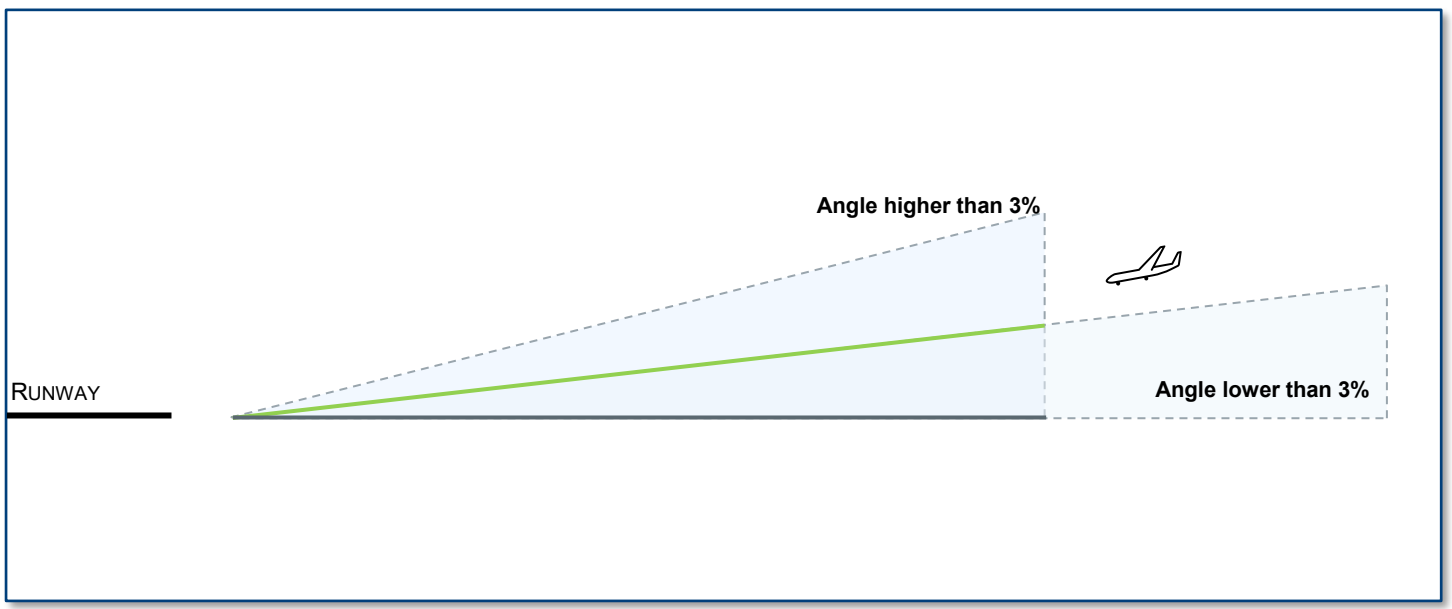
1. Where approach trajectories are offset or curved within the length of the approach or inner approach surface, lateral dimensions of the approach and inner approach surface vary.
    - Approach trajectory angle lower than 3.0°: the slope decreases and the length increases
    - Approach trajectory angle higher than 3.0°: the slope increases and the length remains same
2. Where the obstacle protection surface of a visual slope indicator system is lower than the standard slope of the approach surface
3. Where the obstacle clearance height (OCH) of an instrument approach is higher than 150 m (500 ft) above the threshold.

Adapting OFS



Offset Trajectory: Plane view

Adapting OFS



Offset Trajectory: Cross Section view

Adapting OFS

Adjusting the slope

Slope approach surface = TAN(approach angle) – (TAN(3.0°) – 0.0333 or 0.0322)

Adjusting the length

Length approach surface = 150 m / slope approach surface (Instrument Runway)

Length approach surface = (150 m – 15 m threshold crossing height) / TAN (approach angle) – 60 m approach surface inner edge (Non- Instrument Runway)

Whenever the approach and inner approach surfaces are varied, the transitional and inner transitional surfaces shall be modified accordingly.

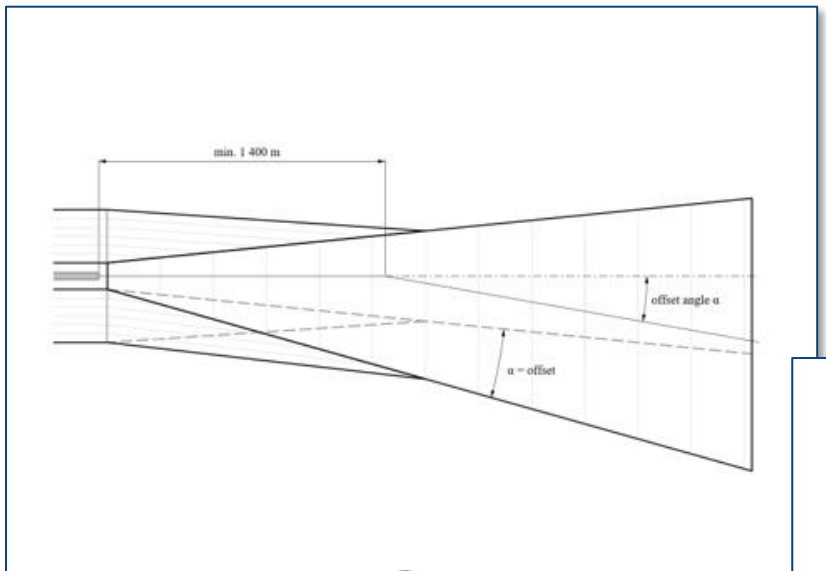
Adapting OFS

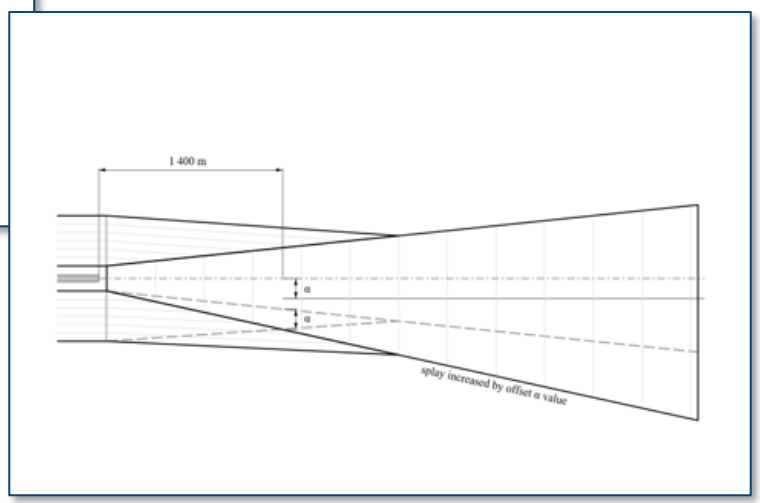
Whenever the approach slope is varied, the inner approach surfaces slope aligns with the approach surface.

When the slope changes the length of the approach and inner approach surfaces are to be adjusted.

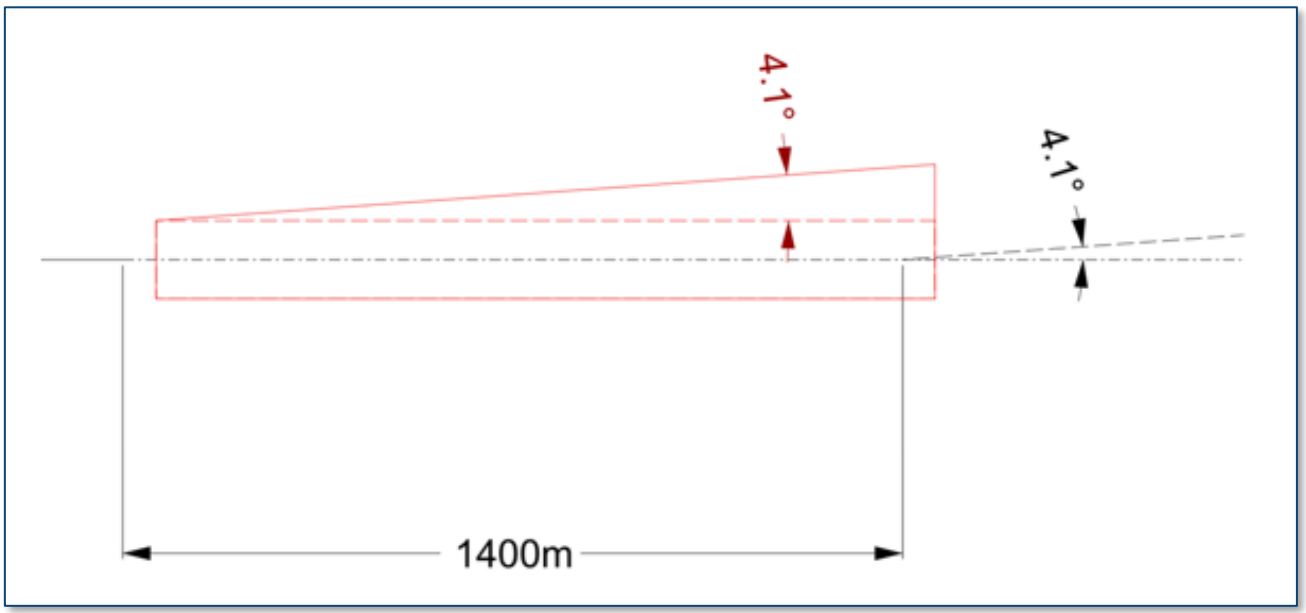
The transitional and inner transitional surfaces on the side of the approach and inner approach surface shall be modified accordingly.

Adaptation of approach and transition surfaces





Adaptation of inner approach



Module Summary

- Adjusting the OFS to facilitate developments is to be avoided.
- The OFS are adapted when there are differences in the design criteria such as approach angle or the published OCH.