



visual vectoring

产品描述

vvstackTM

入境航班延误管理培训

版本 3.0

目录

目录	2
概要	3
背景	3
适用性	3
交付	3
培训内容	3
学习过程	4
复习	4
定制	5
课程结构	5
进场交通 :	5
等待交通 :	5
AMAN 交通 :	5
所教授的技能	6
可用性	6
截图	7
程序课程	7
空域课程	7
序列排序课程	8
等待课程	9
等待模拟练习	10
模拟性能反馈	10
AMAN 课程	11
AMAN 演示	11

概要

VVStack™是一款独立的基于 PC 的空中交通管制员安全培训程序，是在 VVEnroute™提供的交通处理和排序培训的基础上的扩展。VVStack™ 特别教授在监视的航路/区域环境中对进场交通的显著延迟进行管理。这包括使用速度控制、矢量引导、等待和时间发布等方法的指导和广泛模拟，以实现指定的尾随距离或流控门时间。

背景

在任何繁忙的机场，如恶劣天气、跑道关闭和紧急情况等不寻常事件都可能影响跑道的降落率，并要求延迟进场飞机。在战略层面上，处理这些情况的策略多种多样，例如取消起飞、改降、使用到达管理（AMAN）系统和协作决策制定。对于管理进场序列的管制员来说，需要一种战术方法，这需要一套能够实施延迟的技能，如矢量引导、速度控制和等待。

适用性

VVStack™课程适合由航空导航服务提供商（ANSPs）和空中交通管制培训提供者使用，为完成 VVEnroute™课程的初级培训者提供。它也可用于大学和学院作为通用空中交通管制熟悉课程的一部分，或作为空中交通管制职业生涯的准备。

交付

课程可以在现场实验室或计算机实验室中进行，也可以通过我们的云基础学习管理系统 Control Zone™提供。这些消费模式支持教师引导、监督、半监督和自主学习。

VVStack™是完全独立的，包含教学内容和实践模拟练习。性能数据上传并存储在 LMS 中，允许监控学生表现并生成报告和可视化。

培训内容

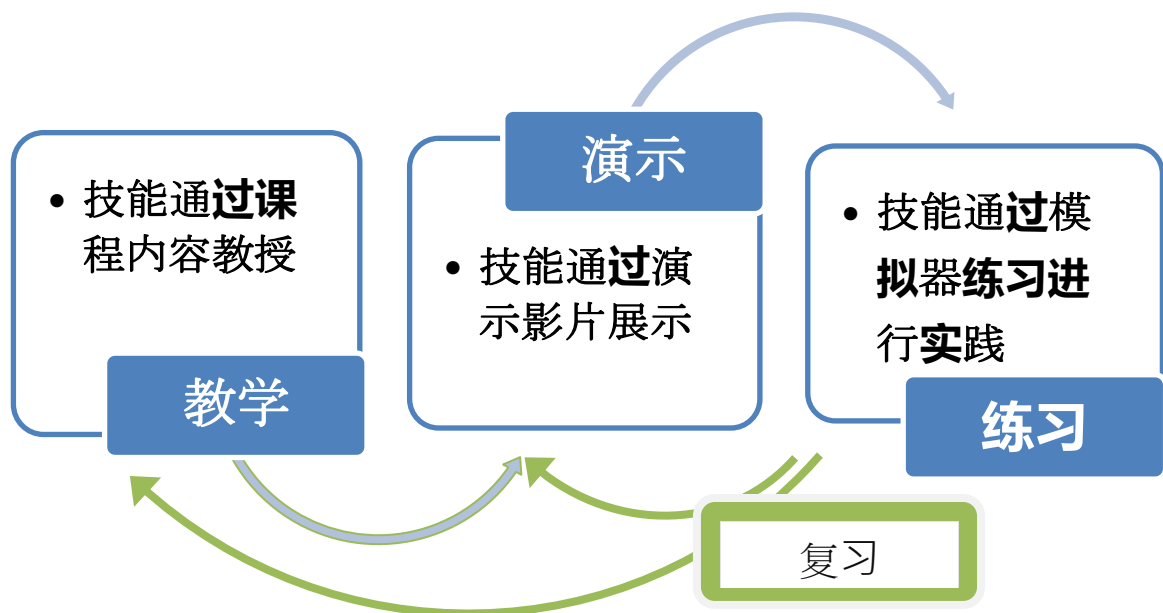
培训内容可在任何设备上使用。模拟需要一台安装有 Windows 7 或更高版本（英文版）的 PC。

学习过程

在到达序列中管理和应用延迟的任务需要开发一系列复杂且相互关联的技能。首先，有一个规划组成部分，其中控制员将评估交通序列并确定是否需要干预，如矢量引导、速度控制、等待和/或时间发布。然后必须向飞行员发布正确的指令以实施交通管理计划。最后，必须不断监控和审查交通配置，以确保间隔，达到所需的退出条件并维护正确的界面显示。

VVStack™课程教授学生如何通过一套结构化的学习步骤执行这些复杂、时间紧迫的任务，这些步骤建立了基本技能，可以在此基础上构建更综合的技能。每个步骤都从一堂课开始，教授特定技术的背景和应用。这之后是其实际应用的演示。然后通过旨在针对已学内容的实践模拟练习应用并加强这些技能。最后，学生可以根据需要复习和进行实践模拟，然后再进行下一个学习步骤。

Visual Vectoring 学习过程在下面的图表中描述。



定制

教学和模拟在一个中性平台上呈现，旨在推广学习过程。所使用的用语符合国际民航组织空中导航服务程序 - 空中交通管理文件（文件 4444）和无线电通话手册（文件 9452）中的规定。当这些文件中不包含适用的示例时，VVStack™中教授的措辞是许多空中导航服务提供商通常使用的措辞。对本地空域的模拟以及界面功能的定制是可用的，并需要当地培训专家的协助。

课程结构

VVStack™课程包括三个模块，每个模块包含多个课程、演示和模拟器练习：

进场交通：

本模块涵盖使用矢量和速度控制来实现进入终端区交通所需间隔的技能，这是对 VVEnroute™课程所获技能的扩展。

等待交通：

在此模块中，介绍了将飞机引入、在等待图案中处理以及引出的程序和用语。强调了确保间隔的实施。模拟场景涉及管理机场关闭事件，需要技能无限期地延迟繁忙的交通序列，直到可以恢复到达，然后以有序的顺序处理到达。

AMAN 交通：

本模块教授解释典型到达管理（AMAN）系统的方法，以及这些信息如何指导处理进场序列以满足所需登机门时间的控制决策。这需要解释 AMAN 延迟的能力，并开发及应用各种策略以实现所需的排序结果。本模块中的模拟练习提供了一个非常真实的主要机场到达序列的表现，并是在 VVEnroute™和 VVStack™课程中提供的监视培训的高潮。

所教授的技能

VVStack™涵盖以下技能：

- 处理进场到达序列。
- 发布高度表压力信息。
- 传输压力信息变更。
- 发布等待指令。
- 发布高度要求。
- 使用标准用语。
- 分隔进入等待图案的交通。
- 在等待图案中维持垂直间隔。
- 处理离开等待图案的交通以满足排序要求。
- 基于所需的纵向间隔和/或所需的登机门时间，通过 TMA 入口门控制交通。
- 工作负载管理。
- 等待用语。
- 界面使用。
- 解释 AMAN 系统。
- 应用如矢量引导、等待、速度控制和时间发布等控制技术来实施 AMAN 序列。
- 投射和规划。
- 工作负载管理。

可用性

VVStack™目前可通过 Control Zone™ LMS 进行评估。

截图

程序课程

Slide 7

If the QNH has changed, immediately remove the X Prompts from every aircraft you have given descent to an altitude, to remind yourself to give each the new QNH.

In simulation, issue the new QNH to each aircraft in turn ...

STACK: BAW10 QNH 1012
BAW10: 1012, BAW10

空域课程

Slide 8

The dimensions of all ATC sectors are designed to contain the range of flight paths of the transiting aircraft. The outermost boundary of STACK sector is a segment of a circle of 120nm radius from the airport ...

This is the approximate range of distances at which jet aircraft typically commence descent from cruise level.

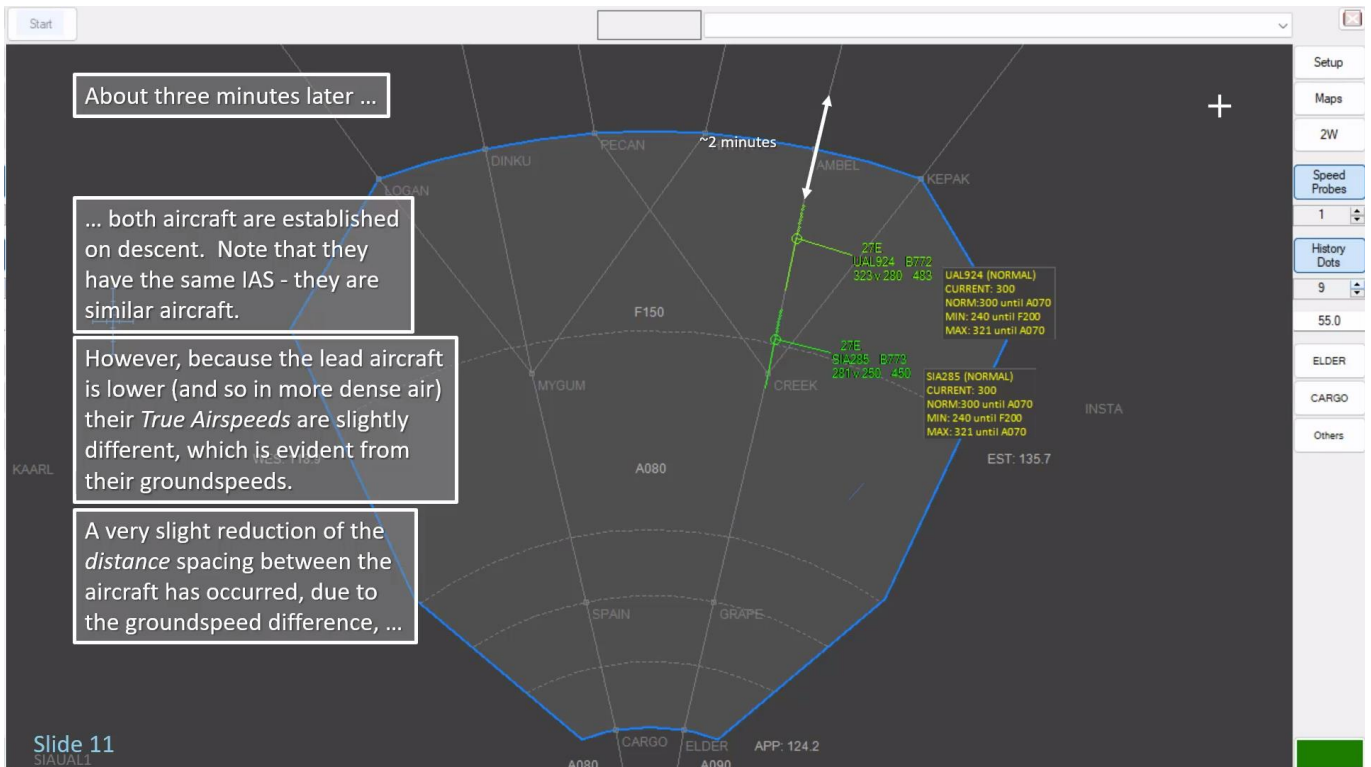

Range of typical jet descent points

And this the range of distances at which turboprop aircraft typically commence descent from cruise level.

Range of typical turboprop descent points

Factors affecting descent point include the cruise level, the aircraft type and any speed restrictions.

序列排序课程

Sequencing Non-Jet Aircraft

Propellor-driven aircraft have very different flying characteristics to jets on descent. Jets do a power-off descent - they are virtual gliders. That means they are slowly reducing groundspeed as they descend. turboprop aircraft do a (reduced) power-on descent, so their groundspeed on descent is, in general, higher than it was at cruise.

Also, descent for non-jets (typically turboprops) commences later than for jets in terms of distance from the runway. Descent *times*, however, are similar; both are limited by the time it takes to de-pressurise the cabin at a rate acceptable to passenger comfort.

We now move on to examine the processing of non-jet aircraft. Specifically, we will be using turboprop aircraft, that is, types powered by turbine-driven propellers. Slower types, those employing piston engine-driven propellers are not considered, because they are not commonly used in services to and from major airports. Techniques used for managing turboprops are easily adapted to slower aircraft in local training.

Slide 30

等待课程

Stack

Press **Esc** to exit full screen

Entry to a Holding Pattern *Continued*

Aircraft approaching the Fix from other directions need to carry out a more complex entry procedure. There are two further segments, first the **Teardrop Entry**:

Slide 11

Stop

Removing #1 from the hold:

The object is, of course, to have the aircraft on track to the gate as soon as possible. If it is on the inbound leg, as it is here, or in the process of turning inbound, it is a simple procedure:

If #1 was where #4 is now, early in the outbound turn, the turn can be reversed and the aircraft turned first onto a heading and then tracked direct to the gate. It becomes a continuous turn.

A few seconds later, the shortest path to the gate is to continue the outbound turn into an orbit back to GRAPE.

If #1 happened to be anywhere on an outbound leg when holding is terminated it is simply given an immediate inbound turn.

STACK: BAW372 CANCEL HOLD, TURN INBOUND NOW, WHEN READY DESCEND TO 9000 QNH 1014.
BAW372: CANCEL HOLD, TURN INBOUND, 9000 1014 BAW732. 5

27E QFA732 A332 160>160 318
27E BAW372 A320 150>150 315
27E UAL924 B772 180>180 327
27E SIA285 B773 170>170 323

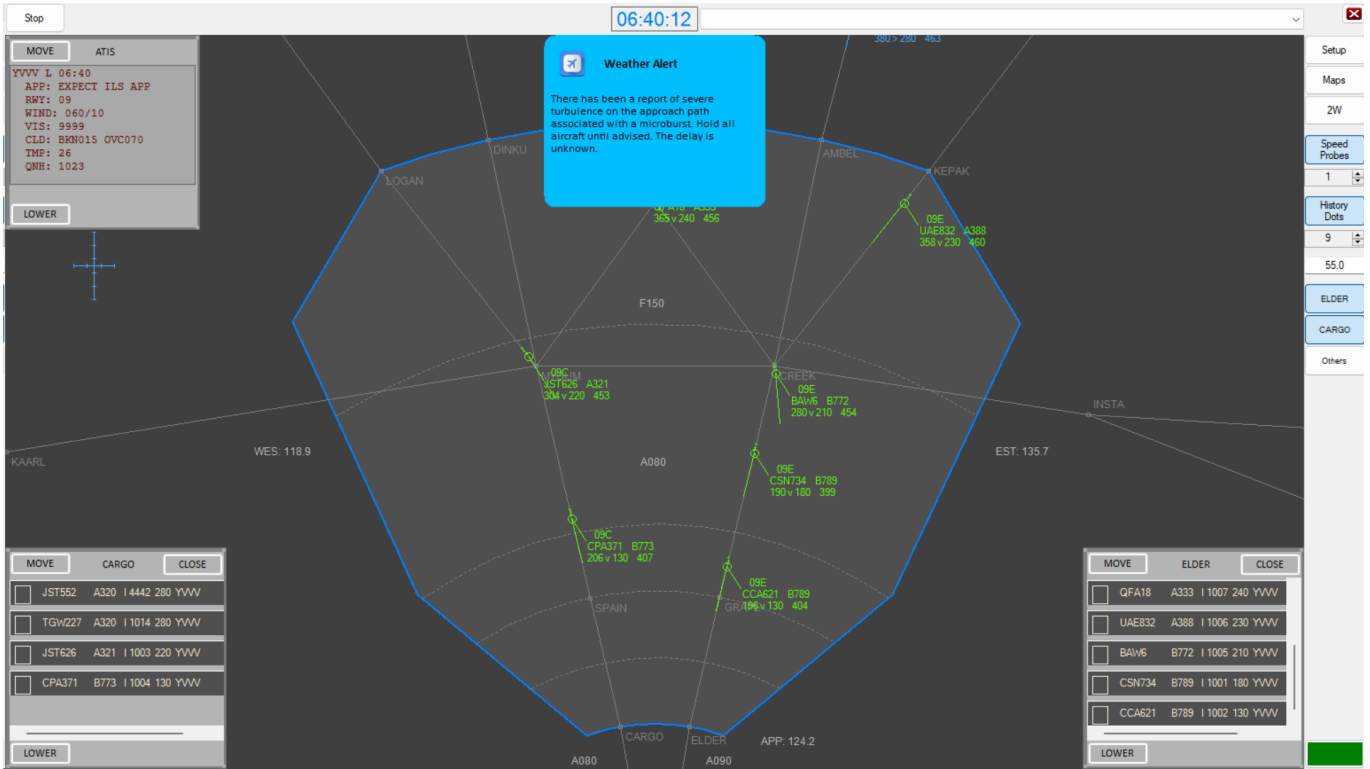
MOVE ELDER CLOSE

<input type="checkbox"/>	UAL924	B772	I 4442	280	YVW
<input type="checkbox"/>	SIA285	B773	I 4441	270	YVW
<input type="checkbox"/>	QFA732	A332	I 4437	260	YVW
<input type="checkbox"/>	BAW372	A320	I 4440	250	YVW

LOWER

Slide 42


等待模拟练习



模拟性能反馈

Scenarios	
Scenario:	1
Trail:	VOZ833+ETD164
Outcome:	10.26 (Ideal)
Completed:	2023-11-28 11-37
Scenario:	3
Trail:	JST635+CSN602
Outcome:	11.03 (Ideal)
Completed:	2023-11-28 11-41
Scenario:	5
Trail:	CCA414+SIA428
Outcome:	10.76 (Ideal)
Completed:	2023-11-28 11-49

AMAN 课程



The AMAN Display *Continued*

08:13:00

The outside number, called the **Initial Delay**, represents the original duration in minutes that the system has calculated for the aircraft's delay.

The **Initial Delay** does not change and has limited value to the processing of aircraft except, through a comparison of Current Delay, to indicate how much delay has been absorbed. For example, ANZ708 was initially subject to 3 minutes delay, based on the system calculations, one minute of delay has been absorbed.

All aircraft should have 0 at the gate:

MOVE
YVWV
CLOSE

3	2	ANZ708	11	11
		JST600	9	9
		CES195	12	12
		JST920	13	13
		VOZ267	10	10
		QFA52	12	12
		BAW10	13	13
4	0	CSN725		

CARGO 08:13:00 ELDER

LOWER
RESET

The **Current Delay**, indicated by the inside numbers, shows the remaining minutes of delay, as determined by the system, required to reach the scheduled gate time. As delaying action is applied, the **Current Delay** should slowly decrease so that, if sequencing actions have been performed correctly, it displays 0 as the aircraft passes the gate

Note that the system estimates the **Current Delay** based on the aircraft's progress to the gate, making use of standard performance profiles that do not account for any control actions that have been applied, such as vectoring or speed control.

Slide 7

AMAN 演示

Stop
08:32:26
08:32:25 HVN725 (Acknowledgement)
✖

MOVE
ATIS

YVWV W 08:08
APP: EXPECT ILS APP
RWY: 09
* WIND: 100/10-20
VIS: 9999
CLD: SCT030 BNK080
* TMP: 37
* QNH: 1019

LOWER

MOVE
YVWV
CLOSE

14	10	RXA619	8	8
16	10	NWI	6	6
17	14	FD11	9	9
12	5	QLK434		
		JST318	7	7
		HVN725	5	6
		QFA755	9	9
		VOZ112	3	11
		JST600	0	9
		CES195	0	12

CARGO 08:32:15 ELDER

LOWER
RESET

MOVE
SECOND

Filter

Setup

Maps

2W

Speed Probes

1

History Dots

9

55.0

ELDER

CARGO

Others

AMAN



与合作

北京视联伟视科技有限责任公司

+86 137 0126 9381