出國報告（出國類別：其他）

出席 2011 年「國際飛航管制員協會聯盟」年會出國報告書

服務機關：交通部民用航空局
姓名職稱：許智婷　科長
派赴國家：約旦
出國期間：自 100 年 4 月 9 日至 4 月 18 日
報告日期：100 年 6 月 3 日

提 要 表

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計畫名稱：	出席國際飛航管制員協會聯盟年會
報告名稱：	出席 2011 年「國際飛航管制員協會聯盟」年會出國報告書
計畫主辦機關：	交通部民用航空局
出國人員：	
前往地區：	約旦
參訪機關：	國際飛航管制員協會聯盟
出國類別：	其他
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關鍵詞：	國際飛航管制員協會聯盟(FATCA)，中華民國飛航管制協會(ROCATCA)，飛航管制服務
報告書頁數：	12 頁
報告內容摘要：	IFATCA 為我國參加少數幾個具正式會員身分之國際組織，交通部民用航空局每年均積極參與該協會聯盟之相關活動，藉以了解國際飛航管制服務發展趨勢，參與會務運作並強化與各會員國關係，以作為提供政策之參考。 於會議中了解各協會會員國管制員對於工作時數與薪資待遇均非常之重視，而希望 IFATCA 能予以協助解決。另 IFATCA 一直在推動公正文化（JUST CULTURE），希望管制員於管制上萬一有業務上之疏失而造成事件時，能受到免責或公正之對待，惟目前國際上有兩件被該國法院判決成立有罪之案例，因此本國之管制員應以此為殷鑑，於執行業務上應更小心謹慎。
電子全文檔：	C10002271_01.pdf
出國報告審核表：	C10002271_A.doc
限閱與否：	否
專責人員姓名：	陳碧雲
專責人員電話：	02-23496197

出國人員：

姓名	服務機關	服務單位	職稱	官職等	E-MAIL 信箱
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出席2011年「國際飛航管制員協會聯盟」年會出國報告書

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出席 2011 年「國際飛航管制員協會聯盟」年會出國報告

壹、前言與目的

一、 國際飛航管制員協會聯盟（International Federation of Air Traffic Controllers’ Associations ,FATCA）總會設於加拿大蒙特婁，分為歐洲、美洲、亞太、非洲/中東等四大地區，該組織遍及全球，發展迄至今已有 130 個會員國成為該聯盟之正式會員，超過 45,000 個飛航管制員已被納入聯盟之中。

二、 該協會聯盟為一非政治性及營利性之獨立專業組織，於 1961 年 10 月 26 日於荷蘭之阿姆斯特丹正式成立，主要發起國為奧地利、比利時、丹麥、芬蘭、西德、冰島、愛爾蘭、盧森堡、荷蘭、挪威及瑞士等 11 個國家歐洲國家。聯盟之主要目標為：

（一）有效率即有規律地提升國際間之飛航安全。

（二）協助發展飛航管制之安全有效制度。

（三）促進飛航管制員間之學術交流。

（四）維護飛航管制員之應有權益。

（五）擴展與其它國際組織之互利關係。

（六）致力發展成為泛世界之飛航管制員協會聯盟事業。

三、 我國於 1978 年首度應邀以觀察員身份參加在丹麥哥本哈根舉辦之 IFATCA 第 17 屆年會，開始瞭解 IFATCA 之宗旨並邁出我飛航管制國際化之腳步。1979 年獲邀參加在比利時布魯塞爾舉行之第 18 屆年會，並進一步與 IFATCA 理事會討論我入會之可行性。1980 年「中華民國飛航管制協會」正式成立，並以 ROCATCA (Republic of China Air Traffic Controllers’Association)名義正式申請加入 IFATCA，註冊名稱為『ROCATCA (TAIWAN)』。

四、 IFATCA 為我國參加少數幾個具正式會員身分之國際組織，交通部民用航

空局每年均積極參與該協會聯盟之相關活動，藉以了解國際飛航管制服務發展趨勢，參與會務運作並強化與各會員國關係，以作爲提供政策之參考。

五、 另本國目前正積極推動加入 ICAO，藉由參加 IFATCA 年會以尋求建立相關人脈。

貳、行　程

4 月 9 日至 10 日	自桃園國際機場搭乘長榮航空公司 BR061 至奧地利維也納，轉機至約旦安曼。
4 月 11 日至 15 日	出席年會。
4 月 16 日至 18 日	搭機離開約旦安曼至奧地利維也納，轉機搭乘長榮航空公司 BR062 班機經曼谷，返回桃園國際機場。

參、會議過程

一、 約旦安曼

位於約旦西部邊陲地帶的安曼（Amman）是約旦全國第一大城，全國 600 萬人口中，有 240 萬集中於此，90%的經濟活動在安曼，在新王阿不都拉的勵精圖治下，目前各項建設仍在加速進行中，讓這個已經有 3500 年以上的歷史名城展現新的風貌。

安曼就是舊約聖經中的拉巴(Rabah)，公元前一千年猶太的大衛王統治期間，爲了奪取他部屬烏利亞的妻子，居然派遣烏利亞攻打拉巴致死。安曼還有八世紀時是歐瑪亞王朝(Umayyad)王朝的皇宮。

羅馬時代在這裡建設了有五千個席次的三層羅馬劇場，如今都可以完整的看到。安曼考古學博物館中藏有考古學的稀世珍寶昆蘭經卷的原稿，

是猶太人民族靈魂的代表。臺灣和約旦的關係過去半個多世紀以來都非常良好，約旦國王的貼身侍衛幾乎全部都是臺灣的特種部隊出身，據說，這些終極保鑣即使在深夜不需要通報，也可直接進入國王的寢宮。如今許多退役人員都選擇留在安曼開中國餐館。安曼人對來自臺灣的遊客似乎也特別友善。

惟於今（100）年從利比亞開始爆發並擴大至北非中東等多國之政治革，且於 3 月 25 日安曼有示威活動導致 1 死及多人受傷，原本擔心無法成行，故一直注意外交部是否有發布國人不宜赴約旦旅遊之警訊，且承辦此次年會之約旦管制員協會，於行前亦以電郵通知並未接獲當局不准外國人入境之命令，於是懷著忐忑不安之心情搭機前往安曼開會，於離開安曼機場，當飛機緩緩升空時，心中的一塊大石頭，終於可以放下。

二、 會議過程

（一） 4 月 11 日晚上為歡迎酒會(Welcome Party) 地點在 Le Royal Hotel 舉行（也是未來幾日舉行會議之同一飯店），揭開本（50）屆年會之序幕。當晚臺北區域管制中心管制員林敬益因事晚點抵達，結果竟連一杯水都沒喝到。

（二） 4 月 12 日上午舉行開幕典禮，揭開第 50 屆大會之序幕，開幕典禮完成後，隨即唱名（Roll Call），本次共有來自 74 個會員國家之 389 個管制員出席來討論如何增進飛航管制之安全及效率，本次盛逢 IFATCA 年會，所以有 ICAO、EUROCONTROL、CANSO、 IFT 及 FAA 均有派資深人員參加；而日本管制員協會因 3 月 11 日之大地震，致無法派員參加，由於我國航管向來與日本航管關係良好，中華民國飛航管制員協會原擬捐助日本航管協會，惟因故卻沒有完成；而日方事先以 email 委請中華民國飛航管制員協會全權代理，另於會上中華民國飛航管制員協會被指定為韓國之代理。接下來則依慣例分為 A、B、C 三組同時進行工作分組會議。謹就本屆年會各組工作會議內容簡摘如下：

1. 第一組（A 組）

(1) A 組係針對年會組織運作（如會員之入會、退會）、行政、財務、季刊、業務報告及管理等方面做討論與報告。

(2) 本次年會計有巴基斯坦（Pakistan）、聖多美（San Tome）、馬達加斯加（Madascar）及開曼群島（Cayman Island）4 國申請加入爲正式會員會員，前述 4 國於簡單報告其協會會員人數及運作狀況等，經主席詢問有無異議，均無其他國家有反對意見，該 4 國順利完成入會手續。

(3) 選舉委員會主席及委員

新任的技術 EVP 爲 Patrick Forrey

新任的非洲中東地區 EVP 爲 Keziah Ogutu

新任的亞太地區 EVP 爲 D.K.Behera

新任的美洲地區 EVP 爲 Ignacio Oliva Whiteley

(4) 協會聯盟年會主辦

2012 年第 51 屆年會將於 3 月 12 日至 16 日於尼泊爾加得滿都舉行，2012 年之區域性協會聯盟年會原在 2010 年第 49 屆於多明尼加之旁達嘉納（Punta Cana）舉行之年會中，印度提出有意願主辦，經過討論最後亦確定由印度舉辦，但於今年年會得到之新消息了解，依朗有意接手（沒有消息來源可以了解印度爲何不主辦？），惟其尚未作最後之決定。

(5) 爲配合全球之節能減碳及環保議題，本次年會已不再提供相關紙本資料，原擬給有需求之會員國可以要求拷貝攜回，後因作業問題，改由放置協會聯盟網站，由會員國自行下載，這也是全球管制員爲愛護地球，身體力行所盡之一份心力。

(6) 委員會及各區域報告：

各區委員會並就過去一年之工作提出報告。而在亞太區域報告時依朗報告因與其相鄰之國家有 11 個，因此造成其航管作業及與鄰區之協調相當大之困難，希望國際飛航管制員協會聯盟能幫忙解決。印尼則表示其將由 5 個服務提供者

（service providers），變為 1 個，作業上將會有很大的改變，是否國際飛航管制員協會聯盟有好的對策。印度亦報告其將民營化，公司將增加管制員之工作時數，等於變相的減薪，並希望國際飛航管制員協會聯盟能給予協助。最後香港地區代表出來發言，國際飛航管制員協會聯盟並不能給任何一個政府或私人公司施壓，各協會加入這個聯盟主要是多認識其他會員，蒐集其他會員國之資料，以擬訂適合自己所需之制度，提供給政府或私人公司決策者參考。

(7) 亞太地區執行副主席 EVP 選舉

原亞太地區 EVP 係由香港執行副主席 Raymond K.W. Tse 擔任，因其任期已滿，香港另推出參選，此次印度及尼泊爾亦派員出馬競選，印度遊說時訴求因其航管將民營化，當選 EVP 可讓其與公司談判時較有籌碼，較能獲得公司派之重視；尼泊爾則由說說香港已把持亞太地區 EVP 太久，應換人做看看，而香港代表並未事先跟中華民國飛航管制員協會代表遊說，第一天開大會議不見人影，終於選舉時尼泊爾退出競選（事後了解應是其與印度條件交換，於下一屆時再由印度之持尼泊爾出馬競選），最後結果是印度當選。

2. 第二組（B 組）

本組主要討論有關飛航管制技術和作業層面之議題，本次主要討論內容如下：

(1) 跑道安全燈之研究：

美國在 2007-2010 年總共發生了 3679 件跑道入侵事件，其中屬車輛違規者有 747 件，佔 20%；屬管制員疏失有 575 件，佔 16%；屬駕駛員違規者有 2357 件，佔 64%。全球平均每天有一件跑道入侵事件發生，每年花費航空產業約一億美元。於是美國就開始研究跑道狀況燈（runway status light），以燈光之管控提醒相關人員（包含車輛）注意跑道使用安全。這些燈光包括跑道進入指示燈、等待起飛停止

燈、跑道交叉指示燈等等，依據 2010 年 10 月調查美國洛杉磯、波士頓、加州等機場使用前述燈光系統之管制員了解，有 86%之管制員認為增加了跑道之安全；有 85%之管制員認為認為至少增加了 25%跑道之安全：有 41%之管制員見證了有此燈光系統後，至少免除了一件跑道入侵事件。

(2) 標準離場及到場程序之研究：

標準離場程序主要設計在於對航空器地障之保護，也可以加速航管服務。而標準到場程序之設計僅在提供作業之便利。

(3) 航路環境之限制研究：

除非航管許可改變空層高度，否則航空器應依照標準離場或到場所指示之空層限制飛航。

(4) 「fly by 與 fly over」之產物定義

Fly by 與 fly over 兩者均為一過渡點，fly over 之飛行操作較為複雜，fly over 過渡點之航跡通常較 fly by 大；fly by 通常無法預測也無重複航跡，因其常會因空速及轉彎角度而有不同，除非該過渡地區可預測及重複之邊界可以先予界定。為何要有 fly over 航點呢？例如誤失進場點為了保與航空器與地障或特別空域之隔離就必須設立 fly over 航點。因為個別航空器飛經 fly by 或 fly over 航點有很大之差異，因此 ICAO 即建議對於 fly by 與 fly over 之概念應予訓練，並且應包含航空器在轉彎操作上之差異。

(5) 飛航管理系統之操作研究

(6) 缺氧警告研究

(7) 不中斷下降操作手冊之檢視

(8) 飛航流量管理之研究

ICAO 第 11 號附約，對於飛航流量管理定義：為使航管容量發揮至最大可能，且促使航行量符合適當飛航服務主管機關宣告之容量，以促進飛航之安全、有序、迅速所建立之服務。第 11 號附約並提到：

A. 當空域之航行量超過或預期將超過相關航管服務之航管容量時應建立飛航流量管理。

B. 飛航流量管理之建立應基於區域性航行協議或透過多邊協議；該類協議應訂定共同之程序及決定容量之共同方法。

C. 當在某一定點或區域於某特定時間內，除已接管者外，航管單位明顯無法再容納更多航行量，或只能容納特定之數量時，該單位應將情況告知飛航流量管理單位及相關飛航服務單位。另應將預計延誤及採取限制措施告知飛往該目的地相關之定點或區域之航空器飛航組員及相航空器使用人。

有關流量管理之研究應再加上管制員之工作負荷考量。

在孟加拉灣、南亞洲及巴基斯坦之空域提供者已建立自動流量管理服務系統，該系統係由 ICAO 孟加拉灣飛航服務協調團體所監控。

該系統坐落於曼谷區域管制中心，由 AEROTHAI 所管控。

(9) 航空器使用字母與數字呼號政策之檢視

3. 第三組（C 組）

本組主要討論為航管專業事務議題，本次主要討論內容如下：

(1) 安全管理系統

(2) 目前無線電溝通英語之最新實施情形

(3) FAA 有關專門技術之調查

(4) CPDLC 在歐洲施行之情形

(5) ICAO 有關 USOAP 與 CMA

(6) ICAO 有關全球飛航安全政策及全球安全計畫

(7) 飛航流量與容量管理

(8) 給各協會會員國有關公正文化之指導

（三） 4 月 15 日，

1. 進行 50 週年之回顧

由於今年是 IFATCA 第 50 週年大會，大會非常用心地作了從創辦人至現任理事長之簡介，並請來 ICAO、IATA、FAA、CANSO 資深代表及其中一任理事長發表感言，場面溫馨感人。

2. 各分組報告討論結果，並確認相關紀錄資料。大會感謝冰島管制員協會之所有管制員於 2010 年冰島火山爆發時承擔相當重的管制工作，提供安全有序之飛航管制服務。
3. 大會報告未來一年重點研究之項目：
   (1) 有關管制員訓練
   (2) 疲勞風險管理系統
   (3) 安全資訊之保護
   (4) 自願報告系統
   (5) 操作軟體之部署標準
   (6) 飛航服務提供者民營化或商業化
   (7) 監理與線上管理
   (8) 人與機械合作
   (9) 證照
   (10) 失能
   (11) 改變管理

(12)法院判決之結果

(13)符合無線電溝通英語之規定

(14)標準離場程序與標準到場程序及 FMS 之設計

(15)到場所需之時間（Require Time of Arrival）

(16)不中斷爬高操作

(17)目視觀察

(18)目標重疊及次序安排工具

(19)區塊升級概念

(20)Transponder 強制區域

(21)進場時之目視隔離及呼號混淆

4. 大會並感謝這次之主辦國－約旦管制員協會。

5. 惜別晚宴係 IFATCA 年會之重頭戲之一，主辦國特地選在約旦之觀光聖地死海舉辦，約一個小時之車程由會場至死海，主辦國精心安排讓與會者能看到死海之夕陽；另經了解，當晚之餐宴係由約旦退休之一名航管人員所獨立贊助，該人士於去年本國所主辦之亞太地區年會議曾來臺北。晚宴採自助餐式，美中不足之處係取菜大排長龍，自助餐之用餐動線之規劃真的很重要。另外飲料也不像我國舉辦時無線暢飲，一兩杯後即要自費，

許世沙漠國家酒水都很貴吧（難怪到過我國之管制員對我國舉辦之會議均讚譽有加）。

肆、心得與建議

一、 於區域報告之各協會會員國報告中了解，各協會會員國管制員對於工作時數與薪資待遇均非常之重視，而希望 IFATCA 能予以協助解決，惟 IFATCA 僅能提供相關資料或以會議為與他國管制員溝通或詢問相關資料之平臺，解決問題還須各協會會員國自身之努力。

二、 IFATCA 所提之各項技術研究報告，是每個協會會員國管制員於日常工作上比較常碰到的問題，如駕駛員最常要求的不中斷之爬升與下降，以節省燃油；管制員須注意有關「fly by 與 fly over」對航空器操作之不同，而在管制上之應用也有不同；相關資訊均有很高之參考價值。

三、 雖然 IFATCA 一直在推動公正文化（JUST CULTURE），希望管制員於管制上萬一有業務上之疏失而造成事件時，能受到免責或公正之對待，惟目前國際上有兩件被該國法院判決成立有罪之案例，一件是 2001 年發生於日本，教官帶在職訓練學生，因人為疏失而造成日航班機空中接近事件，

日本高等法院判決該 2 名管制員有罪，該兩名管制員也可能因此喪失其工作;2004 年 2 月 24 日發生於義大利之 Cagliari 事件,當日係一架 Cessna 飛機請求於夜間作目視進場，管制員特別詢問該機駕駛員是否能與地障保持安全距離，駕駛員回答可以，管制員於是許可該機作目視進場，該機卻撞上地障，雖然義大利管制員均是依照該國之管制規定（亦符合國際民航法規之相相關規定），准許駕駛員自行保持目視及與地障之安全隔離而實施目視進場，然而義大利高等法院認為管制員應儘可能地提醒駕駛員，判決該管制員 2 年之刑期，並已定讞。雖然 IFATCA 也公開聲援該管制員，但徒勞無功。因此本國之管制員應以此為殷鑑，於執行業務上應更小心謹慎，除了維護飛安之因素外，另一原因在於外人對於飛航管制工作壓力及性質並不是那麼了解，難免於法規之解釋上更於嚴苛，且國際上已有此兩起判例，未來萬一有事件發生，本國法院是否也會比照辦理，值得吾人關切。

四、 舉辦大型國際會議非常不容易，舉凡會議室、會議資料蒐集、與會人員住宿及交通、接待、用餐之安排等等各項小細節都要非常注意，否則任何一個小環節之疏失，都有可能讓參與會議之人留下不好印象，可說是相當艱難之工作，在與他國相作比較且其他曾來我國參與我國所主辦之年會或亞太地區年會，大部分之他國管制員都對我國所主辦之會議贊譽有加，我中華民國飛航管制員協會應持續保持此光榮。

伍、附件

一、 議程

二、 大會 A 組會議資料

三、 大會 B 組會議資料

四、 大會 C 組會議資料

INTERNATIONAL FEDERATION OF
AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

50th ANNUAL CONFERENCE – Amman, Jordan
11 – 15 April 2011

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INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

50th ANNUAL CONFERENCE – Amman, Jordan, April 11 - 15, 2011

Agenda Item: A.14.1

IFATCA 11
LWP No. 03

ELECTION OF THE EXECUTIVE BOARD

Presented by the Executive Board

- Late nominations (received after deadline 11.02.2011 until 04.04.2011) -

A.14.1 Deputy President

Nominee: *Patrik Peters*
Nominated by: EUROCONTROL Guild of Air Traffic Services (EGATS)

A.14.2 Executive Vice-President Technical

Nominee: *no nomination*
Nominated by:

A.14.3 Executive Vice-President Africa Middle East

A.14.3.1

Nominee: *Keziah Ogutu*
Nominated by: Kenya Air Traffic Controllers' Association (KATCA)

A.14.4 Executive Vice-President Asia-Pacific

Nominee: *D. K. Behera*
Nominated by: Air Traffic Controllers' Guild of India

A.14.5 Executive Vice-President Americas

Nominee: *Ignacio Oliva Whiteley*
Nominated by: Air Traffic Controllers' Association of Argentina (ACTA Argentina)

INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

50th ANNUAL CONFERENCE – Amman, Jordan, April 11 - 15, 2011

Agenda Item: A.5.1

IFATCA 11
LWP No. 02

ELECTION OF STANDING COMMITTEE CHAIRS
Presented by the Executive Board

A.5.1 Finance Committee (FIC) Chairman

Nominee: *John P. Redmond*
Nominated by: Canadian Air Traffic Controllers' Association (CATCA)

INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

50th ANNUAL CONFERENCE – Amman, Jordan, April 11 - 15, 2011

Agenda Item: A.14.3 **IFATCA 11**
LWP No. 04

ELECTION OF THE EXECUTIVE BOARD
Presented by the Executive Board

A.14.3 Executive Vice-President Africa Middle East

A.14.3.1

Nominee: *Abdellatif Matoual*
Nominated by: Air Traffic Controllers' Association of Morocco (MATCA)

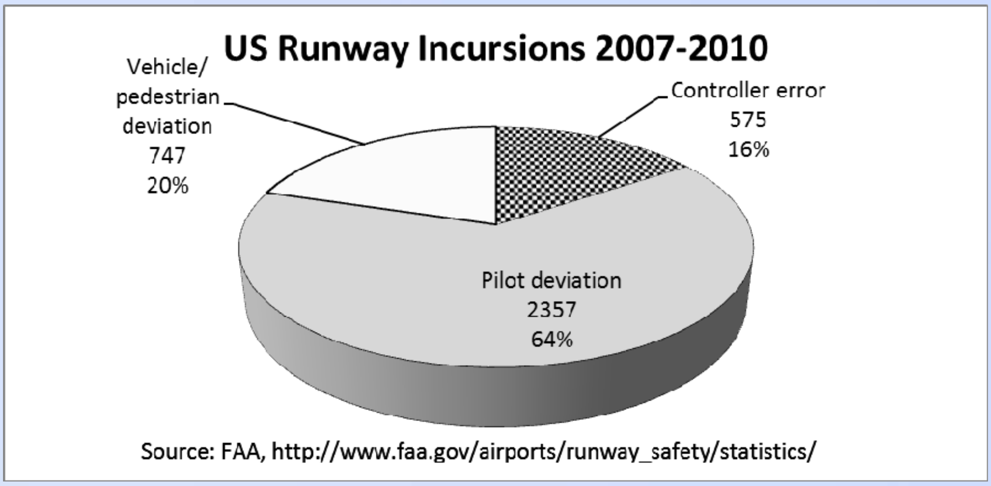
B.5.3 WP89

Aerodrome – Study Runway Status Lights

Presented by:
Bill Holtzman (USA)
on behalf of TOC

B.5.3 RWSL WP 89

Runway Incursions



Notable Runway Incursions

- 27 Mar 1977, Canary Islands. Two 747s collide. 583 dead.
- 20 Dec 1983 , Sioux Falls, USA. DC9 collides with snow plow. 1 dead.
- 3 Dec 1990 , Detroit, USA. DC9 collides with B727. 8 dead.
- 1 Feb 1991, Los Angeles. B737 lands on Fairchild Metro. 34 dead.

Source: Wikipedia

B.5.3 RWSL WP 89

Notable Runway Incursions

- 8 Oct 2001. MD87 collides with Citation, Milan. 118 dead.
- 9 Jun 2005, Boston. Departing A330 flies over departing 737. None hurt.
- 30 Dec 2007, Otopeni, Romania. B737 hits repair car. None hurt.

Source: Wikipedia

International Federation of Air Traffic Controllers' Associations

Costs

"One runway incursion happens daily on average worldwide, at a cost to the industry of about $100 million a year."

TK Kallenbach, Honeywell Vice President of Product Management

Runway Status Lights

RWSL:

•Developed in US

•Uses ASDE-X to detect potential conflicts in real time.

•Direct heads-up warning to pilots and vehicle drivers

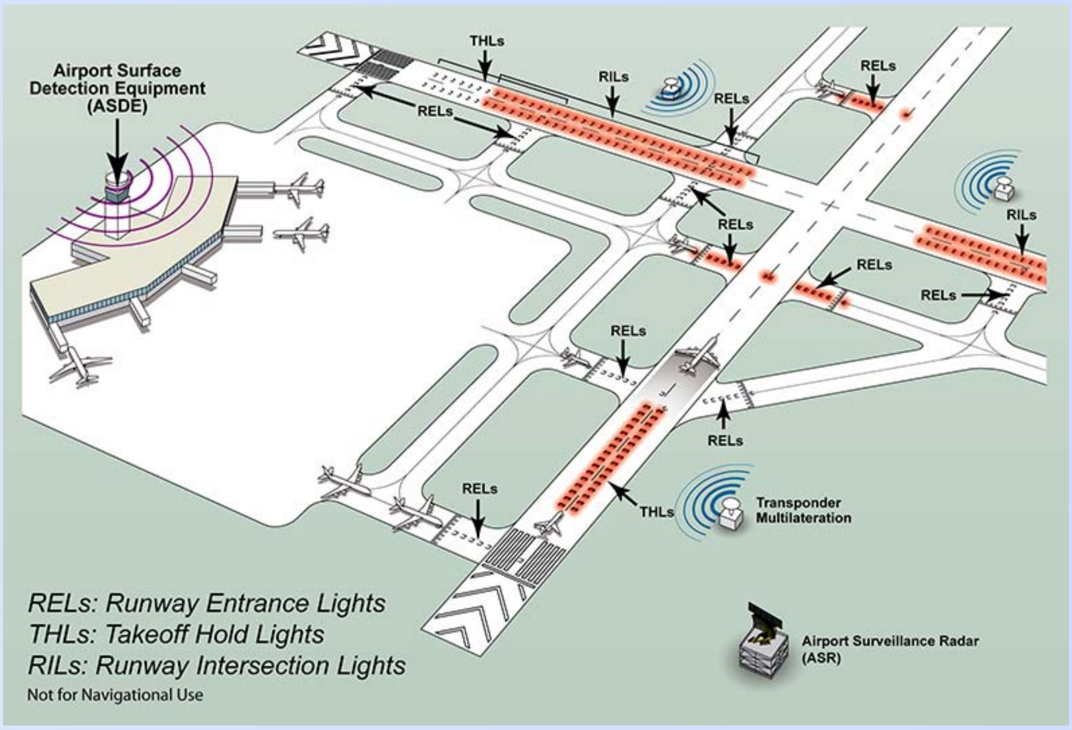
•Commercial, off-the-shelf hardware

•Cost: 1 million USD per runway

Operating Principles (USA)

- No interference with normal ops.
- No controller action required.
- Lights allow anticipated separation.
- Clearance by ATC only, as always.
- Lights are on = Stop.
- Lights off = Proceed with clearance.
- Lights apply to vehicles also.
- Automatic brightness in low visibility.

Schematic



Runway Entrance Lights

- Warn of active traffic on runway
- On centerline
- Point at aircraft nearing runway
- Activated by 30+ knot traffic
- Activate during all runway activity


REL - red taxiway centerline lights

REL

Takeoff Hold Lights

- Warn of active traffic on runway
- On centerline
- Point at departing aircraft
- Activated only when departure in takeoff position and 2nd aircraft on or approaching runway


THL - double-row red lights

THL

Runway Intersection Lights

- Warn of active traffic on runway
- On centerline
- Point at departing aircraft
- Activated only when aircraft approaching runway and departure rolling at 30+ knots

RIL

Pilot's View

- IFALPA:
  - ✓ Fully supports global standard
  - ✓ Seeks "consistent, universally recognized displays."
- European Cockpit Association:
  - ✓ Use red only
  - ✓ Training, global standard
  - ✓ Proceed only with clearance

Controller's View

Survey of US controllers at DFW, LAX, SAN, BOS with RWSL experience (Oct 2010):

•86% - Improves runway safety

•85% - Will lower runway incursions by at least 25%

•41% - Witnessed at least one "save" by RWSL

Controller Concerns

- False indications
- Pilot and controller training
- Confusion with other lights
- Pilots asking when lights turn green
- Pilots proceed when lights turn off
- Use of tower display as radar
- Vehicles on grass

Confusion with Other Lights

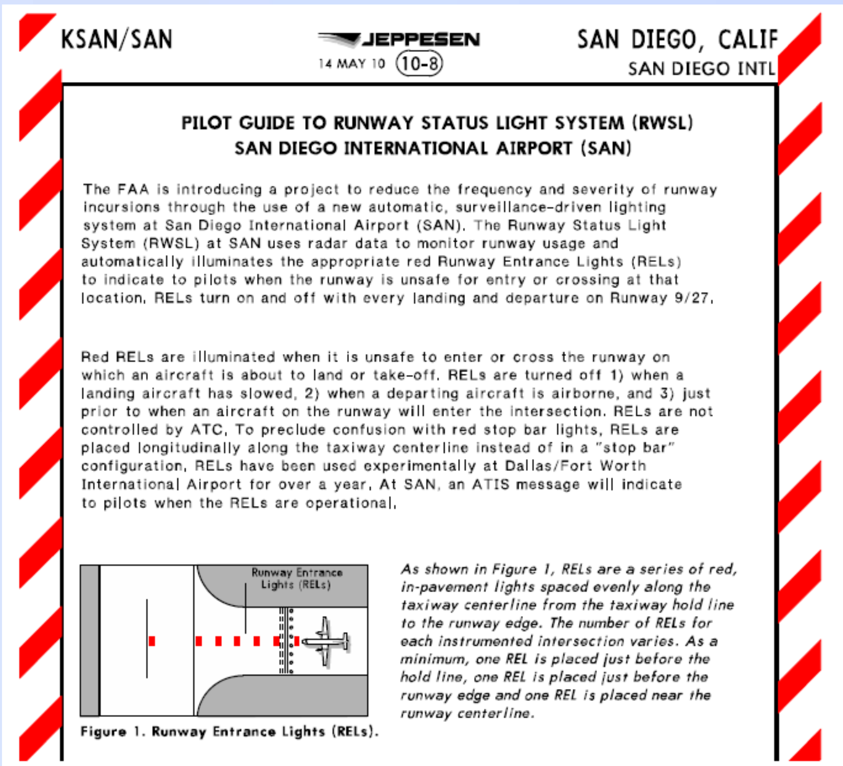
- Displaced threshold
- Stop bars
- Approach lights
- Runway end lights – alternating red and white last 900 meters, then red for last 300 meters

Kill Switch

Global Consistency

- Eurocontrol E-RWSL, Dec 2010
  - o Two modes.
    - ➢ Prevention – Same as existing.
    - ➢ Incursion - Lights flash to show emergency action needed.
- ICAO Aerodrome Panel, Oct 2010
  - o Orientation, spacing and use
  - o "...only control...to disable....”

Charting



KSAN/SAN JEPPESEN 14 MAY 10 (10-8) SAN DIEGO, CALIF SAN DIEGO INTL

PILOT GUIDE TO RUNWAY STATUS LIGHT SYSTEM (RWSL)
SAN DIEGO INTERNATIONAL AIRPORT (SAN)

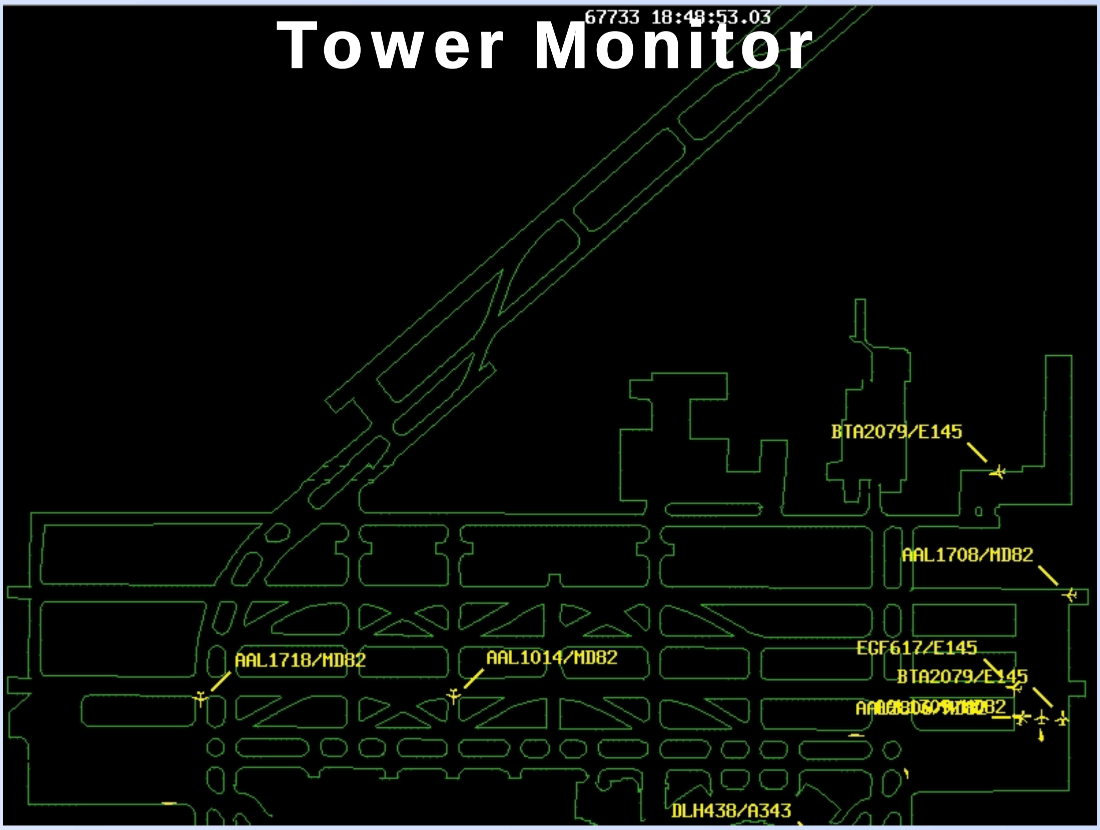
The FAA is introducing a project to reduce the frequency and severity of runway incursions through the use of a new automatic, surveillance-driven lighting system at San Diego International Airport (SAN). The Runway Status Light System (RWSL) at SAN uses radar data to monitor runway usage and automatically illuminates the appropriate red Runway Entrance Lights (RELs) to indicate to pilots when the runway is unsafe for entry or crossing at that location. RELs turn on and off with every landing and departure on Runway 9/27.

Red RELs are illuminated when it is unsafe to enter or cross the runway on which an aircraft is about to land or take-off. RELs are turned off 1) when a landing aircraft has slowed, 2) when a departing aircraft is airborne, and 3) just prior to when an aircraft on the runway will enter the intersection. RELs are not controlled by ATC. To preclude confusion with red stop bar lights, RELs are placed longitudinally along the taxiway centerline instead of in a "stop bar" configuration. RELs have been used experimentally at Dallas/Fort Worth International Airport for over a year. At SAN, an ATIS message will indicate to pilots when the RELs are operational.

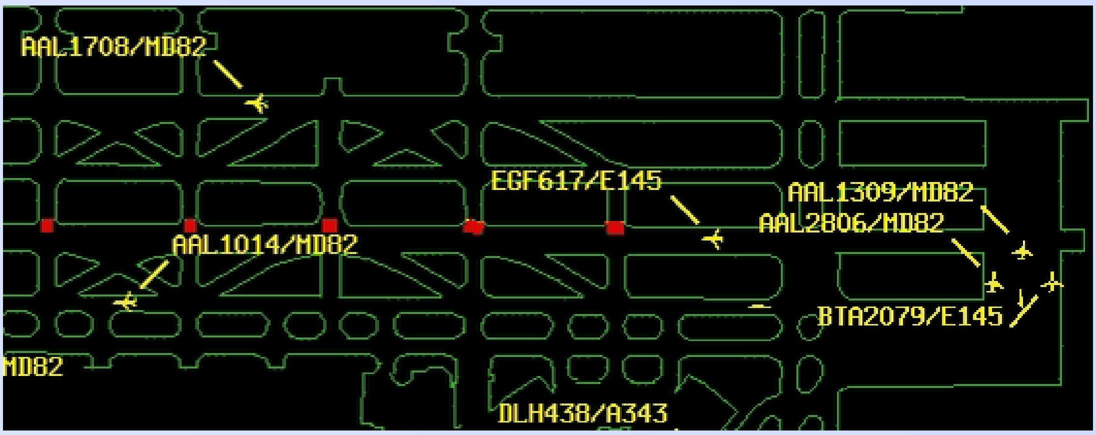
Figure 1. Runway Entrance Lights (RELs).

As shown in Figure 1, RELs are a series of red, in-pavement lights spaced evenly along the taxiway centerline from the taxiway hold line to the runway edge. The number of RELs for each instrumented intersection varies. As a minimum, one REL is placed just before the hold line, one REL is placed just before the runway edge and one REL is placed near the runway centerline.

Tower Monitor



Tower Monitor (cont'd)

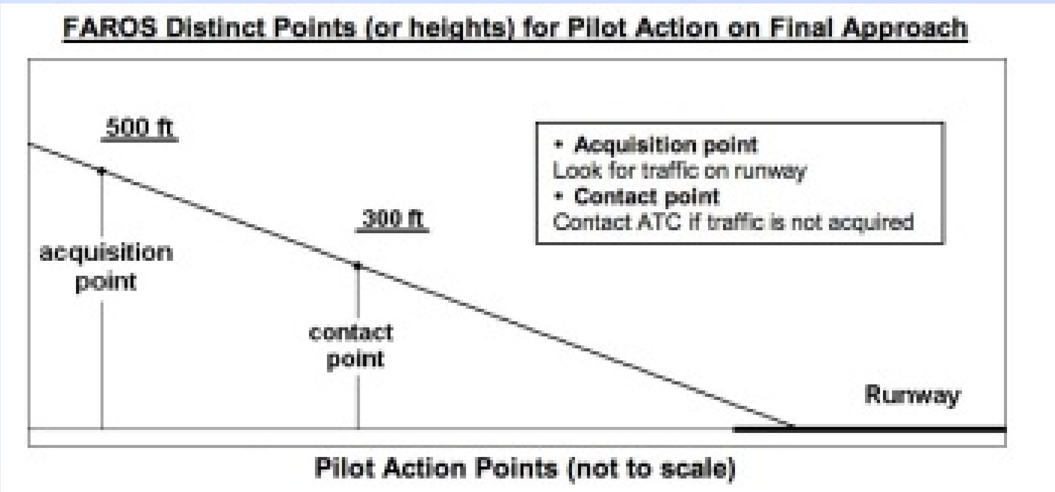


Final Approach Runway Occupancy System

- Warn pilot on approach of traffic on runway
- Use existing PAPIs
- Flash PAPIs to show conflict

FAROS

FAROS Action Points



FAROS Performance

- 25% of US controllers surveyed – negative effect on safety
- Too many nuisance alerts
- Deactivated at both test sites - Dallas and Long Beach
- FAA program on hold for improvements

Existing Policy

- AAS 1.1 - ACAS: **ACAS should only be considered as a 'safety net'.**
- ATS 3.18 – The Use of Safety Nets in ATM: **A safety net is an airborne and/or ground based function, the sole purpose of which is to alert the pilot or controller of the imminence of collision of aircraft, aircraft and terrain/obstacle, as well as penetration of dangerous airspace.**

Existing Policy (cont'd)

- AAS 3.21 – Short Term Conflict Alert:
  - ✓ Controller involvement and training
  - ✓ Localized nuisance filters
  - ✓ Use of simulation and studies
  - ✓ Relevance to safety case

Conclusions

1. RWSL is promising.
2. Runway incursions are not reduced where no conflict is present.
3. International leadership is critical. Non-uniform deployment is a risk.
4. Training of pilots and controllers is vital to success.
5. Interaction with other lighting is a concern. Issues are largely local.

Conclusions

6. Any requirement to scan an additional monitor would increase workload and liability.
7. TOC is concerned RWSL monitors might be used as a surveillance tool without regulation.
8. FAROS in its present state is an immature system.
9. TOC considers RWSL a safety net.

Debate

Recommendations 1

4.1 - *IFATCA Policy is:*

IFATCA supports RWSL provided the following criteria are met:

- **The system will be used as a safety net.**
- **It will operate automatically with no controller input required.**
- **The system specifications are globally harmonized under ICAO guidance.**
- **Potential confusion with other lighting systems is eliminated or mitigated.**
- **Clearance to proceed will still be required.**

and is included in the IFATCA Technical and Professional Manual.

Recommendations 2

4.1 – *(continued):*

IFATCA supports RWSL provided the following criteria are met:

- **All surface traffic will be required to comply with the system.**
- **Comprehensive training is provided to all pilots, drivers and controllers.**
- **False activations are kept to an absolute minimum.**

and is included in the IFATCA Technical and Professional Manual.

Recommendations 3

4.2 - *IFATCA Policy is:*

If RWSL activations are displayed to the controller, the following criteria should be met:

- **The information should be efficiently incorporated into existing surveillance displays at the appropriate control positions.**
- **Legal responsibilities are clearly and unambiguously defined.**

and is included in the IFATCA Technical and Professional Manual.

Agenda Item B.5.4 **WP 90**

ATS – Study SID and STAR design

Presented by
Alexander Schwassmann (Germany)
on behalf of TOC

Timeline

- November 2007: ICAO introduces Amendment 5 to Doc 4444
  - new procedures and phraseologies for aircraft following a SID or a STAR.
  - considerable confusion as half the world adopts the Amendment while the other half does not.
- September 2009: Joint TOC and IFALPA ATS Committee Meeting proposes new phraseology
- April 2010: IFATCA accepts new policy and puts SID and STAR design on the TOC work programme.

Documentation

on SIDs and STARs:

- ICAO Annex 11 „Air Traffic Services
- ICAO Doc 8168 „PANS OPS“ Vol. I and II
- ICAO Doc 9426 „Air Traffic Services Planning Manual
- IFATCA Technical and Professional Manual 2010
- IFATCA „Statement on the Future of Global ATM“

ICAO

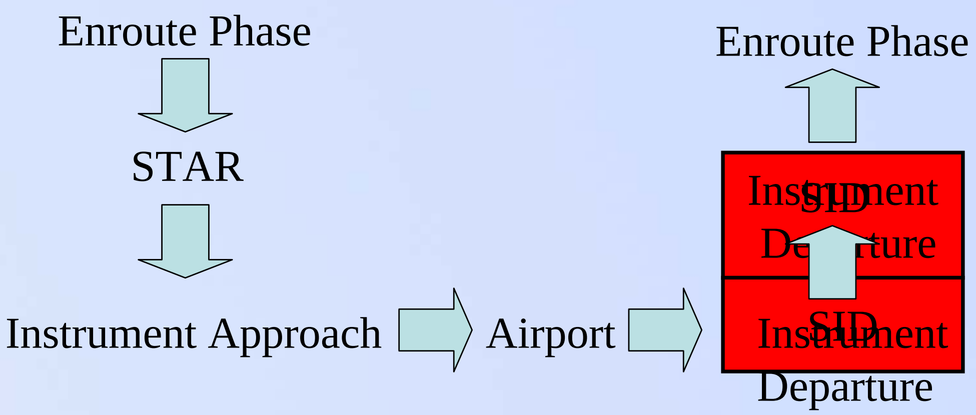
- SIDs are primarily established for terrain and obstacle clearance but may also be designed to facilitate ATC service.

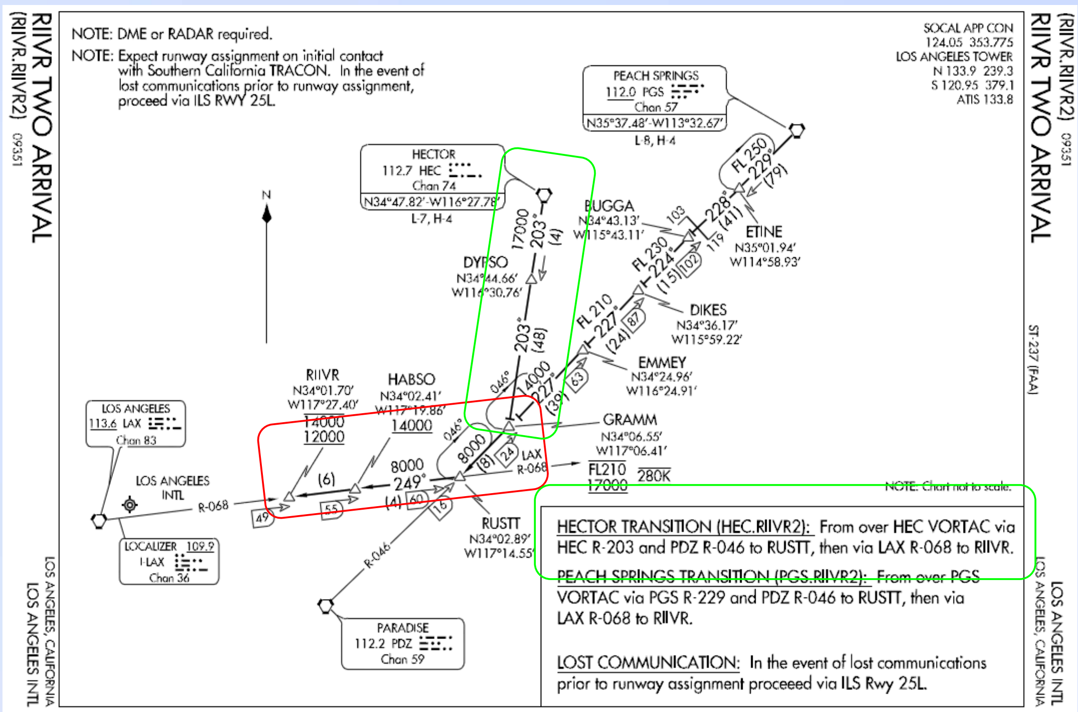
- STARs are established ONLY to provide an operational advantage

    Note: SIDs start at the end of the departure runway while STARs terminate at the initial approach fix of an instrument approach procedure. These approach procedures also account for terrain and obstacle clearance.

ICAO

- There is no mention whether or not an SID may have an open vertical design.
- Inconsistency between the arrival and departure sectors:

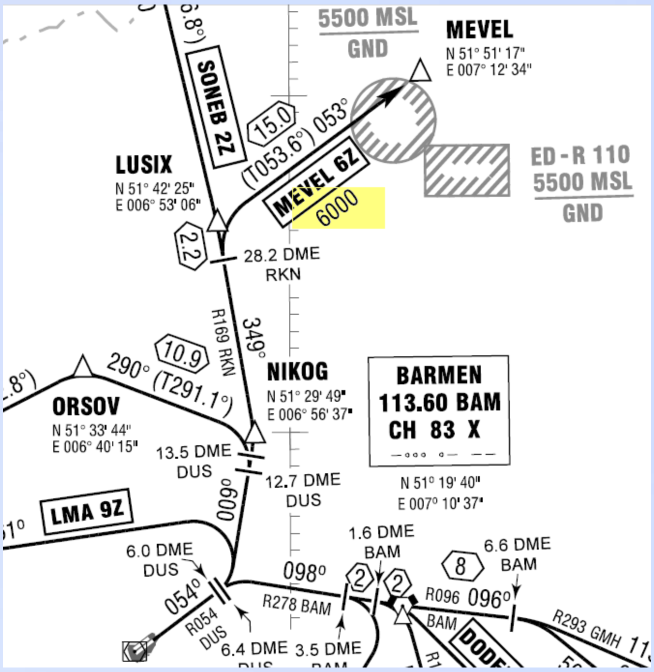


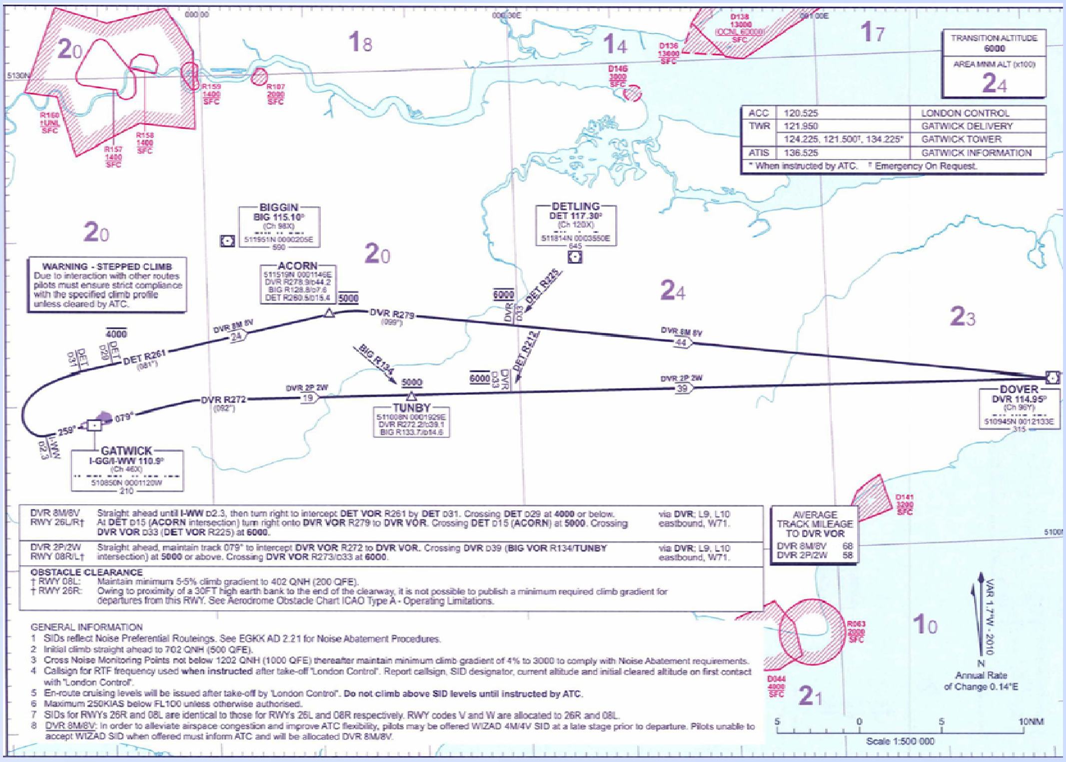


Designator	Route	After Take-Off: Climb to	After Take-Off: Contact	Remarks
1	2	3	4	5
LMA 9Z	**LIMA NINE ZULU** On R 054 DUS to 6.0 DME DUS; LT, on track 261° LMA to LMA (△). Climb with 7% (425 ft/NM) or more until passing 3000. **GPS/FMS RNAV:** [A600+] - DL050[R] - DL051[L] - DL052 - LMA.	5000 ft	Langen Radar 128.500	1. PDG due to airspace structure. If unable to comply, advise Delivery on start-up request. 2. Only for flights to EDLN.
SONEB 2Z	**SONEB TWO ZULU** On R054 DUS to 6.0 DME DUS; LT, on track 009° to 13.5 DME DUS; LT, on R169 RKN to 28.2 DME RKN; LT, on track 346° to SONEB (△). Climb with 7% (425ft/NM) or more until passing 3000. **GPS/FMS RNAV:** [A600+] - DL050[R] - DL053[L] - NIKOG[L] - LUSIX[L] - SONEB.			1. PDG due to airspace structure. If unable to comply, advise Delivery on start-up request. 2. After 28.2 DME RKN BRNAV equipment necessary. 3. Only for flights with RFL140 or above via RKN/TENLI. Other flights proceed via MEVEL. Expect clearance to cross 10 NM prior SONEB at FL140 or above. If unable advise clearance Delivery upon start-up request.
MEVEL 6Z	**MEVEL SIX ZULU** On R054 DUS to 6.0 DME DUS; LT, on track 009° to 13.5 DME DUS; LT, on R169 RKN to 28.2 DME RKN; RT, on track 053° to MEVEL(△). Climb with 7% (425ft/NM) or more until passing 3000. **GPS/FMS RNAV:** [A600+] - DL050[R] - DL053[L] - NIKOG[L] - LUSIX[R] - MEVEL.			1. PDG due to airspace structure. If unable to comply, advise Delivery on start-up request. 2. Flights intending to proceed via Y850 to BASUM must be able to cross ARTER above FL245. If unable or planning below FL245, continue via L179 to OSN. 3. After 28.2 DME RKN BRNAV equipment necessary.

6.3.2.5 COMMUNICATION FAILURE

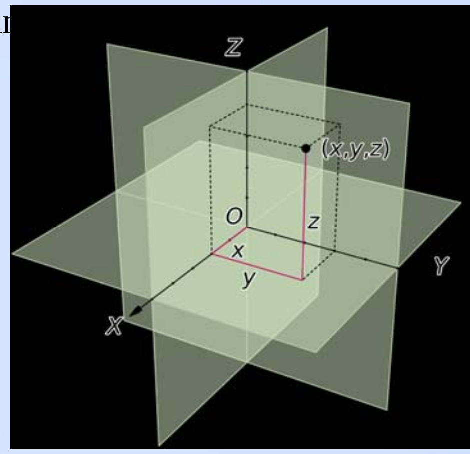
6.3.2.5.1 Clearances for departing aircraft may specify an initial or intermediate level other than that indicated in the filed flight plan for the en-route phase of flight, without a time or geographical limit for the initial level. Such clearances will normally be used to facilitate the application of tactical control methods by ATC, normally through the use of an ATS surveillance system.



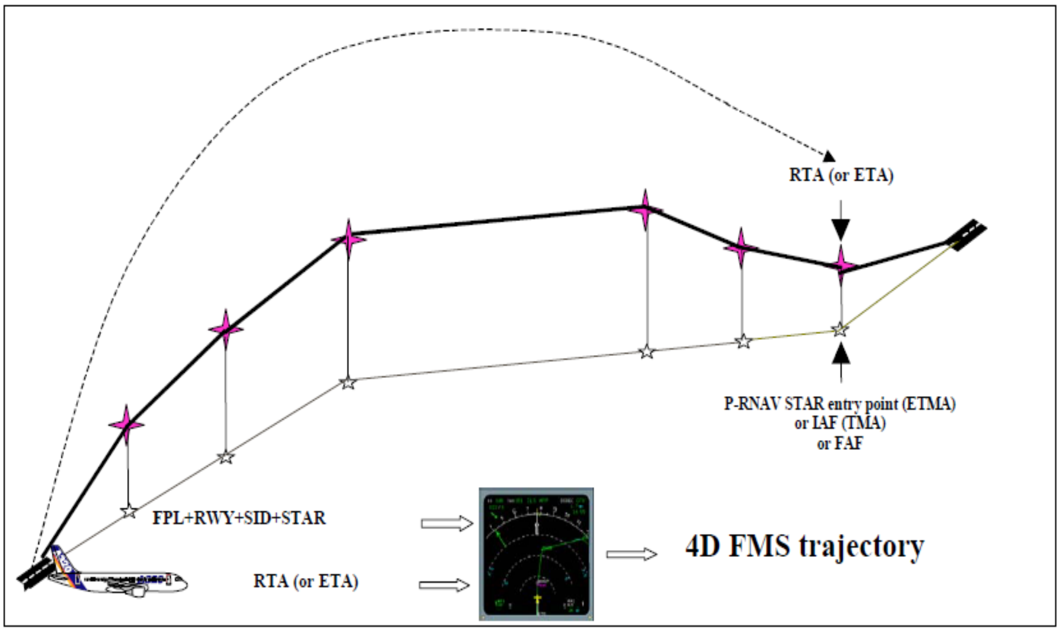


Trajectory Concept

- 3D or 4D trajectories will replace 2D routes and vertical restrictions
- Trajectories may still be built from predefined segments but
- trajectory data tra of 3D coordinates:



Trajectory Concept



Source: C-ATM Operational Concept document

Trajectory Concept

- Proposed phraseology will suffice until trajectory based ATM is in place
- ATM has not made clear to avionics manufacturers what its requirements for avionics performance are
- Mismatch between aircraft capabilities ATM requirements and regulations
- See also Agenda Item B5.9

SID/STAR naming

• Discrepancies between charts and on-board displays

SID/STAR naming

• Discepancies in naming conventions between different states

  • EGLL: STAR LAM3A named after fix at which it ends

  • EDDL: STAR LMA3G named after fix at which it begins

  • KLAX: LOOP5 SID named because it loops around

• TOC proposes work study on SID and STAR naming

Conclusions

• SID design takes into account obstacle and terrain clearance. Additionally, ICAO allows for SIDs and STARs to be designed for separation or environmental purposes.

• States have been driven to introducing more complex terminal procedures to accommodate growing traffic volumes and address environmental issues.

Conclusions

• An initial level in a departure clearance exists mostly to facilitate ATC coordination and is not considered a published level restriction.

• SID and STAR naming conventions are not adequately addressed by some FMS designs or by the ARINC 424 standard.

• Future avionics systems need to be designed in accordance with ATM requirements. ATM has not yet formulated all such requirements.

Recommendation

Naming of SIDs and STARs shall be added to the TOC work programme for 2012.

Agenda Item B.5.5 **WP 91**

ATS - Study Restrictions in the Enroute Environment

Presented by
Alexander Schwassmann (Germany)
on behalf of TOC

Timeline

- November 2007: ICAO introduces Amendment 5 to Doc 4444
  - new procedures and phraseologies for aircraft following a SID or a STAR.
  - considerable confusion as half the world adopts the Amendment while the other half does not.
- April 2010: IFATCA states that, since the introduction of Amendment 5, discrepancy exists between restrictions on SIDs and STARs and restrictions in the en-route environment.

ICAO

- PANS-ATC (Doc. 4444) Chapter 11 ("ATS Messages"): "Level restrictions issued by ATC in air-ground communications shall be repeated in conjunction with subsequent level clearances in order to remain in effect.
- PANS-ATM (Doc. 4444) Chapter 6: Level Restrictions published on SIDs and STARs remain in force until explicitely cancelled by ATC.

What about published restrictions that are NOT part of a SID or STAR ???

IFATCA policy

Phraseology and corresponding message sets should be developed to easily indicate whether published vertical restrictions and requirements are to be followed or not.

All level change clearances for aircraft on SIDs and STARs shall explicitly indicate whether published vertical restrictions and requirements are to be followed or not, provided that phraseology is used which does not increase controller workload beyond an acceptable level.

Phraseology

- Current ICAO phraseology is complicated and cumbersome to use, especially when ATC wants to cancel some restrictions on a procedure but leave others in place.
- Various industry bodies including IFATCA, IFALPA and CANSO are in the process of discussing a joint IFALPA/IFATCA proposal for revised phraseology with the aim of submitting a joint recommendation to ICAO by April 2011.

Conclusions

- The concept that ICAO recommends for SIDs and STARs should also apply to all other published level restrictions.
- The problems arising from the inconsistent implementation of the PANS-ATM provisions for SIDs and STARs across the States as well as within some States could be resolved by the new phraseology proposed by IFALPA and IFATCA.

Conclusions

- The intention of the proposed phraseology is to not repeat published level restrictions on SIDs and STARs verbatim but instead simply to instruct the aircraft to comply with the vertical profile.
- Current ICAO phraseology to cancel restrictions is cumbersome.
- IFATCA policy on SIDs and STARs has to be amended to be aligned with the recommendations for en-route restrictions. This amendment does not change the intention of the Policy on SIDs and STARs.

Recommendation 4.1

IFATCA Policy is:

Published level restrictions remain valid unless explicitly cancelled by ATC.

and is included in the IFATCA Technical and Professional Manual

Recommendation 4.2

IFATCA Policy is:

Phraseology and corresponding message sets shall be developed to easily cancel published level restrictions.

and is included in the IFATCA Technical and Professional Manual

Recommendation 4.3

IFATCA Policy on page 3 2 3 28 of the IFATCA Technical and Professional Manual:

All level change clearances for aircraft on SIDs and STARs shall explicitly indicate whether published vertical restrictions and requirements are to be followed or not, provided that phraseology is used which does not increase controller workload beyond an acceptable level.

is amended to read:

For aircraft on SIDs and STARs, all level change clearances shall explicitly indicate whether the published vertical profile is to be followed or not, provided that controller workload does not increase beyond an acceptable level.

Recommendation 4.4

IFATCA Policy on page 3 2 3 28 of the IFATCA Technical and Professional Manual:

Phraseology and corresponding message sets should be developed to easily indicate whether published vertical restrictions and requirements are to be followed or not.

is amended to read:

Phraseology and corresponding message sets shall be developed to easily indicate whether a published vertical profile is to be followed or not.

B.5.6/WP92

Definitions of “fly-by” and “flyover”

Presented by Alasdair Shaw (NZ) on behalf of TOC

Editorial

Page 2, 2.1.3:

“working paper XX” *should read* “working paper 93”

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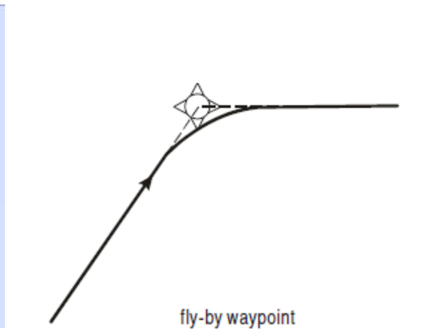

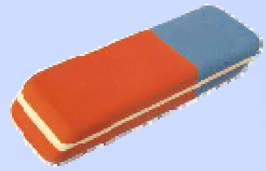

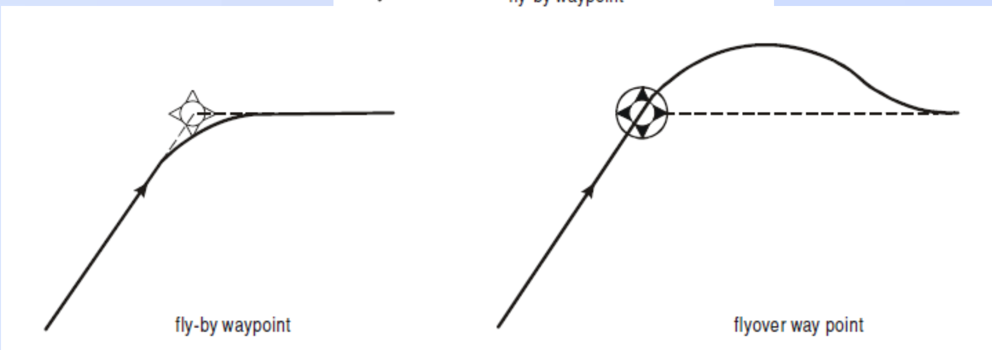

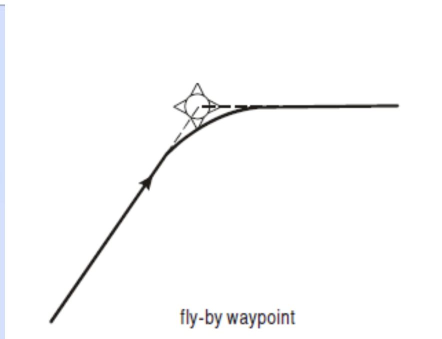

From PANS-OPS:

"*Fly-by waypoint. A waypoint which requires turn anticipation to allow tangential interception of the next segment of a route or procedure*"

What does this mean?

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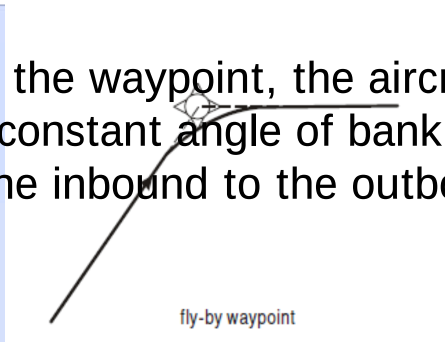
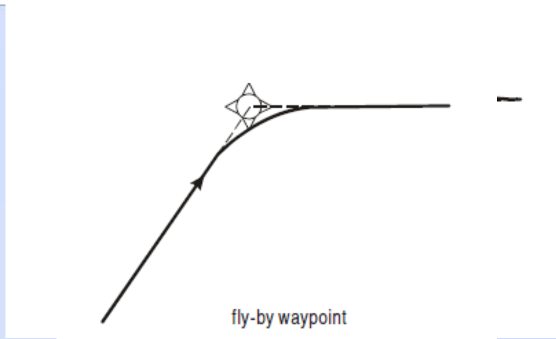
Prior to reaching the waypoint, the aircraft makes a simple turn at a constant angle of bank in order to transition from the inbound to the outbound track

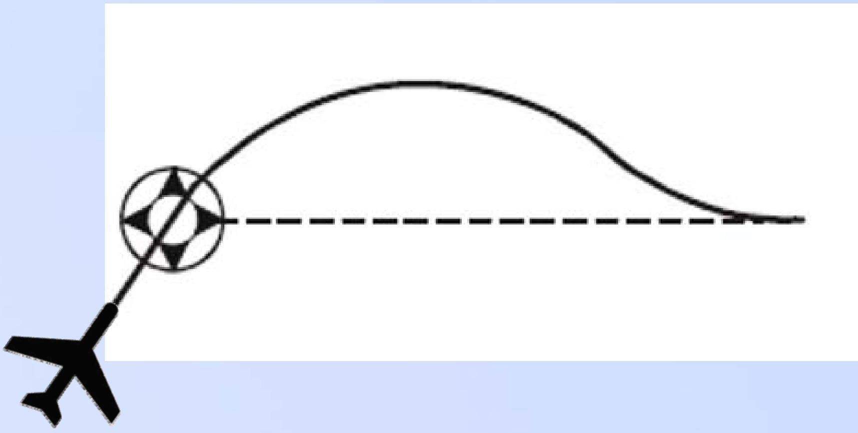




From PANS-OPS:

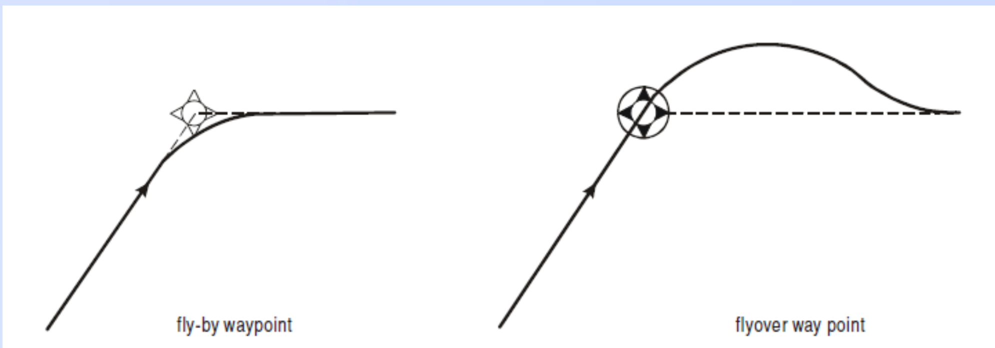
"*Flyover waypoint. A waypoint at which a turn is initiated in order to join the next segment of a route or procedure.*"

What does this mean?



A more complicated manoeuvre:

- an initial roll-in at the flyover point
- a straight 30° intercept course with the next leg
- a roll-out onto the new course



- For both waypoints the track the aircraft follows is known as a "transition"
- A flyover transition is larger than a fly-by transition for the same change in track
- EUROCAE & RTCA define requirements for transitions in ED-75B/DO-236B

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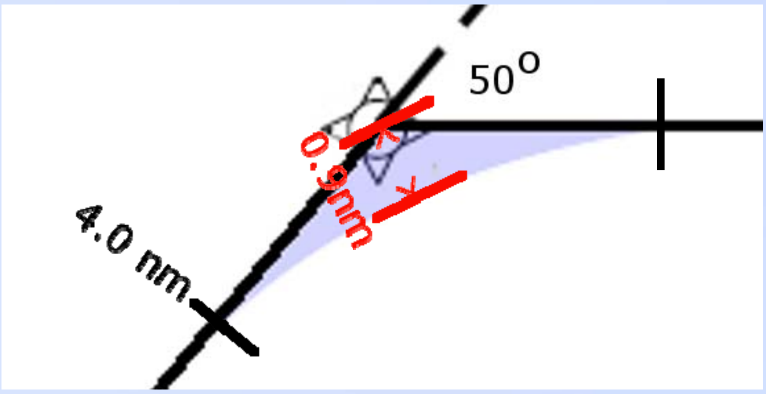
On fly-by transitions, ED75B/DO-236B says:

"... no predictable and repeatable path is specified, because the optimum path varies with airspeed and bank angle... Instead, predictable and repeatable boundaries of the transition area are defined..."



Tables of theoretical transition area boundaries are presented in the paper

Track change in degrees	Maximum assumed groundspeed in kts	Maximum assumed bank angle in degrees	Radius of turn in NM	Turn initiation boundary distance in NM	Abeam distance in NM
5	500	2,5	83,5	3,6	0,1
10	500	5	41,7	3,6	0,2
15	500	7,5	27,7	3,6	0,2
20	500	10	20,7	3,6	0,3
25	500	12,5	16,4	3,6	0,4
30	500	15	13,6	3,6	0,5
35	500	17,5	11,6	3,6	0,6
40	500	20	10,0	3,6	0,6
45	500	22,5	8,8	3,6	0,7
50	500	23	8,6	4,0	0,9
55	500	23	8,6	4,5	1,1
60	500	23	8,6	5,0	1,3
65	500	23	8,6	5,5	1,6
70	500	23	8,6	6,0	1,9
75	500	23	8,6	6,6	2,2
80	500	23	8,6	7,2	2,6
85	500	23	8,6	7,9	3,1
90	500	23	8,6	8,6	3,6
95	500	23	8,6	9,4	4,1
100	500	23	8,6	10,2	4,8
105	500	23	8,6	11,2	5,5
110	500	23	8,6	12,3	6,4
115	500	23	8,6	13,5	7,4
120	500	23	8,6	14,9	8,6

Low Altitude Transitions

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ED75B/DO-236B defines a trapezoidal shaped transition area for a flyover waypoint

Trapezoid corners (A, B, C, D), for θ = 50 degrees:

A =	(0, 0)
B =	(3.22, 3.84)
C =	(11.11, 3.84)
D =	(19.34, 0)
x =	19.34
y =	3.84
v =	843.9 feet /second (500 kts)
a1 =	roll in and roll out distance for initial turn, in NM
a2 =	roll in and roll out distance for recovery turn, in NM
b1 =	bank angle for initial turn
b2 =	bank angle for recovery turn
r1 =	initial turn radius
r2 =	recovery turn radius
b1 =	23
b2 =	23
a1 =	1.02
a2 =	1.02
r1 =	8.67
r2 =	8.67

Flyover compared with fly-by

Fly-by waypoints have 3 advantages:

1. The transition from one track to the other is a shorter distance
2. The transition from one track to the other is smoother as only one turn is made
3. The theoretical transition area is smaller

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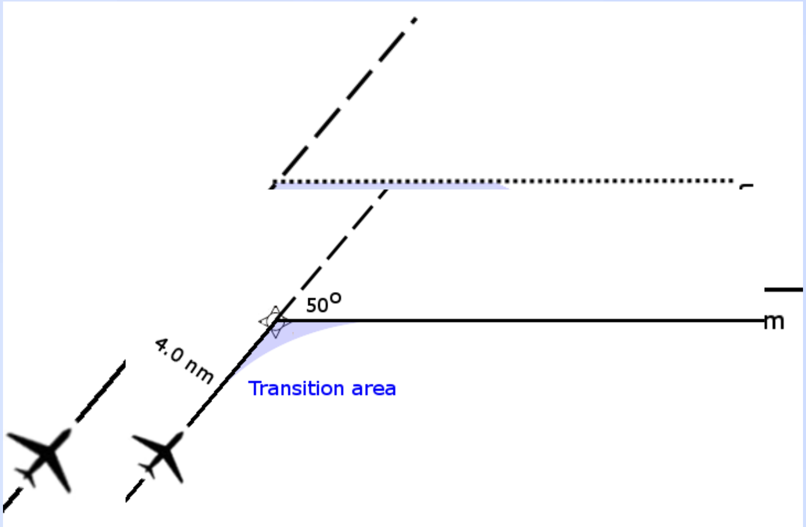
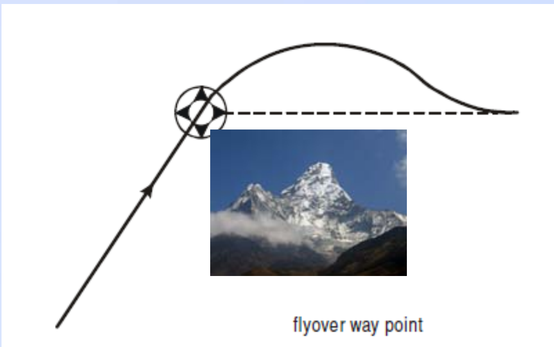
Flyover compared with fly-by



So why use flyover waypoints?

To ensure that an aircraft passes over a specific point, for example:

- a Missed Approach Point
- where protection from terrain or airspace is required



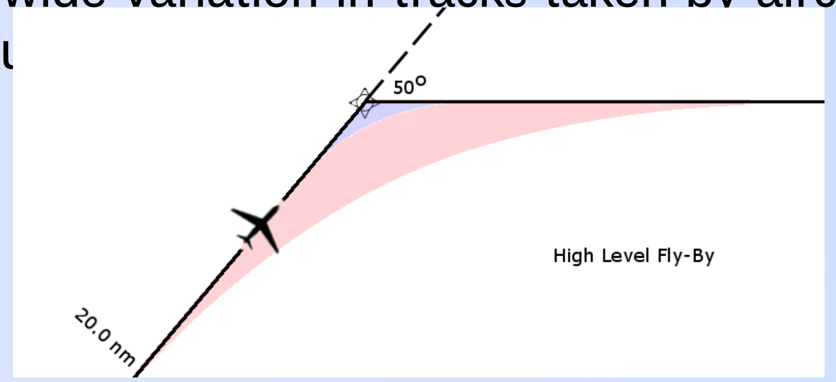
Are there any issues?

Yes – potentially!

•The path followed during the turn is neither predictable nor repeatable

•It may not be obvious how large a transition area is

•The wide variation in tracks taken by aircraft can su



ICAO recommends training that includes fly-by versus fly-over concept (and differences in turn performance)

However the size of transition areas are not documented anywhere

A solution proposed in ICAO SASP working paper – publish the transition tables in PANS-ATM

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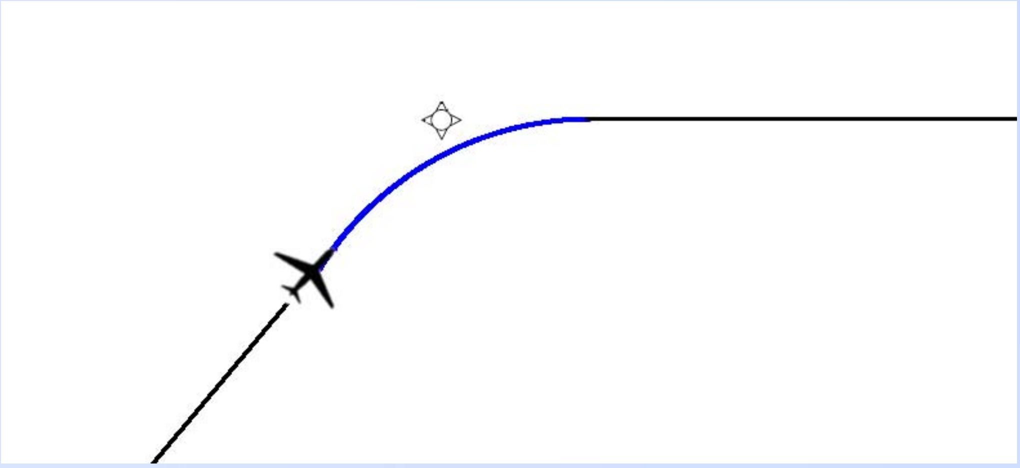
Fixed Radius Transition



Fixed Radius Transition

Advantages:

- Predictable and repeatable track
- Potential for higher density of traffic

Conclusions

- Definitions for "fly-by waypoint" and "flyover waypoint" are adequate
- Controller training is necessary
- Turns at fly-by and flyover waypoints are neither predictable nor repeatable and the actual track flown can widely vary between aircraft
- Fly-by waypoints are more efficient and so they are preferred
- Understanding of the fly-by concept could be improved by publishing transition tables in PANS-ATM
- Fixed radius transition could help, but many aircraft are not capable of this

Recommendations

It is recommended that:

4.1 IFATCA policy is:

Tables, which show the maximum dimensions of fly-by transitions, should be published in ICAO PANS-ATM.

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Recommendations

It is recommended that:

4.2 IFATCA policy is:

Where predictability in the turn is required, PBN fixed radius path mechanisms should be implemented.

Study Air Traffic Flow Management

B.5.10*

Presented by Jules Ogilvie TOC

Study Air Traffic Flow Management: ICAO Definitions

- *This paper provides an overview and evaluation of current IFATCA policy regarding Air Traffic Flow Management (ATFM). Current evolution of ATFM in those regions that are fortunate enough to have a system in place is addressed, as are shortcomings and positive points. This paper compares existing legacy ATFM systems to those more advanced and those of the future. A brief insight into the considerations required of a future ATFM system is provided, and in particular the beneficial role of CDM (Collaborative Decision Making).*

- *The paper identifies the need to create IFATCA policy by addressing the requirements of an ATFM system, present and future.*

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Study Air Traffic Flow Management: ICAO Definitions

- ICAO Doc 4444 Procedures for Air Navigation Services, Air Traffic Management, Chapter 1 - Definitions
- *"**Air Traffic Flow Management (ATFM).** A service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that Air Traffic Control (ATC capacity is utilised to the maximum extent possible, and that the traffic volume is compatible with the capacities declared by the appropriate Air Traffic Service (ATS) authority."*
- ICAO Annex 11 Air Traffic Services, Chapter 3 – Air Traffic Control Service, 3.7.5.1 & ICAO Doc 4444 Procedures for Air Navigation Services, Air Traffic Management, Chapter 3, 3.2.1.1
- *"ATFM shall be implemented for airspace where the traffic demand at times exceeds, or is expected to exceed, the declared capacity of the air traffic control services concerned."*
- ICAO Annex 11 Air Traffic Services, Chapter 3 – Air Traffic Control Service, 3.7.5.2 & ICAO Doc 4444 Procedures for Air Navigation Services, Air Traffic Management, Chapter 3, 3.2.1.2
- *"ATFM should be implemented on the basis of regional air navigation agreements or, if appropriate, through multilateral agreements. Such agreements should make provision for common procedures and common methods of capacity determination."*

IFATCA ATFM Related Policy

- ATS 3.6 ATFM - Adherence to Slot Times (Technical and Professional Manual 3236)
- "IFATCA recognises the potentially dangerous situations that can arise when slot times are not adhered to. In the EUR region ATFM utilises departure slot times as a means of regulating air traffic and that when a departure slot time is used, the time should be passed to the ATC unit at the departure airfield. It is the responsibility of the aircraft operator to be ready for departure to meet the assigned ATFM departure slot. Civil aviation administrations (shall) pursue with utmost vigour those operators who consistently fail to comply with ATFM measures."
- ATS 3.7 - Sector Capacity Values (Technical and Professional Manual 3237)
- "Operational controllers should always be involved in determining capacity values."
- TRNG 4.3 Air Traffic Flow Management
- "ATFM staff not performing clerical or administrative functions, so called ATFM controllers, must be qualified controllers with recent experience on control duties on entry to ATFM services. The responsibility for aircraft in flight remains solely with ATC and any subsequent ATFM involvement shall be at the request of ATC only. An ATFM controller must hold an ATFM rating. Such a rating will require the ATFM controller to demonstrate a comprehensive knowledge, skill and experience of all relevant ATC procedures and ATFM duties. ATFM controllers should be obliged to familiarise themselves with major changes in relation to ATFM in their region."

Standard ATFM of Today

- Planning for the introduction of some form of ATFM should take place when demand is exceeding capacity on a regular basis.
- Benefits of implementing an ATFM system
  - Efficiency versus cost benefit (a maximisation of flights through a particular ANSP's airspace generates revenue).
  - Safety Improvements.
  - Improvement of predictability from gate to gate.
  - Reduction of aviation's carbon footprint, therefore supporting environmental sustainability goals.
  - Decreases in delays for passengers. Control over the allocation of the Air Traffic supply in a particular regions' airspace.
  - Ability to adjust sector capacity over a certain lapse of time in order to deal with airspace availability, weather conditions and airfield availability.
  - Protection of ATCOs in their daily task from overload situations.

Standard ATFM of Today

- Lack of communication of one system to another, for example the systems in Canada and the USA do not communicate with the Eurocontrol CFMU autonomously
- Introduction of tools such as arrival sequencers for major airports (Heathrow (AMAN), Schiphol, Frankfurt, Paris CDG) can also provide limitations to the overall ATFM system
- No real time dynamic uplink of external factors is present such as en-route and airport weather, equipment shortfalls or restrictions, and sector staffing at individual ANSPs.
- The success of the organisation of the network between ATFMU, FMPs and ACCs. Also inter-ACC.
- Focus on the performance of individual ACC performance (the UK ANSP NATS, provides a television update around its centres of its performance compared to other ANSPs in the EUR region) tends to diminish the awareness of the overall ATFM system performance in a geographical region.
- Inconsistent flight profiles (non-adherence to FPLs and slots and the late implementation of restrictions) can corrupt the data and create "over deliveries" increasing complexity in en-route sectors and the effective bunching of traffic.

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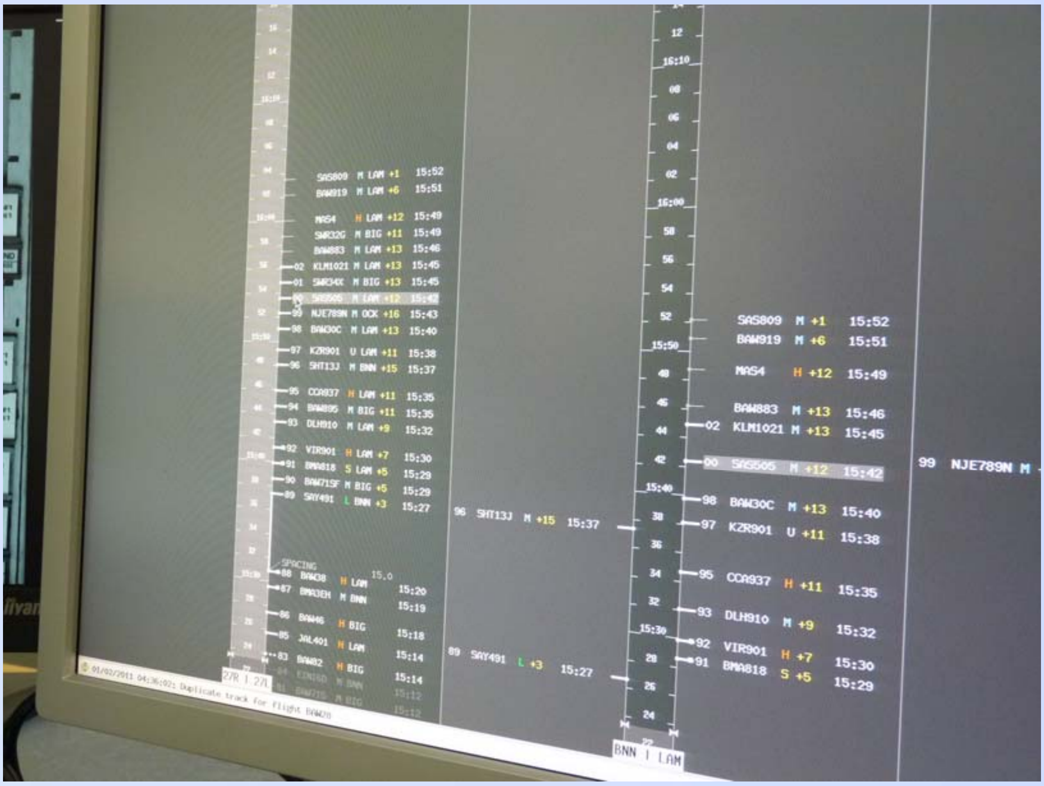
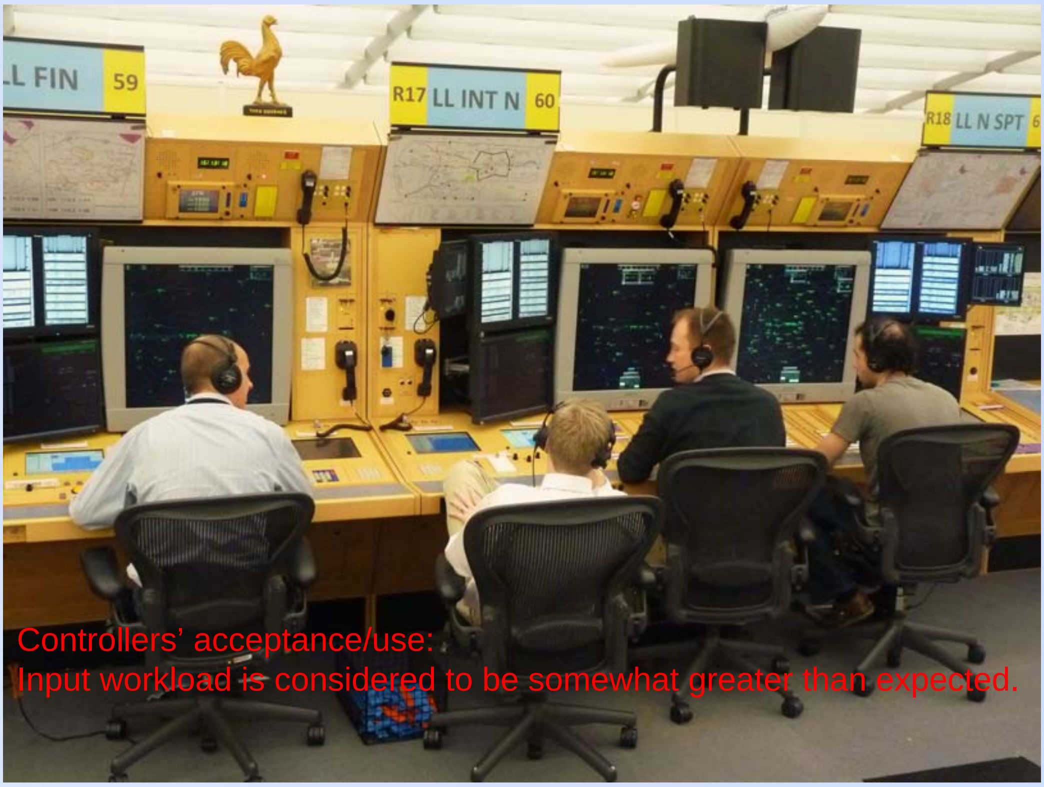


EGLL AMAN Master Screen



Controllers' acceptance/use:
Input workload is considered to be somewhat greater than expected.

EGLL AMAN Controller Display

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Implementing Future ATFM solutions today: BoB

- In the Bay of Bengal, South Asia and Pakistan airspace providers have implemented an automated ATFM service supervised by ICAO Bay of Bengal ATS Coordination Group – ATFM taskforce. Provides Kabul FIR regulation, a traffic congestion area.

- Located in Bangkok ACC and run by AEROTHAI.
  - They calculate, promulgate and manage mandatory Allocated Wheels Up Times (AWUT), Kabul FIR entry fix times and flight levels, and ATS routes for each affected flight.
  - Singapore ATC responsible for tactical management of flights that are subject to ATFM.
  - Also manage non-ATFM flights through delayed start-ups, non-preferred routes, en-route holding or diversion around Kabul airspace.

- Coordination required between aircraft operator, flight crew, ANSPs and Bangkok ATFMU.
  - At start up flight crew state the AWUT in the initial ATC clearance request transmission.
  - The crew are then responsible for adjusting their flight profile to arrive at the Kabul FIR entry fix as cleared (level + time).
  - The crew/ ATC are advised to request another FIR slot time if any doubt exists as to initial AWUT compliance.
  - The initial slot for that flight may then be passed to another.

Implementing Future ATFM solutions today

- UPS, with NASA and the FAA have simulated, trialled and put into operation a 4D trajectory management system into Louisville International Airport, Standiford USA.

- Simulations of "Trajectory Orientated Operations With Limited Delegation" (TOOWiLD) carried out at NASA's Ames research centre in 2006.
  - Investigate the operational effects of an Arrival MANagement (AMAN) system scheduling aircraft along CDAs through data linked arrival information to individual aircraft.
  - Crossing traffic also featured to increase realism.

- Implemented by UPS to generate a runway schedule for each aircraft. Factors include;
  - Scheduled Times of Arrival (STAs) determined from ETAs
  - Minimum required wake vortex spacing at the runway threshold.
  - ETAs are based on the aircraft's flight plan routing, a charted CDA, ADS-B reported position information and a company cost index.

- When an aircraft reaches 300nm from the airfield the arrival management system computes:
  - A cruise descent profile using the STA, that gets the aircraft to the runway at its allotted time.
  - It also generates an arrival message to all other participating aircraft within the 300nm range.

Implementing Future ATFM solutions today

- Some of the UPS fleet are equipped to conduct merging and spacing operations, this is also recognised by the arrival management system, and uplinked to other similarly equipped aircraft.

- Merging and spacing operations have two phases:
  - A strategic set-up by a ground operator (not ATC)
  - A tactical Flight Deck Based Merging and Spacing (FDMS)

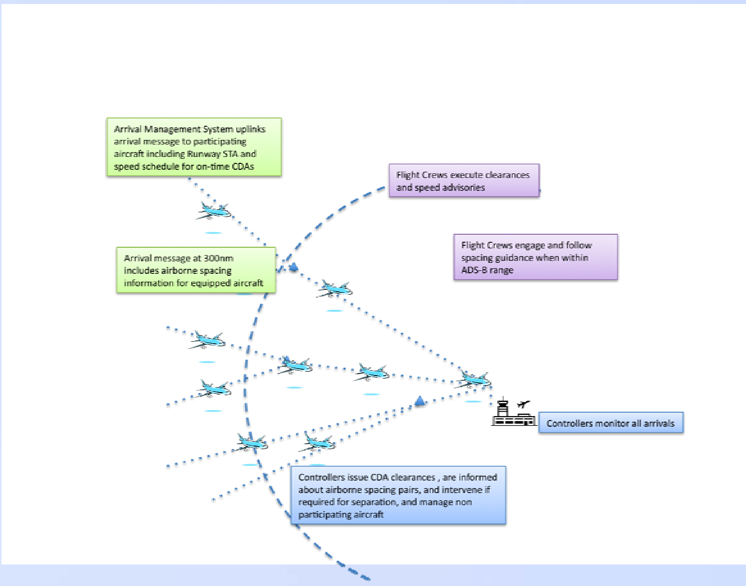
- Both indicate speeds that the aircraft must fly to achieve the required spacing during the descent.

- Approaching the merge fix, the ground based unit will uplink via ACARS an advisory that includes as a minimum:
  - The Traffic To Follow (TTF) flight identification
  - The spacing interval in seconds
  - The common merge waypoint for the aircraft systems

- The FDMS phase then takes over. Onboard equipment calculates and displays information that allows flight crew to manage their speed to achieve a desired spacing interval at a common merge fix.

- Pairs of compatibly equipped aircraft can be formed into linked chains that allow the second aircraft to become the TTF for a subsequent third aircraft. These procedures require less controller input and workload, less fuel burn and increase capacity.

Implementing Future ATFM solutions today

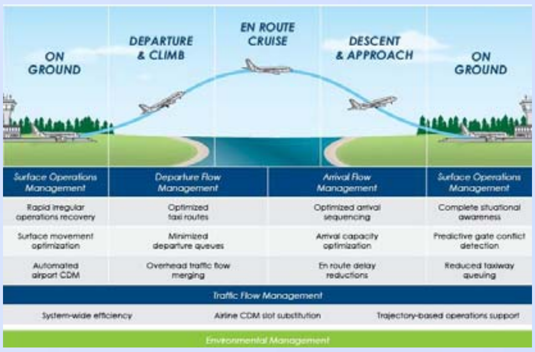


Implementing Future ATFM solutions today: What it means to the ATCO

- ATCOs retain the same responsibilities as they have today.
- Experience has shown that their role is different with regard to managing arrivals:
  - Normal controlling for non participating aircraft
  - "Do their own thing" for participating aircraft.
  - Non-participating traffic, crossing traffic, and transitioning traffic have become a greater challenge to integrate into the approach flow.
- Although the most advanced in the world today, the system still has some limitations.
- The most restrictive is that it only works for one company into one airport with aircraft that have identical equipment levels.
- It should be seen, however, as a great stepping-stone, and learning exercise for the NextGen and SESAR concepts

Investigating the ATFM of the Future

- The next generation of ATFM is forward thinking and will enable harmonisation of a global network of systems. The evolution of ATFM has been named I-ATM (Integrated ATFM), or ATFCM (Air Traffic Flow and Capacity Management). It aims to serve:
  - Across operational domains - surface, departure, en route and on arrival; across FIR boundaries.
  - Across planning time frames - scheduling, strategic planning, pre-tactical, tactical and post-operations.
  - Between service provider and flight operator - coordinating efforts and aligning objectives for mutual benefit.
  - Across international boundaries – data exchange and strategic control



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Investigating the ATFM of the Future

- In order to achieve the future ATFM process, several areas have been highlighted to receive particular attention:
  - Improving Traffic Flow and Capacity Management through optimisation of ATM/airport capacity vs demand.
  - Improving traffic flow management by developing flow measures and procedures with ATC to best manage expected traffic.
  - Ensuring quality of service, by continuously assessing through Key Performance Indicators (KPIs) the efficiency of the service.

Investigating the ATFM of the Future

- Collaboration with ATM partners through the exchange of accurate ATM data (FPL, airspace, crisis decision etc) within a regulatory framework between all the relevant stakeholders is of great importance:
  - ***Ensuring Flight Plan Data Consistency*** - Each airspace user has different requirements, a common basis should exist in order that each stakeholder is able to complete their task in an effective manner.
  - ***Optimising the Interface with Airspace Management*** - Increased capacity relies on airspace usage. Requires optimisation with the users.
  - ***Collaborating with Airport Operations*** - The airport has to be seen as an integral part of the ATM system in a "gate to gate" concept.
  - ***Managing Critical Events*** - although sometimes unplanned, the reaction by the ATFM system should mitigate their impact by sharing information in real time.
  - ***Creating a Regulatory Process*** - to ensure that there is equality between all partners and compliance to the rules.

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Investigating the ATFM of the Future

- Collaborative Decision Making (CDM)
  - Is the key process in ATFM that allows decisions about events (e.g. snow, runway closure etc) to be taken by those best positioned to make them using comprehensive and up to date quality information.
  - This CDM process is an enabler of ATFM strategy allowing the sharing of all relevant information between the parties involved in making decisions and supporting a dialogue between all stakeholders.

Investigating the ATFM of the Future

- In order to be efficient and to meet the required objectives, CDM should have the following characteristics:
  - An inclusive process
  - A transparent process
  - A process that builds trust between the stakeholders

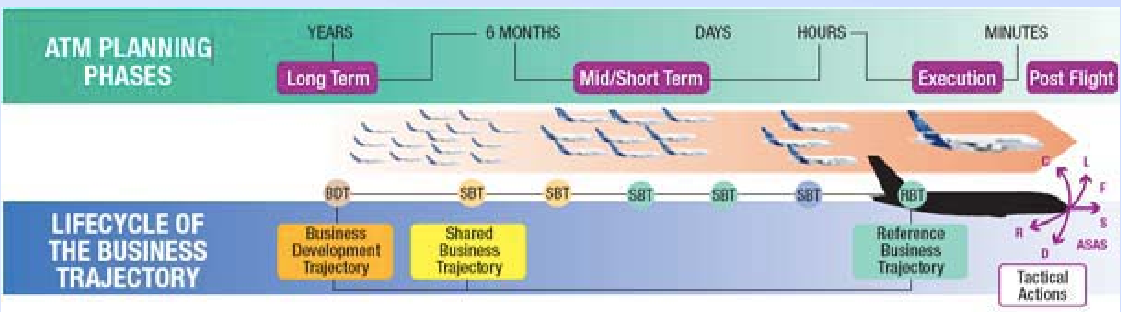
Investigating the ATFM of the Future

"In the future it is foreseen that separation assurance will be enforced by a regulatory aspect and complemented by ATM data (e.g. FPL data, airspace status etc).
Its implementation is performed by a safety planning process, initially through airspace management, flow and capacity management; then separation by ATC, and finally collision avoidance through cockpit tasks".
As defined by Eurocontrol

= 4D Trajectories

Investigating the ATFM of the Future

- The 4D concept relies on a RBT (Reference Business Trajectory) which the airspace user agrees to fly and the ANSP agrees to make available. Contrary to existing ATFM systems, it implies a target time of arrival over a waypoint of the trajectory.
  - The RBT time window tolerance (currently -2min; 3min) may not be accurate enough to ensure an efficient pre-regulation of traffic and to optimise runway capacity.
  - The aircraft, in this case, could be tasked to achieve a Controlled Time of Arrival (CTA) at the IAF with a certain, stricter time tolerance.
- The 4D concept can be combined with ASAS (Airborne Separation Assistance Systems) limited delegation clearances concept.
  - Trajectory based operations are first used to precondition the flow, sufficient to avoid overloading local airspace sectors. Subsequently, Air Traffic Controllers issue limited delegation clearances to aircraft to cross behind, merge with, or follow aircraft in the proximity.



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Conclusions

- Existing ATFM procedures have many limitations.
- Users are required to adapt their real-time operations to limitations of ATFM systems.
- IFATCA has policy designed to address certain small aspects of current ATFM concepts, but not as a whole. A high level statement should therefore be defined to promote the adoption of ATFM around the world.
- ATFM will have an important role in the ATM solutions of the future; however ATFM is expected to evolve into 4D Trajectory Management.
- ATFM has been implemented differently on a regional basis. No clear guidance exists from ICAO to provide an international standard.
- Tactical sector capacity should be determined by an ATCO/FMC.
- Current ATFM restrictions are not transparent to all users.

Recommendations

- It is recommended that:
- 4.1 IFATCA Policy is:
- ***IFATCA encourages the implementation of ATFM processes provided that:***
- ***The process achieves an optimum overall performance.***
- ***Air Traffic Controllers and Flow Management Controllers are involved in the design of their local procedures and the determination of capacity values and/or occupancy counts.***
- ***The communication between and the compatibility of regional systems is established.***
- ***The tactical capacity is managed on an operational level.***
- ***The process, including restrictions, is transparent to all users.***
- ***Procedures should be in place to allow controllers to report occasions where they felt overloaded or sector capacity values were exceeded. Feedback should be given to the reporting controller***

Recommendations

- 4.2 ***That the existing policy "ATS 3.7 - Sector Capacity Values (Technical and Professional Manual 3237)" is deleted.***

附件四

Update on the English Language Proficiency Requirements Implementation

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Amendments to WP C.6.3
Since 07 February 2011

Page 2, Art. 2, Para. 2.2
As of 07 April 2011

65 States are compliant.	**(+07)**
92 States have an implementation plan.	**(-03)**
38 States with no implementation plan.	**(-04)**

Attachment 1

The States:

Bosnia and Herzegovina	**(plan)**
Gabon	**(plan)**
Luxembourg	**(plan)**
Uruguay	**(plan)**
Zimbabwe	**(compliant)**

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ICAO requires compliance in English Language Proficiency for ATCOs.

ICAO requirements are that controllers meet a minimum of Level 4

Initial Deadline was
05 March 2008.

A large number of states have not been able to comply in time.

States where air traffic controllers or radio station operators did not meet the language proficiency requirements in 2008 got a waiver until

05 March 2011, …

States must post their language proficiency implementation plans.

ICAO's 37th Assembly in September 2010 superseded resolution A36-11 with resolution A37-10.

ICAO urges States not yet fully compliant on 5 March 2011 **to continue to provide ICAO with regularly updated implementation plans including a timeline for full compliance.**

As of 07 April 2011

65 States are compliant.

92 States have implementation plans.

There are still
38 States
that did not submit plans.

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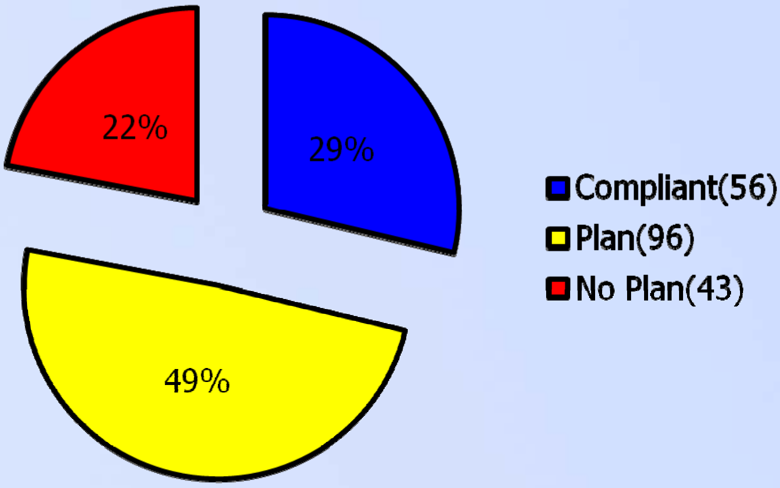
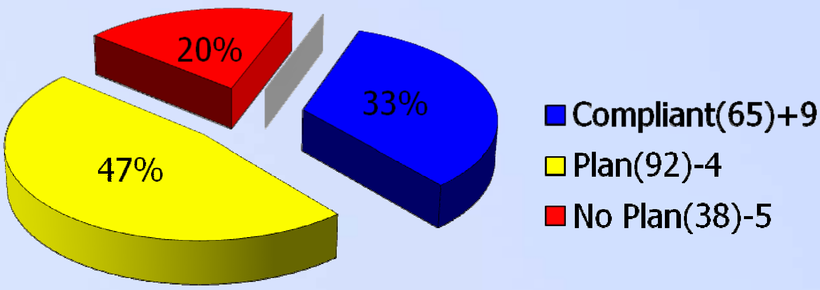
Compliancy 15/03/2010



Compliancy 07/04/2011



38 States without an implementation plan

Afghanistan
Albania
Algeria
Andorra
Bangladesh
Benin
Bhutan
Botswana
Central African Republic
Chad
Djibouti
El Salvador
Equatorial Guinea
Eritrea
Guinea
Honduras
Kiribati
Lesotho
Liberia
Malawi
Marshall Islands
Micronesia (Federated States of)
Montenegro
Mozambique
Namibia
Nauru
Palau
Papua New Guinea
Sao Tome and Principe
Sierra Leone
Solomon Islands
Somalia
Swaziland
Syrian Arab Republic
Timor-Leste
Tonga
Vanuatu
Zambia

Conclusions

-ICAO introduced English Language Proficiency to increase comprehension and safety in R/T communications.

-Compliancy by 05 March 2008.

-Waiver was to 05 March 2011 if ICAO is advised and implementation plan available.

-Waiver is now for **undetermined period of time** if ICAO is advised, with an implementation plan and timeline.

-IFATCA is disappointed in slow rate and lack of compliance.

-IFATCA will continue to monitor this issue.

CPDLC

Controller Pilot Data Link Communications

Presented by PLC

Frederic Deleau

International Federation of Air Traffic Controllers' Associations

CPDLC uses technologies and procedures to provide digital messaging between controllers and pilots over a secured mode.

Clearances/information/request messages are digitally displayed on a computer screen (FMS) in the cockpit and displayed at Controllers' position instead of heard through frequency exchanges.

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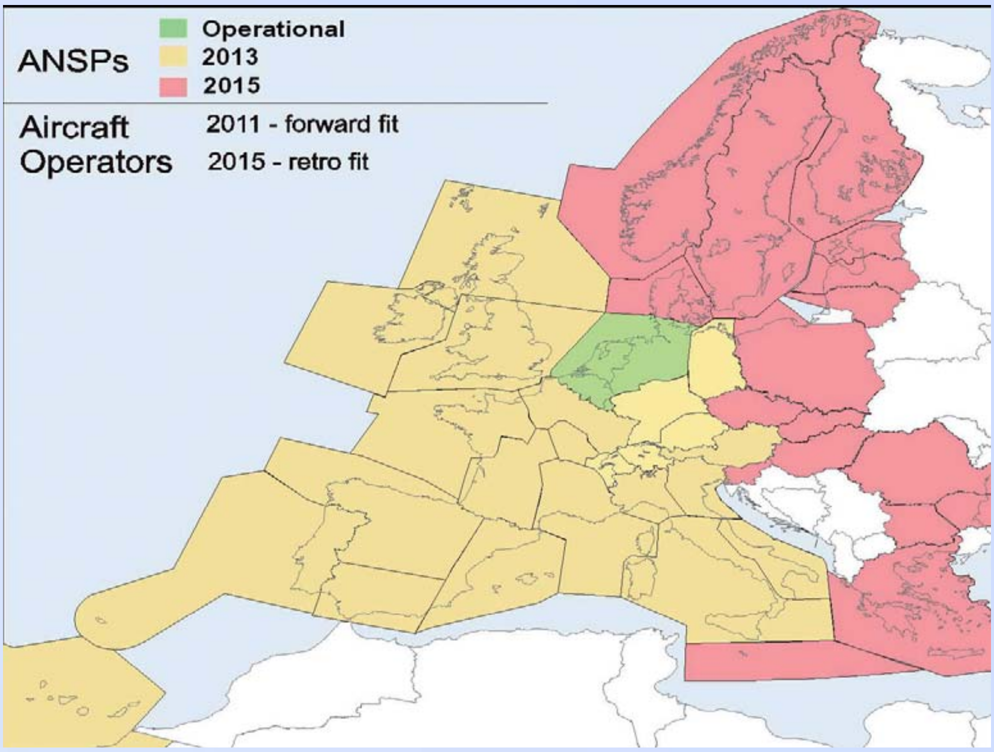
SAY AGAIN !

European Commission Regulation (EC) N° 29/2009

Date	Milestone
01/01/2011	After this date all new aircraft operating above FL 285 must be delivered with a compliant system.
07/02/2013	By this date all Region Air Navigation Service Providers (ANSPs) must have implemented an operational compliant system
07/02/2015	By this date all aircraft operating above FL285 must have been retrofitted with a compliant system.
07/02/2015	By this date all EU Region ANSPs must have implemented an operational compliant system.
31/12/2017	Aircraft which are at least 20 years old and which will cease operation in the concerned airspace before are exempt.
01/01/2014	Aircraft with individual airworthiness certificate before this date that are equipped with Future Air Navigation System (FANS) are exempt for the lifetime of the aircraft. Aircraft entering into service after shall comply with the rule.
01/01/2014	State aircraft should comply with the rule if equipped with non-military data link.



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Minimize the « Jack effect »

Clear procedures at local/sector level

Transparency of inputs at sector level

Problem of training

(HMI)

AIR TRAFFIC FLOW AND CAPACITY MANAGEMENT

Presented by

FELICE DE LUCIA

Agenda Item: C.6.10 **WP No. 163**

Dear **Friends**,

First, I would like to apologize to all of you for not being present at this conference so important for all AIR TRAFFIC CONTROLLERS.

I will try to present the work I have done with the PLC as well as possible, hoping to contribute to professional growth of the Federation.

But before doing that I want to thank my chairman

THANKS Mrs. **M**

This paper intents to investigate ACC capacity from a professional point of view, giving examples of actual Air Traffic Flow Management and provide information about its influence on an ATCOs daily performance.

This paper will also explain the new concept of occupancy.

IFATCA POLICIES

"Operational controllers should always be involved in determining capacity values." page 3.2.3.7

"Research should be carried out in each country to determine the capacity of the ATC system and the workload to be carried out by each air traffic controller..." page 4.1.2.6

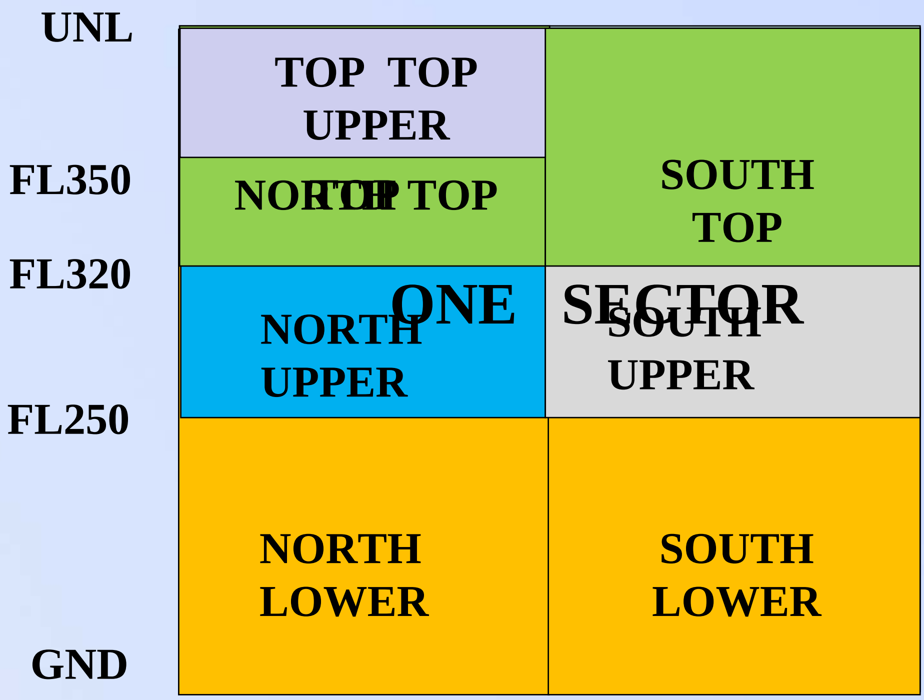
WHAT IS CAPACITY?

"The maximum number of flights that may enter a sector per hour averaged over a sustainable period of time, to ensure a safe, orderly and efficient traffic flow. "

The term ATC capacity

- reflects the ability of the ATC system to provide service to aircraft during normal activities, and

- is expressed in numbers of aircraft entering a specified portion of the airspace in a given period of time.



AIR TRAFFIC FLOW AND CAPACITY MANAGEMENT

The current mode of operation is mainly limited by two factors:

➢the fact that overloads may occur in elementary sectors that cannot be split,

➢ the number of controllers on duty may not be sufficient to open as many control sectors as would be necessary.

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EUROPEAN EXPERIENCE

WHAT IS ATFCM ?

HOW DOES IT WORK?

The main actors involved in this process are

- the CFMU tactical team;
- the FMP (Flow Management Position) located in each Air Traffic Service Unit (ATSU);
  - Monitoring traffic load of the ATSU sectors and fixing monitoring values;
  - Communicate monitoring to CFMU
  - Analysing sector overload
  - Request and coordinate regulation, level capping or rerouting
  - Monitor effectiveness of the measures
- and the AO (Aircraft operator).

Air Traffic Flow Capacity Management is currently based on the hourly entry counts for each sector (or combination of sectors) considered as the maximum number of aircraft that a controller can handle during one hour in the most complex traffic situation.

The hourly capacities are declared and communicated to the CFMU who then have a global vision of the network (capacity, demand and capacity shortfalls)

After coordination with the local FMP, CFMU activates regulations as necessary.

Regulations consist of start and end times, traffic volume and flow rates.

BUT those measures:

- Do not reflect quantitative issues other than hourly capacity shortfalls (e.g. accumulation of flights on the ATCO working position);

- Do not consider the complexity of each flight.

As the complexity of traffic entering a sector is variable, the hourly capacity of a sector should reflect that variation.

Any lack of flexibility in hourly counts could be counterproductive in terms of optimization of airspace capacity and could lead to inappropriate regulations.

AIR TRAFFIC FLOW AND CAPACITY MANAGEMENT

Why Capacity is changing to Occupancy?

- ATFCM regulations were efficient when applied with sufficient prior notice (typically at least 2 hours)
- many situations for which the system of ATFCM regulation did not provide the expected traffic delivery (e.g. when there was inaccurate data)
- The limitation of this system, and the resulting excessive costs incurred by AOs, were identified by ATFM independent studies.
- A need was identified to allow last-minute adjustments, as data accuracy improved. Short Term ATFCM measures (STAM) were required to optimize traffic flows.

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Some ACCs started to define measures, tools and parameters to solve problems created by variations between planned and real time operations. A major enabler was the introduction of **occupancy counts** to monitor traffic load in the tactical phase.

The introduction of occupancy counts and Enhanced Tactical Flow Management (ETFM) allows decisions to be made closer to real time as more accurate data is available within 2 hours.

Occupancy Counts are redefining the tactical roles of CFMU and FMP and bridging the gap between ATFCM and ATC

OCCUPANCY COUNTS

Occupancy Counts can be defined as "***the number of flights occupying a sector simultaneously during a specified period of time".***

One of the operational problems flow managers encounter is how to evaluate:

- real time traffic situations from a short term perspective, and
- take relevant actions i.e. applying Short Term ATFCM Measures to regulate traffic

.

The introduction of occupancy counts aims to address two parameters - load and **complexity** - because ATCO workload is dependent upon both.

The notion of complexity is a good indicator of quality. Each flight can be associated with a degree of complexity (criteria to be defined at local level). For example in UK (NATS) each flight is given a value relating to the difficulty expected handling that flight e.g. an overflight has a low value, and a departure needing climb/ vectors and crossing other traffic flows will have a high value.

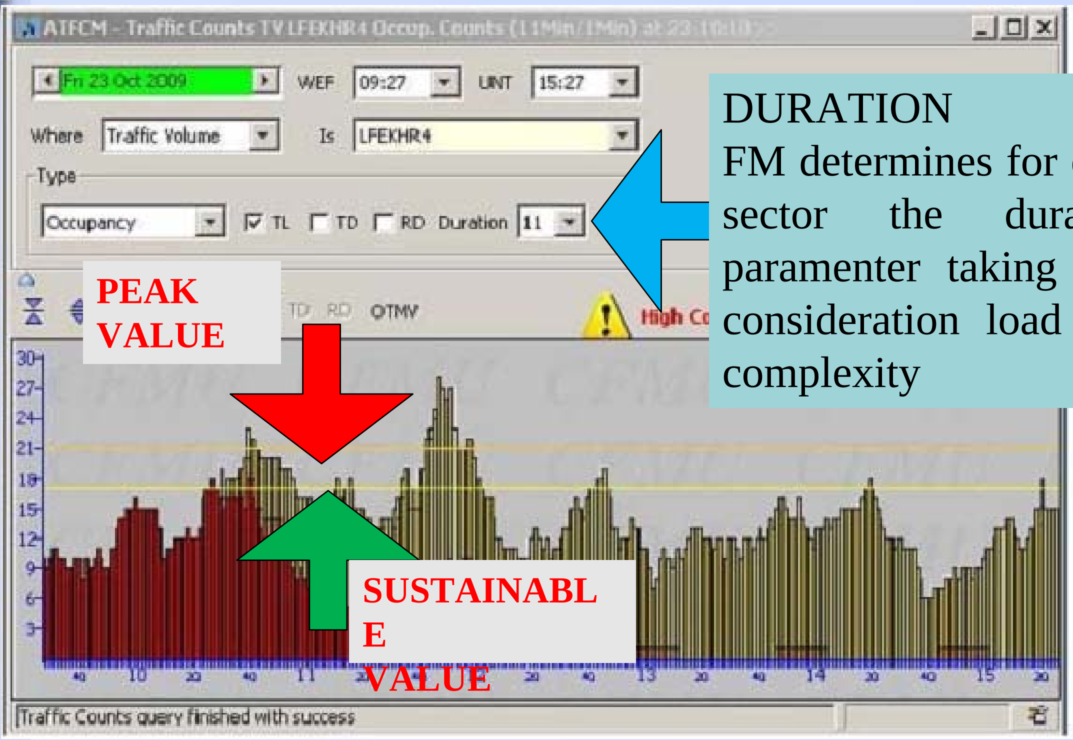
The methodology for displaying local occupancy

The relevant time parameters for occupancy counts are based on a statistical study of local traffic.

The duration is calibrated for each sector to reflect workload and can be adapted to reflect different factors, including flight characteristics and Weather.

For each sector Flow Managers determine limits/ saturation values and define in particular the peak value, that can never be exceeded, and the sustainable value, for which sector productivity can be maximised if complexity permits.

The methodology for displaying local occupancy



DURATION
FM determines for each sector the duration paramenter taking into consideration load and complexity

The methodology for displaying local occupancy

Once the tables are built, they are used to determine hourly counts corresponding to a desired occupancy count between sustainable and peak values.
This allows the declared capacity to be adjusted, based on the complexity of the traffic.

Once the tables have been built, the method to use occupancy counts is as follows;

- Monitor the occupancy counts to identify peaks;
- Analyze the traffic list to evaluate the complexity of traffic;
- Identify actions to be taken

AIR TRAFFIC FLOW AND CAPACITY MANAGEMENT

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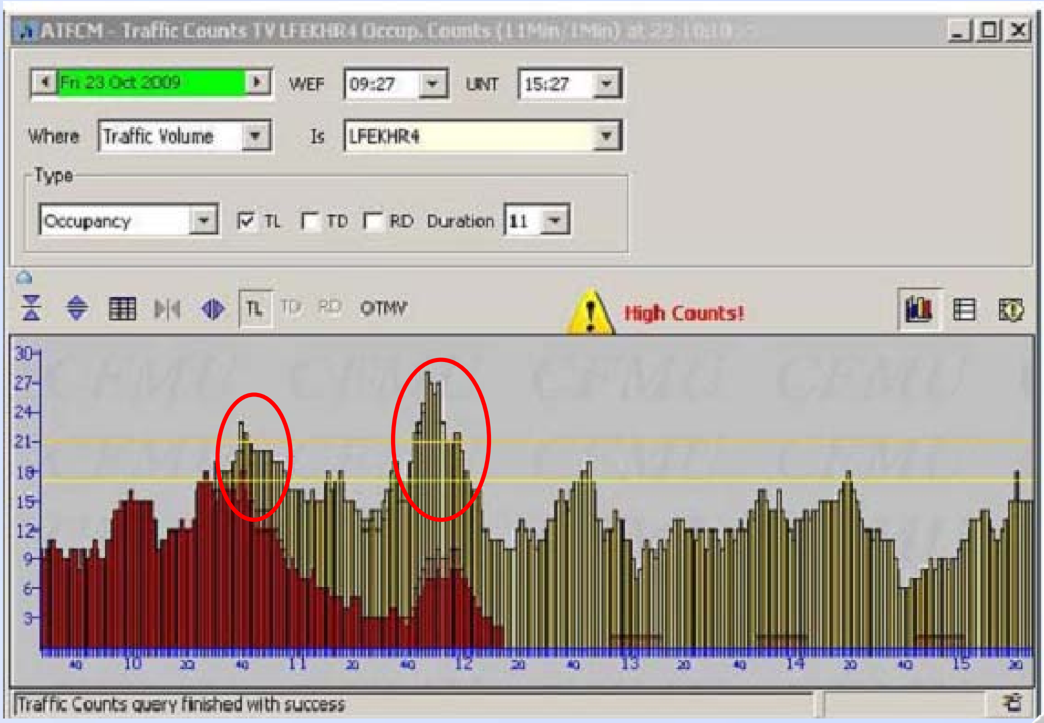

HUMAN FACTOR ASPECTS

Under ideal conditions, each en route sector in the air traffic management system has a maximum operational traffic density that its controller team can safely handle.

But certain conditions i.e. bad weather, military activity, altered flow patterns, system malfunction and other elements can impact the operational situation, increasing controller workload and therefore reducing capacity below its designed value.

The resulting reduced capacity is the dynamic capacity of the sector, effectively a weighted combination of traffic density and other controller workload factors

AIR TRAFFIC FLOW AND CAPACITY MANAGEMENT

When operational conditions cause workload to exceed the controller's capability, the Flow Manager can respond either by reducing demand or by increasing capacity.

Reducing capacity however can impose delays and increase aircraft operating costs.

Increasing capacity is usually accomplished by assigning more control resources to the airspace and can increase the costs of ATM.

AIR TRAFFIC FLOW AND CAPACITY MANAGEMENT

To ensure full utilization of the dynamic capacity and efficient use of the workforce, it is important to accurately determine the capacity of each sector.

Airspace designers often estimate sector capacity using microscopic workload simulations that model each task imposed by the aircraft.

However, the complexity of those detailed models limit their real-time operational use, particularly in situations in which sector volume or flow directions must adapt to changing conditions.

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AIR TRAFFIC FLOW AND CAPACITY MANAGEMENT

A number of factors affect ATCO workload. These factors include, but are not limited to:

- number of flights on frequency,
- potential conflicts,
- number of handoffs,
- heading and speed differences,
- aircraft proximity to each other and sector boundaries,
- presence of weather,
- radar coverage,
- frequency coverage,
- reliability of the system, procedures, and
- airway structure

AIR TRAFFIC FLOW AND CAPACITY MANAGEMENT

PLC is of the opinion that the Flow manager should also work closely with the sector team in order to know how it responds in different situations.

While traffic numbers are important, knowledge of how people behave within those teams can be more useful information in determining capacity dynamically.

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PLC is of the opinion that all the information relative to the capacity/ occupancy of the sector shall be considered as transparent information and that each controller shall be informed about those numbers

PLC is also in the opinion that the ANSP management should not influence the Flow manager's decision to take ATFCM measures.

CONCLUSIONS

Air Traffic Flow and Capacity Management (ATFCM) is about balancing demand and capacity through optimizing the use of available resources and coordinating adequate responses, in order to enhance the quality of service and performance of the ATM system.

PLC uses the Eurocontrol definition of '**sector capacity**' which is; ***the maximum number of flights that may enter a sector per hour averaged over a sustainable period of time, to ensure a safe, orderly and efficient traffic flow.***

The shortcomings of using sector capacity as an ATFCM tool is that decisions about flow measures do not take into account the complexity of the traffic.

Occupancy counts bridge this gap as they address the two parameters; load (based on actual flight data) and complexity.

PLC defines occupancy counts as '***the number of flights occupying a sector simultaneously during a specified period of time***'

Capacity and/or occupancy are influenced by conditions such as bad weather, military activities, altered flow patterns, system malfunction, and other elements.

Complexity and ATCOs workload are also affected by these factors, but can also be influenced by the number of flights on frequency, potential conflicts, number of handoffs, heading and speed differences, aircrafts proximity to each other and sector boundaries.

Because of the direct influence declared capacity numbers has on the ATCOs daily job it is important that not only they are involved in determining them, but also that they are advised when the figures or managing methods change.

In situations where sector capacity values were exceeded or ATCOs felt overloaded they should have the opportunity to report this to the appropriate department and feedback should be provided to the reportee

AIR TRAFFIC FLOW AND CAPACITY MANAGEMENT

RECOMMENDATIONS

I have to inform the audience that with regard to the recommendations i should make a clarification.

Few weeks ago, after the distribution of the conference documents, PLC and TOC realized that the subject matter of this w.p. was treated from another point of view even from the TOC, but more ore less with the same conclusions.

Fortunately the two chairman of two committees have been noticed that and after a short but intense and collaborative exchange of ideas and email, it was decided to delete some of the PLC reccomendations and to insert them into TOC wp.

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DRAFT RECOMMENDATIONS

To insert in the manual the following definitions on page 3.2.3.7.:

Sector Capacity as: "***The maximum number of flights that may enter a sector per hour averaged over a sustainable period of time, to ensure a safe, orderly and efficient traffic flow.*** "

Occupancy Counts as "***the number of flights occupying a sector simultaneously during a specified period of time***".

I have space…. Give me more traffic,,, ops… food