

出國報告（出國類別：研究）

參訪加拿大運輸安全委員會  
研討其航空事故資料庫系統  
建置過程及成果出國報告書

服務機關：行政院飛航安全委員會

姓名職務：副工程師／葉添福

副工程師／日智揖

派赴國家：加拿大渥太華

出國期間：民國 98 年 5 月 17 日至 5 月 24 日

報告日期：民國 98 年 7 月 27 日

公務出國報告提要 系統識別號 C09801071

出國報告名稱：參訪加拿大運輸安全委員會研討其航空事故資料庫系統建置過程  
及成果出國報告書

頁數：129 頁 含附件：是

出國計畫主辦機關：行政院飛航安全委員會

聯絡人：黃佩蒂

電話：(02) 8912-7388

出國人員姓名：葉添福、日智揖

服務機關：行政院飛航安全委員會

單位：調查實驗室

職稱：副工程師

電話：(02) 8912-7388

出國類別：1 考察2 進修3 研究4 實習5 其他

出國期間：民國 98 年 5 月 17 日至 5 月 24 日

出國地區：加拿大渥太華

報告日期：民國 98 年 7 月 27 日

分類號/目

關鍵詞：事故調查、資料庫、事故調查地理資訊系統、工程分析。

內容摘要：

加拿大運輸安全委員會 (TSB) 於瑞航 111 事故調查過程中打撈了數百萬片的殘骸，並建置一大型資料庫以管理龐大的相關調查資料，包含：證據及報告資料庫、超級文字資料庫、文件紀錄管制資料庫、相片資料庫、客艙安全研究技術資料庫、地理資訊系統資料庫，並開發 PRODOCs 應用程式做為一平台，可直接存取各資料庫資料進一步展示及分析。另外，針對打撈之飛機殘骸及人體病理，TSB 工程部門建置一套事故調查地理資訊系統 (AIGIS)，該系統整合資料庫的文字資訊及 CAD 的圖形介面，可互動查詢檢索及編輯，對調查作業幫助甚多。

飛安會於執行科發計畫時，規劃建置一套事故調查資訊管理系統，期望將本

會實驗室常使用的數個分析工具整合並集中於此系統中，以提升工作效率。此外，深入了解 TSB 近 30 年累積之工程分析能量，研討其因應調查事故所開發或建置的工具與系統，希望吸取其經驗，導入至本會所開發的事故資訊管理系統中。

此次參訪很榮幸與多位經驗豐富之工程部資深技術人員交流研討，不僅止於了解軟、硬體採購建置，對更深一層之建置需求、目的、人員培養及應用有進一步體認。

本文電子檔已上傳至出國報告資訊網

# 目次

第一章 目的及過程.....	1
第二章 參訪紀要.....	4
2.1 參訪行程.....	4
2.2 TSB簡介.....	5
2.3 技術服務部簡介.....	6
2.4 技術服務部門及能量.....	7
2.5 雷達軌跡重建案例討論.....	13
2.6 事故調查地理資訊系統.....	13
2.7 PRODOCs與TIIMS.....	18
2.8 現場測量與動畫模擬.....	21
2.9 照像建模.....	22
第三章 心得.....	25
第四章 建議事項.....	27
附件.....	28

# 第一章 目的及過程

## 1.1 目的

1998年9月2日瑞士航空111班次，波音MD-11型機，由美國紐約甘迺迪機場起飛前往瑞士日內瓦，途中墜毀於加拿大佩姬灣西南方5哩之大西洋中，機上機組員計有14人，乘客215人，全部罹難。加拿大運輸安全委員會（Transportation Safety Board, TSB）於調查過程中打撈了數百萬片的殘骸，並建置一大型資料庫以管理龐大的相關調查資料，包含：證據及報告資料庫（Evidence and Reports III Database）、超級文字資料庫（SuperText Database）、文件紀錄管制資料庫（TSB Control Log Database）、相片資料庫（Photo Database）、客艙安全研究技術資料庫（CSRTG Database）、地理資訊系統資料庫（Geographic Information System），並開發 PRODOCs 應用程式做為一平台，可直接存取各資料庫資料進一步展示及分析。

另外，針對打撈之飛機殘骸及人體病理，TSB 工程部門建置一套事故調查地理資訊系統（Accident Investigation Geographic Information System, AIGIS），該系統整合資料庫的文字資訊及 CAD 的圖形介面，可互動查詢檢索及編輯，對調查作業幫助甚多。

飛安會於執行科發計畫，計畫中規劃建置一套「事故調查資訊管理系統」，期望將飛安會實驗室於事故調查經常使用的數個資料處理、分析及展示工具整合並集中於此系統中，以提升工作效率。此次出國的目的有二，第一為了解 TSB 近 30 年累積之工程分析能量，第二為研討其因應調查事故所開發或建置的工具與系統，希望吸取對方的經驗，進而將其優點導入至本次開發的系統中。

## 1.2 過程

參訪過程如表 1-1 所示。TSB 工程辦公室與 TSB 總部辦公室設置於不同的地點，網站資訊僅提供總部之地址及電話，特提供工程辦公室地址如下：1901 Research Road Gloucester, Ontario K1A 1K8；工程部位於渥太華機場旁，大眾交通工具不甚發達，建議租用汽車代步，其與總部及渥太華市區相關位置圖如圖 1-1 所示。工程部外觀如圖 1-2 所示。

表 1-1 參訪過程

日期	行程
5/17(日)~5/18(一)	搭乘長榮航空航班前往加拿大溫哥華，轉搭加拿大航空航班抵達渥太華機場
5/19(二) ~5/21(四)	參訪加拿大運輸安全委員會工程辦公室
5/22(五) ~5/24(日)	由渥太華機場搭乘加拿大航空 AC189 航班前往溫哥華，轉乘長榮航空 BR9 航班返抵桃園機場

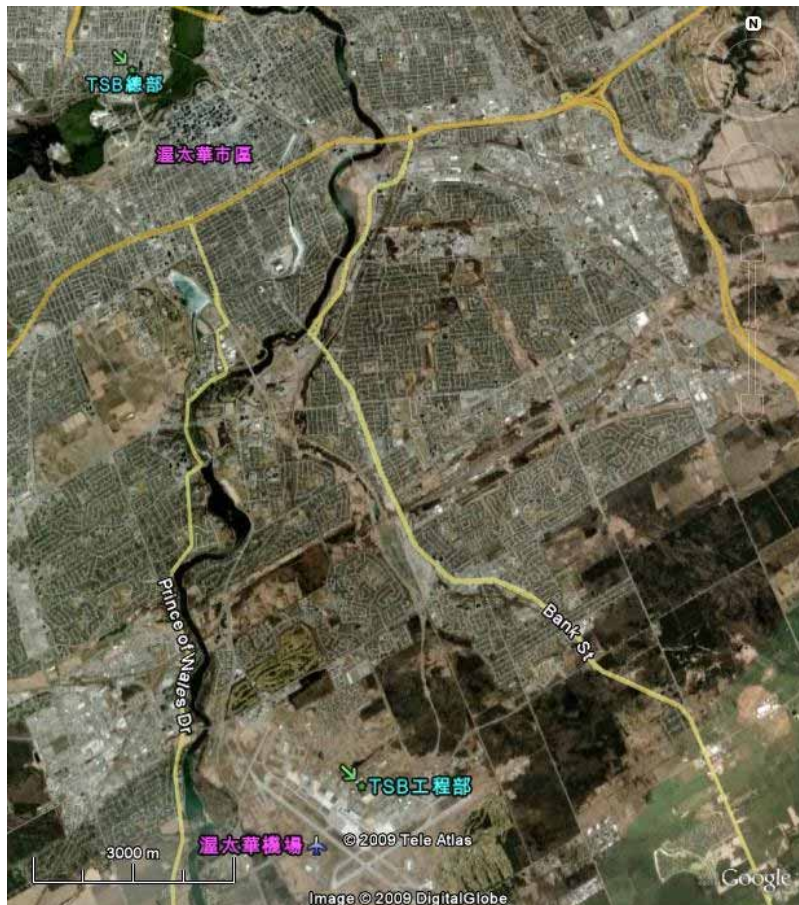


圖 1-1 TSB 總部與工程部位置圖



圖 1-2 TSB 工程部外觀

### 1.3 本次參訪接待人員

姓名	職稱	備註
James E. Foot	系統與工程科學組組長	
Ted Givins	記錄器與載具性能組組長	
Leo Donati	人為因素與巨觀分析組組長	
David J. McNair	資深調查官	TSB 重大事故調查經驗
Douglas A. Baker	資深工程師	雷達軌跡分析
Louis Landriault	系統工程師	AIGIS 開發者
Mike Mathieu	結構工程師	材料及結構實驗室
Derek Gagne	系統工程師	現場測量
Tony Gasbarro	資深工程師	現場攝影及照像建模
Theodore R. Parisee	系統技術員	PRODOCs 開發者、事故動畫

## 第二章 參訪紀要

### 2.1 參訪行程

<b>第 1 天 May 19, 2009</b>	
0830 – 0930	TSB 工程部簡介
0930 – 1045	參觀工程部設備及能量
1045 – 1220	TSB 重大事故調查經驗分享
1220 – 1330	午餐
1330 – 1600	記錄器實驗室-雷達軌跡重建案例討論
<b>第 2 天 May 20, 2009</b>	
0830 – 1220	AIGIS 系統建置及功能討論
1220 – 1330	午餐
1330 – 1600	AIGIS 資料庫展示、TIIMS 系統簡介
<b>第 3 天 May 21, 2009</b>	
0830 – 0920	結構實驗室能量介紹
0830 – 1100	現場測量及動畫模擬 <ul style="list-style-type: none"><li>● 測量儀器介紹</li><li>● 事故動畫</li></ul>
1100 – 1220	PRODOCs 介紹
1220 – 1330	午餐
1330 – 1600	照相建模技術實務及應用 <ul style="list-style-type: none"><li>● Photomodeler</li><li>● 案例介紹</li></ul>



## 2.2 TSB 簡介

加拿大運輸安全委員會(TSB)，其調查的範圍包含航空、海運、鐵道及油管。該委員會成立的目的為「改善運輸安全」，並以獨立調查、找出肇因之調查發現、找出安全缺失、提出改善建議及公布調查報告等作為達成之。在航空調查方面，若事故發生於加拿大境內、在加拿大航管範圍內、受委託調查或涉及註冊於加拿大境內的航空器，該委員會皆會著手調查。

TSB組織上分為總部、6 個區域辦公室以及操作服務部門，總部與區域辦公室位置分布如圖 2-1 所示，總部位於魁北克的加蒂諾市(Gatineau)主要負責政策及標準的制定、重大事故的調查工作以及與國際事務相關的事宜，其組織架構圖如圖 2-2 所示，總部下設有四個單位，其中調查處為主要執行調查工作的部門，其組織圖如圖 2-3 所示；區域辦公室負責事故初期的處理工作、協助調查工作以及獨立完成小型或中型的事故調查工作，若為主要事故調查(Major Investigations<sup>1</sup>)，則調查工作則由總部主導。另外，並非各個區域辦公室都具備全模組的調查能量，例如Edmonton、Winnipeg以及Montreal區域辦公室皆不具備海運調查能量。目前TSB組織內員工共約 230 人。

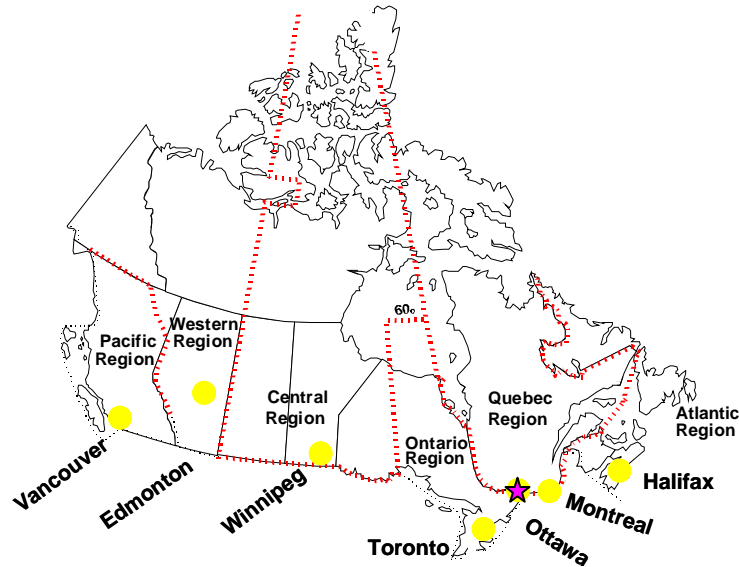


圖 2-1 TSB 區域辦公室位置圖

<sup>1</sup> The National Transportation Safety Board (NTSB) classifies an accident as “major” if the accident results in the destruction of a commercial aircraft, multiple fatalities, or one fatality and substantial damage to a commercial aircraft.

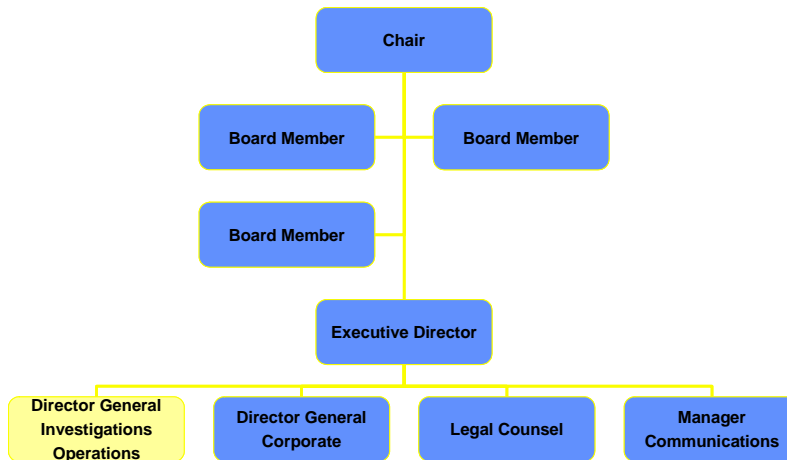


圖 2-2 TSB 組織架構圖

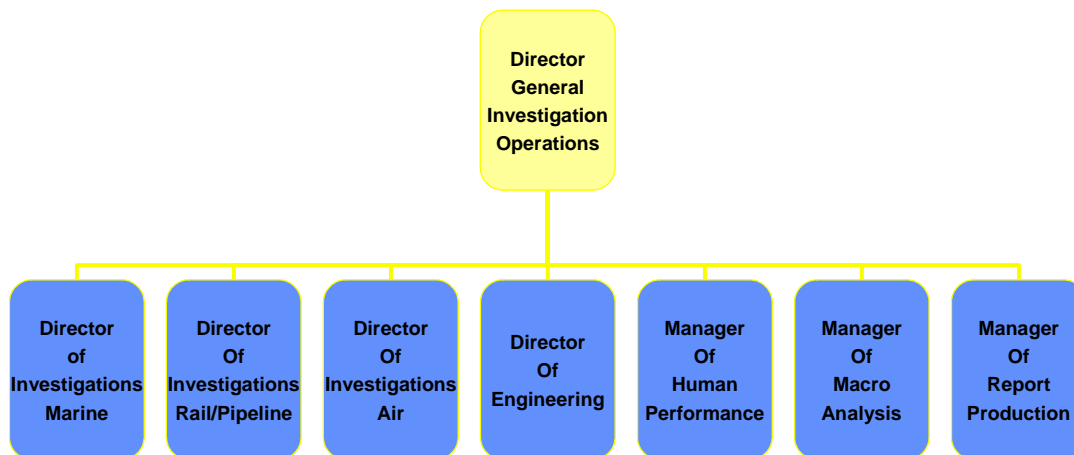


圖 2-3 TSB 調查處組織圖

## 2.3 技術服務部簡介

TSB 工程部成立於 1980 年設立「記錄器與載具性能組」、「材料與結構組」及「系統與工程科學組」等三個組，於 2009 年加入了「人為因素與巨觀分析組」及「多模組訓練與標準組」兩個組，並將名稱改為「技術服務部」，組織架構如圖 2-4。職掌各模組於調查中要求之工程支援、協助加拿大其他政府部門及國外機關、實驗室工程分析、組成重大空難技術團隊、工程報告產出等。2007 及 2008 年技術服務部門分別執行了 136 及 160 件調查專案。

本次出國參訪研習的單位以位於機場旁的原 TSB 工程部三個組為主要參訪對象。

### 記錄器與載具性能組

人力資源：5 位工程師、1 位工程支援。

能量：航空及鐵道記錄器解讀與分析、飛機及軌道載具性能分析與模擬、聲紋分析、雷達資料分析、抄件製作、事件發生順序推演、現場重建與動畫。

### 材料與結構組

人力資源：5 位工程師、1 位工程支援。

能量：結構及應力分析、金相分析、疲勞分析、材料與複合材料、空中解體、防撞性評估。

### 系統與工程科學組

人力資源：3 位工程師、4 位工程支援、1 位技術調查員。

能量：電氣系、航電系、液壓系、機械的、電子的、火燒及爆炸分析、現場攝影、攝影測量分析、動畫模擬。

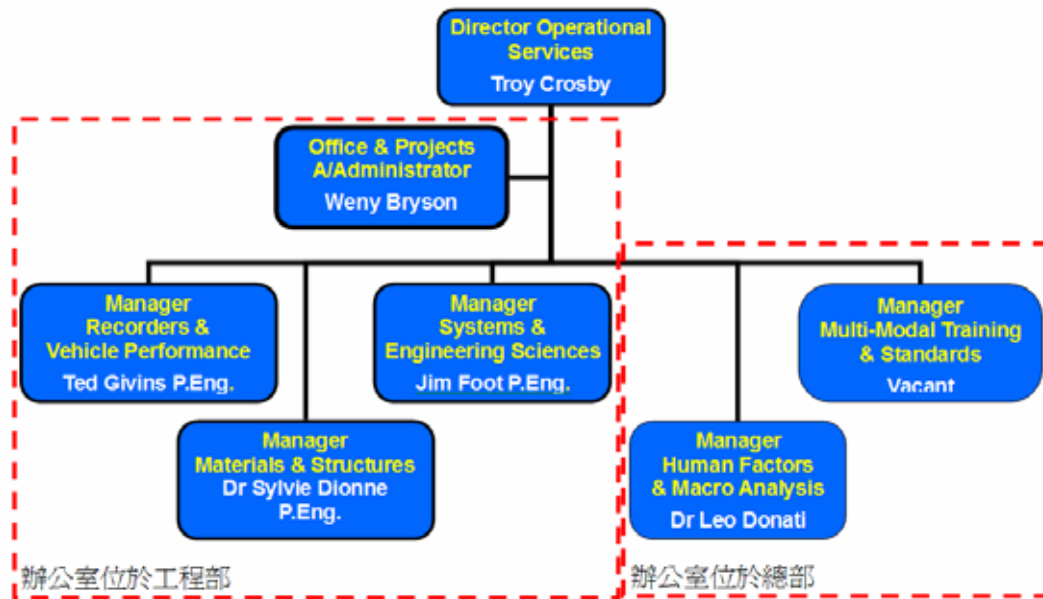


圖 2-4 TSB 技術服務部組織架構圖

## 2.4 技術服務部門及能量

由於目前飛安會正在進行多模組運輸安全委員會的籌劃工作，故本次參訪 TSB 工程部門，特別提出了參訪材料及金相試驗室能量的請求，期望了解其目前已經建置完成的能量，以供本會相關技術人員參考。

### 搬運

為因應事故調查所需，有時候調查團隊會將較為大型的殘骸搬運至 TSB 工程部門，作進一步的檢視，位於工程部門後方的棚廠中裝備有固定式起重機及移動式起重機，可用來搬運、移動或檢視殘骸，TSB 工程部中約有 50%的成員具有固定式起重機操作證，可相互支援操作起重機，棚場及固定式起重機如圖 2-5 所示。另配合鐵軌的外型，棚場中裝備有鐵軌夾具等附件，方便配合固定式起重機使用，夾具如圖 2-6 所示。



圖 2-5



圖 2-6

## 非破壞性檢驗

TSB 材料工程師說明事故現場殘骸被運送至工程部門後，通常會依調查官的指定，針對特定的部位進行進一步的試驗或檢查。而工程部門建置有相當完整之材料及金相能量，可進行各式的檢驗。若欲檢視殘骸是否發生裂紋，可使用非破壞性 (Nondestructive Inspection, NDI) 檢驗的裝備，傳統的儀器是運用磁力感測的原理，於待測物上灑上磁粉，通過電流後有裂紋處的磁粉將出現不規則形態，藉以發現材料表面或內部微小裂紋，如圖 2-7 所示；另一種裝備是利用超音波感應，體積小適合帶到現場使用。



圖 2-7 利用磁力檢視殘骸裂紋之裝備

## 切割研磨

確認殘骸位置後再對該特定區域進行切割或研磨，車床及洗床及殘骸切割機如圖 2-8 所示，試片研磨機如圖 2-9，研磨完成之試片如圖 2-10 所示。



圖 2-8 車床及洗床(左)、殘骸切割機(右)



圖 2-9 試片研磨機



圖 2-10 經切割及研磨處理之試片

### 顯微觀察

試驗室裡另備有實體顯微鏡及照相平台等裝備，可對試片進行觀察及照相等檢視與記錄，如圖 2-11 所示，其中圖 2-11 左圖為照相平台，可搭配四個光源拍攝照片，中間為實體顯微鏡品牌為 Leica，型號為 Z6 APO，最高觀察倍率為 57×-360×，右圖為具有兩組觀測鏡頭之實體顯微鏡，其品牌為 WILD，型號為 355110，最高觀察倍率為 31×，具有兩位使用者同時觀測的優點，可同時討論觀測物的狀態。



圖 2-11 實體顯微鏡及照相平台

## 材料檢驗

材料檢驗須透過高倍率之電子顯微鏡（SEM）觀察其斷面紋理或晶粒，亦或透過能譜儀（Energy dispersive X-ray spectroscopy, EDS）解析材料成分，如圖 2-12，為方便固定待測試片，可使用如圖 2-13（中）之塑化材料，並同時與試片放置於圖 2-13（左）的壓製儀器中，壓製完成後再使用如圖 2-13（右）的研磨儀器，製作成如圖 2-14 之圓柱體樣本。



圖 2-12 材料檢驗之電子顯微鏡及能譜儀（SEM/EDS）設備



圖 2-13 製作電子顯微鏡用試體工具及材料



圖 2-14 電子顯微鏡用試體

若待測試體為非金屬，例如橡膠、油類液體、複合材料等，則需透過傅立葉轉換紅外線光譜儀（Fourier Transform InfraRed spectroscopy, FTIR），如圖 2-15，其原理為當分子中的原子間發生振動或轉動時，會吸收特定的能量，一般而言，分子轉動及振動所吸收的能量範圍在紅外線的範圍，即形成IR光譜。由於每一特定的分子振動或轉動時，均會有特定波長的吸收，因此可藉由IR光譜做為鑑定分子結構的工具。



圖 2-15 傅立葉轉換紅外線光譜儀（FTIR）

## 測試設備

工程部門另備有以下的裝備能量：氣體壓力測試平台、拉力測試機、撞擊測試機、硬度測試機等，如圖 2-16 及圖 2-17 所示。





圖 2-16 氣體壓力測試平台(左)、拉力測試機(右)



圖 2-17 撞擊測試機(左)、硬度測試機(右)

## 2.5 雷達軌跡重建案例討論

TSB 工程部門簡報其目前正在調查中的一起飛航事故，由於發生事故的飛機上並無裝置飛航資料記錄器以及 GPS 接收機。資訊有限的狀況下，工程部門人員嘗試利用雷達資料、氣象資料及現場殘骸分布狀況等資料，計算可能的飛航軌跡，以供調查人員參考。

此事故為一 Cessna 172 型機發生事故後迫降於平地上，TSB 著手調查後取得雷達軌跡資料，但於該雷達資料於高度 700 呎以下無記錄，故工程部門嘗試使用有限的雷達軌跡資料配合美國 NTSB 所發展的雷達軌跡分析軟體 (DANTE) 重建飛航軌跡。另取得風速、風向等氣象資料，假設多組風的條件，結合現場測量結果，分析其飛航軌跡。其中檢視事故機於現場造成的破壞痕跡，以及該機本身受損的情形推測，事故機於著陸前應無大角度的操作。綜合上述考量研判最有可能的飛航軌跡。

## 2.6 事故調查地理資訊系統

事故調查地理資訊系統 (Accident Investigation Geographic Information System, AIGIS) 是 TSB 工程部一位工程師歷時 2 年開發的雛型軟體，選用 Microsoft Access 資料庫搭配 Bentley Microstation CAD 應用軟體作為資料儲存、管理、分析及展示之工具。除了以地圖方式呈現事故現場殘骸分佈外，最強大的功能是呈現事故前後結構件的損害情形，包括航機及人體。

AIGIS 分為後台的資料表單 (Table) 以及前台的使用者介面 (User Interface, UI)，TSB 的調查員可將前台複製至個人電腦，帶到事故現場或指揮中心，按照使用者介面中的欄位填入蒐集的資料，建立個別的子資料表單，如此可多工進行資料蒐集，再藉由特定的電腦做資料彙整進行資料分析。

所有的資料表格 (Data table) 及使用者介面表單 (User form) 皆由撰寫程式碼組成，如果要新增新的資料表格或介面表單，可將已完成的程式碼視為範本，複製經過些微修改即可重複使用；因此 AIGIS 功能具有相當大的可塑性及彈性，隨時可新增修改或移除一些功能以適應調查需求。

資料庫軟體及 CAD 軟體為各自獨立的應用程式，可個別使用；AIGIS 為兩者間橋樑，將資料庫查詢結果透過 CAD 軟體呈現，不論是殘骸分佈或是結構損害；反之，可在 CAD 軟體中選取有興趣的物件，進一步了解資料庫中該物件已記錄的訊息。

使用者介面的目的在於簡化使用者直接面對資料庫的困難度，AIGIS 有個主介面，其下包含許多次介面，有關資料輸入、修改及展示接透過這些介面完成；透過選單中選項設定，所有介面中的欄位搖身一變成為查詢欄位，查詢結果自動載入主畫面中顯示，點選任一筆結果，對應的資料即在次介面中出現，接著可進行修改、儲存或另存新檔等動作。如此一來，使用者不需了解複雜的 SQL 查詢語言，即可輕易的編輯及查詢資料庫中的調查資料。

使用者介面同時也簡化了操作 CAD 繪圖的困難度，可由介面中的欄位設定查詢條件，系統自動產生 CAD 圖，接著可進行擷取畫面、儲存或另存新檔等動作；查詢條件亦可儲存供後續重複使用。

## 資料庫編輯

加拿大警方 (Royal Canadian Mounted Police, RCMP) 具有專業現場蒐證能量及人力，RCMP 參與瑞航事故之搜救、打撈及殘骸辨識作業，大多數資料由 RCMP 負責蒐集，TSB 調查員透過 AIGIS 彙整進入資料庫。

依據資料庫內容的不同，AIGIS 又分為殘骸資料庫及人體病理資料庫，其中殘骸資料庫即是本次出訪最想要了解的重點，本會今年所開發的事故調查資訊管理系統中亦有規畫殘骸資料庫，期望藉由了解其建構的概念以及作法，將其優點導入至本會所開發的系統當中，其殘骸資料庫的功能詳述如下：

## 殘骸資訊

如圖 2-18 所示，AIGIS 在資料庫編輯的使用者介面中透過活頁的方式將殘骸資訊進行分類，包括：殘骸詳細資訊、描述、照片、多媒體、存放位置、地形資料、載具資料、火燒證據等。

關於殘骸之詳細資訊記錄殘骸的發現日、記錄時間、發現地點、被記錄與否、火燒的狀況、是否為漂浮物、源自於那個殘骸等；並可在描述活頁中以詳細的文字說明此殘骸的狀況；載具資料記錄其名稱、發現者、件號、序號、站位、區域、信任度以及描述等，便於殘骸於機身位置重建；照片及多媒體資訊包含拍攝時間、拍攝人員、照片編號、照片類別以及儲存位置等資訊；關於殘骸打撈位置資訊則記錄在地形資料活頁中。

AIGIS 殘骸及病理資料庫總共管理超過 2 萬件殘骸、16 萬張以上的照片。

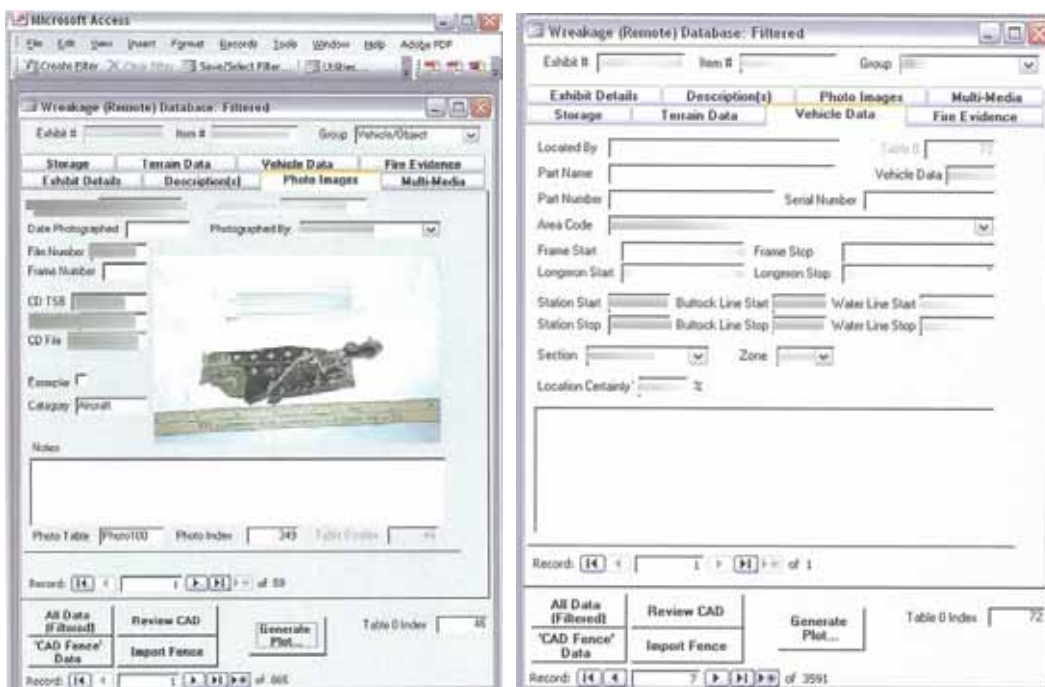


圖 2-18 AIGIS 的資料庫編輯介面

## CAD模型

AIGIS 展示之 3D CAD 模型是 TSB 聘請工程師按 MD-11 飛機設計圖，一件一件繪製而來，包括：線路、結構、座椅、地毯、天花板、艙門、管路、機身蒙皮、儀表等，如圖 2-19 中各圖層名稱所示；病理資料庫所需之人體模型將人體分為 16 個部件，並按性別、成人、小孩做區別；殘骸及病理模型總共繪製 3 萬 5 千餘 CAD 圖形元件，耗時一年以上。

TSB 工程師說明使用 3D CAD 模型展示效果很好，缺點是非常費時費力，建議若非必要不要嘗試，可改用簡化的模型或 2D 圖形示意。

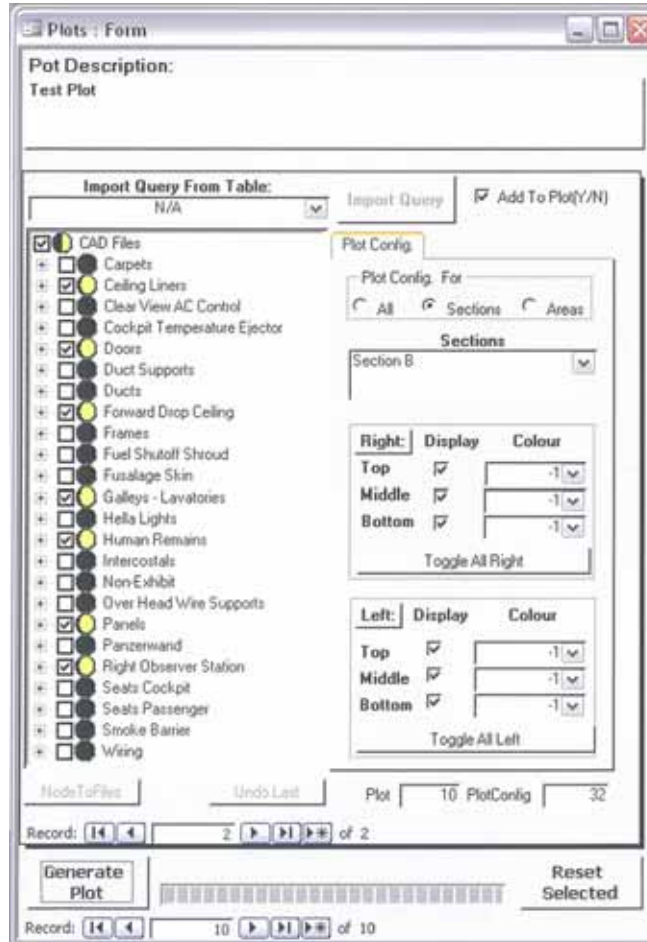


圖 2-19 瑞航 111 事故繪製之 3D CAD 模型分類

## 查詢及展示

查詢檢索乃資料庫的基本功能，也是建立資料庫的主要目的之一，使用者可依需求設定查詢條件，資料庫便檢索出符合條件之項目，使用者可進一步對每一筆項目作檢視、編輯或比對整體關聯性。一般資料庫查詢結果大多以表單方式呈現，AIGIS 也不例外，因為它的本質是 Microsoft Access，但 AIGIS 最強大的功能是資料庫與 CAD 繪圖程式雙向溝通，在使用者介面上設定查詢條件（例如：受熱溫度 500 度 C 以上），除了符合條件的殘骸清單外，亦可透過 Bentley Microstation CAD 應用軟體將預畫好的殘骸模型作檢索，符合條件的殘骸將以不同顏色作為區隔，如圖 2-20 所示，圖中綠色部分殘骸並未尋獲，其他顏色分別表示不同受熱溫度。反之，亦可由 CAD 模型上點選或框選有興趣的殘骸，再透過 AIGIS 作為橋樑，由資料庫中檢索出對應之殘骸資料，以清單的方式顯示。

為有效及正確的呈現使用者所關心的 CAD 模型，AIGIS 裡另有設定圖層的介面，可以在產生 CAD 模型之前，選擇希望顯示的圖層，設定模型的範圍、記錄曾經設定過的查詢條件等功能，最後產生 CAD 模型。

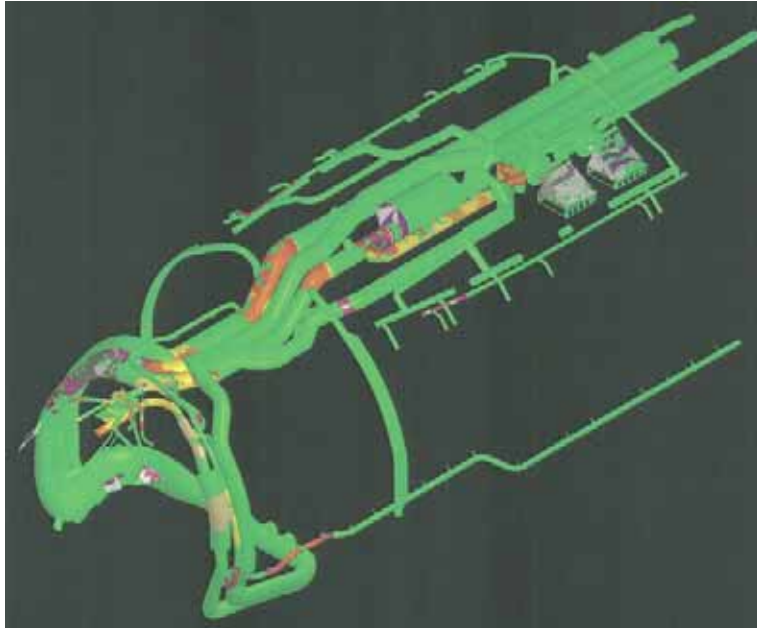


圖 2-20 AIGIS 展示線路殘骸受熱情形

為呈現 AIGIS 病理資料庫的資訊，建立瑞士航空 111 班機之客艙座位分佈圖及人體模型，與殘骸資料庫相同的互動方式，提供查詢乘客病理檢視之結果，如圖 2-21。

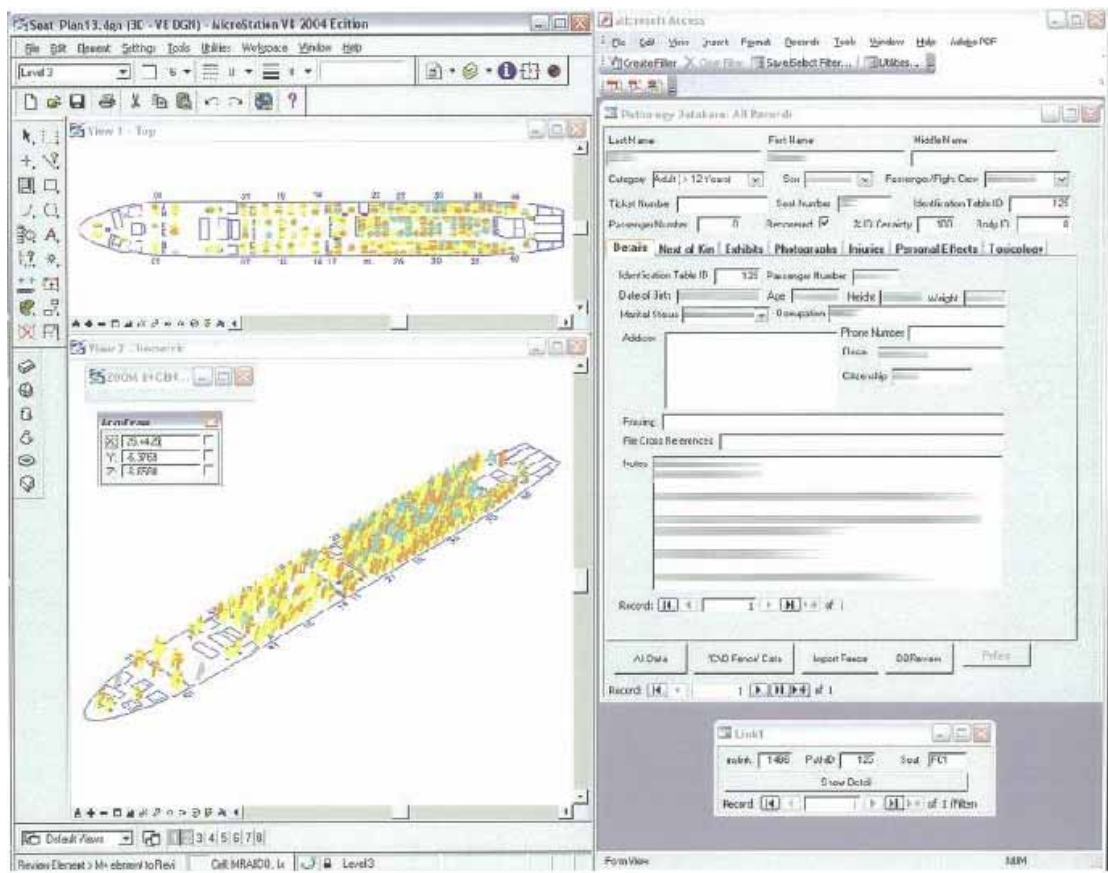


圖 2-21 AIGIS 病理資料庫

## 2.7 PRODOCs 與 TIIMS

### PRODOCs 簡介

PRODOCs 乃 TSB 瑞航事故火災及爆炸組開發之調查工具，目的在於提供單一標準操作平台給調查員檢索各式調查資料，包括：Supertext 文件、殘骸與線路模型、客艙安全資料庫 (CSRTG)、火災技術文件、照片及多媒體、架艙及客艙內 360° 全景圖等。PRODOCs 必須經過 IIC 或副 IIC 同意後始得安裝使用，IIC 或副 IIC 有權同意或終止 PRODOCs 使用者權利。

### Supertext

每件調查案皆有大量相關的技術文件（例如：AMM/CMM/FOM/FCOM 等），瑞航 111 事故也不例外。當時文件電子化程度不高，絕大部份手冊或記錄 (Log) 仍以紙本型式保存，調查員很難從中找到特定的資訊，以及文件間的關聯性，因此引進 Supertext 技術。

Supertext 是掃描硬體整合資料庫及 OCR 文字辨識技術的資訊系統，工程部將所收集到大量的文件依序經由建立文件控管紀錄、複製保存、掃描、掃描影像品管、OCR 文字辨識、建立索引資料後儲存於資料庫當中；接著開發 PRODOCs 中 Supertext 文件檢索介面（如圖 2-22），以增加搜尋調查資料之速度，並可藉由交叉索引，找出文件及文件之間的關聯性。另將紙本資料電子化後，可較容易的永久保存調查資料。

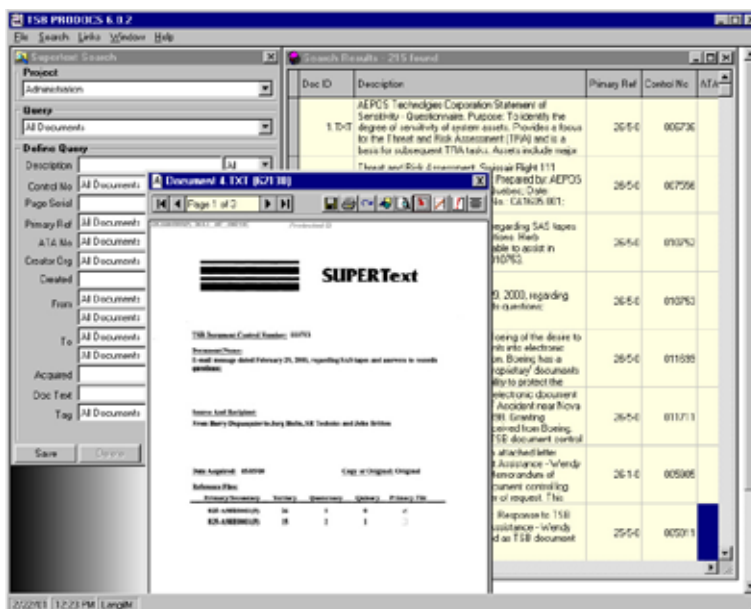


圖 2-22 PRODOCs 之 Supertext 文件檢索畫面

### 全景圖及殘骸模型檢索

爲了調查瑞航事故，TSB 調查員進行 MD11 同型機機身內部 360° 全景圖拍攝，拍攝內容除駕駛艙及客艙環境外，亦包括架艙天花板及地板內部線路（如圖 2-23 中藍色及綠色幾何符號），目的爲便於解釋說明殘骸位置及比對原貌。使用工具如圖 2-24 之全景攝影雲台。

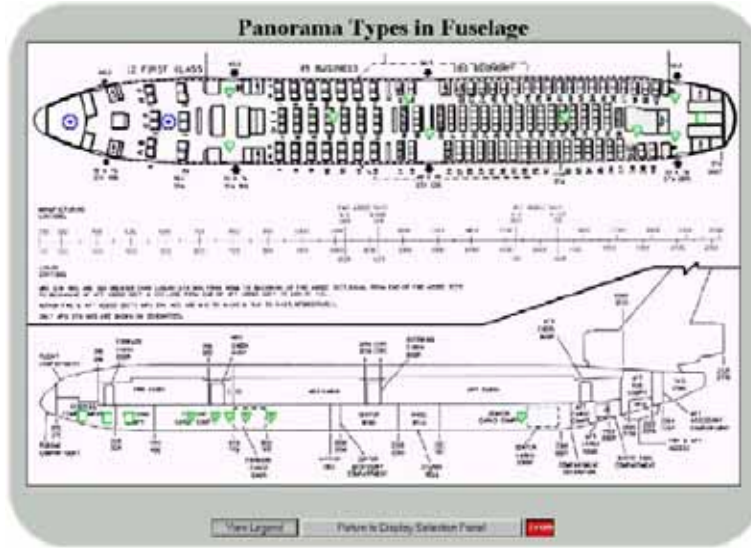


圖 2-23 MD-11 同型機全景圖拍攝位置



圖 2-24 全景攝影雲台

全景圖及殘骸模型成果可透過 PRODOCs 畫面中的左右視窗顯示，左右視窗可分別選取不同的興趣源，如圖 2-25 為兩張全景圖、圖 2-26 為一張全景圖及一模型，左右視窗顯示有幾個優點：殘骸及原貌比較、巨觀及微觀觀察、模型示意等。



圖 2-25 PRODOCs 展示兩張全景圖



圖 2-26 PRODOCs 展示一張全景圖及一模型

### 運輸調查資訊管理系統 (TIIMS)

TSB 已投入了大量資源、時間和精力發展「運輸調查資訊管理系統」(Transportation Investigation Information Management System, TIIMS)，以便更好地管理其業務，同時滿足政府要求對資訊和技術管理。該系統如同政府部門的內部入口網，需要時間讓員工及主管們熟悉操作，並改變作業流程及習慣。TSB 人員向我們介紹一項文件檔案管理功能，透過該系統輸入文件基本資料，如標題、來源、時間、摘要、歸檔類別等，系統將列印出一張條碼 (Bar code)，再將這條碼當作文件的首頁進行掃描，則系統將自行歸檔，並將基本資料建進資料庫供後續查詢使用。



## 2.8 現場測量與動畫模擬

現場測量主要由區域辦公室的調查員負責，若有較大的事故或特別需求才會向總部請求支援，若總部收到區域辦公室的請求，將會由工程系統及工程科學組派出 1 至 2 位技術人員進行現場測量及攝影的工作。

### Trimble S6 全測站

系統及工程科學組於去年購置 Trimble S6 電子式全測站（如圖 2-27），取代傳統經緯儀，磁驅伺服基座及多點自動追蹤功能使測量更快速，使用菱鏡最遠可測量 5.5km 外的目標物，測距精度達 1 公分，測角精度達 2”。

全測站仍屬於傳統測量工具，一般作業需要 2 個人以上，一位操作儀器、另一位拿反射菱鏡游走於待測殘骸處。以儀器為參考點測得殘骸之相對角度及距離，經換算後得到殘骸之位置坐標；傳統經緯儀作業需由已知坐標之控制點，一步一步引測至待測目標附近之參考點，才能開始進行測區的測量工作；現代化的全測站已經可以結合 GPS 獲得參考點坐標，節省大量引測的時間，再者，參考點與待測點間透過相對距離、角度換算坐標的繁瑣計算，全測站內建軟體亦可於測量當下計算完畢，直接以圖形展示測量成果。目前 TSB 之全測站尚未實際使用於事故調查任務。



圖 2-27 TSB 近期購置之 Trimble S6 電子式全測站

### Canon 5D Mark II 相機

系統及工程科學組有兩位專司事故現場攝影之技術人員，加入 TSB 工程部門近 30 年時間，大部分事故現場皆由他們進行攝影記錄，所有殘骸要移動前，必須經過他們確認記錄完畢，才可以移動。

推薦使用 Canon 5D Mark II 單眼相機進行事故現場攝影存證，因為它在設計上每個按鍵及轉環內部皆有墊圈保護，可避免事故現場的異物進到相機內部，尤其火燒事

故現場之灰燼。

### 3D max studio 與 Rhinoceros 動畫軟體

除了Insight飛航動畫外，系統及工程科學組另外常用的動畫模擬軟體是 3D max studio與Rhinoceros（簡稱Rhino）；透過這兩套動畫軟體可模擬一些動力構件的細節與失效過程，如圖 2-28 及圖 2-29。



圖 2-28 3D Max Studio 動畫軟體模擬鐵道事故現場環境

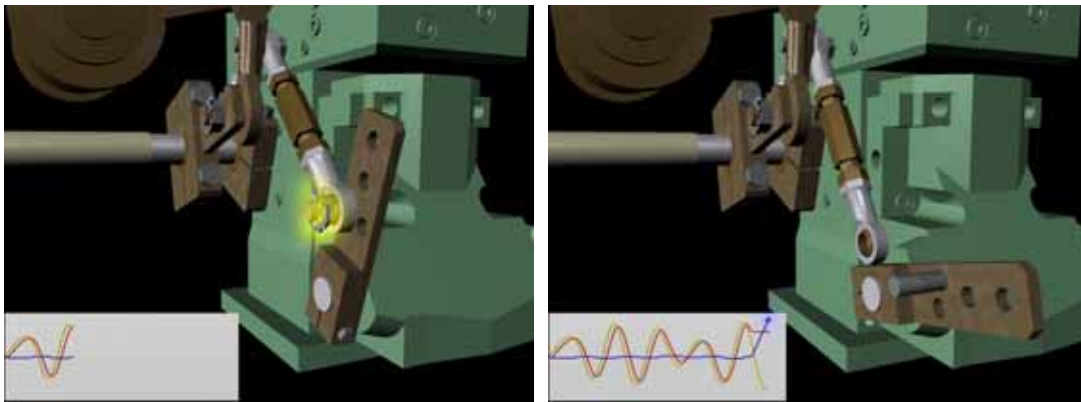


圖 2-29 Rhinoceros 動畫軟體模擬動力系統因未裝插銷導致失控過程

## 2.9 照像建模

現場測量部分除了全測站裝備之外，TSB 工程部門已建立相當成熟的照相建模技術，成功的運用在數個事故調查現場測量當中，可以在兩種不同的狀況下運用此類技術。

第一是運用市面上可以購得的商用軟體(Photomodeler)，配合使用搭載定焦鏡頭的數位相機，於照相前針對定焦鏡頭預先校正相機，取得相機的焦距、鏡頭等基本參數，至測量現場後拍攝至少三張不同角度的待測物照片，建議是每隔 45 度取得一張

照片，爾後利用 Photomodeler 配合照片中的參考點建立待測物模型。如圖 2-30 所視，針對波音 727 型機的機尾，於三種不同的角度拍攝照片，並指定現場一特定的物件，量測其長度，相當於取得一參考比例尺，此比例尺於模型建立後可輸入至模型場景中，可回推模型的真實尺寸，處理後成果如圖 2-31 所示，利用軟體可將機尾的模型建立。



圖 2-30 取得三種不同角度的拍攝照片



圖 2-31 三維模型成果

第二是運用照相技術反推飛機飛航軌跡。解說中，TSB 以一架 PIPER PA-18 小飛機於事故前乘客在飛機上對坐落於原野上某一農莊拍攝了數張照片，事故發生後調查 ASC-TRT-09-07-002

人員於飛機殘骸中取得了乘客的相機，因事故後飛機上除了相機之外，無法取得其他資訊，故工程部工程師嘗試藉由相片建模的技術，反推飛航軌跡。

將事故機的相機照片下載後，取得其中針對同一個農莊拍攝的三張照片，另比對相機的型號並取得相機鏡頭的基本資訊，進行農莊現場測量取得真實空間參考，利用建模技術反推相機於空中的位置，亦即飛機的位置，再配合飛機的三維模型，比對乘客與飛機視窗的相對位置，進而決定飛機的姿態，最後利用三個不同的拍攝角度，推測飛機的飛航軌跡。如圖 2-32 所示，右半邊為乘客對於一農莊拍攝三張不同角度的照片，剛好符合相片建模的最低限制，反推後的成果如圖 2-33 所示。

另外於所建立的三維場景中，取得房舍影子的長度及角度，比對太陽位置，反推事故發生的時間點，經比對機場記錄該航機起飛時間，墜毀時間約於起飛後 30 分鐘。



圖 2-32 乘客拍攝照片

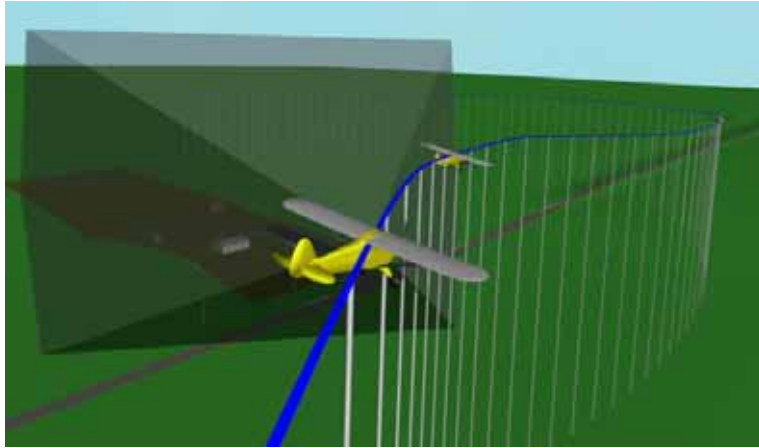


圖 2-33 飛航軌跡模擬圖

### 第三章 心得

TSB 累積近 30 年調查工程分析經驗，確實有相當多能量值得飛安會學習。本次很榮幸與多位經驗豐富之工程部資深技術人員交流研討，不僅止於了解軟、硬體採購建置，對更深一層之建置需求、目的、人員培養及應用有進一步體認。

飛安會於執行科發計畫，計畫中規劃建置一套「事故調查資訊管理系統」，它是一套結合資料庫與地理資訊系統的調查工具，建置目的與 TSB 的 AIGIS 類似，提供事故資料管理、分析及展示功能，採取 TSB 建議，「事故調查資訊管理系統」將以 .Net 程式語言開發，使系統具較佳的相容性；設計上不局限於單一事故，如此可進行各事故間之統計分析；不僅如此，「事故調查資訊管理系統」亦將國內航空公司使用的機型、飛機基本資料、記錄器裝置普查等建置基本資料庫，針對實驗室工程分析常用之飛航軌跡計算、雷達資料處理、格式轉換等工具也將整合入系統中。

本次參訪後了解 TSB 工程部會為了因應不同的事故調查需要，開發不同的調查工具及方法，利用有限的人力與資源，很有效率的協助調查官完成事故調查，一旦技術能量建立完成後，亦可運用於往後的相類似的事務調查

此次參訪討論幾個主題，心得如後：

#### 一、 資料庫及資訊系統

TSB 選用 Microsoft Access 資料庫搭配 Bentley Microstation CAD 應用軟體，運用 VBA 程式語言開發 AIGIS 作為事故資料儲存、管理、分析及展示之工具。AIGIS 殘骸資料庫具有以下優點：

- 事故資料電子化保存，讓資料使用更便利。
- 人性化的使用者操作介面，調查員不必使用生硬、複雜的程式語言，就可以完整記錄、編輯及查詢殘骸資訊。

- 查詢及交叉索引功能，提供分析資料間彼此的關連性。
- 完整的三維模型及資料庫驅動展示功能，讓調查員更容易了解殘骸位置、狀態與周圍環境。

AIGIS 亦有不足之處：

- 僅限於瑞航 111 事故使用。
- 建立殘骸 CAD 模型所需人力及時間成本非常的大，非必要不建議嘗試。
- Microsoft Access 資料庫容量上限為 1GB，建議改用其它容量較大的資料庫軟體。
- 以 VBA 程式語言開發系統，整合性受到諸多限制，建議使用 .Net 語言相容性較佳。
- 強大的三維機身、線路、殘骸等模型展示功能，缺乏真實地理環境展示能力。

PRODOCs 系統提供調查人員在單一操作平台檢索不同資料庫中各式調查資料；運輸調查資訊管理系統 (TIIMS) 如同飛安會入口網，管理調查行政流程及文件歸檔檢索。不論哪套資訊系統，關鍵在資料的取得、保存、管理、交流及應用。

另外建立資料庫系統的關鍵在於所輸入的資料的完整性，存在於外部的殘骸資料必須完整的輸入至資料庫，使用時才可正確的呈現資訊，若輸入的過程中發生錯誤，也會造成搜尋錯誤的情形發生，建立資料庫時必須要小心處理。

## 二、 雷達軌跡計算案例

雷達軌跡計算之案例中，工程部利用有限的資訊（雷達資料、氣象資料以及現場測量資料），有邏輯的推估事故機的飛航軌跡，並書寫報告，提交調查官參考。由此案例可以說明，並非所有事故發生後都會有完整的資訊可以參考，調查人員會盡可能的收集資料，仍有不足的地方，工程部人員會利用既有的資訊協助調查官完成分析。

## 三、 照相建模技術以及 3D 動畫模擬

加拿大地廣人稀，發生事故以區域辦公室調查人員趕赴現場，必要時才請求總部支援，有時候需要工程部協助時，事故現場已經清除完畢，此時若仍有一些重要證物的位置、長度、距離等資訊想要取得，傳統測量技術或目前的 GPS 測量技術將無用武之地，勢必只能從僅存的現場照片著手。

目前市面上不只一套攝影測量軟體，例如：PhotoModeler, iWitness 等，可透過特定的取景方式、相機校正、影像套合、給定參考坐標及比例尺、建立模型等步驟，再由軟體中模擬的環境進行測量；加拿大 TSB 採用 PhotoModeler 軟體，後續結合 Rhino 或 3D max 製作動畫；飛安會亦於 2007 年採購 PhotoModeler 軟體，後續結合 Google Earth 與其他空間資訊整合。

## 第四章 建議事項

1. 參考 TSB 殘骸資料庫架構，擇其優點導入本會開發中的系統。
2. 飛安會未來若需要建立航空材料及結構檢驗相關能量，可參考 TSB 之運作方式。
3. 建議持續培養具有程式開發能力之調查人員，以因應多變的調查需求，以節省公帑及提升調查時效。

# 附件

1. AIGIS 簡介
2. PRODOCs 使用手冊



# 附件 1 AIGIS 簡介

## 1.0 Introduction

- 1.1 Experience has demonstrated the need for an accident investigation tool that can be used in the collection, storage, retrieval, analysis and display of spatially referenced data. Research revealed that the best approach to accomplish this task would be to use a non-conventional Geographic Information System (GIS)<sup>1</sup>. Since an appropriate “off the shelf” tool could not be found a prototype Accident Investigation Geographic Information System (AIGIS) was developed.
- 1.2 The AIGIS tool would be similar to conventional GIS in that it would allow the mapping of occurrence sites/scenes. In addition it should also be capable of collecting, analyzing and displaying data associated with both pre and post occurrence structures. These would include vehicles, buildings and human anatomy.

## 2.0 AIGIS Primary Components

- 2.1 The AIGIS prototype is divided into two primary components, a relational database<sup>2</sup> and a two and three dimensional (2D & 3D) Computer Aided Design (CAD)<sup>3</sup> application. The relational database that was selected was Microsoft (MS) Access. This database management system was chosen because of its availability (i.e. it comes standard with MS Office Professional), because it has a productivity enhanced development environment and because it can be used to store and retrieve any ODBC<sup>4</sup> compliant data. The CAD application that was chosen was Bentley Microstation. It was chosen because of its availability, because it's GIS capable and because it can be manipulated by an external program (e.g. MS Access).
- 2.2 In order to make AIGIS a multi-user application the database and user interface would be separated into two MS Access applications. One, the “back-end”, would host the relational tables and the collected data and the other, the “front-end” would host the user interface. This separation will allow multiple users, each possessing their own copy of the front-end, to access a shared back-end.

---

<sup>1</sup> The United States National Science Foundation defines a GIS as a computerized database management system used for the capture, storage, retrieval, analysis, and display of data that is spatially referenced. GIS is typically used in mapping environments.

<sup>2</sup> A relational database is a means of structuring data as a collection of tables that are logically associated to each other by shared attributes.

<sup>3</sup> A CAD system is a computer system used in the design, drafting and display of graphically oriented information.

<sup>4</sup> Open Database Connectivity (ODBC) is a standard or open application programming interface (API) for accessing a database.

### 3.0 AIGIS Framework

- 3.1 The AIGIS framework is divided into three main categories:
- Developmental
  - Database (MS Access) / CAD (Bentley Microstation) communications.
  - User Interface
- 3.2 The developmental aspect of the AIGIS framework consists of data table and user form templates from which new tables and user forms can be rapidly developed and deployed. These templates have reusable custom code associated with them which, among other things, facilitates data entry, data querying and data display. Consequently AIGIS can be quickly deployed and new tables and forms can be rapidly added, removed or modified to adapt to new circumstances and rapidly changing priorities.
- 3.3 Because the database (MS Access) and CAD (Microstation) applications are separate programs they can function independently of one another. However the true power of any GIS is its ability to graphically display spatially referenced data. Consequently the AIGIS framework includes custom code that facilitates two way communications between MS Access and Bentley Microstation. This means that, through the framework, MS Access can send information and commands to Microstation causing it to selectively and systematically generate 2 and 3D plots depicting things such as occurrence site maps and pre and post crash structures (e.g. vehicles, buildings and human anatomy). Similarly Microstation can send information and commands to MS Access causing it to query and display data from its database. For example the selection of a graphic element or a group of elements depicting anything from a map location(s) to an object(s) in a structure (e.g. vehicle component(s), human body part(s), etc.) can trigger Microstation to send information and commands to MS Access causing it to query the database and display all information associated with that graphic object. It is however important to note that for this aspect of the AIGIS framework to work a previously established link must exist between a graphic object and the database. Consequently the framework also has custom code to facilitate the establishment of these links.
- 3.4 The user interface framework is designed to simplify user interaction with the database. The interface consists of a variety of sub forms which are all embedded in one "master" form. All data is entered, edited and displayed through this "master" and its sub forms. In addition, through the selecting of a menu option, these forms are transformed into a database querying interface. Both simple and complex SQL<sup>5</sup> queries, based on any available field or combination of available fields, can be easily created by filling in the same forms that are used for data entry. Once the query forms are filled in the selection of another menu option will cause the template code to produce

---

<sup>5</sup> SQL is a standard computer language for accessing and manipulating databases.

properly formatted SQL commands which are then used to query the database (Operators do not require any knowledge of the SQL language in order to effectively query the database.). The results of these queries are automatically displayed back into the “master” and its sub forms. The user interface framework allows these queries to be modified, saved and restored.

- 3.5 The user interface framework also simplifies CAD plotting. Plots can be systematically built up, saved and restored. They can be created in steps, each step representing the results of a database query. These steps can be saved and later recalled to either recreate a plot or to be used as the foundation of additional plots.

#### 4.0 AIGIS Wreckage and AIGIS Pathology

- 4.1 To date the AIGIS foundation software has been used to create two variations of AIGIS. They are AIGIS Wreckage and AIGIS Pathology. As the names imply AIGIS Wreckage is used to collect, store, retrieve, analysis and display data associated with vehicle wreckage components and AIGIS Pathology is used to collect, store, etc. data associated with the occurrence victims. Both variations have some common tables and forms. For example each has a “Photo” table and form that hosts the photographs associated with the wreckage component or victim. This table / form contain, among other information, a “thumbnail” of each image, which when selected, will launch a high resolution version of the image located in near line storage (i.e. a jukebox).
- 4.2 AIGIS Wreckage was adapted to include tables to host among other things pre and post crash component descriptions, locations (i.e. where a component was located on the pre-crash vehicle and where it was found in the wreckage field) and multi-media data (e.g. object models, panoramic images, video and audio). For one specific investigation this variation of AIGIS was used to host and analyze over 20,000 exhibits, over 160,000 images and was used to track and plot over 35,000 CAD graphic elements.
- 4.3 AIGIS Pathology was adapted to host victim data, which among other things, included, victim statistics (e.g. age, sex, etc.), next of kin, personal effects, exhibits (i.e. recovery of body parts), injuries and toxicology. In addition a special plotting utility was added that allowed 3D mannequins to be placed in a CAD model depicting a vehicle’s interior (one mannequin for each victim). These mannequins, one male and one female were scaled to indicate whether they were an infant, a child or an adult. Each mannequin was divided into sixteen segments (left and right for – head, face, neck, chest, arms, abdomen, pelvis and legs) and each segment was linked to the database allowing manipulation of the individual segments and allowing the database to be queried from the CAD application. In addition human anatomical CAD models were added which would allow a detailed analysis of an individual’s

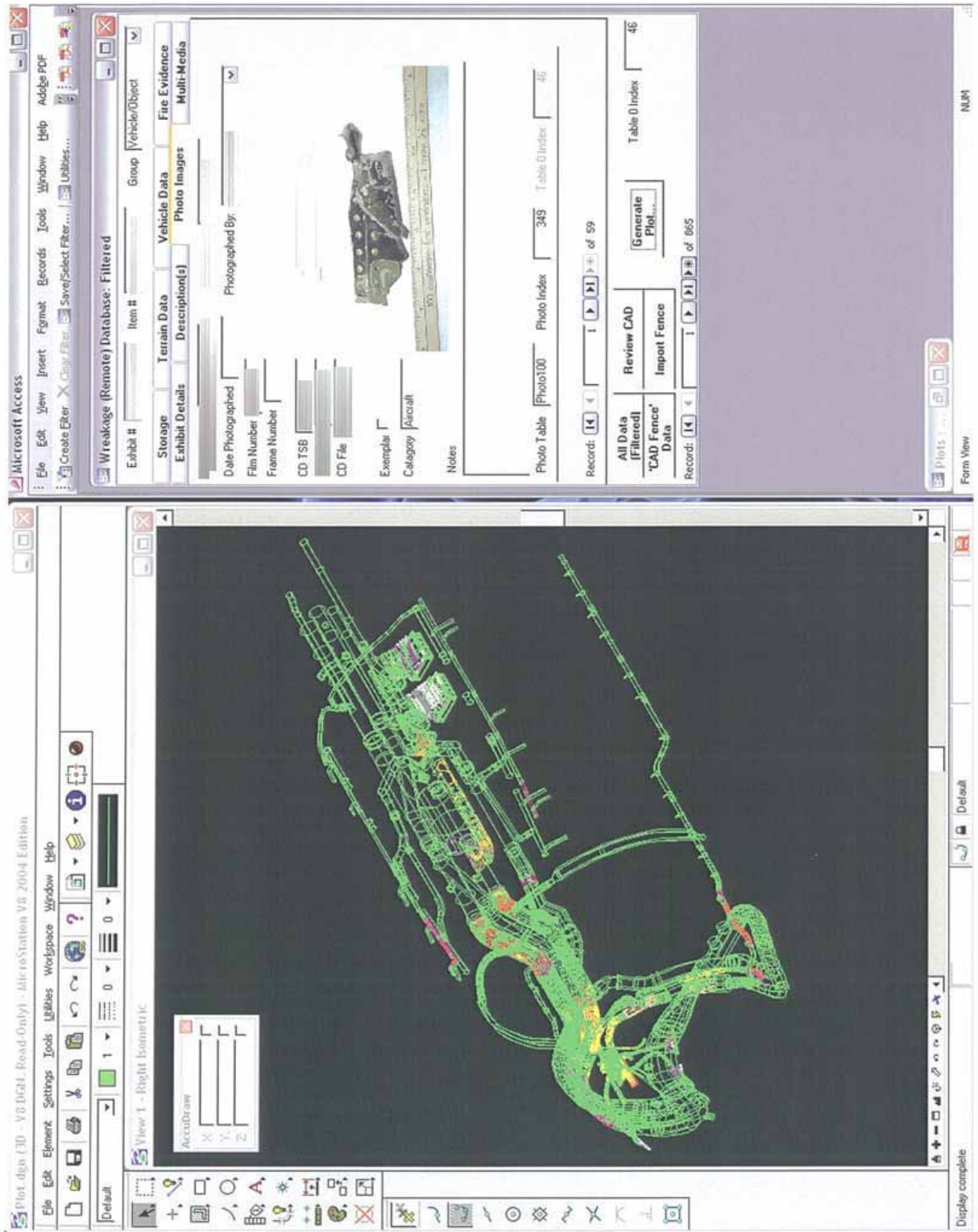
injuries. These models, which were on loan from Visible Productions (<http://visiblep.com>), included a complete human skeleton, the major organs (both male and female) and the major portions of the central nervous system (i.e. different sections of the brain and spinal column). They were also linked to the database which allowed them to be programmatically manipulated. AIGIS Pathology was used to in a wide range of applications. The list includes but is not limited to, victim recovery and identification, selecting of victims for toxicology purposes and the analysis of injuries and injury patterns. In one occurrence the system was used to collect, track and analysis data for 229 fatalities. During one four hour session approximately 80 different questions (e.g. where were the people with tibia or fibula fractures seated?) were answered. This included the creation of approximately 80 different 3D mannequin seating plan plots, one for each question asked.

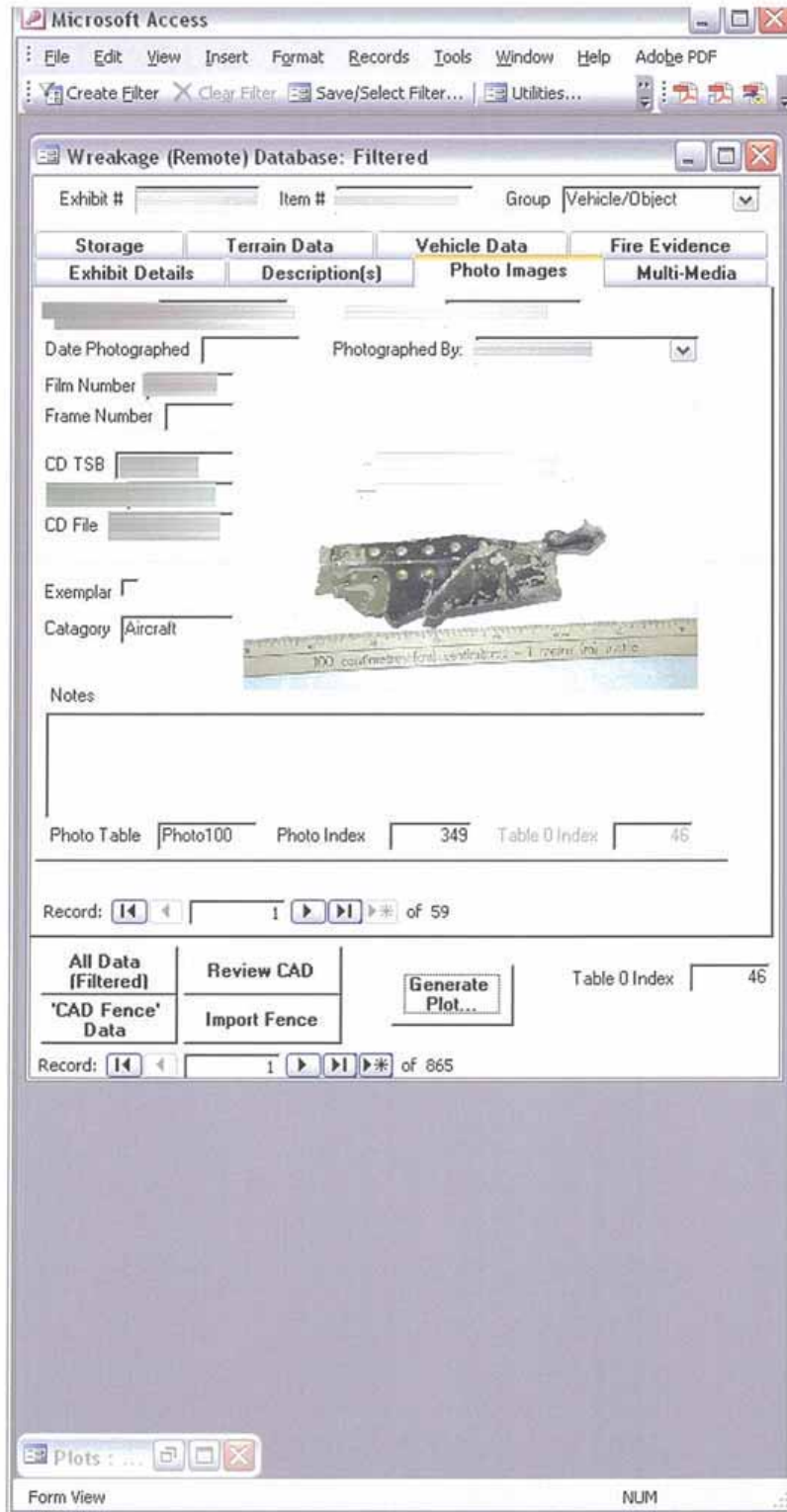
## 5.0 Conclusion

- 5.1 AIGIS has proven to be a very powerful tool and the prototype has exceeded expectations. However there are areas that need improvement and additional features that should be added.
- 5.2 The use of MS Access has proven to be a limiting factor. It has a file size limitation of 1 Gigabyte which, in one case, required the database “back-end” to be separated into multiple “back-ends”. MS Access also has performance issues when operating in a multi-user environment. The programming language used in MS Access (Visual Basic for Applications) limits the development of the AIGIS framework and its user interface.
- 5.3 The use of AIGIS in real world applications has identified areas where additional features would be useful. The AIGIS prototype is limited in that it can only deal with one occurrence at a time. An ability to query across multiple occurrences would be beneficial. Both AIGIS Wreckage and AIGIS Pathology need to be combined into one product. This would allow a better analysis of the human – machine environment. AIGIS should also be expanded to include modules to generate reports (e.g. Crystal Reports), perform statistical analysis and to create charts.
- 5.4 The data that is hosted by AIGIS is dynamic in nature however future AIGIS development would benefit from expert advice as to content. This is particularly important in the medical areas. There are however other areas of expertise that would be beneficial (e.g. law enforcement, legal, military, etc.).
- 5.5 In conclusion it is recommended that AIGIS be redesigned to:
  - Use a more powerful multi-user relational database “back-end”.
  - Use a more powerful development environment (e.g. MS Visual Studio .NET).
  - Query across multiple occurrences.

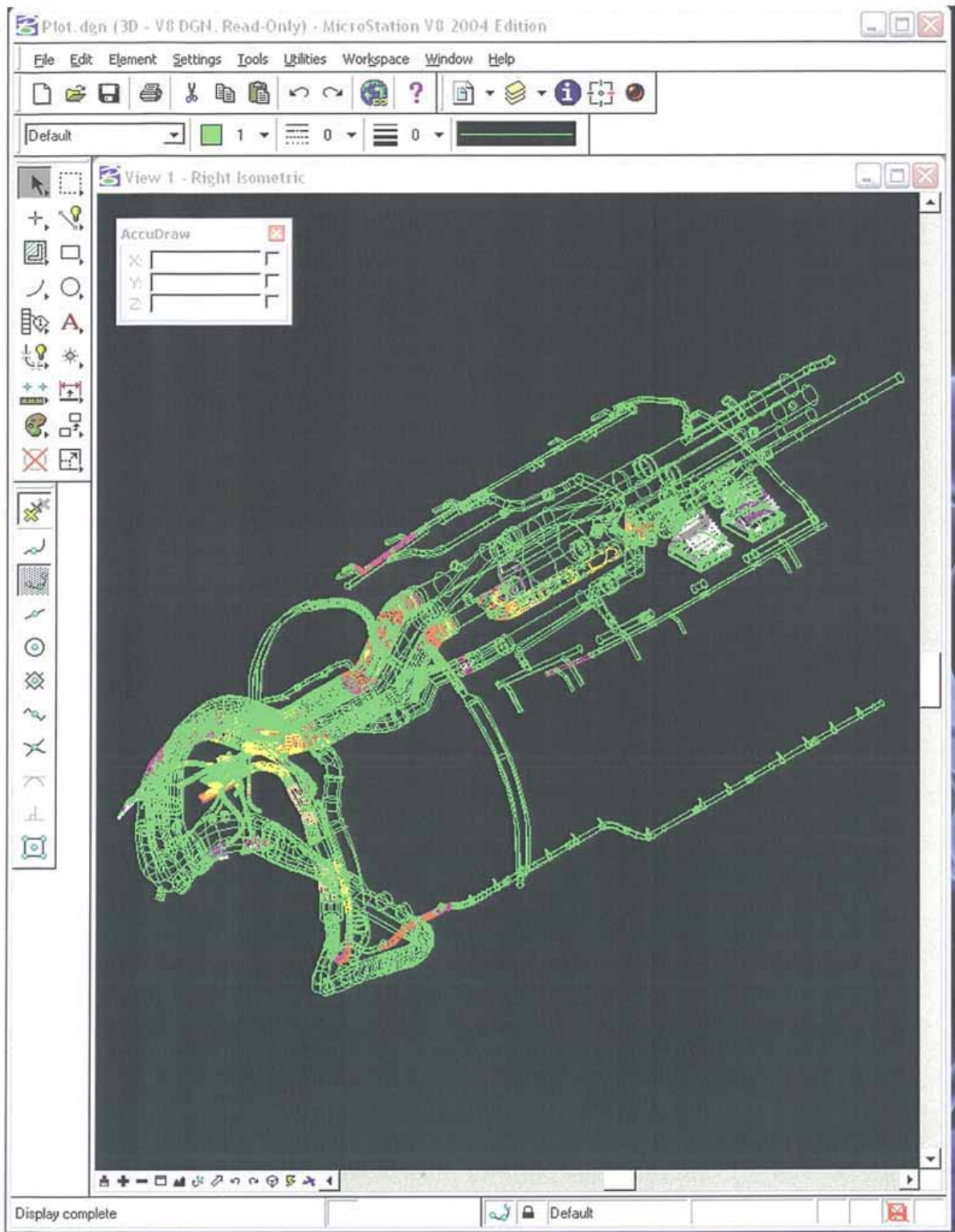
- Combine AIGIS Wreckage and AIGIS Pathology.
- Include reporting, statistical analysis and charting modules.
- Update the data content.

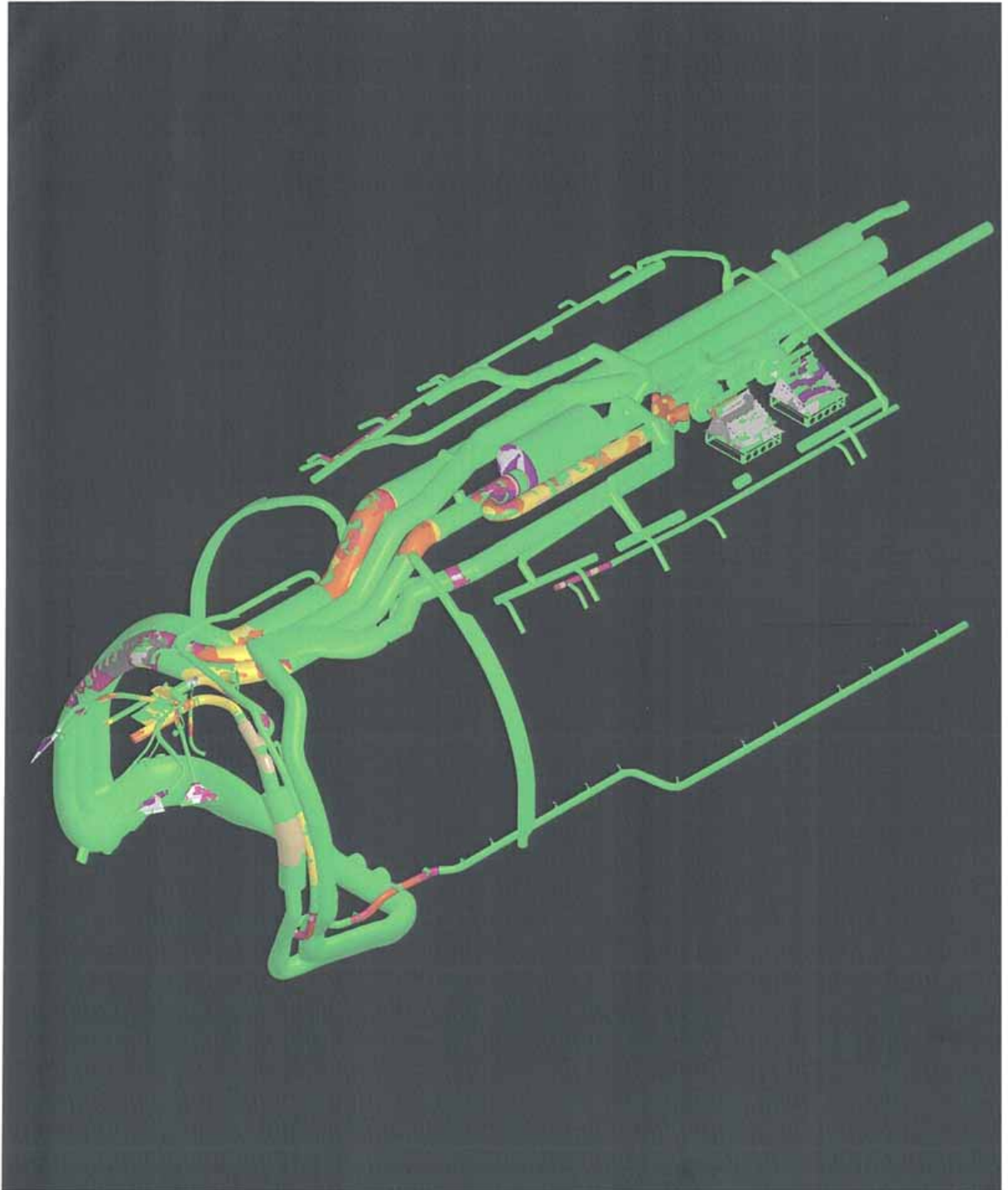
AIGIS Wreckage  
Images

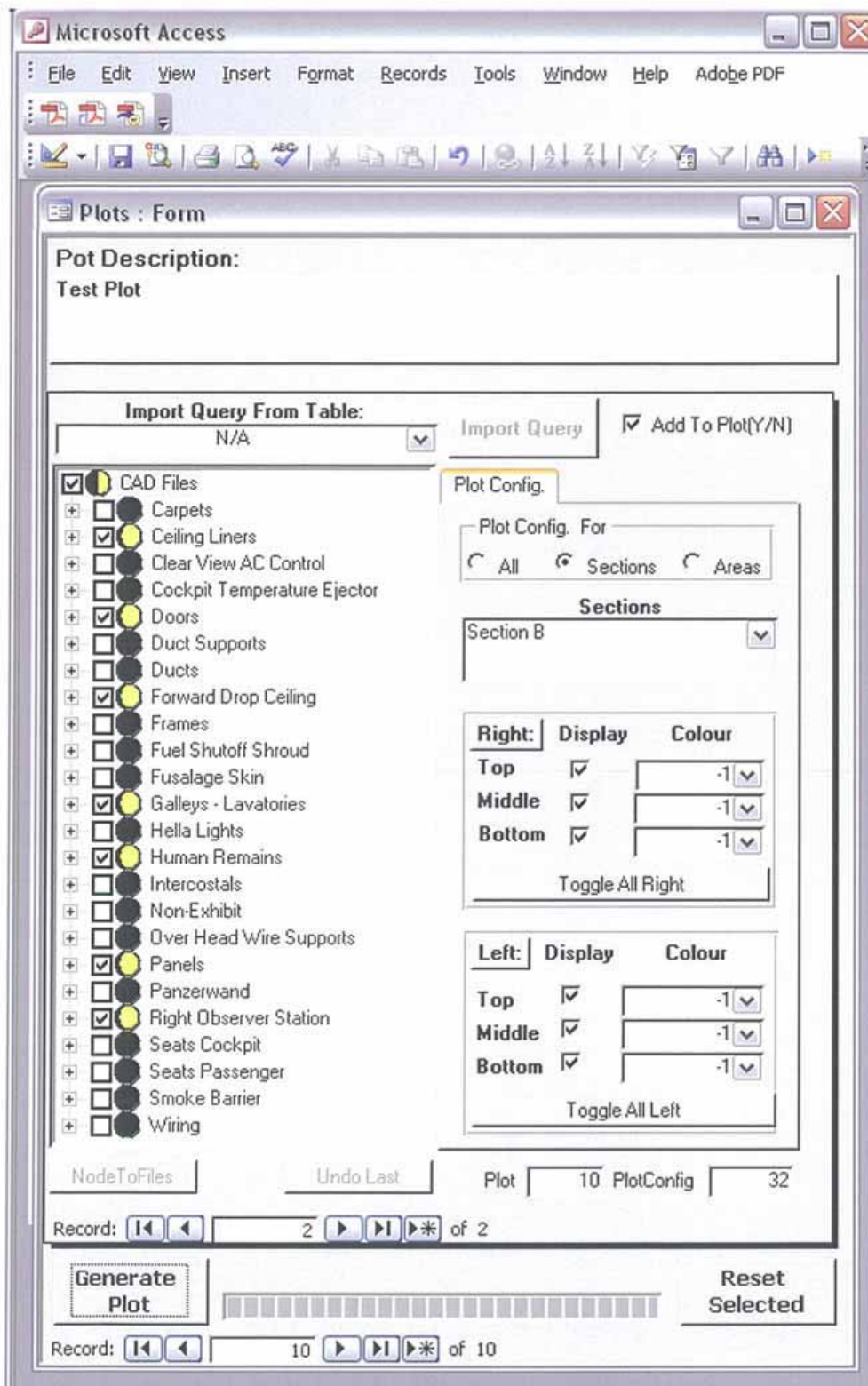


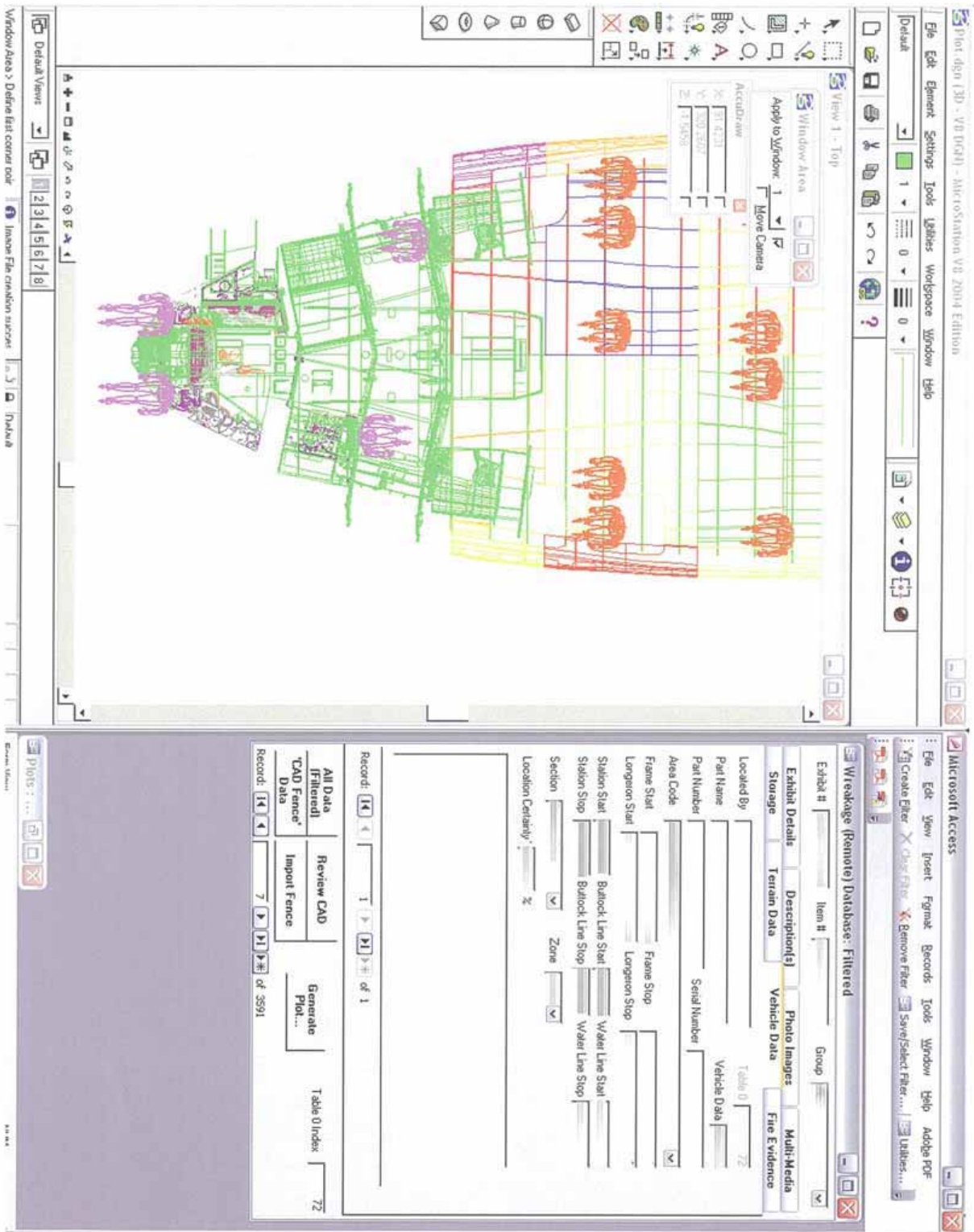


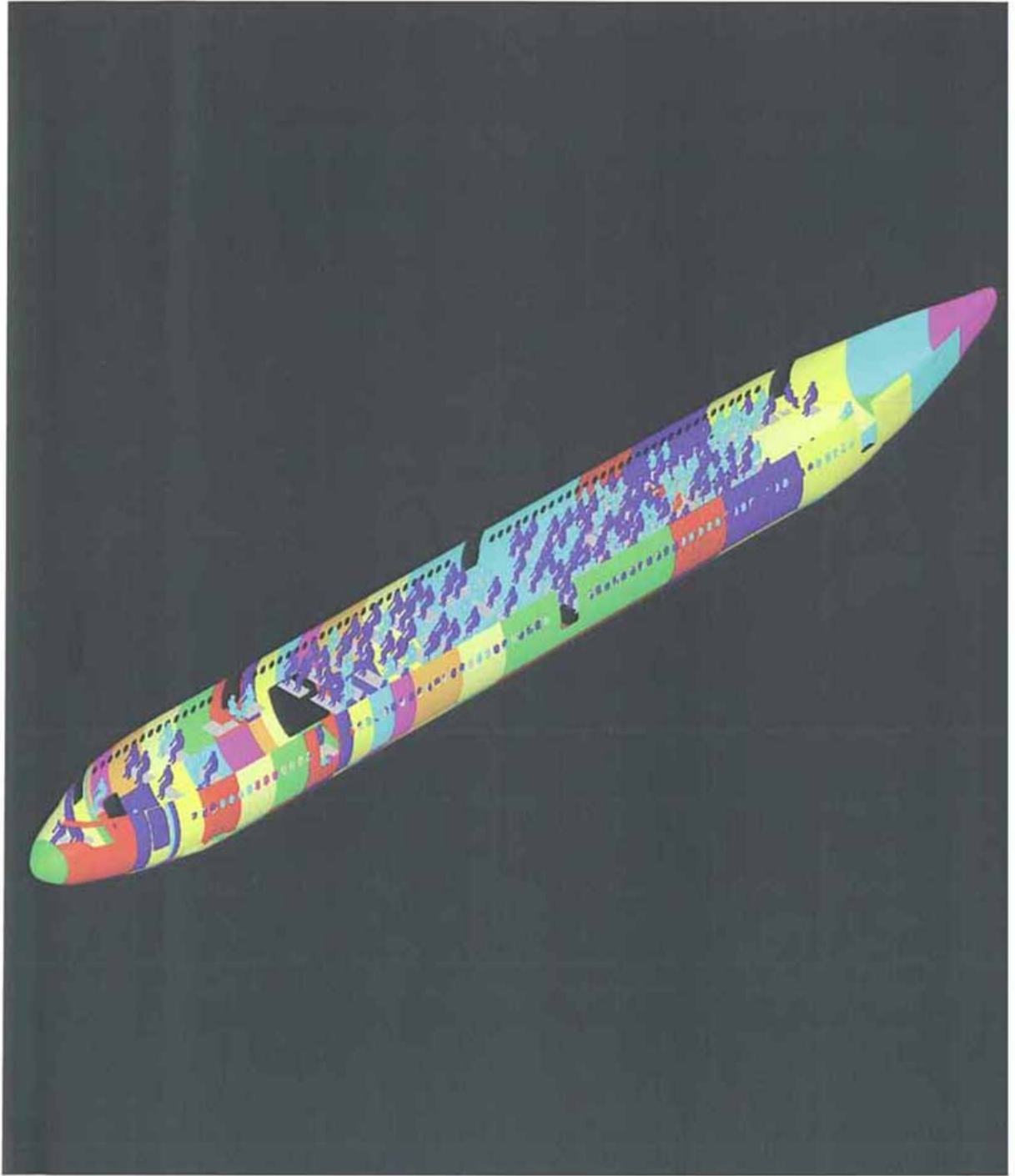


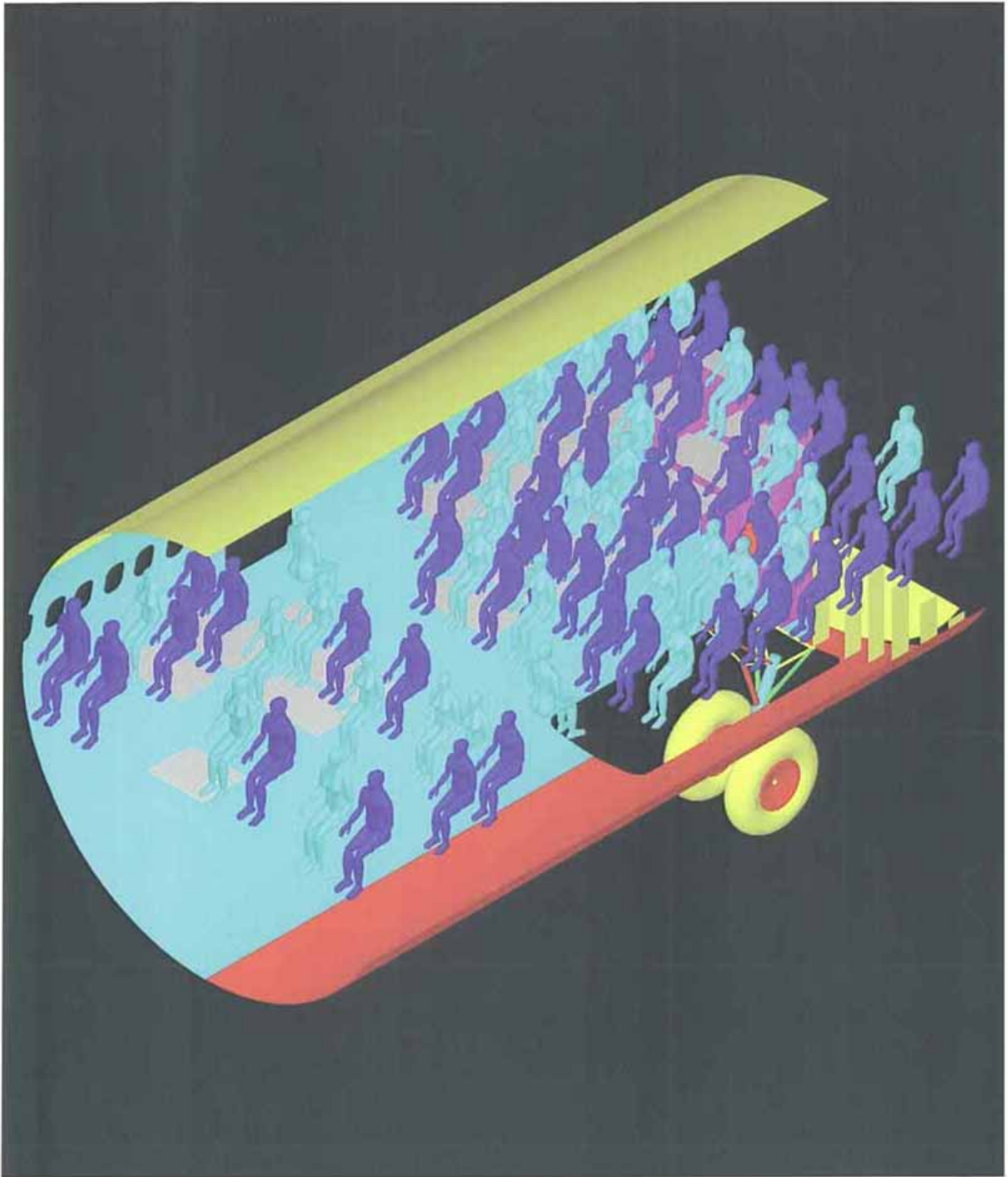


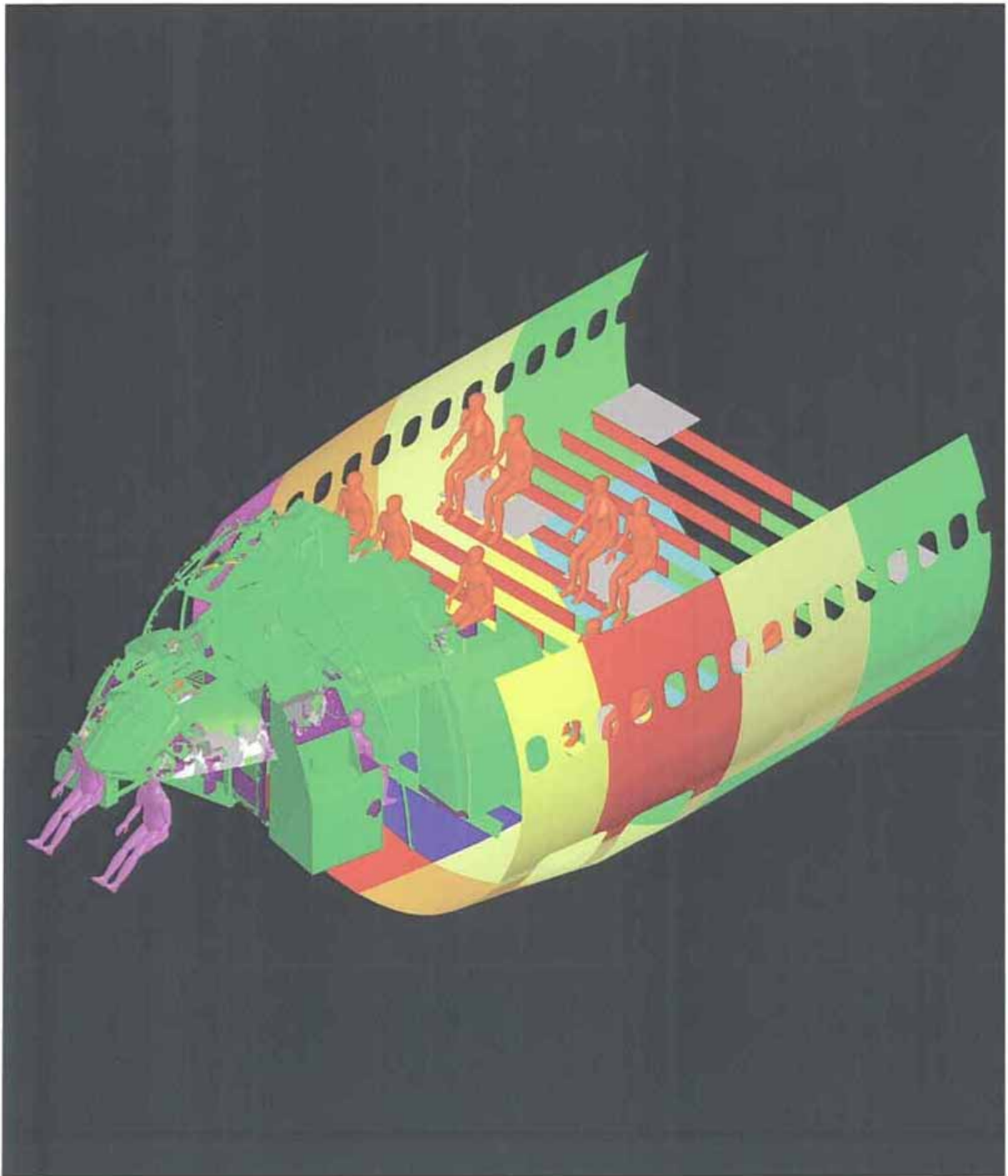








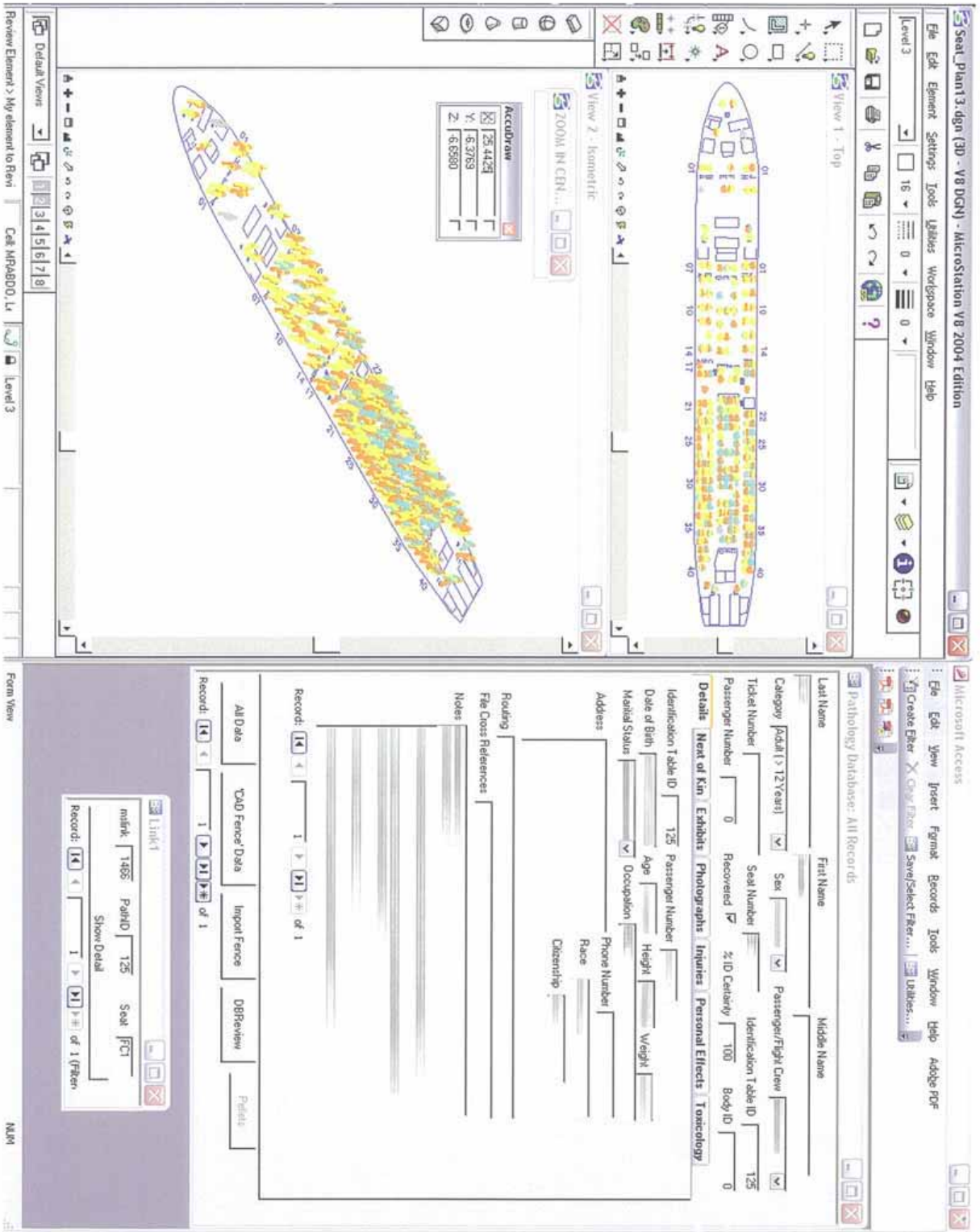








AIGIS Pathology  
Images



Microsoft Access

File Edit View Insert Format Records Tools Window Help Adobe PDF

Create Filter Clear Filter Save/Select Filter... Utilities...

Pathology Database: All Records

Last Name \_\_\_\_\_ First Name \_\_\_\_\_ Middle Name \_\_\_\_\_

Category  Sex  Passenger/Flight Crew

Ticket Number \_\_\_\_\_ Seat Number \_\_\_\_\_ Identification Table ID

Passenger Number  Recovered  % ID Certainty  Body ID

Details Next of Kin Exhibits Photographs Injuries Personal Effects Toxicology

Identification Table ID  Passenger Number

Date of Birth \_\_\_\_\_ Age \_\_\_\_\_ Height \_\_\_\_\_ Weight \_\_\_\_\_

Marital Status  Occupation \_\_\_\_\_

Address \_\_\_\_\_ Phone Number \_\_\_\_\_

Race \_\_\_\_\_

Citizenship \_\_\_\_\_

Routing \_\_\_\_\_

File Cross References \_\_\_\_\_

Notes

Record:      of 1

All Data 'CAD Fence' Data Import Fence DBReview Pelets

Record:      of 1

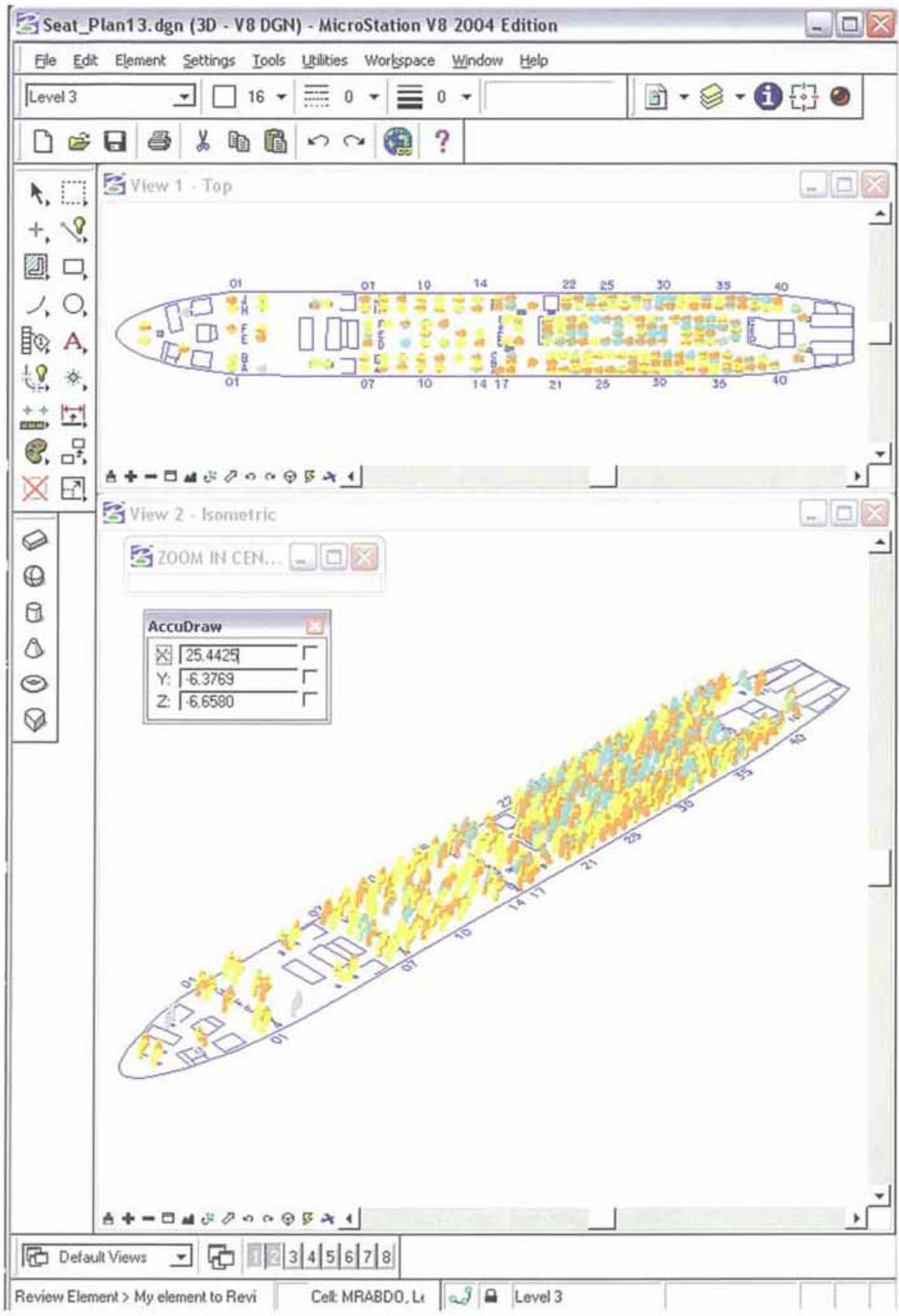
Link1

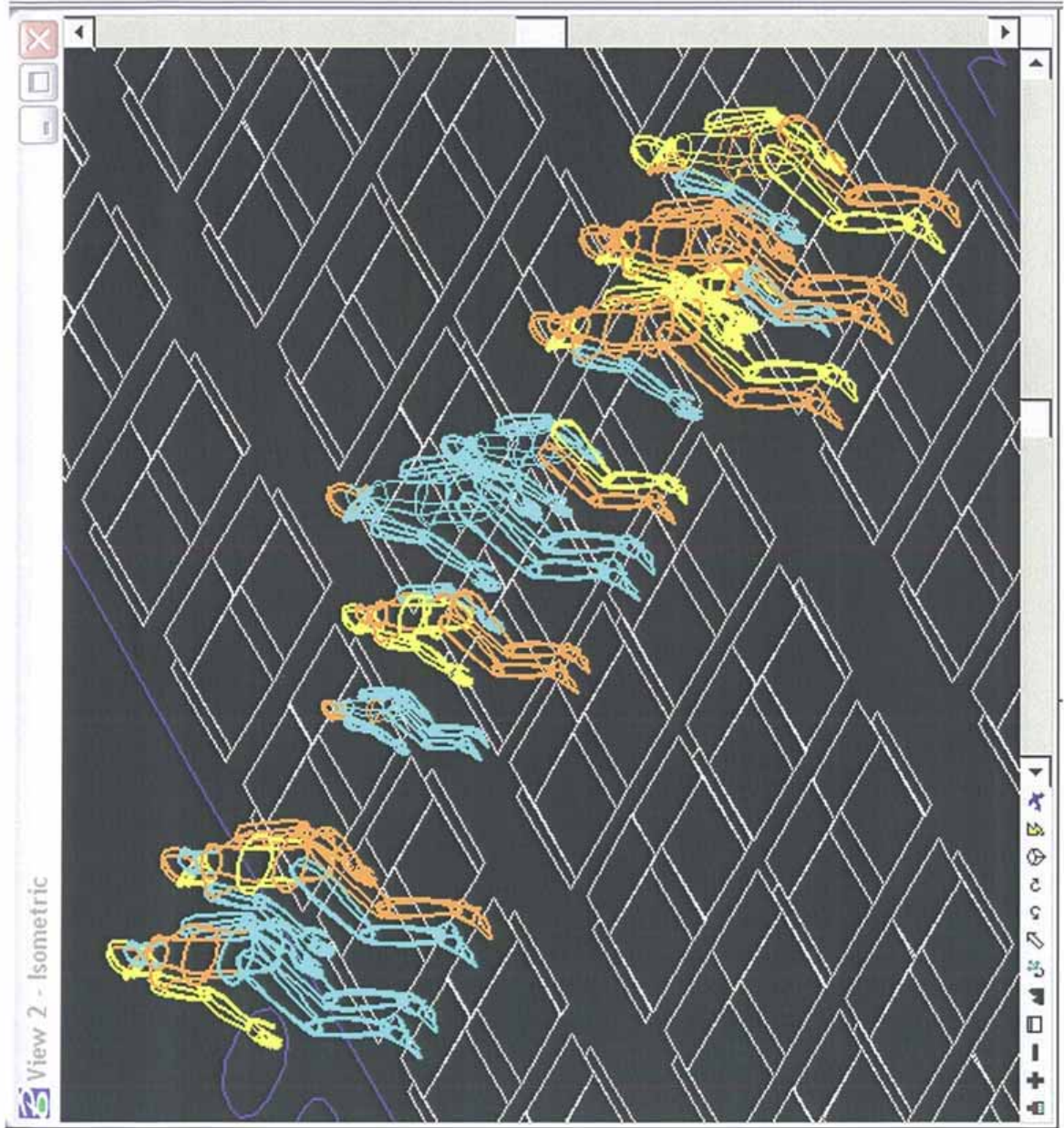
mslink  PathID  Seat

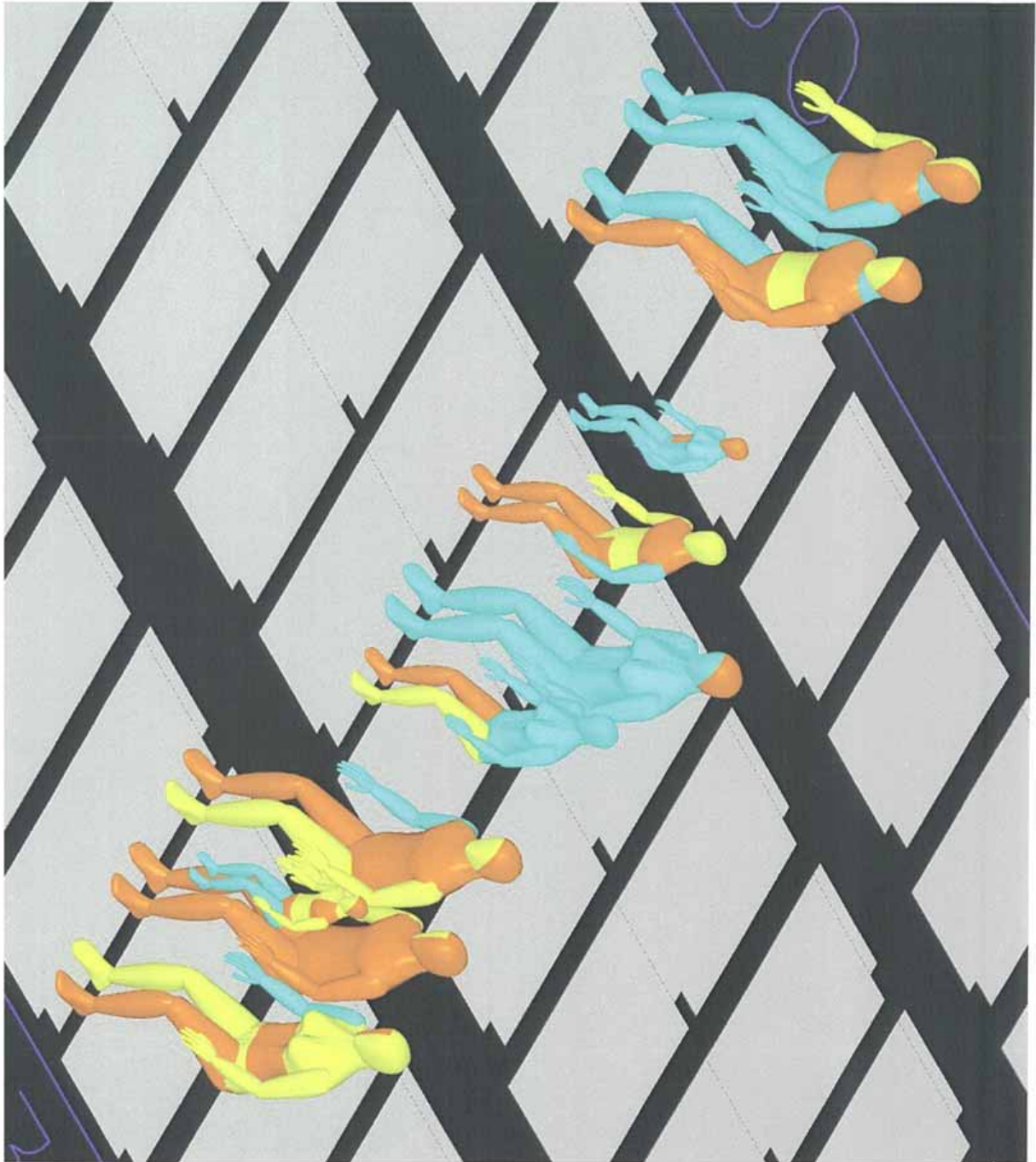
Show Detail

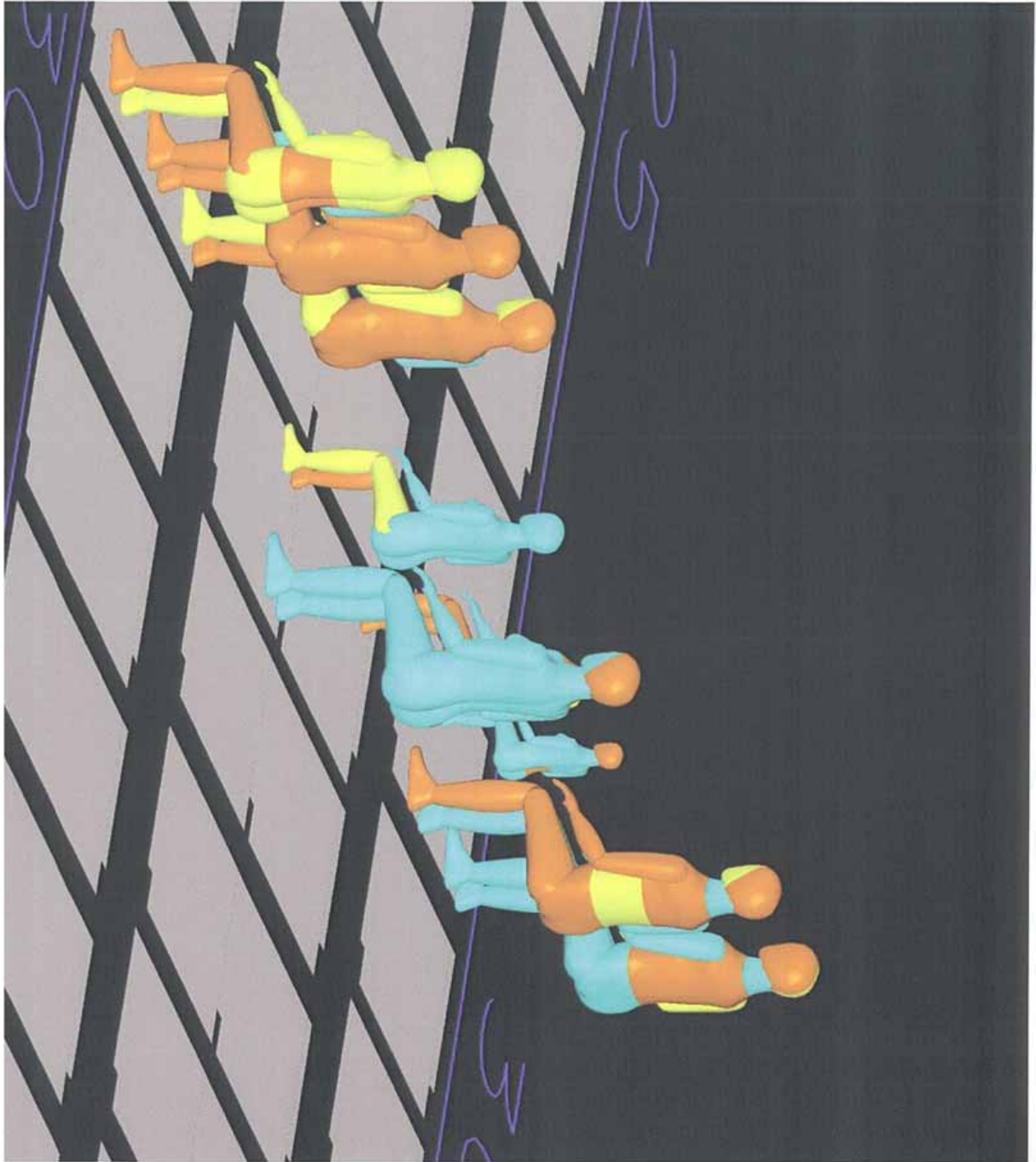
Record:      of 1 (Filter)

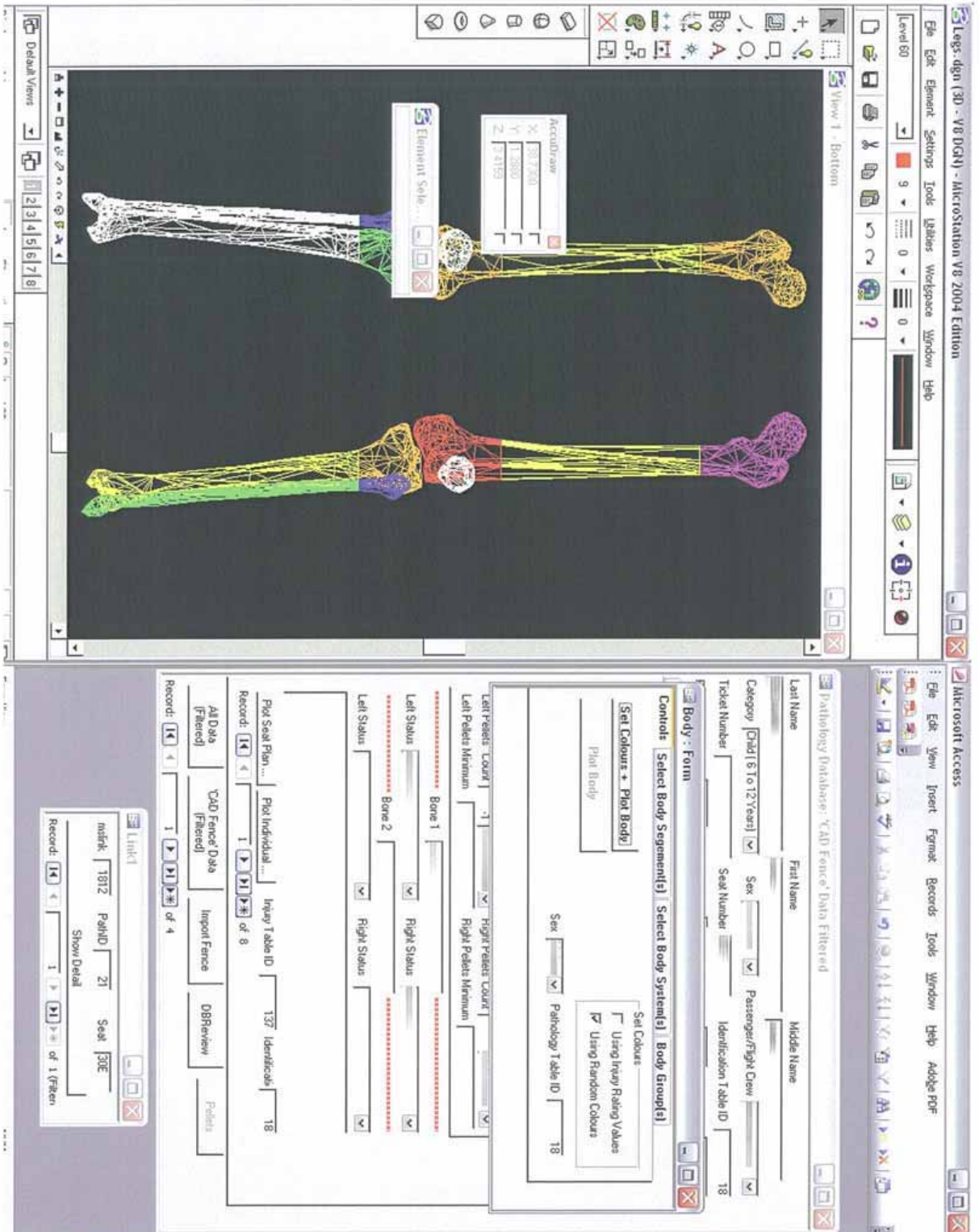
Form View NUM



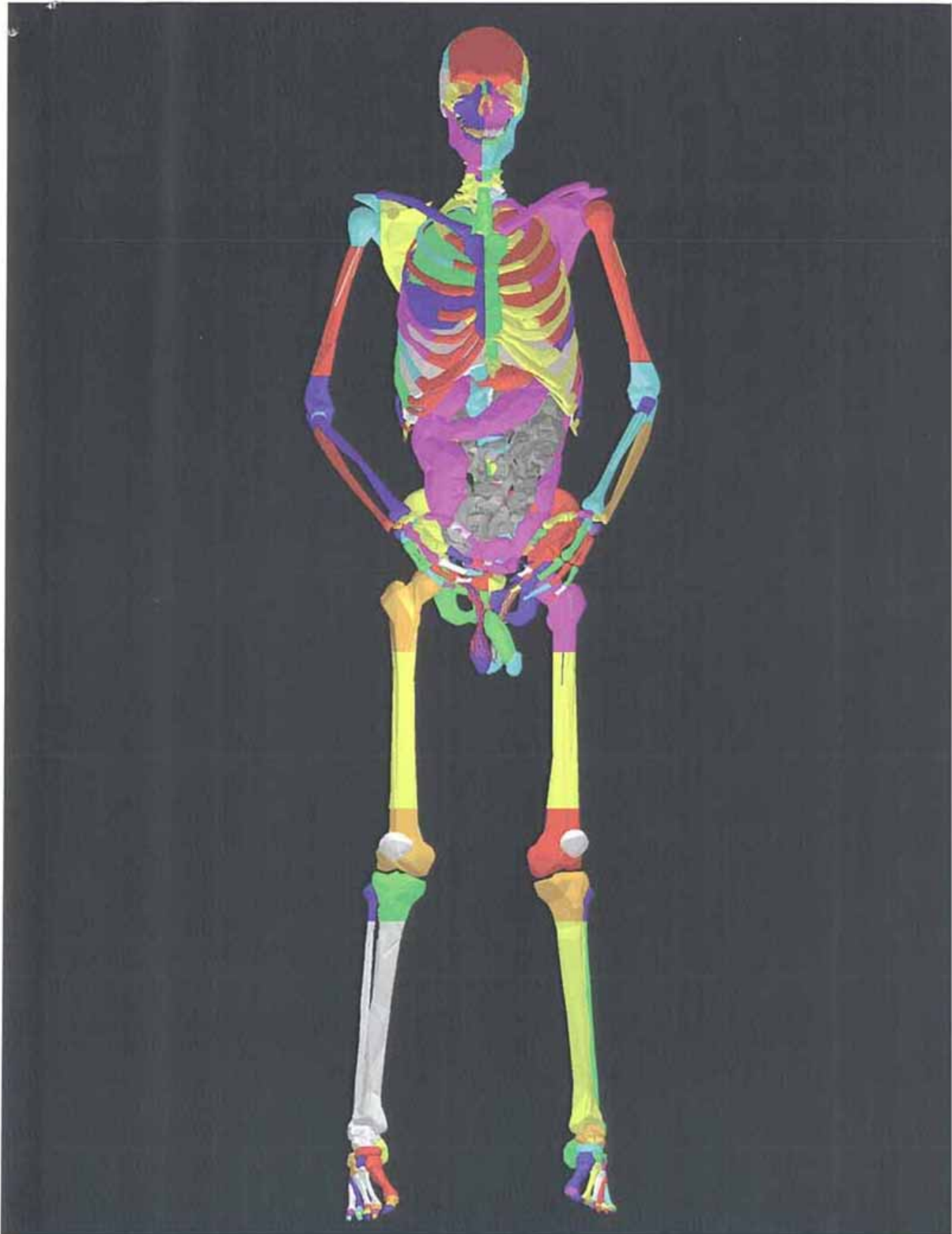


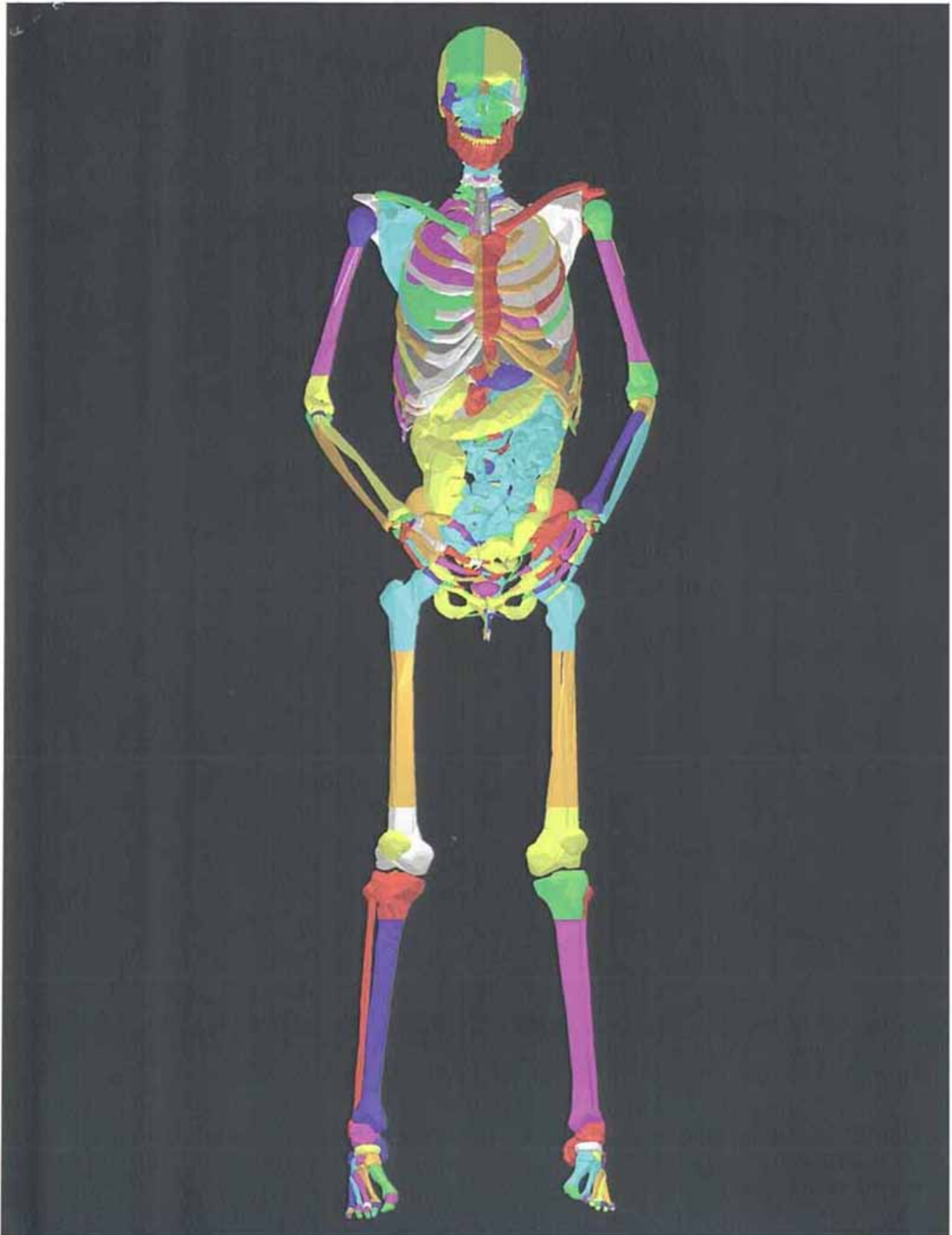












# TSB PRODOCs User Guide



Doc ID	Description	Primary Ref	Control No	ATA
1.TXT	AEPOS Technologies Corporation Statement of Sensitivity - Questionnaire. Purpose: To identify the degree of sensitivity of system assets. Provides a focus for the Threat and Risk Assessment (TRA) and is a basis for subsequent TRA tasks. Assets include major Threat and Risk Assessment. Swissair Flight 111	26-5-0	006736	
	Prepared by: AEPOS Quebec; Date: No.: CA1605.001;	26-5-0	007956	
	regarding SAS tapes from. Herb able to assist in 710753.	26-5-0	010752	
	9, 2000, regarding its questions;	26-5-0	010753	
	losing of the desire to put into electronic on. Boeing has a 'paperlay' documents ally to protect the electronic document - Accident near Nova 980. Granting received from Boeing. TSB document control attached letter of Assistance - Wendy Memorandum of document control log of request. This	26-5-0	011699	
		26-5-0	011711	
		26-1-0	005905	
	Response to TSB assistance - Wendy as TSB document	25-5-0	005911	

Primary/Secondary	Primary	Secondary	Primary File
425-AM00004(P)	36	5	0
425-AM00004(S)	15	2	1

August 21, 2002

# Contents

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>5</b>
<b>2.0</b>	<b>GENERAL USAGE .....</b>	<b>5</b>
<b>3.0</b>	<b>SUPERTEXT SEARCHING.....</b>	<b>6</b>
3.1	SEARCHING SINGLE PROJECTS .....	7
3.1.1	Using Predefined Queries.....	7
3.1.2	Defining a New Query .....	7
3.1.3	Saving Queries.....	9
3.2	SEARCHING MULTIPLE PROJECTS.....	10
3.2.1	Selecting Projects .....	10
3.2.2	Defining a New Query .....	11
3.3	SUPERGRAVITY SUPERTEXT RESEARCH AND PRODOCS.....	11
<b>4.0</b>	<b>EXHIBITS SEARCHING .....</b>	<b>11</b>
4.1	DEFINING A NEW QUERY .....	12
<b>5.0</b>	<b>WIRING SEARCHING.....</b>	<b>13</b>
<b>6.0</b>	<b>DOCUMENT CONTROL LOG SEARCHING.....</b>	<b>13</b>
6.1	DEFINING A NEW QUERY .....	14
<b>7.0</b>	<b>PHOTO DATABASE SEARCHING.....</b>	<b>15</b>
7.1	DEFINING A NEW QUERY .....	15
<b>8.0</b>	<b>VIEWING SEARCH RESULTS .....</b>	<b>17</b>
8.1	ATIP IMAGE EXPORT .....	18
<b>9.0</b>	<b>VIEWING ITEM DETAILS.....</b>	<b>20</b>
9.1	SAVING IMAGES/TEXT .....	22
9.2	COPYING TEXT.....	22
9.3	FINDING TEXT.....	23
<b>10.0</b>	<b>ALERTS.....</b>	<b>23</b>
10.1	CREATING ALERTS .....	23
<b>11.0</b>	<b>TAGS.....</b>	<b>23</b>
11.1	CREATING TAGS.....	24
11.2	SEARCHING TAGS.....	24
11.3	IMPORTING/EXPORTING TAGS.....	24
<b>12.0</b>	<b>NOTES.....</b>	<b>24</b>
<b>13.0</b>	<b>VIEWING LINKED MATERIAL.....</b>	<b>24</b>
<b>14.0</b>	<b>SYSTEM SETUP .....</b>	<b>25</b>
14.1	PRODOCS APPLICATION INSTALLATION .....	25
14.2	SECONDARY APPLICATION INSTALLATION.....	26
14.2.1	CSRTG Accident Database .....	26

14.2.2	<i>MD-11 Panoramas, References, and Object Models</i> .....	26
14.2.3	<i>Utilities and Plugins</i> .....	27
14.3	FILE STRUCTURE .....	27
14.4	INI FILES .....	27
14.5	NETWORK ACCESS RIGHTS .....	29
<b>15.0</b>	<b>APPENDIX A – SUPERTEXT SCANNING, PROCESSING, DATA ENTRY</b> .....	<b>30</b>
<b>16.0</b>	<b>APPENDIX B - MD-11 PANORAMAS, REFERENCES, AND OBJECT MODELS</b> .....	<b>32</b>
16.1	VIEWING PANS, OBJECTS, LINKED IMAGES .....	33
16.1.1	<i>One Panorama</i> .....	33
16.1.2	<i>One Object Model</i> .....	36
16.1.3	<i>One Panorama &amp; One Object Model</i> .....	37
16.1.4	<i>Two Panoramas</i> .....	38
16.1.5	<i>Two Object Models</i> .....	39
16.1.6	<i>Linked Images</i> .....	40
16.2	VIEWING REFERENCE FILES .....	41
16.2.1	<i>Image Reference Files</i> .....	42
16.2.2	<i>Video Reference Files</i> .....	42
16.2.3	<i>Audio Reference Files</i> .....	43
16.2.4	<i>Drawings</i> .....	43
16.2.4.1	Exhibit Database .....	43
16.2.5	<i>Documents</i> .....	45
16.2.6	<i>Site Maps</i> .....	45
16.3	LIVE PICTURE VIEWER .....	46
16.3.1	<i>Using the Live Picture Viewer—Plug-in Version</i> .....	46
16.3.2	<i>Glossary</i> .....	47
<b>17.0</b>	<b>APPENDIX C – ADB OVERVIEW</b> .....	<b>48</b>
17.1	PERFORMING A SEARCH .....	49
17.2	VIEWING SEARCH RESULTS .....	50
17.3	ADDITIONAL NOTES .....	51
17.4	ABBREVIATIONS AND DEFINITIONS .....	51
<b>18.0</b>	<b>APPENDIX D - WHIP! VIEWER HELP</b> .....	<b>61</b>
18.1	OVERVIEW .....	61
18.2	WHIP! COMMANDS .....	61
18.2.1	<i>PAN</i> .....	61
18.2.2	<i>ZOOM</i> .....	61
18.2.3	<i>ZOOM RECTANGLE</i> .....	61
18.2.4	<i>FIT TO WINDOW</i> .....	61
18.2.5	<i>LAYERS</i> .....	61
18.2.6	<i>NAMED VIEWS</i> .....	62
18.2.7	<i>LOCATION</i> .....	62
18.2.8	<i>FULL VIEW</i> .....	62
18.2.9	<i>HIGHLIGHT URLs</i> .....	62
18.2.10	<i>COPY</i> .....	62
18.2.11	<i>PRINT</i> .....	63
18.2.12	<i>SAVE AS</i> .....	63
18.2.13	<i>ABOUT WHIP!</i> .....	63
18.2.14	<i>FORWARD</i> .....	63
18.2.15	<i>BACK</i> .....	64
18.2.16	<i>Viewing Hyperlinks in WHIP!</i> .....	64
18.2.17	<i>Printing DWF Files</i> .....	64
18.3	SYSTEM REQUIREMENTS .....	64
18.4	INSTALLATION .....	64

18.4.1	<i>Manually Installing WHIP!</i> .....	64
18.4.2	<i>Installation Troubleshooting</i> .....	65
<b>19.0</b>	<b>APPENDIX E – RHINOCEROS CAD VIEWER (RHINO)</b> .....	<b>66</b>
19.1	OVERVIEW .....	66
19.2	RECOMMENDED SETTINGS .....	66
19.3	GENERAL USAGE .....	66
19.3.1	<i>Pan</i> .....	67
19.3.2	<i>Rotate</i> .....	67
19.3.3	<i>Zoom</i> .....	68
19.3.4	<i>Shade</i> .....	69
19.3.5	<i>Layers</i> .....	70
<b>20.0</b>	<b>APPENDIX F – ARCEXPLORER GIS VIEWER</b> .....	<b>72</b>
20.1	OVERVIEW .....	72
20.2	GENERAL USAGE .....	72
20.2.1	<i>Zoom</i> .....	72
20.2.2	<i>Pan</i> .....	73
20.2.3	<i>Identify</i> .....	73
20.2.4	<i>Measure</i> .....	73
20.2.5	<i>Layers/Themes</i> .....	73
<b>21.0</b>	<b>APPENDIX G – UTILITIES AND PLUGINS HELP</b> .....	<b>75</b>

## ***1.0 Introduction***

The *PRODOCS* system is an application that provides access to investigation data and reference materials from the following sources - Supertext, E&R Exhibits, Wiring and also contains links to other related resources and applications such as the CSRTG Accident Database, Fire Technical Notes, Panoramas, etc for the Swissair SR111 investigation. Through the use of this system, users can gain access to data without the need to use a number of different systems and interfaces. The goal of *PRODOCS* is to provide a standard common interface for accessing key investigation information.

In order to make use of *PRODOCS* it must be installed and configured on your PC; TSB Informatics handles this. A request to access the system must first be granted by the TSB Investigator In-charge (IIC) or the Deputy IIC. Security privileges to access specific data will be approved or denied by the IIC or the Deputy IIC.

*PRODOCS* was developed by the Swissair SR111 TSB Fire & Explosion Team.

**NOTE** – *PRODOCS* and the related reference material is part of an active investigation and as such is subject to change. Modifications, additions are made on a regular basis and therefore there may be differences between the current system and that referenced in this document. Specific material and features may also be removed or disabled for some users due to legal issues with confidentiality of material and proprietary rights of the content.

## ***2.0 General Usage***

Once setup, the user can begin using *PRODOCS* by launching it from the *desktop icon*. This will launch the application and display the main system screen.

The *Search* and *Links* menus contain the main functions of the system.

The *Help* menu provides access to this document.

The *Window* menu provides standard Windows control over the various open windows within *PRODOCS*.

The *Search* menu provides access to the main search components of the system, and launches the specific search window for each type.

To perform searches, select *Search* from the main *PRODOCS* menu and choose the desired information you would like to retrieve.

Currently *PRODOCS* supports the following data as of version 7:

- *Document Control Log*
- *Supertext*
- *Exhibits*
- *Photos*
- *Wiring*

The *Links* menu provides access to related information and reference materials that are not accessed directly from within PRODOCS or that does not require specialized search capabilities.

Currently PRODOCS supports the following links as of version 7.5:

- *Aeronautical Abbreviations*
- *ATA Numbers*
- *TSB File Reference Numbers*
- *Utilities and Plugins*
- *Cabin Safety Research Technical Group (CSRTG) Accident Database*
- *Operation Persistence*
- *MD-11 Panoramas, References, and Object Models*
- *Systems/Fire Technical Notes and Summaries*
- *FAA Foam Duct Burn Test Reference Files*
- *Preliminary 2D CAD Drawings*
- *Preliminary 3D CAD Drawings*

The Links displayed may differ from those listed. They can be dynamically changed to allow for changes or additions, as new material becomes available over time.

### ***3.0 Supertext Searching***

The *Supertext Search* menu provides the ability to search for documents processed as part of the Supertext scanning project. This includes a large portion of the logged paper documents collected during the investigation that have been electronically scanned and processed. These documents may contain information such as color/black & white images, diagrams, drawings, and hand written notes.

The system is broken down into major project areas that contain documents specific to a given area of the investigation.

To search on a given project area, select the desired project name from the *Project* selection list. (**Note:** The selection list will only display projects to which you have been given access permissions for the investigation.)

Once a project has been selected it's associated queries and search criteria will be loaded and the search capabilities will become functional.

As of version 6, PRODOCS has the ability to search multiple projects in addition to single projects. To search across multiple projects, select *<Search Multiple Projects>* from the *Projects* drop-down list.

**Note:** All documents have been classified as “Protected B” pending further ATIP classification.



### 3.1 Searching Single Projects

The image shows a 'Supertext Search' dialog box. It contains a 'Project' dropdown menu, a 'Query' dropdown menu, and a 'Define Query' section. The 'Define Query' section has the following fields: 'Description' (text and dropdown), 'Control No' (dropdown), 'Page Serial' (text), 'Primary Ref' (dropdown), 'ATA No' (dropdown), 'Creator Org' (dropdown), 'Created' (text with 'yyyymmdd' format), 'From' (dropdown), 'To' (dropdown), 'Acquired' (text with 'yyyymmdd' format), 'Doc Text' (text and dropdown), and 'Tag' (dropdown). At the bottom are buttons for 'Save', 'Delete', 'Reset', and 'Submit'.

#### 3.1.1 Using Predefined Queries

Projects may have predefined queries associated with them. Predefined queries are created by the system administrator to provide easy access to commonly used documents and groups of documents.

To use a predefined query, select it from the *Query* selection list and hit *Submit*. A summary of the founded documents will then be displayed in the *Search Results* window.

#### 3.1.2 Defining a New Query

To define a new query first select *All Documents* from the query selection list. To return all documents for the selected project with no filtering criteria, hit *Submit*. To narrow the search further, specify additional information in the *Define Query* section of the window and then hit *Submit*.

You can also define additional criteria against a predefined query by selecting the desired predefined query from the selection list and then specifying additional parameters as described above.

**Note:** Caution should be taken when doing this as the result set will be a combination of both the predefined and user defined parameters.

A summary of the resulting documents will be displayed in the results window after the query has been submitted.

You only need to specify the fields on which you would like to filter the search results. If no parameters are specified, all documents for the selected project will be returned. Each specified parameter will be used in conjunction with each other (AND logic) in order to limit the documents returned.

To reset the query criteria, press the *Reset* button. This will set the form to return all items, however the query will not be processed until *Submit* is pressed.

The following fields can be set in order to define a query:

- **Description** - Contains a summary of the content of the document. Description information can be searched in one of 3 ways using the *Specify search type* selection list found to the right of the field. The following search types can be specified:
  - **All** - Search will return documents that have *all* of the specified terms found in their description. Multiple terms should be separated with a single space.
  - **Any** - Search will return documents that have *any* of the specified terms found in their description. Multiple terms should be separated with a single space.
  - **Phrase** - Search will return documents that have the *exact specified phrase* found within in their description.
- **Control No** - Contains a list of all control numbers that exist for the selected project. These numbers are assigned to each document in the system as they are logged into the *Document Control Log* database.
- **Primary Ref** - Contains a list of all primary reference numbers for the selected project. These numbers are used to classify documents into specific areas of the investigation. See *the Reference Numbers* link for specifics on these numbers.
- **ATA No** - Contains a list of all ATA numbers that exist for the selected project. These primarily apply to manuals and are not use on all documents.
- **Creator Org** - Contains a list of organization names that have been flagged as the creator of documents for the selected project. This represents the organization that physically produced the document, not necessarily the provider of the document.
- **Created** - Date the document was created. The date format is *YYYYMMDD*.
- **From** - Contains a list of organization and contact names that have been logged as the sender of documents. These represent the organization and person who

- provided the document. In most cases this will be a third party organization, however for documents sent by the TSB this will be an internal TSB group.
- **To** - Contains a list of organization and contact names that have been logged as a recipient of documents. These represent the organization and person who the document was sent to. In most cases this will be an internal TSB group, however for documents sent by TSB this will be a third party.
  - **Acquired** - Date the document was logged by TSB document control.
  - **Doc Text** - Contains the OCR captured text from the body of the documents. Document Text information can be searched in one of 3 ways using the *Specify search type* selection list found to the right of the field. The following search types can be specified:
    - **All** - Search will return documents that have *all* of the specified terms found on a single page in their body text. If the specified terms are each located on different pages within a document, the document WILL NOT be returned from the search. This is a limitation within PRODOCS that is currently being reviewed. Multiple terms should be separated with a single space.
    - **Any** - Search will return documents that have *any* of the specified terms found in their body text. Documents with terms located over multiple pages WILL be returned using this search type. Multiple terms should be separated with a single space.
    - **Phrase** - Search will return documents that have the *exact specified phrase* found in their body text. The specified phrase must be completely found on a single page in order for the document to be returned.
  - **Tag** - Contains a list of all user specific tags. Selecting a specific tag will force only those documents that have been flagged with the selected tag to be returned.

### 3.1.3 Saving Queries

The *Supertext Search* allows the user to save specific queries for later reuse.

To save a query, specify the desired project and criteria and press the *Save* button. The user will then be prompted to enter a name by which to reference the query. The name has a maximum length of 50 characters.

Saved queries will appear listed at the bottom of the *Query* selection list after all predefined queries. To use a user query, select it from the list and press *Submit*.

To delete a user query, select it from the list and press the *Delete* button.

**Note:** A saved query cannot have additional criteria defined against it, as is the case with Predefined Queries.

User saved queries can only be accessed by the creator of the query and are not accessible by other PRODOCS users.

## 3.2 Searching Multiple Projects

The screenshot shows a window titled "Supertext Search" with a close button (X) in the top right corner. The window is divided into three main sections:

- Project:** A dropdown menu currently showing "<Search Multiple Projects>".
- Multiple Projects:** A list box containing "Administration" and "Aircraft Performance". To the right of the list are two buttons: "Select All" and "Deselect".
- Define Query:** A section with several input fields and dropdown menus:
  - Description: [text input] All [dropdown]
  - Control No: [text input]
  - Page Serial: [text input]
  - Primary Ref: [text input]
  - ATA No: [text input]
  - Creator Org: [text input]
  - Created: [text input] yyyyymmdd
  - From: [text input] [text input]
  - To: [text input] [text input]
  - Acquired: [text input] yyyyymmdd
  - Doc Text: [text input] All [dropdown]
  - Tag: All Documents [dropdown]

At the bottom of the window are four buttons: "Save", "Delete", "Reset", and "Submit".

### 3.2.1 Selecting Projects

To search multiple projects at once first select *<Search Multiple Projects>* from the *Project* list. Once selected a *Multiple Projects* list will appear.

To select the project(s) that you would like to search on, click the project name in the selection list with the left mouse button. To select additional projects, hold the CTRL key while clicking projects with the left mouse button.

To select all projects for searching press the *Select All* button. This will highlight all projects in the project selection list

To deselect all projects, and clear the selection list, press the *Deselect* button.

Once the desired projects have been selected, define the search criteria in the *Define Query* section of the screen.

### **3.2.2 Defining a New Query**

When in *Search Multiple Projects* mode, a different *Define Query* section is displayed from that of the single project search. No selection lists are provided in this mode, therefore each search term must be specified by entering the desired text.

To define a query, enter the desired terms in the associated fields on the *Define Query* screen and then press Submit.

A summary of the resulting documents will be displayed in the *Search Results* window after the query has been submitted.

The number of results is limited to 5000 documents in *Search Multiple Projects* mode. If more than 5000 are found only the first 5000 will be displayed.

**Note:** Searching multiple projects will take longer than single projects searches, especially when a *Doc Text* term is specified in the query.

*Search Multiple Projects* mode does not allow for the saving of queries, searching for tags/notes, nor does it provide predefined queries. These features are only available in single project search.

### **3.3 Supergravity SUPERText Research and PRODOCS**

The *Supertext Search* feature of PRODOCS mimics many of the basic features provided in the *Supergravity SUPERText Research* software. It is, in part, a “Light” version. It is designed to compliment but not replace the more complex and powerful *SUPERText Research* software product.

PRODOCS *Supertext Search* provides a simplified, more user friendly interface from that of *SUPERText Research*, which can be a bit overwhelming to the average user who accesses it only on an intermittent basis. For power users and administrators, *SUPERText Research* offers many advanced features that PRODOCS *Supertext Search* does not. The average investigator typically does not need many of these extra features initially. PRODOCS *Supertext Search* offers a cleaner, more straightforward interface to quickly and efficiently obtain data.

## **4.0 Exhibits Searching**

The *Exhibits Search* menu provides the ability to search for exhibits and their associated photographs that were processed via E&R.

(It may take up to a few minutes to load this form as it needs to build the search criteria lists based on the exhibit data available in the system.)

#### 4.1 Defining a New Query

To search for all exhibits, press the *Submit* button without specifying any search criteria. To narrow the search further, specify the additional information in the *Define Query* section of the window and then press *Submit*.

A summary of the resulting exhibits will be displayed in the *Search Results* window after the query has been submitted. This may take up to a few minutes.

You only need to specify the fields on which you would like to filter the search results. If no parameters are specified, all exhibits will be returned. Each specified parameter will be used in conjunction with each other (AND logic) in order to limit the exhibits returned.

The *Exhibit* and *Father Exhibit* lists contain all exhibit numbers for items that exist in the database. These lists are sorted alphabetically, therefore all 1XXX items will appear before 2XXX. To jump to a specific item select the list and type the number and it will position to the corresponding item if it exists.

The *Found By* list contains a set of predefined items, and not a list of all possible items that have been logged for all exhibits. To use a predefined item, select it from the list. To use an item not listed select the list and type the desired text into the list.

To reset the query criteria, press the *Reset* button. This will set the form to return all items, however the query will not be processed until *Submit* is pressed.

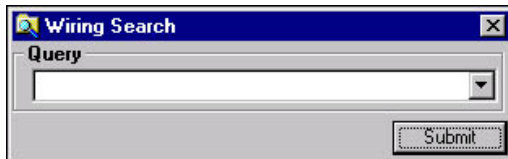
The following fields can be set in order to define an exhibit query:

- **Description** - Contains a description of the exhibit. Description Text information can be searched in one of 3 ways using the *Specify search type* selection list found to the right of the field. The following search types can be specified:

- **All** - Search will return exhibits that have *all* of the specified terms found in the description. Multiple terms should be separated with a single space.
- **Any** - Search will return exhibits that have *any* of the specified terms found in their description. Multiple terms should be separated with a single space.
- **Phrase** - Search will return exhibits that have the *exact specified phrase* found in their description.
- **Exhibit No** - Contains a list of all exhibit numbers that exist in the current data.
- **Exhibit Item** - Contains a list of all exhibit item numbers that exist in the current data.
- **Father Exhibit No** - Contains a list of all father exhibit numbers that exist in the current data.
- **Father Exhibit Item** - Contains a list of all father exhibit item number that exists in the current data.
- **Found By** - Contains a list of the key exhibit finders. You can also type in keyword/names into this list to specify someone that is not listed.
- **Date Found** - Date the exhibit was found.
- **Date Documented** - Date the exhibit was documented.
- **Tag** - Contains a list of all user specific tags. Selecting a specific tag will force only those exhibits that have been flagged with a selected tag to be returned.

## 5.0 Wiring Searching

The *Wiring Search* menu provides the ability to search the wiring database that was created to log recovered wires.

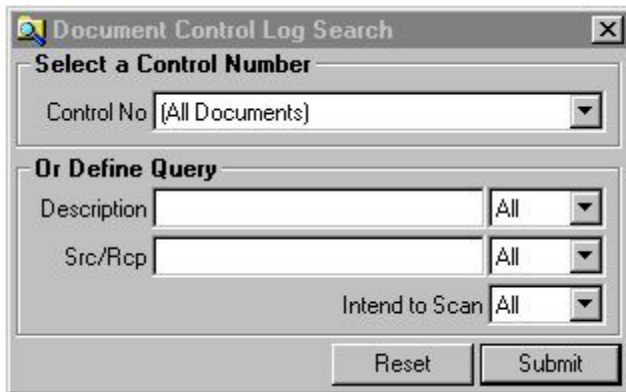


To search for Wiring information, select the predefined query from the selection list and press Submit. Information on the resulting wires will then be displayed in the *Search Results* window. The fields displayed on the results listing will be dependent on the query selected.

**Note:** The Wiring Search does not support the ability to create user-defined queries.

## 6.0 Document Control Log Searching

The *Document Control Log Search* menu provides the ability to search the control log for documents logged as part of the investigation.



### 6.1 Defining a New Query

To search for a specific document for which the control number is known, select the desired number from the *Control No* list and press *Submit*.

To search for a document using a keyword or name, select *All Documents* in the *Control No* list and then specify keywords in the *Description* and/or *Src/Rcp* fields and press *Submit*.

To reset the query criteria, press the *Reset* button. This will set the form to return all items, however the query will not be processed until *Submit* is pressed.

A summary of the resulting documents will be displayed in the *Search Results* window after the query has been submitted.

The number of results is limited to 5000 documents. If more than 5000 are found only the first 5000 will be displayed.

You only need to specify the fields on which you would like to filter the search results. If no parameters are specified, all documents will be returned. Each specified parameter will be used in conjunction with each other (AND logic) in order to limit the exhibits returned.

The *Control No* list contains all document numbers for items that have been logged for the investigation. To jump to a specific item select the list and type the number and it will position to the corresponding item if it exists.

The *Description* field allows you to search on terms that have been entered to describe or summarize the document.

The *Src/Rcp* field allows you to search on names that have been entered to indicate where the document came from and who received it.

The *Intend to Scan* field allows you to search for documents that have been designated to be Supertext scanned or not, by specifying *True* or *False*. Selecting *All*, will return all logged documents.

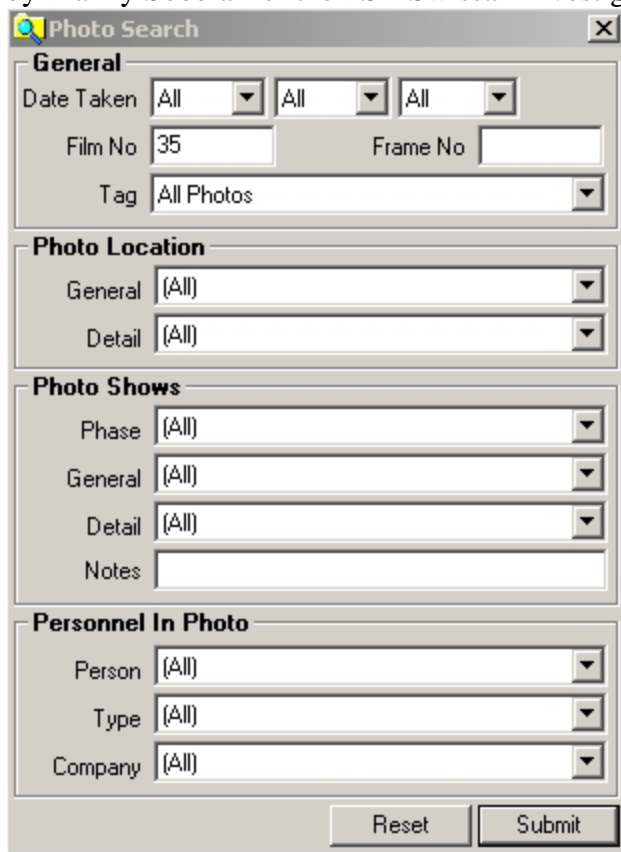


Description and Src/Rcp information can be searched in one of 3 ways using the *Specify search type* selection list found to the right of the field. The following search types can be specified:

- **All** - Search will return documents that have *all* of the specified terms. Multiple terms should be separated with a single space.
- **Any** - Search will return documents that have *any* of the specified terms found. Multiple terms should be separated with a single space.
- **Phrase** - Search will return documents that have the *exact specified phrase* found. The specified phrase must be completely found as entered in order for the document to be returned.

## 7.0 Photo Database Searching

The *Photo Search* menu provides the ability to search the database of photographs taken by Manny Soberal for the TSB Swissair investigation.



The screenshot shows a window titled "Photo Search" with a close button (X) in the top right corner. The window is divided into several sections:

- General:** Contains three dropdown menus for "Date Taken" (all set to "All"), a text input for "Film No" (containing "35"), a text input for "Frame No" (empty), and a dropdown menu for "Tag" (set to "All Photos").
- Photo Location:** Contains two dropdown menus for "General" and "Detail" (both set to "[All]").
- Photo Shows:** Contains three dropdown menus for "Phase", "General", and "Detail" (all set to "[All]"), and a text input for "Notes" (empty).
- Personnel In Photo:** Contains three dropdown menus for "Person", "Type", and "Company" (all set to "[All]").

At the bottom of the window, there are two buttons: "Reset" and "Submit".

### 7.1 Defining a New Query

To search for all photographs, press the *Submit* button without specifying any search criteria. To narrow the search further, specify the additional information in the various filtering fields provided on the *Photo Search* screen and then press *Submit*.

To reset the query criteria, press the *Reset* button. This will set the form to return all items, however the query will not be processed until *Submit* is pressed.

A summary of the resulting photographs will be displayed in the *Search Results* window after the query has been submitted.

The number of results is limited to 5000 documents. If more than 5000 are found only the first 5000 will be displayed.

You only need to specify the fields on which you would like to filter the search results. If no parameters are specified, all photographs will be returned. Each specified parameter will be used in conjunction with each other (AND logic) in order to limit the exhibits returned.

The *Date Taken* lists allow you to specify the month, day, and/or year in which the desired photos were taken. All 3 fields may be set, or a single field or combination there of.

The *File No* and *Frame No* fields allow you to search for photos from a specific roll or frame within a roll.

*Tag* Contains a list of all user specific tags. Selecting a specific tag will force only those photos that have been flagged with a selected tag to be returned.

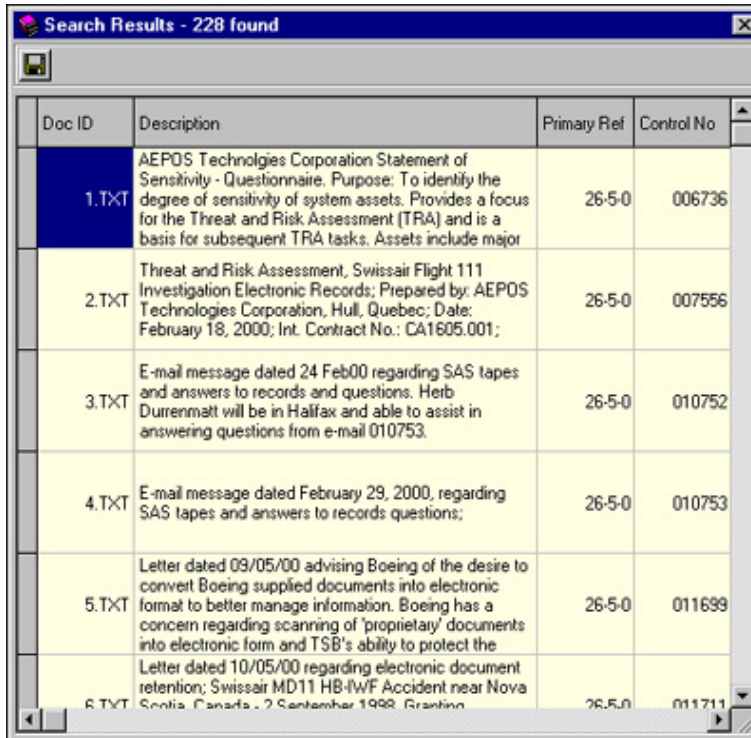
The *Photo Location* fields allow you to specify the location where the photo was taken.

The *Photo Shows* fields allow you to specify what is shown within the photo.

The *Personnel In Photo* fields allow you to specify who is shown within the photo.

## 8.0 Viewing Search Results

The PRODOCS *Search Results* window displays the resulting items retrieved based on the user specified search.



The screenshot shows a window titled "Search Results - 228 found". It contains a table with the following data:

Doc ID	Description	Primary Ref	Control No
1.TXT	AEPOS Technologies Corporation Statement of Sensitivity - Questionnaire. Purpose: To identify the degree of sensitivity of system assets. Provides a focus for the Threat and Risk Assessment (TRA) and is a basis for subsequent TRA tasks. Assets include major	26-5-0	006736
2.TXT	Threat and Risk Assessment, Swissair Flight 111 Investigation Electronic Records; Prepared by: AEPOS Technologies Corporation, Hull, Quebec; Date: February 18, 2000; Int. Contract No.: CA1605.001;	26-5-0	007556
3.TXT	E-mail message dated 24 Feb00 regarding SAS tapes and answers to records and questions. Herb Durrenmatt will be in Halifax and able to assist in answering questions from e-mail 010753.	26-5-0	010752
4.TXT	E-mail message dated February 29, 2000, regarding SAS tapes and answers to records questions;	26-5-0	010753
5.TXT	Letter dated 09/05/00 advising Boeing of the desire to convert Boeing supplied documents into electronic format to better manage information. Boeing has a concern regarding scanning of 'proprietary' documents into electronic form and TSB's ability to protect the	26-5-0	011699
6.TXT	Letter dated 10/05/00 regarding electronic document retention; Swissair MD11 HB-IWF Accident near Nova Scotia, Canada - 2 September 1998. Granting	26-5-0	011711

Each distinct item that was found is represented as a row in the grid. A summary of the data fields of each item is displayed in a given row item's columns. The columns displayed depend on the type of search being performed.

The caption of the *Search Results* window displays the count of the items found.

A specific item can be viewed in detail by double-clicking the desired row in the grid, which will launch a new *Page Viewer* window. (This does not apply for wiring searches.) For *Document Control Log* results, double-clicking will cause a *Supertext* search to be performed for the selected document. The results screen will then reload to display any associated *Supertext* documents. These documents can then be viewed in further detail by double-clicking as is done in a standard *Supertext* search. A warning message will be displayed if the document does not exist in *Supertext* or if you do not have permission to view the selected document.

The columns and rows within the grid can be resized by dragging the cell borders of the header row and left most column. Resizing will allow you to view additional information for a specific item that may not be fully displayed at the default size settings.

To zoom to the contents of a cell, select the desired cell by left-clicking it once and then right-click the cell to display it in a separate, sizable screen. Highlighting the desired

area with the left mouse button and pressing Ctrl-C to copy it to the Windows Clipboard can copy text from this screen. The text can then be pasted into the desired application using normal paste operations.

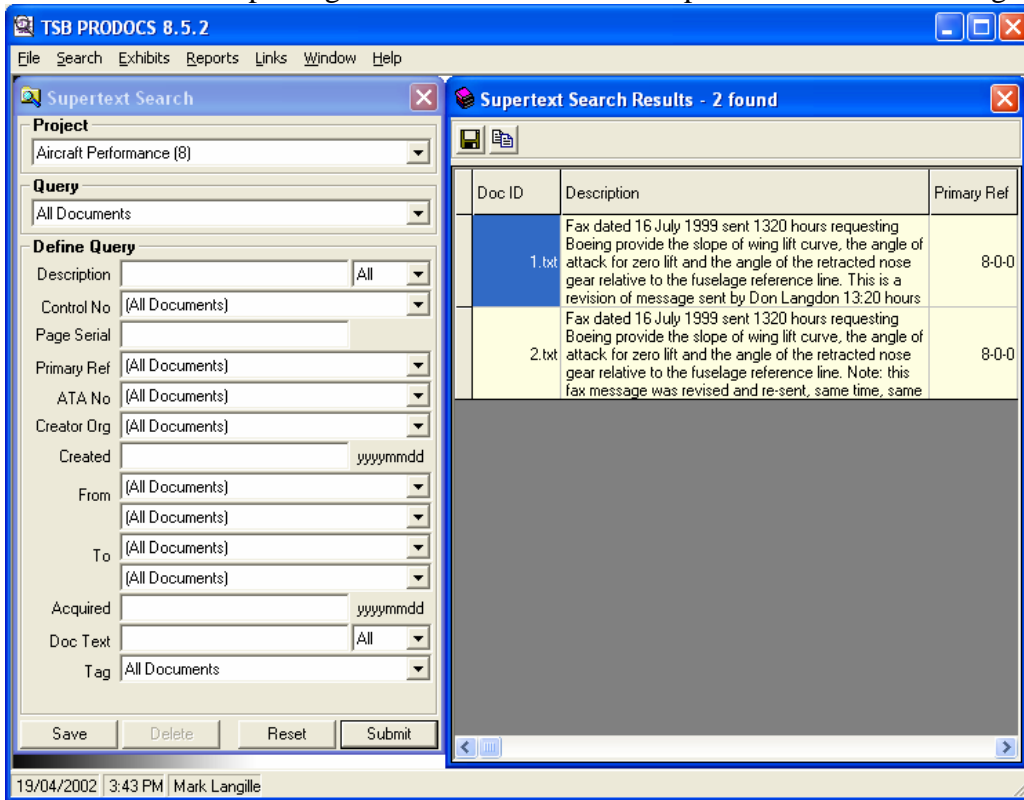
To save a summary of the information displayed in the grid, use the *Save* button on the *Search Results* screen's toolbar. This will allow you to save all data displayed in the grid to a tab delimited text file. This file can then be easily opened in an application such as Excel, which will format the data into rows and columns for external use.

### 8.1 ATIP Image Export

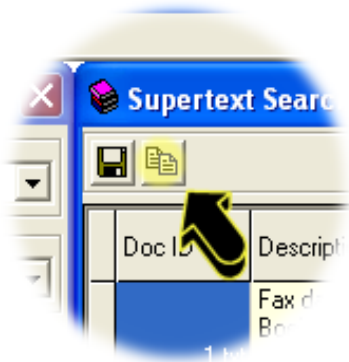
The *ATIP Image Export* allows the exporting of *Supertext* document images from PRODOCS to a designated folder. The process copies all images for documents currently listed on the *Search Results* screen.

To use this feature you need to do the following:

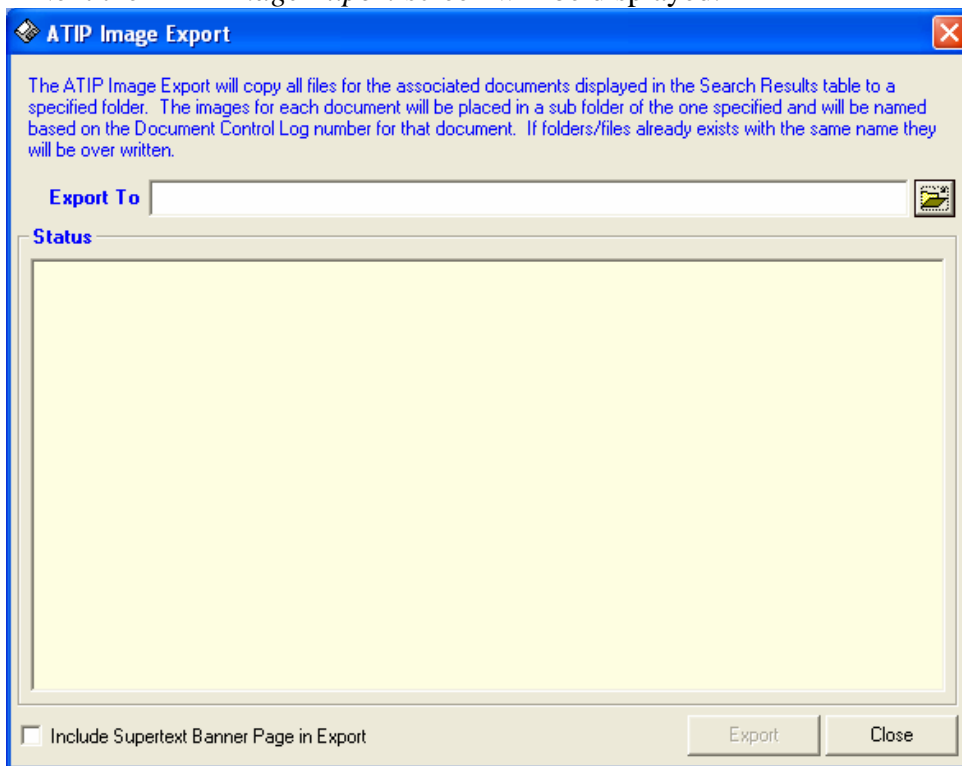
1. Perform a *Supertext Search* from within PRODOCS to get the documents you are interested in exporting. See the PRODOCS Help for details on searching.



2. Press the *ATIP Image Export* button located on the Search Results toolbar

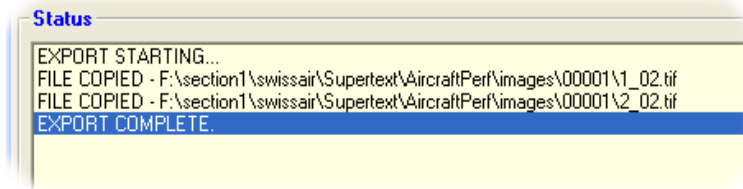


3. Next the *ATIP Image Export* screen will be displayed.

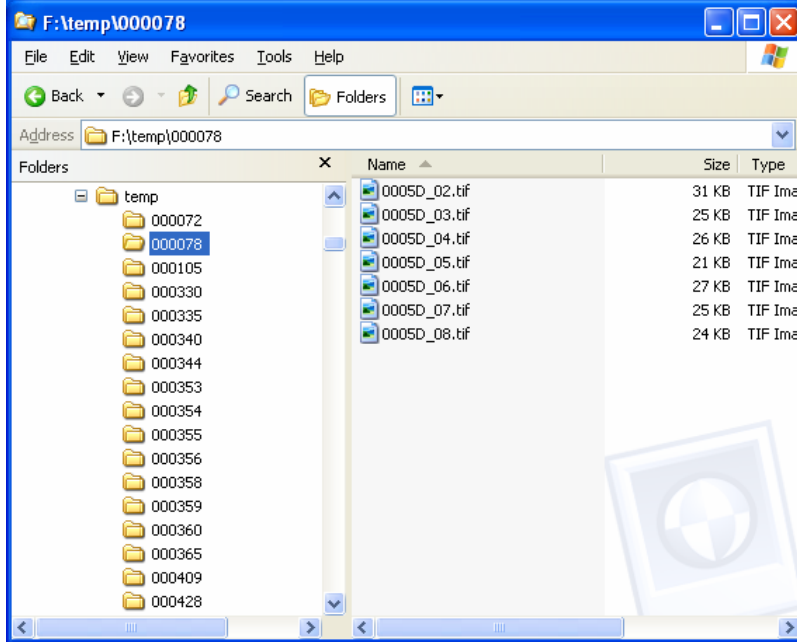


4. Set the *Export To* folder to point to where you would like the images to be exported. Each document's images will be placed in a subfolder from this location. The sub folders will be named based on the documents Control Log number. If the folder already contains folders/images with the same name they will be overwritten.
5. To include the *Supertext* banner pages in the exported images, select the *Include Supertext Banner Page in Export* box. By default this will be off.
6. To start the export process, press the *Export* button. This will start the copying of images.

- The *Status* window will report on the success or failure of each step.



- When the export process is complete you can review the status log and then exit from the screen.
- The Export folder will look similar to the one below when complete:

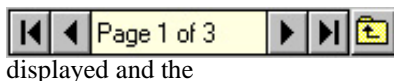


## 9.0 Viewing Item Details

The PRODOCS *Page Viewer* displays the images/text of the associated item selected from the *Search Results* window. From this window the user is able to view and manipulate the image, and step through the images associated with a given document, exhibit, etc.

Multiple *Page Viewer* windows can be displayed at a time by double-clicking multiple items on the *Search Results* window.










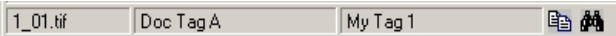
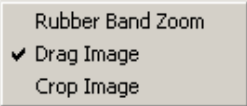
The window can be resized by dragging the window border. This will also result in the image to be resized accordingly when in *Fit to Window* view mode.



displayed and the

The *Page Navigation Bar* allows the user to step through the various images associated with a given item. It also displays the current item that is being

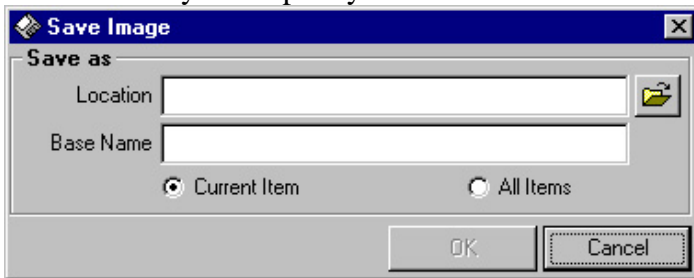
total items available. To move through the images of a given item use the arrow buttons located on either end of

	<p>the control. These allow you to step page by page or jump to the start and end.</p> <p>To go to a specific page/photo press the rightmost icon and enter the desired page/photo number.</p>
	The <i>Goto Prev Tag</i> and <i>Goto Next Tag</i> buttons allow the user to step to tagged pages/photos in the current document/exhibit.
	The <i>Save Image</i> button allows the user to save a local copy of the current image. See section below for details on using this feature.
	The Print button allows the user to print the current image or text. The option to print all pages/photos is available when in View Image mode.
	The <i>Reload Image</i> button allows the user to reload the image into the viewer. This is useful if the image has been modified/adjusted in some way and you need to get the original version back.
	<p>The <i>Adjust Image</i> button allows the user to manipulate the current image. From this button the user has the ability to perform the following functions:</p> <ul style="list-style-type: none"> <li>• Brightness adjust</li> <li>• Gamma adjust</li> <li>• Contrast adjust</li> <li>• Filter image</li> <li>• Mirror image</li> <li>• Rotate image</li> <li>• Invert image</li> <li>• Scale image</li> </ul>
	The <i>Image View Options</i> button allows the user to change the way in which the current image is displayed by specifying various zoom levels. The default view is <i>Fit to Window</i> .
	The <i>Create Tag</i> button allows the user to specify a user specific tag for the current image or document.
	The <i>Create Alert</i> button allows the user to flag a document or image with an alert to inform the system administrator that there may be a problem with the image or document.
	The <i>View Text/View Image</i> button allows the user to toggle between viewing an image and it's associated text. For Supertext documents the OCR text for the current page will be displayed in text mode, for exhibit photos the exhibit description will be displayed.
	The <i>Page Status Bar</i> displays information about the current image. The first section displays the file name of the image, the second section indicates if the name of any user tags, the third section indicates the name of any page/photo tags. The first icon is used to copy select text to the clipboard when viewing text, the second icon is used to find text while in View Text mode (this icons will only appear when in text mode).
	Right-clicking the main displayed image will enable a <i>mouse display options</i> menu. This menu provides access to features that let you perform the following operations on the displayed image:

	<ul style="list-style-type: none"> <li>• <i>Rubber Band Zoom</i> In this mode a selected area of the image can be zoomed in on by selecting a region with the left mouse button.</li> <li>• <i>Drag Image</i> In this mode the image can be moved using the left mouse button.</li> <li>• <i>Crop Image</i> In this mode a selected area can be cropped to create a new image. Once cropped the new image can be saved using the <i>Save Image</i> button.</li> </ul> <p>To reset an image after a crop, zoom, or other modification, use the <b>Reload Image</b> button.</p> <p><b>Note:</b> You cannot access these features when in <i>Fit to Window</i> view. Change to another view option to enable this feature.</p>
--	---

### 9.1 Saving Images/Text

To save a displayed image/text or all images/text for the current document/exhibit, use the *Save* button on the main *Page Viewer* toolbar. This will display the following screen, which allows you to specify what and where to save:



To set the folder where you would like to save the image(s) click the button next to the *Location* field and select the desired folder.

The *Base Name* is the filename that will be given to the file when it is saved.

To save only the currently displayed image, select the *Current Image* option. To save all images, select the *All Doc Images* option. When *All Doc Images* is selected, each filename will be created by appending a sequential number to the *Base Name*.

To save images you must be in *View Image* mode, to save text you must be in *View Text* mode on the *Page Viewer* screen.

### 9.2 Copying Text

When in the *View Text* mode of an item, the *Page Viewer* provides the ability to copy text for use within another application, such as *Word Perfect*.

To copy a selected portion of text, highlight the desired area using the mouse, by holding down the left mouse button and dragging. Once the desired area is highlighted, press the *Copy Selected Text* icon on the status bar. The selected text will then be placed on the



*Windows Clipboard* and can then be pasted into the desired application using normal Windows paste functions.

**Note:** Care should be taken when using the OCR text for Supertext documents, as it may not be an exact translation of the original document text due to errors in the processing of the page.

### **9.3 Finding Text**

When in the View Text mode of an item, the *Page Viewer* provides the ability to find specified text.

To find a specified text item, click the *Find Text* icon located on the status bar. A *Find Text* window will appear where the desired search term can be specified. Press the *Find Next* button and the text will be searched for the first occurrence, which will be highlighted if it is found. To find the next occurrence of the term, press the *Find Next* button again.

**Note:** Care should be taken when using the OCR text for Supertext documents, as it may not be an exact translation of the original document text due to errors in the processing of the page.

## **10.0 Alerts**

The *Alerts* feature allows users to flag documents for review by the system administrator for the purposes of reporting issues such as incorrect, poor quality image, etc.

### **10.1 Creating Alerts**

To create an alert for a given item, view the item in question via the *Page Viewer* and press the *Alert* button on the top button bar. An alert creation screen will appear, allowing you to fill in a comment on the details of what the issue is and also to specify if the alert is for the entire document or an individual image.

Alert information can only be viewed by the system administrator. Existing alerts for a given item will not be viewable by general system users.

## **11.0 Tags**

The *Tags* feature allows the user to tag or flag a document or page with a user-defined name. This allows the user to easily mark items that they may want to recover later without having to know the specifics of the individual item in question.

A note can also be associated with a tag, allowing the user to provide information on why the item may have been tagged or to summarize the item in question for future reference. A user can only access tags they have created.

### 11.1 Creating Tags

To create a tag, view the item in question via the *Page Viewer* and press the *Tag* button on the top button bar. A tag creation screen will appear, allowing you to select an existing tag or create a new tag against either the document/exhibit or page/photo.

To create a new tag to link to an item, press the *Create new tag* button; this will present a menu allowing you to create, edit, or delete a tag.

Deleting a tag using the delete menu mentioned above will result the complete removal of the tag and all its references from the system. To remove a tag reference from an individual item, press the *Tag* button while on the selected item and set the tag to *None*.

### 11.2 Searching Tags

To search for items that have been tagged, select the desired tag on the *Search* window and press *Submit*. All documents that have the selected tag in the selected project will be returned.

The existence of a tag for an item will be indicated on the status bar of the *Page Viewer* screen.

**Note:** The tag criteria works in conjunction with other query criteria, therefore the results can be further filtered by specifying additional criteria on the *Search* window.

### 11.3 Importing/Exporting Tags

This feature has been removed as of version 7.5. It is currently being redesigned.

### 12.0 Notes

The *Notes* feature has been combined with *Tags* as of version 7.5

### 13.0 Viewing Linked Material

PRODOCS contains a number of additional reference materials and documents that are external to the PRODOCS data itself, but can be easily accessed from the system's interface.

To view these linked items, select the desired item from the *Links* menu. The selected item will then be launched from PRODOCS.

- *Abbreviations* – List of commonly used aircraft and related abbreviations
- *ATA Numbers* – List of commonly used ATA numbers
- *Reference Numbers* – List of the file numbers by which investigation documents have been logged and classified
- *CSRTG Accident Database* – Civil Aviation Authority air accident database. This system should only be launched from within PRODOCS in order to gain access to the latest data and not launched from the Star menu. There is no online help available for

this application.

**Note:** The *Check web for updates* feature should **NOT** be used as it is maintained by the PRODOCS system administrator.

- *MD-11 Panoramas, References, and Object Models* – MD-11 panorama and object model web-site
- *Operation Persistence* – Operation Persistence Swissair web-site

Some of the linked materials may require the installation of additional software, outside of the PRODOCS setup.

The Links displayed may differ from those listed. They can be dynamically changed to allow for changes or additions, as new material becomes available over time.

**Note:** The details on using the materials launched from the Links menu are outside of the scope of this document. The specific help material for each item should be referenced for more details.

For linked material that is displayed using the web browser, such as *Abbreviations, ATA Numbers, Reference Numbers*, the standard page find features are available.

To find text on a web page, select the *Edit/Find(on This Page)* menu, or press *Ctrl-F*. This will display a *Find* screen where you can enter the desired term.

## **14.0 System Setup**

The setup of PRODOCS will be handled primarily by *TSB Informatics*, however the following describes some of the issues involved in the setup of the system. These settings should not be modified unless specifically requested by *TSB Informatics* or a PRODOCS administrator.

### **14.1 PRODOCS Application Installation**

The PRODOCS system needs to be installed locally on each client PC that will be using it.

Running the SETUP.EXE file located in the PRODOCS Install folder performs the installation. The installation may require it to be run twice depending on the runtime files that are pre-existing on the client PC. The user will be prompted if this is required,

at which time the system will need to be restarted and the installation re-rerun. The setup may also indicate that some files are in use and cannot be copied, these errors can typically be ignored and the setup can continue successfully.

**Know Issues:** There has been an issue on some PCs where in the DAO350.DLL is not properly registered on the client PC. This seems to be related to the shared nature of this file on the F drive. In the cases where data access errors occur when trying to perform a search, this may be resolved by manually registering the F:\MSAPPS\DAO\DAO350.DLL using the regsvr32 command from the Run dialog.  
*Regsvr32 F:\MSAPPS\DAO\DAO350.DLL*

**Note:** Once the setup has completed an entry will be created on the *Windows Start Menu* to launch the application. This link should NOT be used to access the system. An icon will be available on your Desktop (created by Informatics) that will access the proper PRODOCS information.

Before the system data can be accessed, the INI files and Network Access Rights need to be properly configured. Typically these files are located on the network in the same folder as the shared network PRODOCS.EXE.

PRODOCS and some of the linked application also make use of *Adobe Acrobat* files. Each client PC will require *Adobe Acrobat Reader Version 4.0* or higher to be installed locally in order to access these files.

## **14.2 Secondary Application Installation**

In addition to the installation of the main PRODOCS application, additional secondary applications are also required in order to access the linked material. These applications are installed via separate applications, outside of PRODOCS. Through the links the applications reference shared networked data and EXE files, however the setups are required in order to install the runtime files for these systems.

### **14.2.1 CSRTG Accident Database**

The setup for the *CSRTG Accident Database* is located in \\Section2\Swissair\adb\install. To install the application run the SETUP.EXE file located in this folder. This will install a local copy of the application and its data. Once it has been installed locally the data can then be referenced via the network copy that is launched from within the PRODOCS Links menu.

### **14.2.2 MD-11 Panoramas, References, and Object Models**

The Panoramas & Object Models is a web-based system that requires specific plugins and browser version in order to function properly.

The specifics of the requirements and their installation can be found on the main page of the system. A summary of these requirements is provided below:

- 486/DX
- Windows 95 or Windows NT 4.0
- Minimum 16 MB RAM; 32 MB recommended
- True Color Display at 1024 by 768 (or 65536 Color)
- PC Speakers
- Microsoft® Internet Explorer® 5.0
- Livepicture Viewer 3.22 - Browser Plug-in (PROVIDED)
- Microsoft® Media Player® 6.4 (UPGRADE PROVIDED)
- Adobe Acrobat PDF Reader V4.05 (PROVIDED)
- Microsoft Data Access Components

### 14.2.3 Utilities and Plugins

For information on installing the various utilities and plugins found in the *Utilities and Plugins* menu item, refer to the specific information provided on the link for each component.

### 14.3 File Structure

In order to allow for the splitting of data between a central server and regional servers to split loading, the PRODOCS files is separated into two main areas:

- *Section1* contains the key data elements such as text files, databases, etc. These files are intended to be located on the regional servers so to improve the speed of searches.
- *Section2* contains primarily compressed images and *web type* files that are of limited size and that can be accessed over a slower connection from a central server.

### 14.4 INI Files

PRODOCS makes use of INI files to store paths to data and files required by the system. These INI files allow PRODOCS to access data from different locations, depending on the network environment in which it is being used.

The following shows a typical *PRODOCS.INI* file:

```
[Supertext]
DB=F:\Section1\Swissair\PRODOCS\prodocs_st.mdb
ImagesPath=X:\Section2\Swissair\Supertext\
[UserData]
DB=F:\Section1\Swissair\UserData\userdata.mdb
[Exhibits]
DB=F:\Section1\Swissair\Exhibits\Data\prodocs_ex.mdb
ImagesPath=X:\Section2\Swissair\Exhibits\ [Wiring]
DB=F:\Section1\Swissair\Wiring\Data\prodocs_wr.mdb
[DocControlLog]
DB=F:\Section1\Swissair\DocControlLog\Data\Control Log Back.mdb
[ExhibitTracking]
DB=Q:\PRODOCS\Swissair\ExhibitTracking\PRODOCS_ExhibitTracking.mdb
[Photos]
DB=F:\Section1\Swissair\Photos\Db\Photos BackEnd.mdb
ImagesPath=X:\Section2\Swissair\Photos\images
```

The *Supertext* section contains the settings specific to the Supertext data.

The *DB* entry defines the full path and name of the master Supertext database.

The *ImagesPath* defines the path of the master folder containing the Supertext project folders for images.

The *Exhibits* section contains the settings specific to the Supertext data.

The *DB* entry defines the full path and name of the master Exhibits database.

The *ImagesPath* defines the path of the master folder containing the Exhibit images.

The *UserData* section contains the settings specific to the user specific data.

The *DB* entry defines the full path and name of the user database.

The *Wiring* section contains the settings specific to the Wiring data.

The *DB* entry defines the full path and name of the master Wiring database.

The *DocControlLog* section contains the settings specific to the Document Control Log data.

The *DB* entry defines the full path and name of the master Document Control Log backend database.

The *ExhibitTracking* section contains the settings specific to Exhibit Tracking data.

The *DB* entry defines the full path and name of the master Exhibit Tracking database.

This database must be located on a shared drive, accessible by both the LAB and SES networks with full read/write/delete access for all users.

The *Photos* section contains the settings specific to the Photos data.

The *DB* entry defines the full path and name of the master Photo database.

The *ImagesPath* defines the path of the master folder containing the Photo images.

The *PRODOCSLINK.INI* file is used to define items that will appear within the PRODOCS *Links* menu. This provides the ability to dynamically add/modify PRODOCS links by manipulating the INI and thus eliminates the need to create a new PRODOC

EXE file, as new links are needed.

The following shows a typical *PRODOCSLINKS.INI* file:

```
[PRODOCSLinks]
LinkCount=19
[Link1]
LinkName=&Abbreviations
LinkPath=X:\Section2\Swissair\Prodocs\Help\abbrvs.htm
[Link2]
LinkName=A&TA Numbers
LinkPath=X:\Section2\Swissair\Prodocs\Help\atanos.htm
[Link3]
LinkName=&Reference Numbers
LinkPath=X:\Section2\Swissair\Prodocs\Help\prmrrefs.html
[Link4]
LinkName=-
LinkPath=
[Link5]
LinkName=&CSRTG Accident Database
LinkPath=F:\Section1\Swissair\ADB\adb.exe
[Link6]
LinkName=&Operation Persistence
LinkPath=X:\Section2\Swissair\OpPersistence\main.html
[Link7]
LinkName=&MD-11 Panoramas, References, and Object Models
LinkPath=X:\Section2\Swissair\Panoramas\Program Files\MD11.html
[Link8]
LinkName=-
LinkPath=
[Link9]
LinkName=&Systems/Fire Tech Notes
LinkPath=X:\Section2\Swissair\FireTechNotes\SR FLIGHT 111 SYSTEMS AND FIRE GROUPS FACTUAL
NOTES.pdf
```

```

[Link10]
LinkName=&Systems/Fire Tech Notes - MD11 OBSERVATIONS ADDENDUM 1
LinkPath=X:\Section2\Swissair\FireTechNotes\MD11 OBSERVATIONS ADDENDUM 1.pdf
[Link11]
LinkName=&Systems/Fire Tech Notes - MD11 OBSERVATIONS ADDENDUM 2
LinkPath=X:\Section2\Swissair\FireTechNotes\MD11 OBSERVATIONS ADDENDUM 2.pdf
[Link12]
LinkName=-
LinkPath=
[Link13]
LinkName=Preliminary &2D CAD Drawings
LinkPath=F:\Section1\Swissair\whip\Whip2DCAD.html
[Link14]
LinkName=-
LinkPath=
[Link15]
LinkName=Preliminary 3D CAD Drawings - Setup and Usage Information
LinkPath=F:\section1\swissair\voloview\Volo3DCAD.html
[Link16]
LinkName=Preliminary 3D CAD Drawings - Fire Damage Assembly
LinkPath=F:\section1\swissair\voloview\3DFiles\3D_Fire_Damage_Assembly.dwg
[Link17]
LinkName=Preliminary 3D CAD Drawings - Fire Damage Assembly By Frames
LinkPath=F:\section1\swissair\voloview\3DFiles\3D_Fire_Damage_Assembly_By_Frames.dwg
[Link18]
LinkName=Preliminary 3D CAD Drawings - Fire Damage Assembly Up To Station 400
LinkPath=F:\section1\swissair\voloview\3DFiles\3D_Fire_Damage_Assembly_Up_To_400.dwg
[Link19]
LinkName=Preliminary 3D CAD Drawings - Exemplar Hella Light With Arc Damage
LinkPath=F:\section1\swissair\voloview\3DFiles\Hella_Light_Fire_Damage.dwg

```

The *PRODOCSLinks* section defines the overall structure for the links.

The *LinkCount* entry defines the number of menu items that are listed in the ini file.

The *LinkX* section defines each individual link item that will appear on the menu.

The *LinkName* defines the name of the item as it will appear within the PRODOCS *Link* menu.

The *LinkPath* defines the file path and file name to the file or application that will be launched when the menu is selected. If an EXE is specified the defined application will be run when the menu is selected. If a file type, such as PDF, HTML, DOC, etc is specified the associated application will be launched and the file displayed.

New elements can be added by adding a new Link section to the INI file and increasing the *LinkCount* to match the total number of entries. The menu items will appear in the order define by the Link number.

Only one copy of the *PRODOCSLINKS.INI* file is required for each region/server.

This file is located in the following folder - \\Section1\Swissair\PRODOCS

## 14.5 Network Access Rights

In order to access the underlying data and files referenced from PRODOCS, the proper Network Access Rights must be established for each user. This is handled by *TSB Informatics* and requires approval from the chief investigator.

All PRODOCS users require full read/write access to the *UserData* database. This file is used to save user specific notes and tags, and does not contain PRODOCS data. Users

will also require read access to the network PRODOCS folders as it contains the link INI file and help/support files.

To access *Supertext* data via PRODOCS users will require read access to the desired project folders in each of the following areas:

- Data files (Section1 subfolders) \\Section1\Swissair\PRODOCS\... Users accessing data directly via the *SUPERText Research* application will also require read access to \\Section1\Swissair\Supertext\... project subfolders.
- Image files (Section2 subfolders) \\Section2\Swissair\Supertext\...

To access *Exhibit* data users will require read access to the desired project folders in each of the following areas:

- Data files (Section1 subfolders) \\Section1\Swissair\Exhibits\Data\...
- Image files (Section2 subfolders) \\Section2\Swissair\Exhibits\Images\...

To access *Wiring* data users will require read access to the desired project folders in each of the following areas:

- Data files (Section1 subfolders) \\Section1\Swissair\Wiring\Data\...

Additional access rights will also be required for various system links and associated data.

## ***15.0 Appendix A – Supertext Scanning, Processing, Data Entry***

The following provides a brief overview of the Supertext Scanning, Processing, and Data Entry that makes this data available for use within PRODOCS and *SUPERText Research*.

In order to convert the vast quantities of paper and electronic documents that are part of an investigation, a number of processes take place in order to make this information available in a usable format for the investigators:

1. Original document is received by TSB and stamped and logged into the *Document Control Log* database.
2. The original document is copied for filing and scanning.
3. A banner page summarizing the document is created from the *Document Control Log* and filed with the document and sent to scanning.
4. Document is scanned using *SUPERText Scan*, which converts the paper document's pages into electronic images. Quality control and adjustments are made to the images during scanning to ensure they are properly scanned and of top quality.
5. Scanned documents are OCR (Optical Character Recognition) processed with *SUPERText Process* to extract the textual content for use in key work searching. Documents are also categorized into specific subject areas during this process to further aid in document retrieval and organization.
6. Data entry is performed on each document using *SUPERText Research* to further capture key information that will aid in searching of the documents.



7. Indexes are created using *SUPERText Research* and *STParser*, which make the documents searchable from within *SUPERText Research* and PRODOCS.

## 16.0 Appendix B - MD-11 Panoramas, References, and Object Models

The *MD-11 Panoramas, References, and Object Models* provides access to a variety of visual investigation material, primarily Panoramas and Object Models. It also contains video footage, audio files, reference documents, drawings, maps, and images.



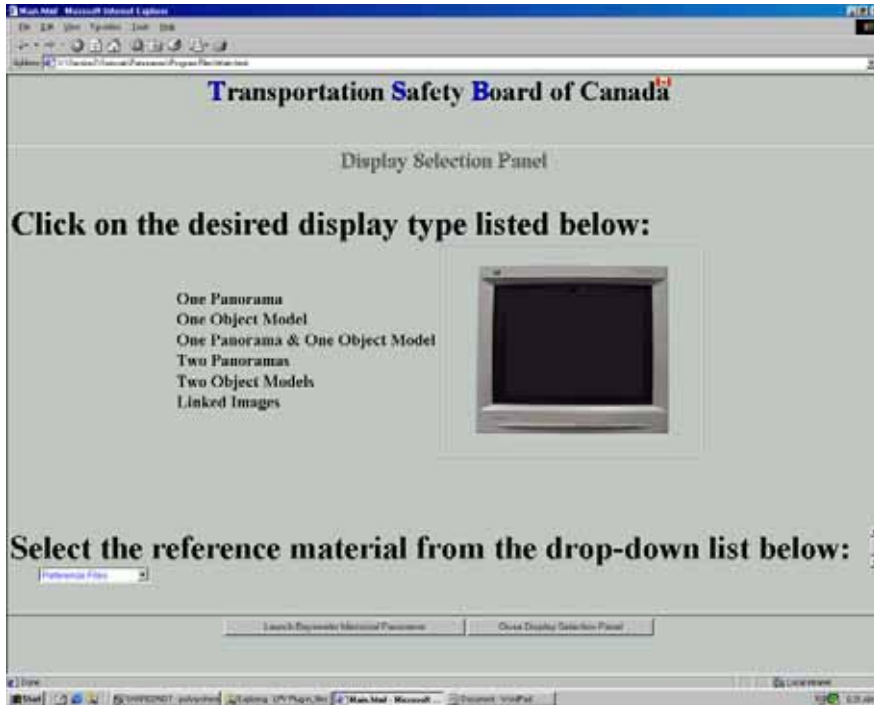
*Panoramas* present wide scale images of a scene which can be up to 360°. During playback you can pan and zoom within the image to get a complete uncut view.

*Object Models* are a collection of photographic images of a real-world 3D object, taken from various angles around the object. During playback, you can manipulate the object to determine which image to show.

*Linked Images* present detailed image views of the elements that compose a larger object, showing it in more detail. The hotspots provide the perspective for relating the detailed smaller component views back to the master object.

Both Panoramas and Object Models may also contain hotspots with hyperlinks to other models, images, reference material.

To launch the *Display Selection Panel* press the *Launch Panoramas, References, and Object Models* button located at the bottom right of the main screen. This will open a new window as shown below.



## 16.1 Viewing Pans, Objects, Linked Images

To view an item first select the display type that you would like to use. The display types available are:

- One Panorama
- One Object Model
- One Panorama & One Object Model
- Two Panoramas
- Two Object Models
- Linked Images

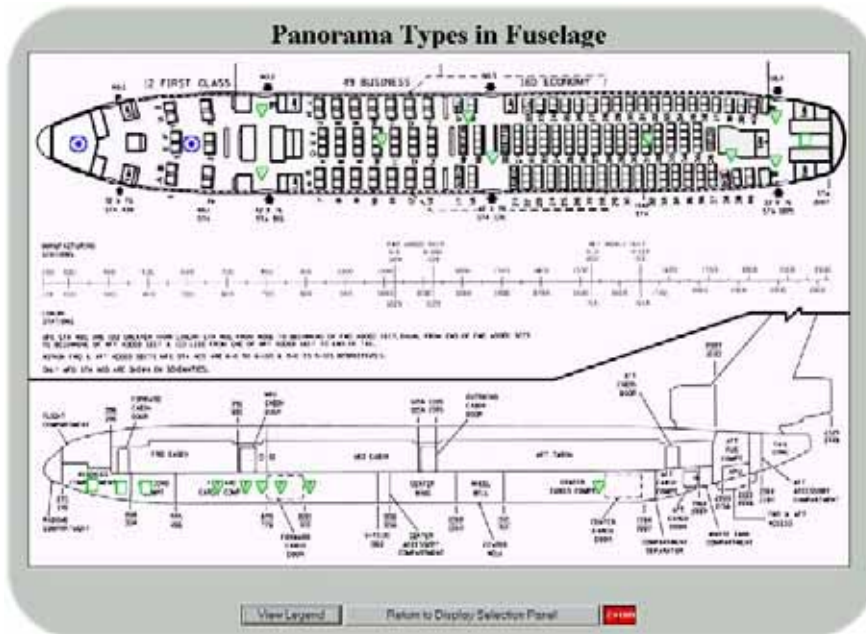
A sample view of the layout will be shown in the *monitor* window shown to the right display type list.

Click on the desired display type listed below:

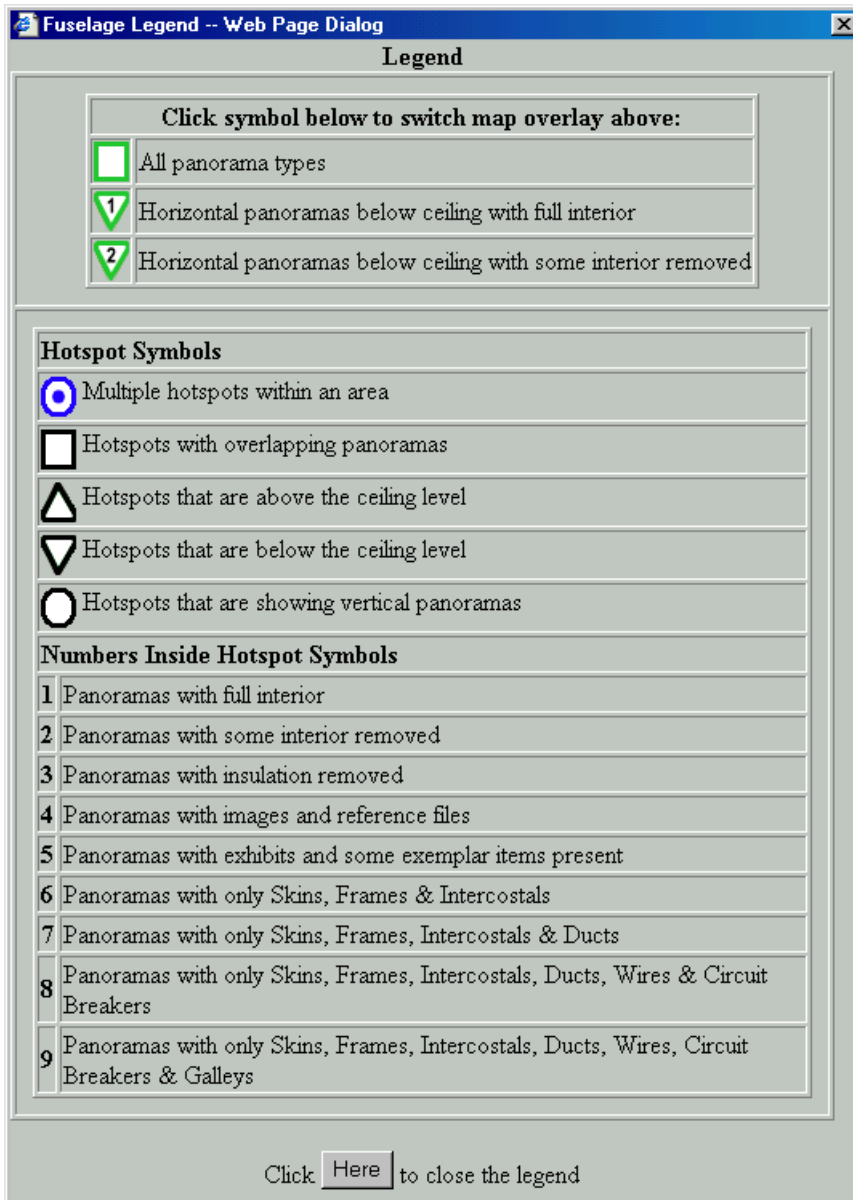


### 16.1.1 One Panorama

Upon selection of *One Panorama*, a new window will be displayed showing a diagram of the aircraft with hotspots indicating areas that contain panoramas.



For details on meaning of the hotspot symbols press the *View Legend* button. This will display a new window listing the specific meaning of each item.



To launch and view a particular hotspot, click on the symbol. This will open a new window showing the panorama and additional information on the location.



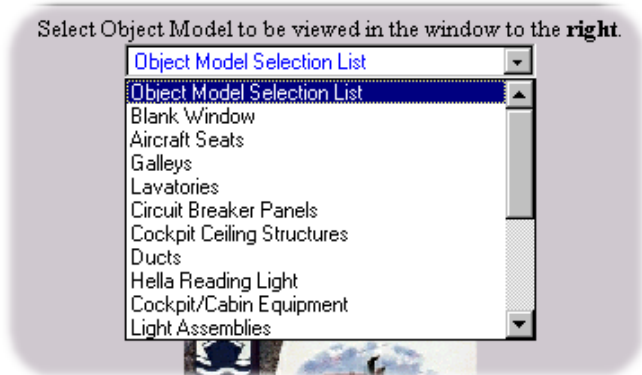
To view a full screen version of the panorama, press the *Show panorama over full screen* button located just below the panorama image.

### 16.1.2 One Object Model

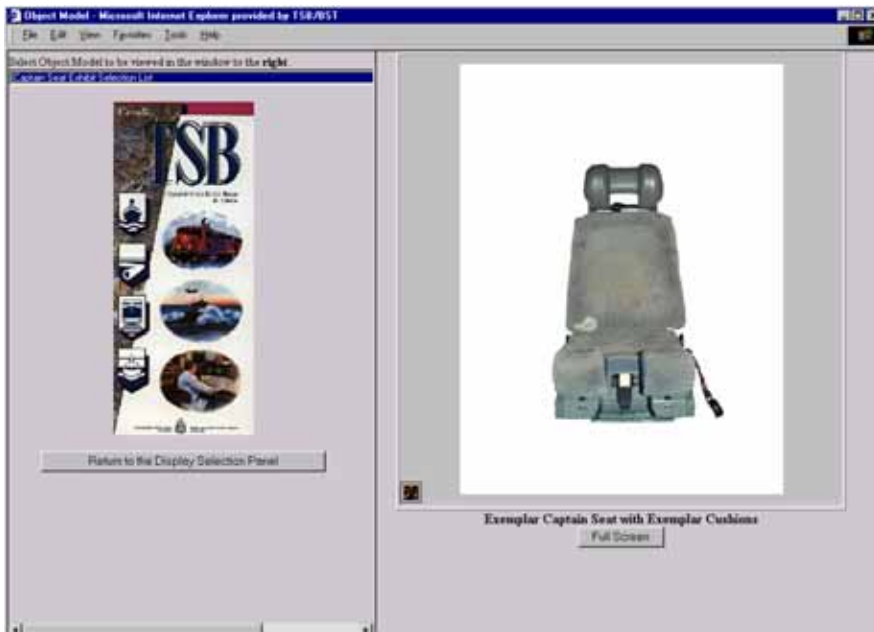
Upon selection of *One Object Model*, a new window will be displayed showing a selection list in the top right of the screen.



To view a specific object, navigate through the list selecting the area of interest. As new categories are selected the list will reload with specific items for that area. You can return to the previous or master list by selecting these choices in the bottom of the listing.



Once the final object is selected it will be displayed in the right hand portion of the screen.



To view a larger picture of the object, press the *Full Screen* button.

### 16.1.3 One Panorama & One Object Model

Upon selection of *One Panorama & One Object Model*, a new window will be displayed showing a selection list in the top right and left of the screen. The right side is for panorama selection and display and the left is for object models.



To view a specific panorama/object, navigate through the list selecting the area if interest. As new categories are selected the list will reload with specific items for that area. You can return to the previous or master list by selecting these choices in the bottom of the listing.

Once the final panorama/object is selected it will be displayed below the appropriate selection list.



To view a larger picture of the panorama/object, press the *Full Screen* button.

The *One Panorama & One Object Model* view can be very useful when viewing a specific object and trying to place it within the aircraft structure and determining objects that may be in close proximity.

#### 16.1.4 Two Panoramas

Upon selection of *Two Panoramas*, a new window will be displayed showing a selection lists in the top of the screen.

To view a specific panoramas, navigate through the left and right lists selecting the areas if interest. As new categories are selected the list will reload with specific items for that area. You can return to the previous or master list by selecting these choices in the bottom of the listing.

Once the final areas are selected they will be displayed below the appropriate selection list.





To view a larger picture of the panorama, press the *Full Screen* button.

The *Two Panorama Model* view can be very useful when comparing items such as an exemplar and reconstruction for a given area or in viewing adjacent regions of the aircraft.

### 16.1.5 Two Object Models

Upon selection of *Two Object Models*, a new window will be displayed showing a selection lists in the top of the screen.

To view a specific objects, navigate through the left and right lists selecting the areas if interest. As new categories are selected the list will reload with specific items for that area. You can return to the previous or master list by selecting these choices in the bottom of the listing.

Once the final objects are selected they will be displayed below the appropriate selection list.



To view a larger picture of the panorama/object, press the *Full Screen* button.


The *Two Object Model* view can be very useful when comparing items such as an exemplar and reconstruction for a given item.

### 16.1.6 Linked Images

Upon selection of *Linked Images*, a new window will be displayed showing a selection lists in the top of the screen.

To view a specific set of images, navigate through the list selecting the area of interest. As new categories are selected the list will reload with specific items for that area. You can return to the previous or master list by selecting these choices in the bottom of the listing.

Once the final image set is selected an image will be displayed below the selection list.

The image will be marked with hotspots - . An image may have multiple hotspots, each with a number of associated images.



When a hotspot is selected the associated image thumbnails will be loaded and displayed on the right side of the window. Detailed views of each image can then be seen by clicking on the desired thumbnail image. This will open a new window showing a large detailed version of the image that was selected.

*Linked Images* can be very useful when wanting to see views of an object and elements that compose an object. Through the process of linking and hotspots the detailed smaller elements are put into perspective for the viewer which might not be the case if each item were dealt with separately on its own.

For details on interacting with the images see the section on *Live Picture Viewer*.

## 16.2 Viewing Reference Files

To view *Reference Material*, select the desired category from the dropdown list located on the bottom right of the main screen. The available categories are as follows:

- Image Reference Files
- Video Reference Files
- Audio Reference Files
- Drawings
- Documents
- Site Maps



Once a main category is selected a secondary selection list will appear on the main screen in the bottom left. From here you navigated to the desired subcategories. The list will reload each time a new subcategory is selected.

Once the final section is made a new screen will be displayed with the detailed information/links to the items selected.

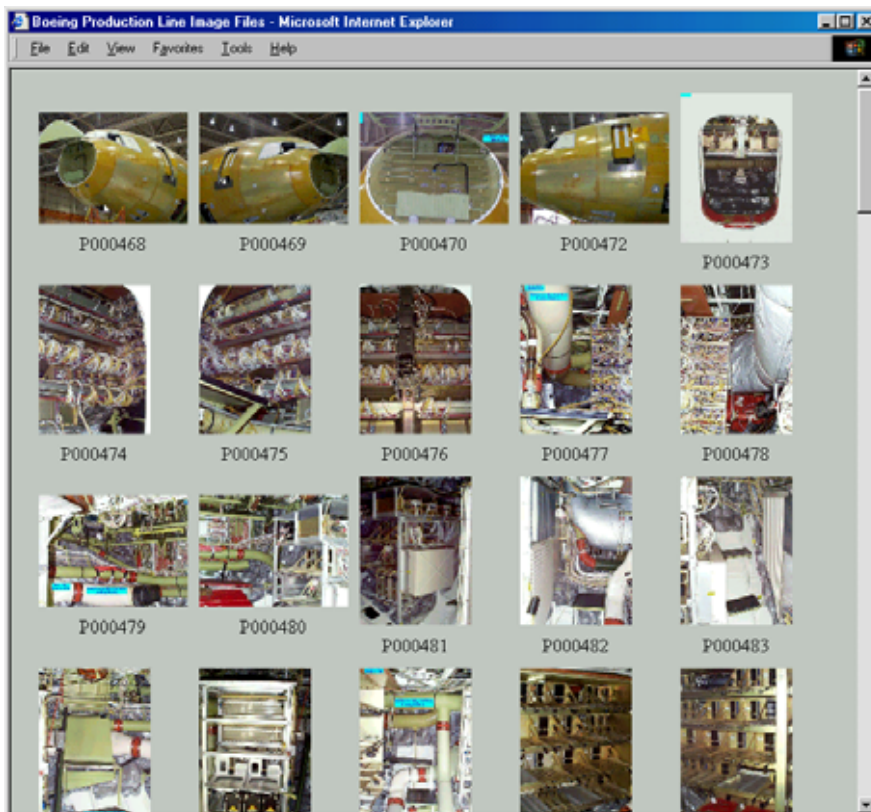
### Select the reference material from the drop-down



Each type of reference file will have a different end viewing screen, which may range from links to videos, image thumbnail indexes, and document links.

#### 16.2.1 Image Reference Files

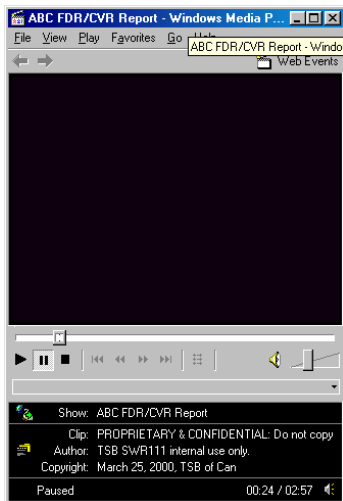
Once the final section is made from the selection list a new screen will be displayed with a thumbnail index for the selected item.



To view a specific image in detail, click on the thumbnail image. A new window will open showing a high resolution picture of the image.

#### 16.2.2 Video Reference Files

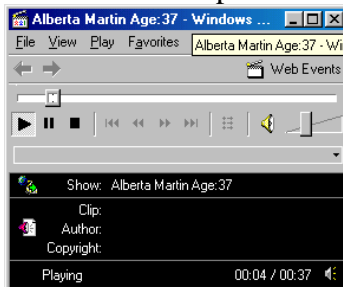
Once the final section is made from the selection list *Windows Media Player* will open and the video will be loaded and played.



The media player features standard *VCR* style controls, allowing you to pause, play, restart, adjust volume of the video.

### 16.2.3 Audio Reference Files

Once the final section is made from the selection list *Windows Media Player* will open and the audio clip will be loaded and played.



The media player features standard *VCR* style controls, allowing you to pause, play, restart, adjust volume of the audio clip.

### 16.2.4 Drawings

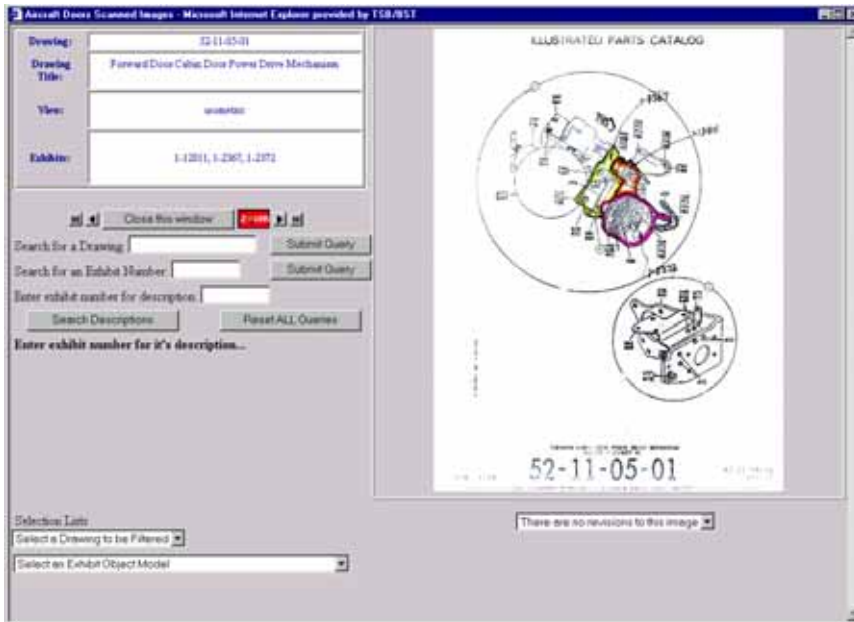
Once the final section is made in the selection list a new screen will be displayed showing the drawing image.

#### 16.2.4.1 Exhibit Database

As part of the Drawing section there are a number of fire exhibit drawings available within the system. These drawings show the exhibits marked on the original engineering drawings, allowing the viewer to put them in perspective to the original aircraft.

This database is accessed under the *Drawings* reference section in *Fire Exhibits* -> *Exhibit Database*

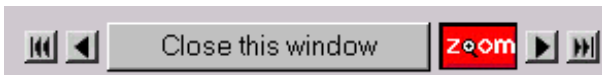
Once a specific topic area is selected from the list, a new screen will be loaded showing the details of the drawings available on that area.



The top left section displays details about the current drawing, such as the drawing number and title, the specific view being shown, and the exhibits that are included on the drawing.

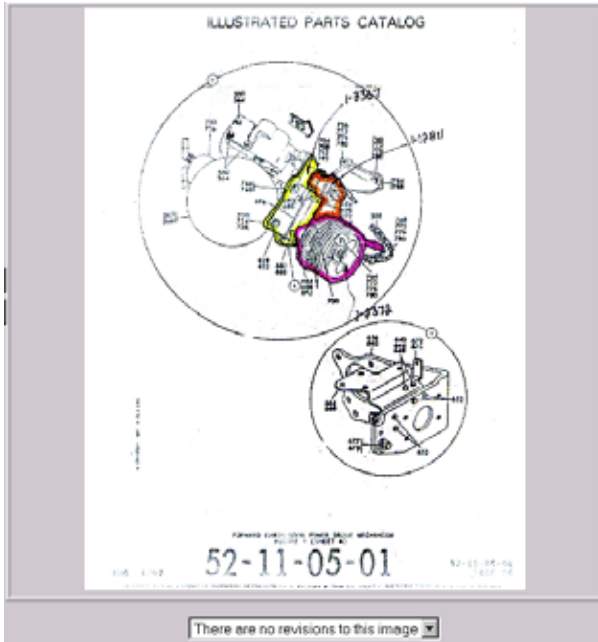
<b>Drawing:</b>	52-11-05-01
<b>Drawing Title:</b>	Forward Door Cabin Door Power Drive Mechanism
<b>View:</b>	isometric
<b>Exhibits:</b>	1-12811, 1-2367, 1-2372

To step through the drawings use the navigation buttons below the drawing description section.



These buttons allow you to step one by one through all the drawings and also jump to the first and last drawing.

The right hand portion of the window displays the actual drawing. If the drawing has revisions these will be listed in the selection list below the drawing, and they can be viewed by selecting them from the list.



To view a high resolution version of the drawing press the *Zoom* button located by the navigation buttons to the left of the drawing.

The mid left section contains a search capability. This area will let you search the current topic area for a given drawing, exhibit, or a descriptive keyword.

Search for a Drawing:

Search for an Exhibit Number:

Enter exhibit number for description:

**Enter exhibit number for it's description...**

To search, enter the desired data and press the *Submit Query* button next to the field that the search criteria were entered.

The results will then be filtered to only show matching drawings.

The bottom left of the screen contains additional selection lists that allow you to select specific drawings directly or link to additional related information, such as object models.

The specific features and options for the Exhibit Database screen will vary from topic area to topic area but the general overall functionality will generally be same for all areas.

### 16.2.5 Documents

Once the final section is made a new screen will be displayed showing a document image or a PDF file will be opened to show the document.

### 16.2.6 Site Maps

Once the final section is made from the selection list a new screen will be displayed with a thumbnail index for the selected maps.

To view a specific map in detail, click on the thumbnail image. A new window will open showing a high resolution image of the map.

### 16.3 Live Picture Viewer



#### **LIVE PICTURE**

*Zoom in for a closer look™*


The Live Picture Viewer—Plug-in Version lets your Web site visitors view and navigate panoramic images created using Live Picture's PhotoVista™ image-stitching software, and interactive panoramic environments created using Live Picture's Reality Studio™ suite of authoring tools. The Live Picture Viewer—Plug-in Version is available for Macintosh and Windows.

#### 16.3.1 Using the Live Picture Viewer—Plug-in Version

The Live Picture Viewer—Plug-in Version works in 2D and 3D modes. The mode change occurs automatically, depending on the content you're viewing. The only difference you'll see is that some toolbar buttons will change.



The Live Picture Viewer —Plug-in Version operates in 2D mode when you're viewing a 2D Flashpix™ image. When viewing a 3D image object (IMOB), a vista, or any combination of images, objects, vistas, and other media (such as audio or video) the viewer automatically presents the content in 3D mode.

#### Toolbar buttons and keyboard shortcuts

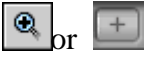

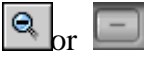
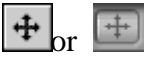


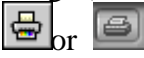
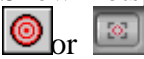
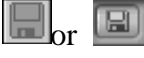
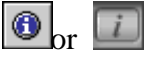
If the toolbar is turned on, you'll see the Live Picture logo in the lower left corner of the viewer window.  Click the logo to expand the toolbar.

**Note:** If the toolbar is turned off, you can use the keyboard shortcuts to zoom in and out, and to locate any hotspots.

The toolbar buttons that appear vary slightly between the view modes, depending on the content you're viewing. The following table describes the functions and keyboard shortcuts for each toolbar button.

Toolbar Button	Function	Keyboard Shortcut
Open/Close Toolbar  or 	Opens and closes the toolbar. <b>Note:</b> A yellow band spinning around the Open/Close Toolbar button indicates that the Live Picture Viewer is downloading information from the server.	



<p>Zoom In</p> 	<p>Zooms into the image. Click Zoom In, then click anywhere in the viewer window. To zoom in continuously, hold down the mouse button.</p> <p><b>Note:</b>  If you try to zoom past the maximum image resolution, the Maximum Zoom icon appears in the upper left corner of the viewer window.</p>	SHIFT or A
<p>Zoom Out</p> 	<p>Zooms out of the image. Click Zoom Out, then click anywhere in the viewer window. To zoom out continuously, hold down the mouse button.</p>	CONTROL or Z
<p>Pan Vista</p> 	<p>Pans a vista or rotates an IMOB. Click Pan Vista and drag the pointer over the vista or IMOB.</p>	
<p>Pan Image (2D mode only)</p> 	<p>Pans a 2D Flashpix IMOB. Click Pan Image and drag the pointer horizontally or vertically over a 2D Flashpix IMOB. This button works best after you zoom in to view a larger portion of the IMOB.</p>	
<p>Initial View (appears only for 2D Flashpix images)</p> 	<p>Returns a Flashpix image to initial view after you've zoomed in.</p>	
<p>Print (appears only for 2D Flashpix images)</p> 	<p>Prints a 2D Flashpix image (if this button is enabled by the Web page developer).</p>	
<p>Show Hotspots</p> 	<p>Shows any hotspot links. If there are no hotspots, this button appears dimmed. Click the hotspot to activate the link.</p>	SPACEBAR or H
<p>Save (appears only for 2D Flashpix images)</p> 	<p>Saves the image (if this button is enabled by the Web page developer). The specific save parameters are defined by the Web page developer.</p>	
<p>Information</p> 	<p>Opens this document in a new browser window</p>	

### 16.3.2 Glossary

#### Flashpix (FPX)

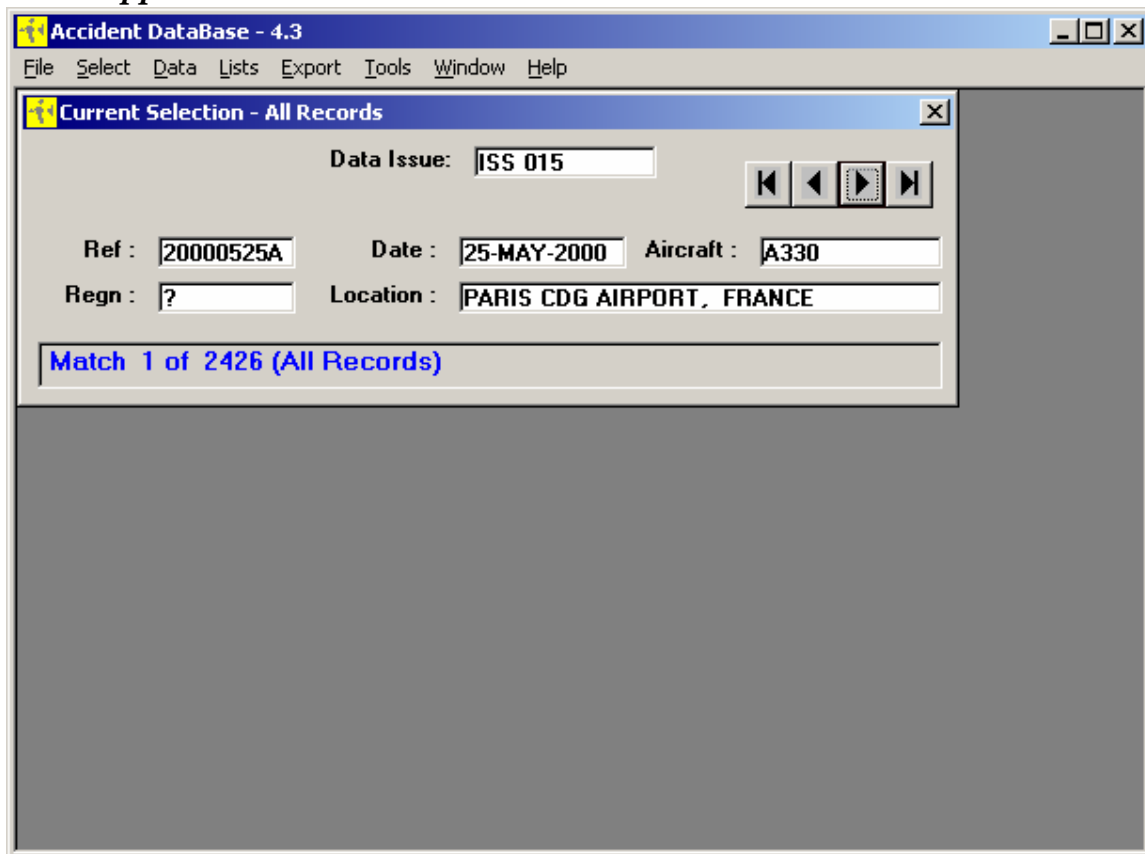
A multi-resolution digital image file format, which offers an ideal way to view and print high-quality, high-resolution images in real time. The Flashpix format is

a trademark of the Digital Imaging Group, Inc. (DIG), and was jointly developed by Live Picture, Eastman Kodak, Hewlett-Packard, and Microsoft. For more information about Flashpix, visit the Digital Imaging Group Web site at <http://www.digitalimaging.org/>.

#### Image object (IMOB)

A collection of photographic images of a real-world 3D object, taken from various angles around the object. During playback, you can manipulate the IMOB to determine which image to show. This simulates the experience of examining an actual 3D object. IMOBs are created using Live Picture Object Modeler, which is part of the Reality Studio suite of authoring tools. For more information, visit the Live Picture site at <http://www.livepicture.com/>.

### 17.0 Appendix C – ADB Overview



This database has been constructed by R.G.W. Cherry & Associates Limited on behalf of the Airworthiness Authorities participating in the CSRTG. Further information on the CSRTG may be found on the following web site [www.fire.tc.faa.gov/cabwg](http://www.fire.tc.faa.gov/cabwg)

For many years, the aviation authorities of North America [the US Federal Aviation Administration (FAA) and Transport Canada Civil Aviation (TCCA)], Europe [the Joint Aviation Authorities (JAA)] and Japan [Civil Aviation Bureau of Japan (JCAB)] have

been conducting research in transport category airplane cabin safety, mostly individually, and sometimes jointly and cooperatively, without the benefit of a coordinating 'tool'. The international nature of civil aviation, current commitments and trends in harmonization, and budgetary constraints dictate the need for a mechanism to foster greater and broader association, cooperation and coordination in cabin safety research. The Cabin Safety Research Technical Group(CSRTG) is intended to achieve this by 'bringing together' the cabin safety research efforts of the FAA, JAA, JCAB and TCA.

All data have been derived from reliable sources, primarily from Accident Investigating Authorities. Records are stored for transport category passenger aircraft (with 19 or more passenger seats) and cargo aircraft certificated under Part 25 requirements or equivalent. The database contains photographs and diagrams as well as textual and numerical data. The database will be reviewed periodically and data added when available. Any suggestions for its improvement should be sent by e-mail to [database@rawcherry.co.uk](mailto:database@rawcherry.co.uk)

The database is freely available for use as a resource for improving aviation safety. Its production has been made possible by the financial support of the following authorities:

- Transport Canada Civil Aviation
- UK Civil Aviation Authority
- US Federal Aviation Administration

The database currently contains information on 2426 accidents and of these, accident report text is available on 577. The database was initially intended to carry out analytical work aimed at improving occupant survivability. More recently the scope has been expanded and it now includes information on non-survivable accidents.

There is no internal help provided with ADB. The following notes are to aid in its usage.

### **17.1 Performing a Search**

The searching within ADB is done from the main *Select* menu.

To retrieve all records, select *All Records* from the main *Select* menu.

To define a specific search, select *Selection* from the main *Select* menu. The following Specify Selection screen will appear:

To define your selection, fill in the desired fields and then press *OK*.

For help on what each field represents and valid entries for the field, press the ? button located to the right of the field. This will display a help screen for the selected field.

## 17.2 Viewing Search Results

Once you have defined your search and pressed the *OK* button, the *Current Selection* screen will appear. This screen shows a summary of the records that were found.

To move through the records, use the *arrow* buttons in the top left of the screen.

To display the details on a given record, select the various menu items from the main *Data* menu. Each will open a new screen displaying specific information on the current record. The main screens to use are *Screen 1*, *Screen 2*, *Screen 3*.

### 17.3 Additional Notes

Due to the manner in which ADB has been setup on the TSB network, there is no need to use the *Tools/Check web for updates* feature. Please do not run this as it may cause errors with your system.

### 17.4 Abbreviations and Definitions

The following is a listing of abbreviations and definitions used within ADB. This list is also accessible from the *Help/Glossary* menu.

<b>AAIB</b>	Air Accidents Investigation Branch
<b>AAS</b>	Anti-icing Advisory System
<b>AC</b>	Advisory Circular; provides nonregulatory guidance to certificate holders for a means (but not necessarily the only means) to comply with Federal Aviation (FAA) Regulations
<b>ACARS</b>	Automatic Communications and Recording System
<b>Accident</b>	<p>An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and until such time as all such persons have disembarked and in which:</p> <p>(a) a person is fatally or seriously injured as a result of</p> <ul style="list-style-type: none"><li>- being in the aircraft or</li><li>- direct contact with any part of the aircraft, including parts which have become detached from the aircraft or</li><li>- direct exposure to jet blast</li></ul> <p>Except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or</p> <p>(b) in which the aircraft sustains damage or structural failure which:</p> <ul style="list-style-type: none"><li>- adversely affects the structural strength, performance or flight characteristics of the aircraft and</li><li>- would normally require major repair or replacement of the affected component, except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wingtips, antennas, tyres, brakes, fairings, small dents or puncture holes in the aircraft skin;</li></ul> <p>or</p>

(c) the aircraft is missing or completely inaccessible

<b>ACO</b>	Aircraft Certification Office (FAA)
<b>AD</b>	Airworthiness Directive; FAA regulatory requirement for immediate mandatory inspection and/or modification
<b>ADC</b>	Air Data Computer
<b>ADS</b>	Air Data Sensor
<b>AEG</b>	Aircraft Evaluation Group (FAA)
<b>AFFF</b>	Aqueous Film-Forming Foam
<b>AFM</b>	Aircraft Flight Manual
<b>AGL</b>	Above ground Level
<b>AHRS</b>	Attitude and Heading Reference System
<b>AIM</b>	Aeronautical Information Manual; a primary FAA publication whose purpose is to instruct airmen about operating in the U. S. National Airspace System
<b>AIRMET</b>	Airman's Meteorological Information; such advisories to flightcrews include, but are not limited to, moderate icing and moderate turbulence
<b>ALPA</b>	Air Line Pilots Association
<b>AMASS</b>	Airport Movement Area Safety System
<b>AMM</b>	Aircraft Maintenance Manual
<b>AOA</b>	Angle-Of-Attack
<b>AOM</b>	Aircraft Operating Manual
<b>APM</b>	Aircrew Program Manager
<b>APOI</b>	Assistant Principal Operations Inspector (FAA)
<b>ARAC</b>	Aviation Rulemaking Advisory Committee
<b>ARFF</b>	Aircraft Rescue and Fire Fighting

<b>ARSA</b>	Airport Radar Service Area
<b>ARTCC</b>	Air Route Traffic Control Centre; A facility established to provide air traffic control service to aircraft operating on IFR flight plans within controlled airspace and principally during the en-route phase of flight.
<b>ASDE</b>	Airport Surface Detection Equipment
<b>ASR</b>	Airport Surveillance Radar
<b>ASRS</b>	Aviation Safety Reporting System (NASA)
<b>ATC</b>	Air Traffic Control
<b>ATCS</b>	Air Traffic Control Specialist
<b>ATCSCC</b>	Air Traffic Control System Command Centre
<b>ATCT</b>	Air Traffic Control Tower
<b>ATIS</b>	Automatic Terminal Information Service; The continuous broadcast of recorded noncontrol information in selected terminal areas. Automated, repetitive transmission of essential but routine information.
<b>ATR</b>	Avions de Transport Regional (Manufacturer)
<b>ATSB</b>	Australian Transportation Safety Board
<b>BAA</b>	Bilateral Airworthiness Agreement
<b>BEA</b>	Bureau Enquetes-Accidents (France)
<b>BRITE</b>	Bright Radar Indicator Tower Equipment
<b>CAA</b>	Civil Aviation Authority (UK)
<b>CAB</b>	Civil Aeronautics Board (now FAA)
<b>CAM</b>	Cockpit Area Microphone
<b>CAMI</b>	Civil Aeromedical Institute (FAA)
<b>CASA</b>	Civil Aviation Safety Authority (Australia)
<b>CASA</b>	Construcciones Aeronauticas, S.A. (manufacturer)

<b>CCP</b>	Control Column Position
<b>CDL</b>	Configuration Deviation List
<b>Ceiling</b>	The heights above the earth's surface of the lowest layer of clouds or obscuring phenomena that is reported as "broken", "overcast" or "obscuration" and not classified as "thin" or "partial"
<b>CFIT</b>	Controlled Flight Into Terrain
<b>CFM</b>	Company Flight Manual
<b>CFR</b>	Code of Federal Regulations
<b>CFR</b>	Crash, Fire & Rescue
<b>CG</b>	Centre of Gravity
<b>CRM</b>	Cockpit Resource Management
<b>CTA</b>	Centro Tecnico Aeroespacial (Brazil)
<b>CVR</b>	Cockpit Voice Recorder
<b>CWA</b>	Centre Weather Advisories
<b>CWP</b>	Control Wheel Position
<b>CWSU</b>	Centre Weather Service Unit
<b>DER</b>	Designated Engineering Representative
<b>DFDR</b>	Digital Flight Data Recorder
<b>DGAC</b>	Direction Generale de L'Aviation Civile (France)
<b>DH</b>	Decision Height; the height at which a decision must be made during an ILS, MLS or PAR instrument approach to either continue the approach or execute a missed approach.
<b>DME</b>	Distance Measuring Equipment
<b>EADI</b>	Electronic Attitude Display Indicator; indicating pitch and roll attitudes
<b>EDCT</b>	Expect Departure Clearance Time



<b>EFC</b>	Expect Further Clearance; from ATC
<b>EFIS</b>	Electronic Flight Information System
<b>EHSI</b>	Electronic Horizontal Situation Indicator
<b>Emergency Evacuation</b>	An emergency evacuation carried out under the control, or partial control, of the crew.
<b>FAA</b>	Federal Aviation Administration
<b>FAR/JAR</b>	Federal Aviation Regulations/Joint Airworthiness Requirements
<b>Fatal Injury</b>	An injury resulting in death within 30 days of the date of the accident
<b>FCOM</b>	Flightcrew Operating Manual
<b>FDR</b>	Flight Data Recorder
<b>Ferry Flight</b>	A flight for the purpose of returning an aircraft to base, delivering an aircraft from one location to another or moving an aircraft to and from a maintenance base.
<b>FL</b>	Flight Level; a level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Each is stated in 3 digits that represent hundreds of feet. E.g. FL250 = 25,000 ft.
<b>FMRB</b>	Flight Manual Review Board
<b>FOQA</b>	Flight Operations Quality Assurance
<b>FPL</b>	Full Performance Level
<b>FSB</b>	Flight Standards Bulletin
<b>FSDO</b>	Flight Standards District Office (FAA)
<b>FSM</b>	Flight Standards Manual
<b>FSS</b>	Flight Service Station; Air traffic facilities, which provide pilot briefing, en-route communication and VFR search and rescue services, assist lost aircraft and aircraft in emergency situations, relay ATC clearances, originate Notices to Airmen, broadcast aviation weather and NAS information, receive and process IFR plans and monitor NAVAIDs.

<b>G</b>	one G is equivalent to the acceleration due to Earth's gravity
<b>GAO</b>	General Accounting Office
<b>GOES</b>	Geostationary Operational Environmental Satellite
<b>GMT</b>	Greenwich Mean Time (see Zulu Time & UTC)
<b>GPWS</b>	Ground Proximity Warning System
<b>HBAW</b>	Handbook Bulletin for Airworthiness (FAA)
<b>HIWAS</b>	Hazardous In-Flight Weather Advisory Service; continuous recorded hazardous in-flight weather forecasts broadcast to airborne pilots over selected VOR outlets defined as an HIWAS Broadcast Area
<b>HSI</b>	Horizontal Situation Indicators
<b>ICAO</b>	International Civil Aviation Organisation
<b>IFR</b>	Instrument Flight Rules; a set of rules governing the conduct of flight under instrument meteorological conditions
<b>IEP</b>	Ice Evidence Probe
<b>ILS</b>	Instrument Landing System
<b>IMC</b>	Instrument Meteorological Conditions; meteorological conditions expressed in terms of visibility, distance from clouds and ceiling less than minima specified for visual meteorological conditions
<b>Incident</b>	An occurrence other than an accident associated with the operation of an aircraft, which affects or could affect the safety of operations.
<b>Injury</b>	The generic term including Non-Fatal Serious Injuries and Fatal Injuries.
<b>IOE</b>	Initial Operating Experience
<b>JAAIC</b>	Japan Aircraft Accident Investigation Commission
<b>KIAS</b>	Knots Indicated Airspeed
<b>KTS</b>	Knots (Nautical mile per hour)
<b>LPC</b>	Low Pressure Compressor

<b>LWC</b>	Liquid Water Content; the total mass of water in all the liquid cloud droplets within a unit volume of cloud; LWC/SLW refer to the amount of liquid water in a certain volume of air
<b>LWD</b>	Left Wing Down
<b>MAC</b>	Mean Aerodynamic Chord
<b>McIDAS</b>	Man-computer Interactive Data Access System
<b>MDA</b>	Minimum Descent Altitude
<b>MED</b>	Mean Effective Diameter; of water droplet
<b>MEL</b>	Minimum Equipment List
<b>MFC</b>	Multi-Function Computer
<b>MLS</b>	Microwave Landing System
<b>MMEL</b>	Master Minimum Equipment List
<b>MSL</b>	Mean Sea Level
<b>MTOW</b>	Maximum Take Off Weight
<b>MVD</b>	Median Volumetric Diameter; freezing drizzle is defined as supercooled water drops with MVDs between 50 and 300 microns and freezing rain as supercooled water drops with MVDs greater than 300 microns (a micron is 1/1,000 of a millimeter) ("supercooled" is the liquid state of a substance that is below the normal freezing temperature for that substance)
<b>NACA</b>	National Advisory Committee for Aeronautics (now NASA)
<b>NAS</b>	Navigational Avoidance System
<b>NASA</b>	National Aeronautics and Space Administration (formerly NACA)
<b>NASIP</b>	National Aviation Safety Inspection Program
<b>NCAR</b>	National Centre for Atmospheric Research
<b>NDB</b>	Non-Directional Beacon
<b>NOAA</b>	National Oceanic and Atmospheric Administration

<b>NOTAM</b>	Notice to Airman
<b>NPRM</b>	Notice of Proposed Rulemaking
<b>NRS</b>	National Resource Specialist
<b>NTAP</b>	National Track Analysis Program
<b>NWS</b>	National Weather Service
<b>NAWAU</b>	National Aviation Weather Advisory Unit; renamed Aviation Weather Centre
<b>OAT</b>	Outside Air Temperature
<b>OB</b>	Operational Bulletin
<b>OIM</b>	Operators Information Message
<b>PA</b>	Public Address; system
<b>PAI</b>	Principal Avionics Inspector
<b>PAPI</b>	Precision Approach Path Indicator
<b>PAR</b>	Precision Approach Radar
<b>PF</b>	Pilot Flying
<b>PIC</b>	Pilot in Command
<b>PIO</b>	Pilot Induced Oscillation
<b>PIREP</b>	Pilot Report
<b>PMR</b>	Performance Maintenance Recorder
<b>PNF</b>	Pilot Not Flying
<b>POI</b>	Principal Operations Inspector (FAA)
<b>QNH</b>	Corrected mean sea level pressure
<b>RAPCON</b>	Radar Approach Control
<b>RIV</b>	Rapid Intervention Vehicle

<b>RTF</b>	Radiotelephony
<b>Runway Incursion</b>	Any occurrence at an airport involving an aircraft, vehicle, person, or object on the ground that creates a collision hazard or results in loss of separation with an aircraft taking off, intending to take off, landing or intending to land.
<b>Runway Vicinity</b>	An accident is considered to have occurred within the Runway Vicinity if egress or injury took place within the area under the control of the airport authorities or within easy reach of the airport firefighting services.
<b>RWD</b>	Right Wing Down
<b>SAT</b>	Static Air Temperature (synonymous with OAT)
<b>SB</b>	Service Bulletin; supplied by manufacturer
<b>SDR</b>	Service Difficulty Report
<b>Serious Injury</b>	An injury which is sustained by a person in an accident and which: <ul style="list-style-type: none"> <li>(a) requires hospitalisation for more than 48 hours, commencing within 7 days from the date the injury was received; or</li> <li>(b) results in a fracture of any bone (except simple fractures of fingers, toes or nose); or</li> <li>(c) involves lacerations which cause severe haemorrhage, nerve, muscle or tendon damage; or</li> <li>(d) involves injury to any internal organ; or</li> <li>(e) involves second or third degree burns, or any burns affecting more than 5% of the body surface; or</li> <li>(f) involves verified exposure to infectious substances or injurious radiation.</li> </ul>
<b>SIGMET</b>	Significant Meteorological Information; such advisories to flightcrews include, but are not limited to, severe and extreme turbulence and severe icing
<b>SLD</b>	Supercooled large droplet
<b>SLW</b>	Supercooled liquid water
<b>SN</b>	Serial Number

<b>SPS</b>	Stall Protection System
<b>STC</b>	Supplemental Type Certificate
<b>Survivable Accident</b>	An accident is considered to be survivable if at least one occupant survived, or there was potential for occupant survival.
<b>TAIC</b>	Transport Accident Investigation Commission (New Zealand)
<b>TAT</b>	Total Air Temperature
<b>TC</b>	Type Certificate
<b>TCAS</b>	Traffic Alert And Collision Avoidance System
<b>TN</b>	Technical Note
<b>TRACON</b>	Terminal Radar Approach Control
<b>TLU</b>	Travel Limiter Unit; which limits rudder travel
<b>UAE</b>	United Arab Emirates
<b>UTC</b>	Co-ordinated universal time (see Zulu Time & GMT)
<b>VMC</b>	Visual Meteorological Conditions; expressed in terms of visibility, distance from clouds and ceiling equal to or better than specified minima
<b>VFR</b>	Visual Flight Rules; rules that govern the procedures for conducting flight under visual conditions (VMC)
<b>VOR</b>	Very High Frequency Omnidirectional Radio; range navigation aid
<b>WSR</b>	Weather Surveillance Radar
<b>Zulu Time</b>	Co-ordinated universal time (UTC), time at the O' longitude line that passes through Greenwich, England, and is based on the 24-hour clock

## **18.0 Appendix D - WHIP! Viewer Help**

### **18.1 Overview**

*WHIP!*® is a free, high-performance viewer for web-enabled (DWF) drawings. *WHIP!* allows users to view DWF drawings using the advanced graphics system found in AutoCAD® 2000 and AutoCAD Release 14, with features including real-time zoom and pan. *WHIP!* also allows you to drag a DWF and its associated DWG into AutoCAD 2000, or AutoCAD Release 13 or 14.

*WHIP!* views any files stored in the DWF format, including files from AutoCAD®, AutoCAD LT®, TurboCAD, Visio Standard, Visio Professional, Visio Technical, and any other application that is capable of correctly exporting data in the DWF format.

### **18.2 WHIP! Commands**

From your browser in the *WHIP!* window click the right mouse button to view a menu of *WHIP!* commands. The *WHIP!* right click menu enables you to select from various modes of operation. This section describes the right click menu commands available for *WHIP!*

#### **18.2.1 PAN**

By default *WHIP!* is in Pan mode and the mouse pointer is a hand icon. To pan, press and hold the left mouse button and drag. The hand grabs the screen as you pan the DWF. Alternatively, you can use the arrow keys as keyboard shortcuts for pan.

#### **18.2.2 ZOOM**

If you choose Zoom, the pointer changes to a magnifying glass. To zoom, press and hold the left mouse button and drag up and down in the window to zoom in and out, respectively. Alternatively, you can use the Pg Up and Pg Dn keys as keyboard shortcuts for zooming in and out.

#### **18.2.3 ZOOM RECTANGLE**

If you right click and choose Zoom Rectangle, the pointer changes to a cross. To Zoom Rectangle, press and hold the left mouse button, then drag a rectangle over the area you want to zoom. When you release the button, the view zooms to the selected area. You must zoom to an area of at least 5 pixels.

#### **18.2.4 FIT TO WINDOW**

If you right click and choose Fit to Window, the view is zoomed in or out so that the drawing fills the available *WHIP!* window. Alternatively, you can use the Home key as a keyboard shortcut for Fit to Window.

#### **18.2.5 LAYERS**

Using *WHIP!*, if you right click and choose Layers, the Layers dialog opens from which you can turn layers on and off. The Layers dialog works like most Explorer dialog boxes in that you can select one or more layers and click the light bulb icon to turn on or off all

of the selected layers. Layers are toggled based on the state of the light bulb icon when you click it. Pressing the space bar is the same as clicking the light bulb icon. From within the Layers dialog, right click to access the Layers submenu. Layers submenu commands are On, Off, Toggle, Select All, and Clear All.

### **18.2.6 NAMED VIEWS**

Some DWG files have named views for use with AutoCAD. When a DWF is generated from such a DWG file, the named views are maintained within the DWF. As a result, when viewing a DWF file you can right click and choose Named Views to open the Named Views dialog. From the Named Views dialog you can select in the DWF file a named view previously defined in the source DWG. To position your browser to a view, double-click the named view, or select a named view and then click OK to select that view and dismiss the dialog. The right click menu Named Views command is available only when a DWF file contains at least one named view.

### **18.2.7 LOCATION**

If you right click and choose Location, the Current Location dialog opens displaying the current location of the mouse with respect to the DWF file. The coordinates displayed in the dialog reflect the original DWG file coordinates, not the coordinates of the DWF file.

### **18.2.8 FULL VIEW**

When you right click and choose Full View, the browser navigates to an URL that contains only the DWF file. The DWF fills the available browser window. To undo this operation, use the browser's Back button or Go menu Back command.

### **18.2.9 HIGHLIGHT URLS**

Right click, then check or clear the Highlight URLs menu command. If the command is checked, *WHIP!* identifies all of the URLs in the DWF by highlighting each URL region. This enables you to see where URLs are before navigating. To avoid matching the color of the background or geometry in the DWF file, the highlighting is drawn in alternating light-gray/dark-gray/clear colors. Rendering in the clear color provides an instance where you can see the geometry underneath the URL text box.

If the command is not checked, URLs are not highlighted.

As a shortcut for the right click menu command, hold down the shift key. Release the Shift key to turn off Highlight URLs.

The right click menu Highlight URLs command is available only when a DWF file contains at least one URL.

### **18.2.10 COPY**

To copy the current view of the DWF file, choose Copy from the right-click menu, or press CTRL+C. The current view is copied as an Enhanced Windows Metafile (EMF) and placed in the Windows Clipboard. You can paste the Clipboard contents into any EMF compliant application by choosing that application's Paste command, or in most cases by pressing CTRL+V. Note that images copied and pasted from *WHIP!* into other applications may lose some precision since EMF format files do not have the same amount of detail as DWF files.



Note that the Copy command shortcut (CTRL+C) does not work in Netscape Navigator. Netscape Navigator users must use the right-click menu Copy command to copy the current *WHIP!* view.

### **18.2.11PRINT**

To print a DWF, right click and choose Print. The view that is currently visible in the *WHIP!* window is printed using the standard system print controls. Using the right click menu Print command prints only the DWF file. Otherwise, to print the entire HTML page including the current view of the DWF in the *WHIP!* window, use the browser's Print button or File menu Print command. If you print using the browser Print command, the Print dialog appears from which you have the option to force the background color of the DWF to white and the color of the geometry to black. (These settings are on by default.) To maintain the original colors when printing, make sure the color adjustments options are deselected.

### **18.2.12SAVE AS**

To save the DWF to your local drive, right click and choose Save As. You can choose to save the DWF file in three formats: DWF, DWG, or Windows Bitmap (BMP).

If you select to save the file as a DWG, *WHIP!* copies the DWG file used to generate the DWF, provided that the DWG file is available. When looking for a DWG file, *WHIP!* looks in the directory where the DWF file is stored. Note that the DWF file and DWG file must reside in the same directory for drag and drop to work.

If you do not want to publish the DWG file, but want to publish only the DWF, do not place the DWG file in the DWF directory. In this case, when you attempt to save as DWG, an error message is generated that indicates that the DWG file is not available and the Save As fails.

The right click menu Save As command is available once the streaming of the DWF file completes.

### **18.2.13ABOUT WHIP!**

When you right click and choose About *WHIP!*..., the About *WHIP!* dialog opens. The About *WHIP!* dialog displays information about *WHIP!* and the current DWF.

Regarding the DWF, you can view information on the following attributes (assuming they were supplied when the file was created): data version (revision of DWF), description, author, creator, copyright, keywords, source filename, creation time, modification time, source creation time, source modification time, current view left, current view right, current view bottom, and current view top.

The coordinates depicted in the current view are useful when used with view="left+right+bottom+top" targets.

### **18.2.14FORWARD**

Forward is equivalent to the browser Forward button. The right click menu Forward command is useful when working with frames. Use it so that the browser only advances forward for the frame containing the DWF file.

### **18.2.15BACK**

Back is equivalent to the browser Back button. The *WHIP!* Back menu item is useful when working with frames. Use it so that the browser only advances backward for the frame containing the DWF file.

### **18.2.16Viewing Hyperlinks in *WHIP!***

In *WHIP!*, if the pointer is positioned over a hyperlink (an URL), the pointer changes to a pointing hand icon and the browser Status bar displays the address (URL) of the hyperlink. To navigate to an URL, click the link. Your browser displays the linked page. If the object or area under the pointer contains more than one URL, the Status bar displays the message *Multiple URLs*. To display a list of URLs attached to the current object or area, click once. A list is displayed from which you can choose an URL.

### **18.2.17Printing DWF Files**

As defined in the Commands section, there are two ways to print:

- Printing from the *WHIP!* right mouse button menu  
This method prints only the current view of the DWF file. The print fills the available printing area as defined by your system printer settings.
- Printing from the browser's Print button  
This method prints the entire HTML page with the current view of the DWF file occupying *WHIP!*. The HTML page prints according to your system printer settings.

With regard to HP printers, printing DWF files using raster graphics (instead of vector graphics) produces higher fidelity results. The default for HP printers is to use vector graphics. From the Windows Start menu, choose Settings, choose Printers, then modify your printer's properties to use raster graphics instead of vector graphics. Printing takes slightly longer, but the resulting DWF images look much better.

## **18.3 System Requirements**

Intel Pentium Pro, Pentium, or 486 PC

Microsoft Windows 98, Windows 95, or Windows NT 4.0

Microsoft Internet Explorer 4.01 or Netscape Communicator 4.5

*WHIP!* Release 4 is for users with either browser type and Windows NT 4.0 or Windows 98/95. *WHIP!* Release 3 is for Windows NT 3.51 users with Netscape Navigator.

## **18.4 Installation**

Installing *WHIP!* as an ActiveX Control for Microsoft Internet Explorer

### **18.4.1 Manually Installing *WHIP!***

To manually install the control:

Download whip4.exe from the Autodesk web site.

Make sure Microsoft Internet Explorer is not running.

Run whip4.exe by double-clicking it.

Follow the on-screen instructions.

### 18.4.2 Installation Troubleshooting

On rare occasions, the whip.ocx may fail to register in the Windows Registry. If *WHIP!* does not successfully register during installation, you will receive an error message at the end of the install process informing you that the whip.ocx failed to register. Failure to register usually happens when you have software on your computer that conflicts with the *WHIP!* install process. For example, the SpeedStart utility included with Norton Utilities version 3.0 may cause *WHIP!* to fail to register. To enable registration of the whip.ocx, disable or uninstall the software you believe is causing the conflict and try installing *WHIP!* again. If you do not believe that previously installed utilities are causing the problem, you should uninstall *WHIP!* and ensure that your system has the following versions of the following DLLs:

<b>DLL</b>	<b>Version</b>
<b>MFC42.DLL</b>	6.00.8267.0
<b>MSVCIRT.DLL</b>	6.00.8168.0
<b>MSVCP60.DLL</b>	6.00.8168.0
<b>MSVCRT.DLL</b>	6.00.8267.0
<b>OLEPRO32.DLL</b>	5.0.4265

These are typically found in the c:\windows\system32 directory. If you find you have older versions of these files, you should rename them, for example mfc42.tmp, and reattempt the installation.

Uninstalling *WHIP!*

To uninstall *WHIP!*:

From the Windows Start menu, choose Programs.

1. Choose Autodesk *WHIP!*
2. Choose UnInstall *WHIP!*, then follow the on-screen prompts.

*WHIP!* is removed from your system.

If the Windows Start menu commands are unavailable for Autodesk *WHIP!*, you can also remove *WHIP!* by following the directions in the Add/Remove Programs portion of your operating system's Control Panel.

If for some reason either of these methods fail, and you need to remove *WHIP!* manually, the steps differ depending on whether you are using the *WHIP!* ActiveX control or the Plug-In.

## **19.0 Appendix E – Rhinoceros CAD Viewer (Rhino)**

### **19.1 Overview**

Rhino is a program to allow you to view 3D CAD models.

Rhino provides the tools to accurately model designs ready for rendering, animation, drafting, engineering, analysis, and manufacturing. Rhino can create, edit, analyze, and translate NURBS curves, surfaces, and solids in Windows. There are no limits on complexity, degree, or size. Rhino also supports polygon meshes.

The version in use at TSB (Rhino 2.0) is an evaluation version limited to 25 saves. As it is only being used to view files this is not a concern and there should be no need for the user to use the save function as all files are read only. The program will continue to function after the 25 saves just without the save functionality so it will continue to function properly as a viewer.

### **19.2 Recommended Settings**

The following settings are recommended when dealing with the TSB CAD files:

*File->Properties->Render Mesh* should be set to *Jagged & Faster*

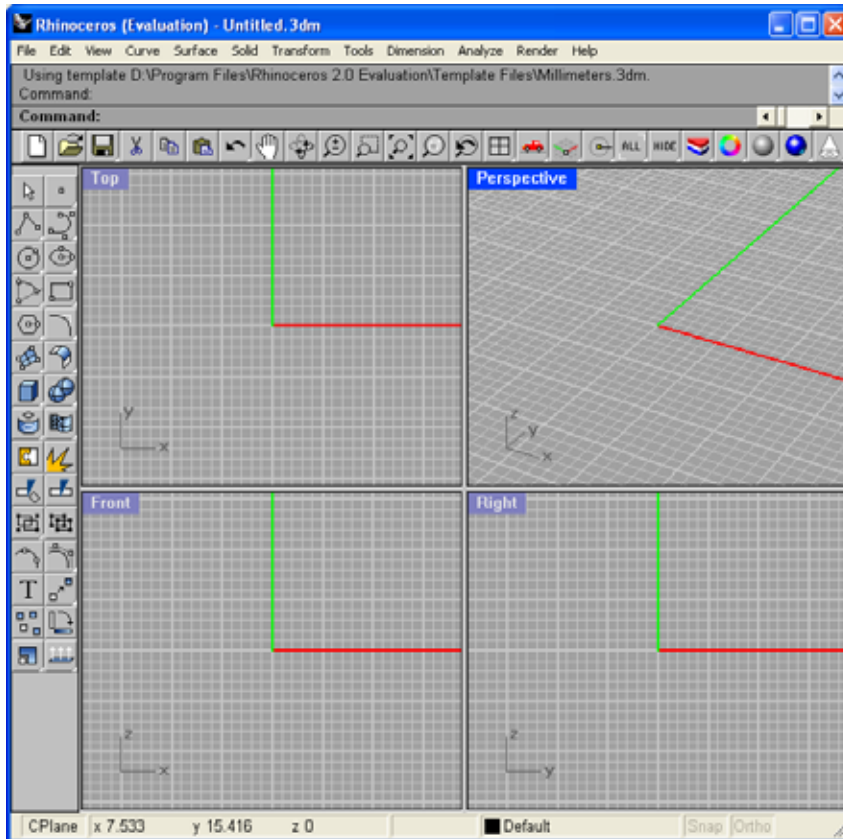
*Tools->Options->Shade* should be set to *Use OpenGL* and *Use Wireframe Colors for Objects*

### **19.3 General Usage**

When Rhino is run or a Rhino file launched from a link, the following screen will appear.



To start using Rhino and view the file, click the *Exit to Rhino* menu item. This will take you to the main Rhino screen as shown below.



### 19.3.1 Pan

To position the image within the Rhino view port window (move it left-right, up-down), use the *Pan* command.

*Pan* can be accessed in any of the following ways:

Toolbar: *Pan* icon



Menu: *View > Pan*

Click and drag in a viewport to pan the view.

The following shortcuts can also be used to pan:

- You can pan by holding Shift and dragging with the right mouse button.
- Plan parallel views like the default Top, Front, and Right view pan by dragging with the right mouse button.
- Hold Shift or Ctrl and press the arrow keys.

### 19.3.2 Rotate

To move the elements around within a drawing to get different views, use the *Rotate View* command.

*Rotate View* can be accessed in any of the following ways:

Toolbar: *Rotate View* icon



Menu: *View > Rotate*

Once you are in Rotate View mode, Click and drag in a view port to rotate the view.

The following shortcuts can also be used to rotate a drawing view:

- Press and hold Ctrl and Shift and drag with the right mouse button. Views that are not looking perpendicular to the construction plane rotate with the right mouse button.
- Press the arrow keys.

### 19.3.3 Zoom

To zoom in on a specific area of a drawing to get a closer view, use the *Zoom Dynamic* or *Zoom Window* commands.

*Zoom Dynamic* can be access in any of the following ways:

Zooms in and out as you drag with the left mouse button down.

Toolbar: *Zoom Dynamic* icon



Menu: *View > Zoom > Dynamic*

Click and drag in a viewport to zoom.

The following shortcuts can also be used to zoom dynamic:

- Press and hold Ctrl and drag up and down with the right mouse button to zoom in and out.
- If you have a wheel mouse, you can rotate the wheel to zoom in and out.
- Press Page Up to zoom in and Page Down to zoom out.

*Zoom Window* can be accessed in any of the following ways:

Toolbar: *Zoom Window* icon



Menu: *View > Zoom > Window*

Menu: Right-click viewport title > *Zoom > Window*

Shortcut: *Z*

At the Drag a window to zoom prompts, drag a window to zoom.

**Note:** In a perspective view, *ZoomWindow* does not always work exactly the way you would expect. Sometimes Rhino is not able to determine how close you want to zoom to, especially if there are parts of several objects inside the zoom rectangle. If you have problems with *ZoomWindow*, try using *ZoomSelected* instead or try to have parts of only a single object inside the rectangle.

### 19.3.4 Shade

To view a drawing as a shaded image as opposed to the wire frame model, use the *Shade* command.

*Shade* can be accessed in any of the following ways:

Toolbar: *Shade* icon



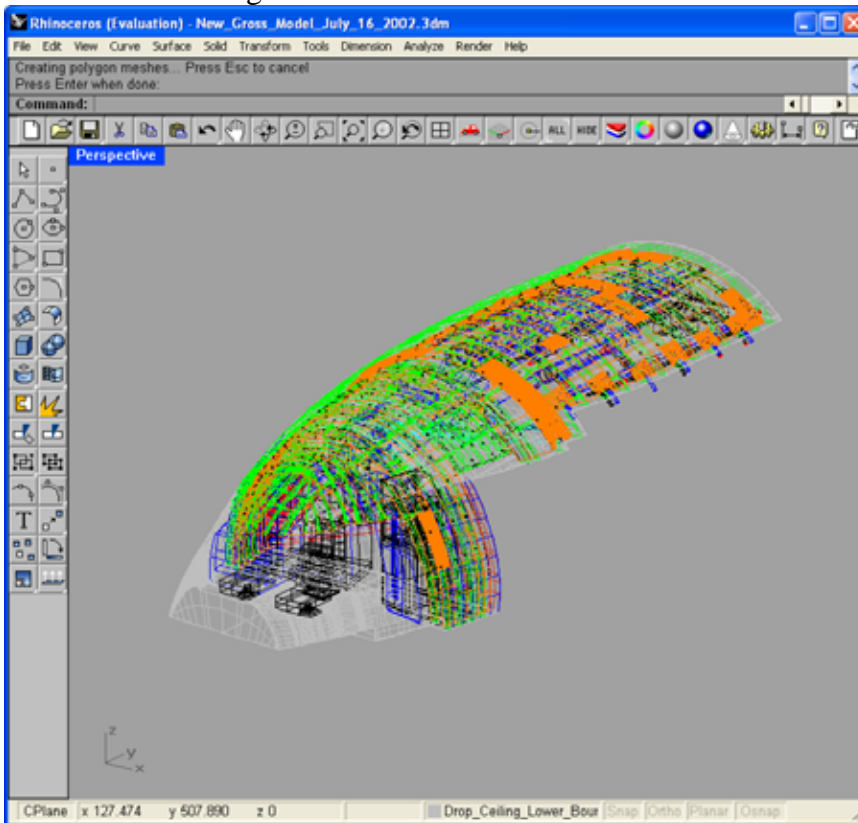
Menu: *Render > Shade*

The current viewport is shaded in monochrome with a white light coming from the viewpoint. The grid and axes are not shown, and a special background color appears.

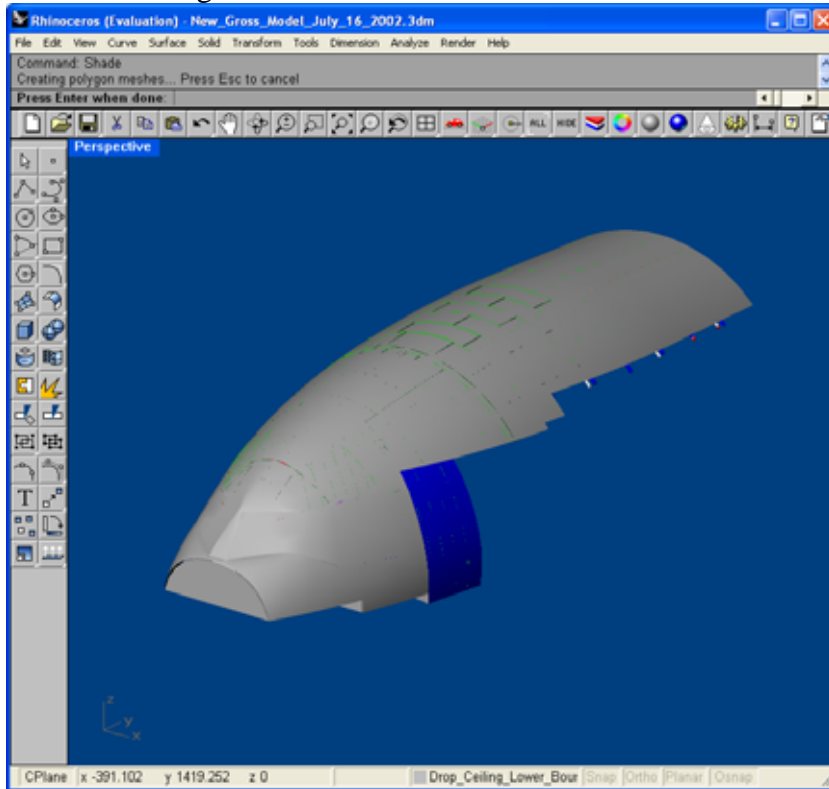
- Pan, zoom, and rotate the viewport to see the shaded model from different views.
- Press Esc or click in a viewport to return to wire frame display mode.

**Note:** Be patient on the first shade. It may not be very quick the first time. Rhino has to create a mesh from the objects in memory. Subsequent renderings may be faster. Shade renders the objects in the active viewport with a white light in front, monochrome, with no shadows, and no antialiasing. If OpenGL is turned on, the OpenGL shade options will be available. If you use the normal Rhino Shade command, you get 256 colors for background and surface color.

Wire frame drawing:



Shaded drawing:



### 19.3.5 Layers

Rhino drawings, like most of the other CAD drawings contain great deals of information. Sometimes you may only want to focus on a specific part of a given drawing. To filter out elements to obtain views of specific items the Layers can be set on/off.

*Layer* settings can be accessed in any of the following ways:

Toolbar: *Edit Layers* icon

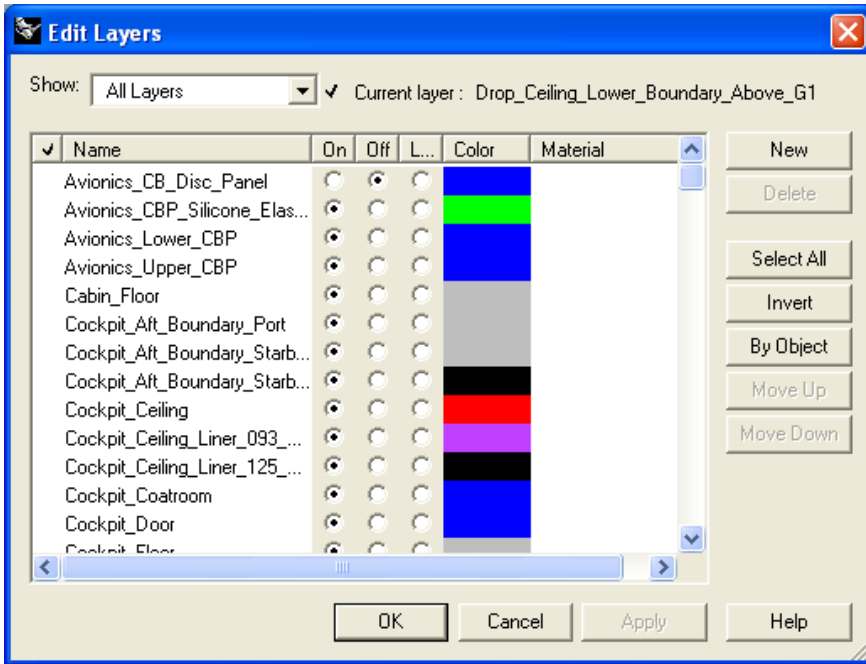


Menu: *Edit > Layers > Edit Layers*

Bottom Status bar: Right click the Layer pane.

In the Edit Layers dialog box, from the list select layers you want to turn on/off. Click the On/Off option for the desired layer settings then press *Ok* to return to the drawing.





For further details on using Rhino see the built in help accessible from the *Help* menu or via the *F1* key.

## 20.0 Appendix F – ArcExplorer GIS Viewer

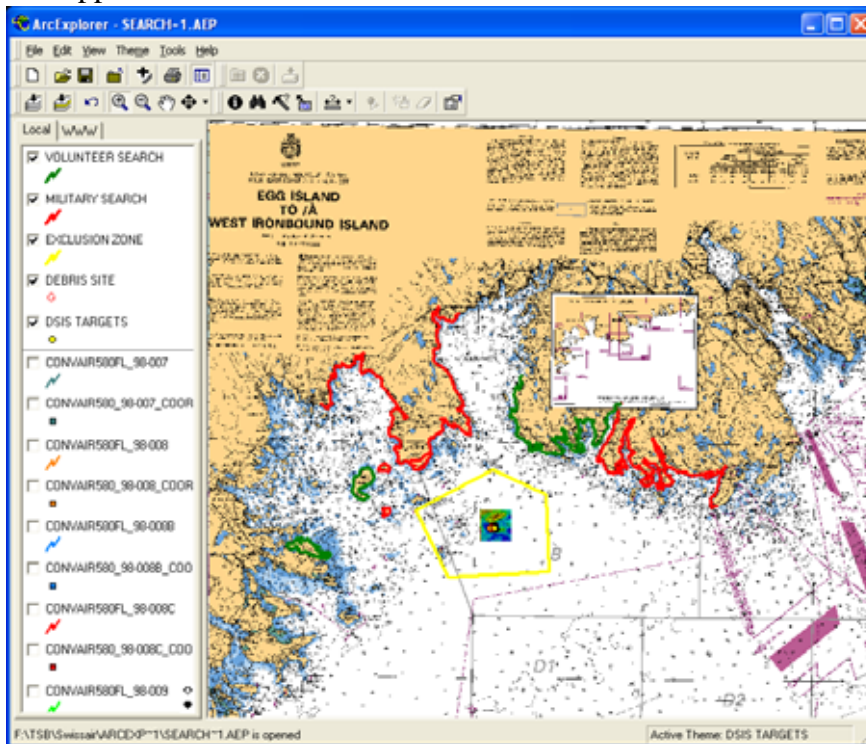
### 20.1 Overview

*ArcExplorer* is a lightweight GIS data viewer developed by ESRI. This freely available software offers an easy way to perform basic GIS functions. *ArcExplorer* comes with a straightforward user interface that includes an intuitive menu bar and tool bars.

As a complete data explorer, *ArcExplorer* lets you display and query a wide variety of standard data sources. Using *ArcExplorer* as a stand-alone desktop application, you can view and query industry-standard ESRI shapefiles, ArcInfo coverages, and ArcSDE (Spatial Database Engine) layers. You can also pan and zoom through multiple map layers and identify, locate, and query geographic and attribute data.

### 20.2 General Usage

When *ArcExplorer* is run or a *ArcExplorer* file launched from a link, the following screen will appear:



From the main interface, the user can then pan, zoom, modify displayed layers, measure, etc.

#### 20.2.1 Zoom

To zoom in on a specific area of a drawing to get a closer view, use the *Zoom In* and *Zoom Out* buttons.



This will change the mouse pointer to the selected zoom type.

Click on the image in the area you want to zoom out or in, the image will then reload with new zoom setting.

You can also hold the left mouse button down and drag a zoom rectangle around the area you want to zoom into when in *Zoom In* mode.

### 20.2.2 Pan

To position/move the image within the *ArcExplorer* window *Pan* button



This will change the mouse pointer to pan mode.

Click the image with the left mouse button and drag the image to the desired location.

### 20.2.3 Identify



When you use the *Identify* tool, *ArcExplorer* looks for features in the active theme at the location you click. On the Identify Results panel, *ArcExplorer* reports the number of features found where you clicked. If more than one feature was identified, you can see all the features that were found by using the drop down functionality on the Feature list. You can drag and drop the results of an Identify into any OLE enabled application, such as Microsoft Word or Excel. With the left mouse button, click one of the data fields listed in the Identify Results panel. Then, drag and drop into the OLE enabled application of your choice.

### 20.2.4 Measure



You can use the measure tool to specify a measurement unit and then measure distances on your map in feet (ft), miles (mi), meters (m), or kilometers (km).

Measuring distances on a map view:

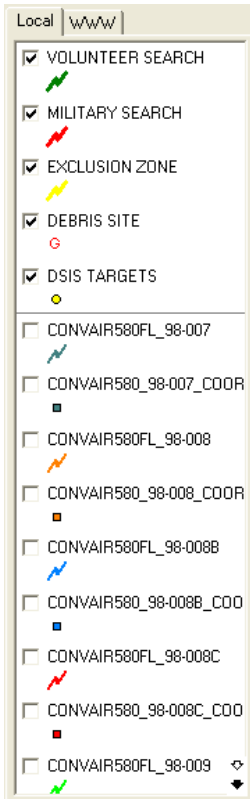
1. Click the Measure tool and choose a measurement unit from the detachable menu.
2. On the map view, click and drag to draw a line representing the distance you wish to measure.
3. Double-click to stop measuring and clear the measurements from the map view.

The segment and total length you measured is displayed in the status panel at the top left of the map view. After you double-click, the total length appears in the lower left corner on the status bar.

### 20.2.5 Layers/Themes

The concept of “layers” as used in CAD type applications is referred to as “themes” within *ArcExplorer*. A theme is a set of geographic features. A theme represents a source of geographic data, spatial data source such as an ArcInfo coverage or ArcView shapefile, an image data source such as a satellite photo, or a data layer managed by ESRI’s Spatial Database Engine (ArcSDE).

All themes in a map view are listed to the left of the map in the Legend.



The legend shows the theme name and the symbol used to draw each theme. The check box next to each theme indicates whether it is currently turned on or off in the map view, that is, whether it is currently drawn on the map or not. The Legend has two modes: Local for managing locally stored databases and WWW for managing data stored on Web sites.

The order in which the themes are listed in the legend is also important. The themes at the top of the legend are drawn on top of those below it. Themes that form the background of your map are listed at the bottom of the legend. Change the drawing order by using the left mouse button to drag themes up and down within the Legend. Use the black and gray arrows to scroll the legend up and down if there are more themes loaded than can be shown.

For further details on using ArcExplorer see the built in help accessible from the *Help* menu or via the *F1* key. Also refer to the *Using ArcExplorer* guide accessible from the *ArcExplorer Setup and Usage* page in the PRODOCS *Links* menu.

## ***21.0 Appendix G – Utilities and Plugins Help***

Additional utilities have been provided to the PRODOCS user via the *Utilities and Plugins* menu under the main *Links* menu. These programs provide added functionality for tasks related to the PRODOCS data and investigation process. For help on using each of these applications, refer to the associated information found for each item on the main *Utilities and Plugins* page accessed from the menu. Many of these applications have built in help that is typically accessible via the *Help* menu or by pressing the *F1* key.

