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A I R B U S T E C H N I C A L M A G A Z I N E

F L I G H T

A I R W O R T H I N E S S

S U P P O R T

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Around the clock... Around the world

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The ESG and ISEP possibilities described in this FAST will enhance the efficiency, life and residual value of the A320 Family.

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ERRATUM FAST40 - page 11 The text should have read: "If all of the PAPI system lights are red, you are below the guide path" instead of white

This issue of FAST Magazine has been printed on paper produced without using chlorine, to reduce waste and help conserve natural resources.
Every little helps!

Customer Services
events

Just happened

A300/A310 FAMILY TECHNICAL SYMPOSIUM TOULOUSE, FRANCE 5-9 NOVEMBER 2007

The Technical Symposium attracted 85 participants from 41 airlines and many vendors and MROs also attended. There was constructive discussion on many technical aspects and also the Airbus plans for the Long Term Support of the programme. The main items of discussion included continued improvements in dispatch reliability for the fuel system and the prevention of hydraulic leaks. The continued availability of spare parts, for the long term, was also appreciated by operators.

TECHNICAL DATA SUPPORT AND SERVICES SYMPOSIUM TOULOUSE, FRANCE 12-15 NOVEMBER 2007

The symposium attracted 150 participants, customers, MROs and suppliers from all over the world. The Theme was 'Developing for the Future' and the current and upcoming developments were outlined during the main presentations, including feedback about implemented or scheduled optimization for advanced consultation, enhanced data deliverables and sustained customer support. Many product demonstrations and workshops were held, which generated fruitful discussion and feedback on the Airbus TD deliverables such as AirN@v Modules, ADOC, AirbusWorld and SB+.

Coming soon

A330/A340 FAMILY TECHNICAL SYMPOSIUM DUBAI, UNITED ARAB EMIRATES 11-15 MAY 2008

Airbus is pleased to announce the date and location of the next A330/A340 Symposium.
The symposium is the opportunity to review actual in-service experience with the A330/A340 Family of aircraft as well as to discuss subjects of more general technical interest. A provisional agenda will be sent in due time.

MATERIAL, SUPPLIERS AND WARRANTY SYMPOSIUM CANCUN, MEXICO JUNE 2008

The symposium objectives will be to review together strategic directions and current support and services initiatives within the material, logistic, supplier & warranty domains.
Presentations, dedicated workshops and bilateral meetings will provide a forum for airlines, suppliers and Airbus to pursue further solutions in optimizing the cost of aircraft ownership and increasing aircraft operational availability. The event will also provide an insight into the developing warranty and material management related e-services and the latest in Supplier Support Conditions (SSC).

Longer service life for the A320 Family

The Extended Service Goal project

After nearly 20 years of successful operation, now with more than 3,300 aircraft in-service and 200 operators, the maintenance programme of the first aircraft is now coming close to the end of the original approved validity. Demand for A320 Family aircraft has never been so high and the A320 is still the most efficient aircraft in its category, with operators still seeing significant potential for their earliest aircraft in terms of both revenue and residual value.

The fleet leader in hours reached 60,000 flight hours (FH) in October 2007. The fleet leader in cycles will reach 48,000 flight cycles (FC) at the beginning of 2011.

Based on in-service experience and market expectations, Airbus launched at the beginning of 2007 the Extended Service Goal (ESG) project for all A321, A320-200 (excluding a specific configuration with bogie main landing gear), A319 and A318 aircraft. Its objective is to enable the current A320 Family fleet to fly beyond 48,000FC and 60,000FH.

This article describes the ESG project and the benefits operators will derive from it.

Nicolas Chrétien
A320 Family Programme
Airbus Customer Services

LONGER SERVICE LIFE FOR THE A320 FAMILY - THE EXTENDED SERVICE GOAL PROJECT

The Family today

The 3,300 aircraft delivered to date are spread over the world with the associated diversity of operations. Typically, aircraft are flying on average 1.84 hours per flight with a large range of variation between 40 minutes and more than 4 hours per flight. Logically, some aircraft will reach the FH limit before the FC one and vice-versa depending on if they are performing longer flights or used on short routes.

The Family tomorrow

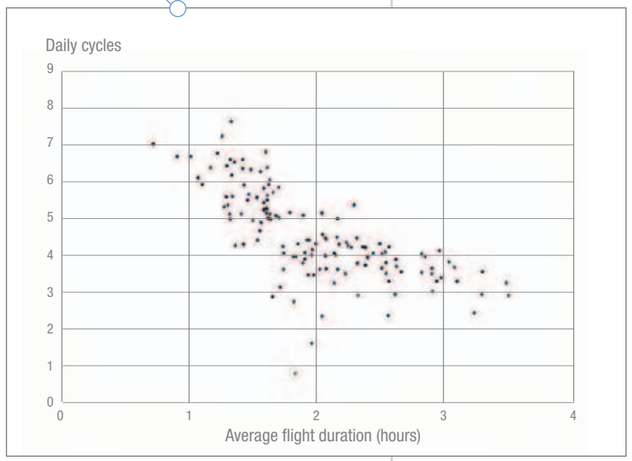
ESG justification to prove maintenance programme validity/update will be achieved in two steps (pending test results):

- ESG I: 60,000FC/120,000FH
- ESG II: to be certified based on tests to be continued after ESG I when the economic limit of the airframe maintainability will be reached.

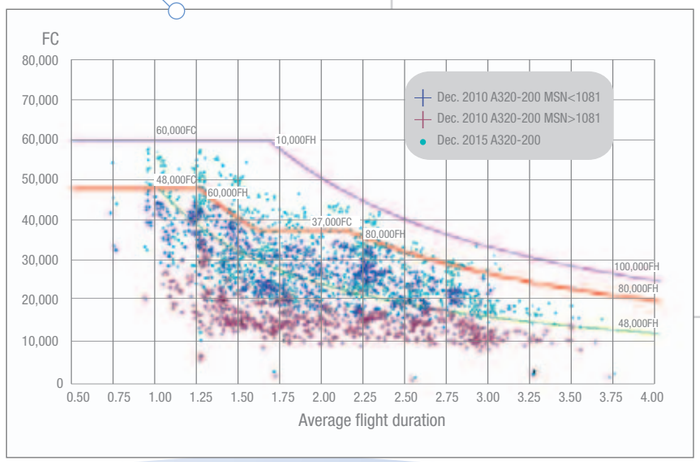
These values have been defined based on today's average figure of about two flight hours per flight cycle. Estimations at today's rate are showing that FH driven aircraft will reach 120,000FH at the earliest in 2022 and FC driven aircraft will reach 60,000FC at the earliest in 2017. This represents at least 10 to 15 years of further operations with ESG I, and even more with ESG II.

For aircraft reaching 60,000FH, an Intermediate Service Goal (ISG) solution is available with its updated maintenance programme formally approved by the airworthiness authorities with only minor adaptations to allow these FH-driven aircraft to be operated until ESG I completion, whose maintenance programme is planned by the end of 2010. Priority is given to the A320-200, as the earliest aircraft of this type will reach the current Design Service Goal (DSG) first, the A321, A319 and A318 values will also be extended to be the same as the A320-200.

Distribution of A320 Family operator fleet average flight duration vs. daily cycles



A320-200 fleet end 2015

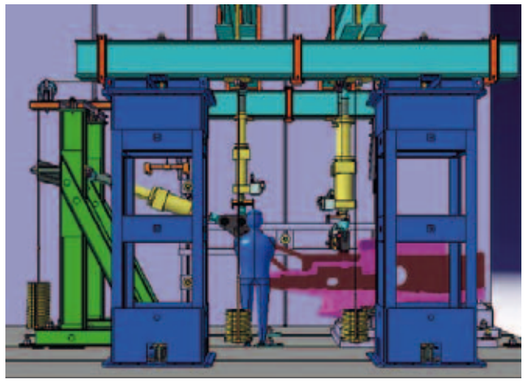


ISG and ESG envelope for A320-200 aircraft

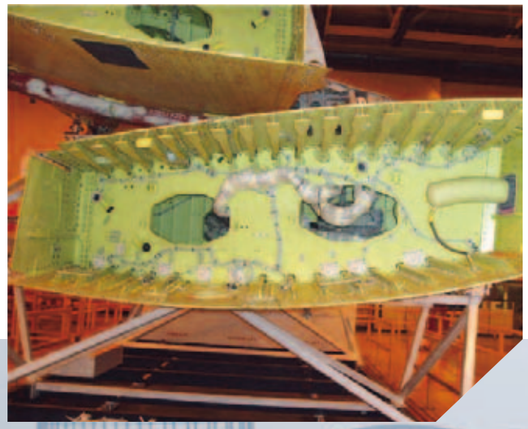
Initial DSG		ISG		ESG I		ESG II	
FC	FH	FC	FH	FC	FH	FC	FH
48,000	60,000	37,500	80,000	60,000	120,000	90,000	180,000

3D view of FWD nose section equipment for fatigue test

3D view of test facility environment to perform pylon fatigue test



Wings for ESG central test section



A series of fatigue tests to reach the target

To ensure adequate justification of the ESG and in addition to the calculation and Finite-Element-Model simulation, full-scale fatigue tests will be performed. Specific test sections are being manufactured taking the original configuration into consideration and the specificities of each type, including A321 sections for example.

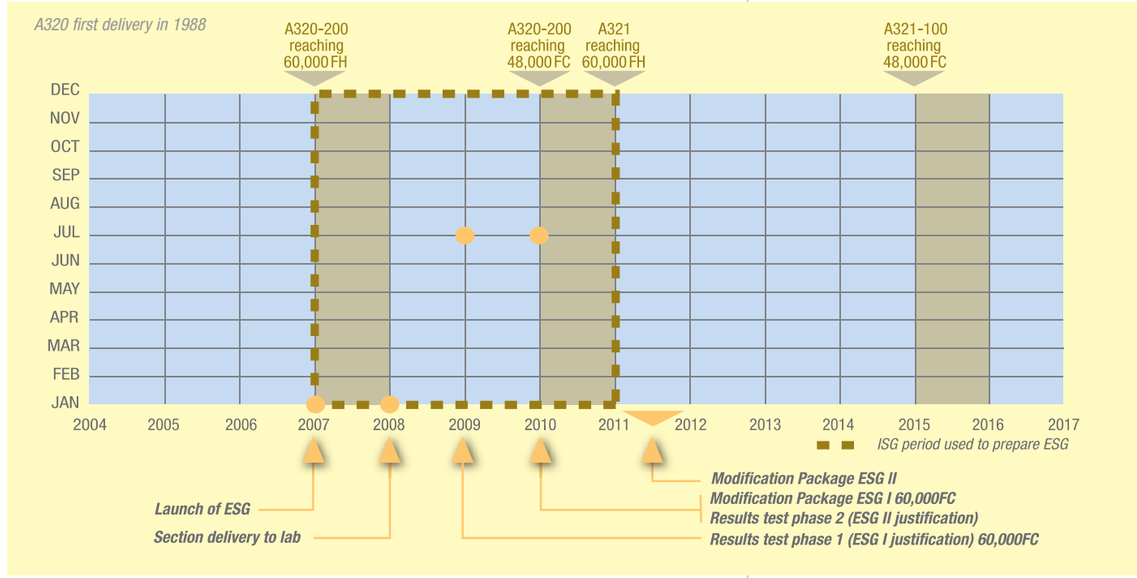
Full-scale fatigue tests will be performed on partial aircraft sections:

- AFT section, from section 16A to tail cone
- Central section, from 13A to 17 plus wings
- FWD section, from section 11 to 14A
- Pylon.

Results will confirm the fatigue behaviour of the complete aircraft.

Compared to the initial and more conservative full-scale fatigue tests performed previously, the new tests will allow:

- To take the 20 years experience in A320 Family operation into account
- The use of new generation calculation and simulation methods
- To use a modern and more representative test environment.



ESG project timescale

The ESG project launched at the beginning of 2007 will go into active phase with the start of the full-scale fatigue tests in January 2008.

Test cycles to justify requirements for ESG I will be reached in July 2009 with ESG I formal maintenance programme update approval mid 2010.

Tests will be continued until mid 2010 to assess and confirm ESG II requirements with formal maintenance programme update approval expected in 2011 or 2012, depending on the test results.

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Conclusion

After 20 years of successful operation, the A320 Family is still the most efficient in its category and operators see significant further potential in their earliest aircraft for revenue and residual value. Based on these operator expectations and in-service experience Airbus launched the Extended Service Goal project for all A320 Family aircraft to make the most of the aircraft's potential and enable operators to benefit from their longer life.

Implementation of the ESG I package will enable operators to operate their A320, A321, A319 and A318 aircraft for an additional 10 to 20 years and even longer with ESG II. This will enable them to generate additional revenue from flying their aircraft longer, increase the aircraft residual value and enable them to maximize benefits from fleet upgrade and harmonization projects like the Airbus In-Service Enhancement Project (ISEP)*, the enhanced cabin, or fuel saving measures offered by Airbus to keep in-service aircraft at the highest level of efficiency.

The early A320 Family aircraft started the successful family story and will further contribute to it by continuing to fly in the next couple of decades as enduring, reliable and efficient aircraft generating further revenue for their operators.

** See next article*

AIRBUS

In-Service A320 Family enhancement

A major avionics system enhancement package

Operators of A320 Family aircraft may have received their aircraft over a number of years, or leased or bought pre-owned aircraft, which can result in differing fleet build standards and possible operational and cost penalties.

Airbus now offers operators the ability to harmonize their fleet standards for operational benefits and cost savings. A comprehensive avionics enhancement package for A320 Family aircraft called the In-Service Enhancement Package (ISEP) is available. This offers the opportunity to adapt fleets to compete in the increasingly challenging market conditions of today. It provides a core platform for bringing earlier aircraft to current production standards in major areas and is designed to bridge the gap between previous and later deliveries in operational performance.

Immediate benefits include improved Operational Reliability (OR), reduced Direct Maintenance Cost (DMC), lower spares costs, weight reduction and significant operational savings. ISEP also opens the door to greater operational performance by providing the foundation for future operational requirements.

Pierre Magro
Head of Avionics Product Line
Airbus Customer Services

ISEP core package

ISEP is a compilation of fully proven Airbus Service Bulletins, selected for their impact on cost savings, operational capability and aircraft residual value.

The ISEP core package covers the following:

1 ***FMS2*** *(Flight Management System second generation)*
Provides core flight management with sufficient NAV Database capacity and sophistication to meet current and future air traffic management requirements.

2 ***EIS2*** *(Electronic Instrument System second generation)*
Updates the EIS cathode ray tube screens to six Liquid Crystal Display flat-screen technology, enabling new graphic features and reducing maintenance costs.

3 ***ISIS*** *(Integrated Stand-by Instrument System)*
Replaces three conventional electro-mechanical standby instruments (altimeter, airspeed and standby horizon), adds new functions and contributes to cost reduction.

4 ***DCDU*** *(Data Communication Display Unit)*
Provides the human machine interface for air traffic data communications.

5 ***MMR*** *(Multi-Mode Receiver)*
Provides a Global Positioning System (GPS) receiver and Instrument Landing System (ILS) functions in a single box, increasing navigation accuracy, reducing crew workload and supporting future landing systems.

6 ***ADIRU*** *(Air Data Inertial Reference Unit)* ***4MCU***
Provides the precision required to support Required Navigation Performance called Low RNP, the previous fit of ADIRU 10MCU does not provide this precision. ADIRU 4MCU also brings other advantages like lower power consumption, improved memory BITE (Build In Test Equipment), Present Position (PPOS) improvement alignment function, and enhanced RVSM (Required Vertical Separation Minima) capability that halves the vertical distance required between two aircraft.

7 ***ATSU*** *(Air Traffic Services Unit)*
Centralizes all data communication between air traffic controllers and airlines operations centre, allowing accurate delivery of flight movement and maintenance reports.

8 ***VDL mode 2*** *(VHF Data Radio)*
Improves the data rate exchange between aircraft and the ground station. Its activation completes the ATSU installation for Future Air Navigation System B (FANS B)

9 ***FDIMU*** *(Flight Data Interface Management Unit)*
Provides the function of Data Management Unit and Flight Data Interface Unit in a single box and reduces operational costs.

10 ***CFDIU*** *(Centralized Fault Display Interface Unit)*
Enables the new systems BITE (Built In Test Equipment) acquisition, indexing all failures from each ISEP component memory and improves trouble shooting.

11 ***GPS antenna***

ISEP core package

- 2 x FMS2
- MMR (ILS + GPS)
- 3 x ADIRU*
- 6 x EIS2 LCD
- GPS antenna
- ATSU
- VDL mode 2
- 2 x DCDU
- ISIS
- FDIMU (replaces FDIU + DMU)
- CFDIU

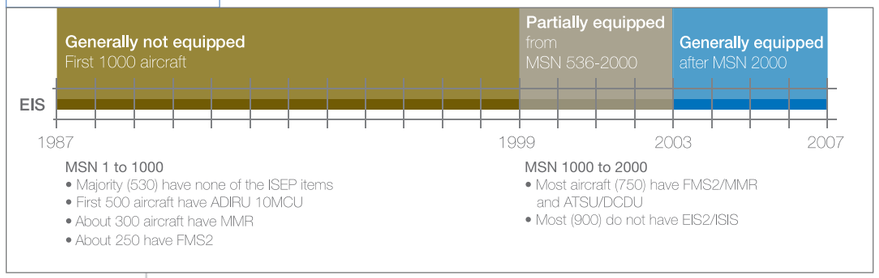
- *Components for low RNP*
- *Components for FANS B*

MMR - ADIRU 4MCU
GPS antenna - ATSU - VDL
CFDIU - FDIMU - DMC - EIS2
ISIS - DCDU - FMS2

Distinct difference in technology, operational performance and capability

ILS - ADIRU 10MCU
VHF - CFDIU - DMC
EIS1 - FMS1

Candidates for ISEP



Candidates for ISEP

The main candidates for ISEP are aircraft manufactured before 2003, in particular those delivered before 1999 as shown above.

Aircraft retrofit

The full ISEP package consists of around 40 Service Bulletins with equipment provided by Airbus. Installation during a standard 4C check or passenger to freighter conversion will allow significant time savings due to simultaneous embodiment and reduced overall access times. The full embodiment duration is assessed at 2,000 man-hours, spread over 2.5 weeks with a three-shift organization.

Operators may decide to split the embodiment dependent on pre-configuration and maintenance planning. It could be split into three packages, depending on the maintenance operation, for example:

Maintenance event	Typical elapsed time	ISEP Item
Check A: Line maintenance 600FH/750FC/100 Days	12H	FMS2/MCDU
Check C: Base maintenance 6,000FH/4,500FC/20M	5-7 days	MMR-ISIS - DCDU/VDL Mode 2 - FDIMU-ADIRU
HMV: Heavy maintenance 5Y/6Y or 10Y/12Y	15-20 working days	EIS 2-ATSU

Customized studies are required if an operator chooses this approach to establish appropriate embodiment of SBs with the maintenance events. Operators may also request Airbus assistance in management of the embodiment (turnkey solution) if so desired.

Benefits

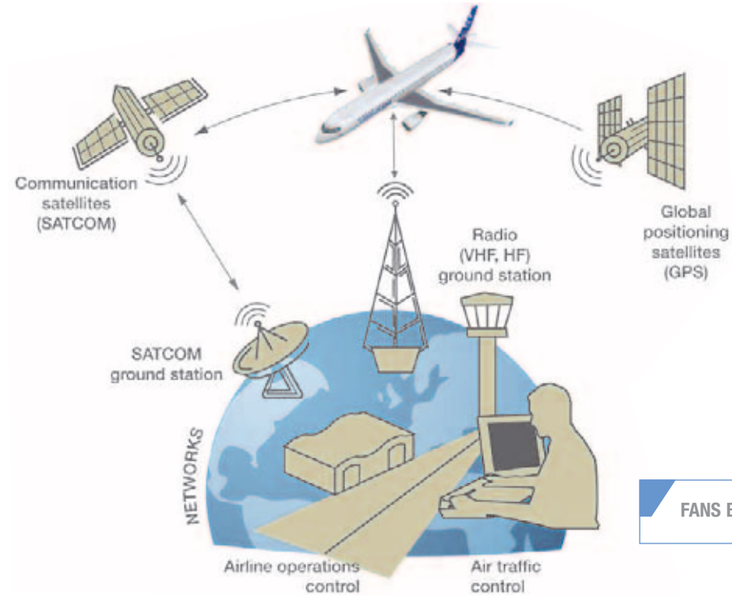
Embodiment of the ISEP core package provides direct benefits. Operational improvements include enhanced reliability, reduced maintenance and spares costs, plus weight reduction. Operational savings come from reduced track miles, fewer diversions, improved navigation performance, reduced fuel burn and less emissions.
ISEP consequently enables an increased aircraft residual value and a fleet harmonization.

The package can be used as a powerful lever to achieve greater operational performance. Indeed, it was formulated to enable a step change in capability in two key areas: Air traffic communications and navigation. It equips the aircraft with the systems needed for Airbus Future Air Navigation System B (FANS B) for the requirements of the forthcoming Air Traffic Management era. FANS B is the Airbus response to the Eurocontrol link 2000+ programme for utilization of ATC data link in high density airspace with radar surveillance in the en-route phase. A European mandate is anticipated in 2014 for in-service aircraft.

ISEP prepares the aircraft for specific Required Navigation Performances called Low RNP (at or below 0.3 nm precision level).

IN-SERVICE A320 FAMILY ENHANCEMENT - MAJOR AVIONICS SYSTEM ENHANCEMENT PACKAGE IS AVAILABLE

FANS B

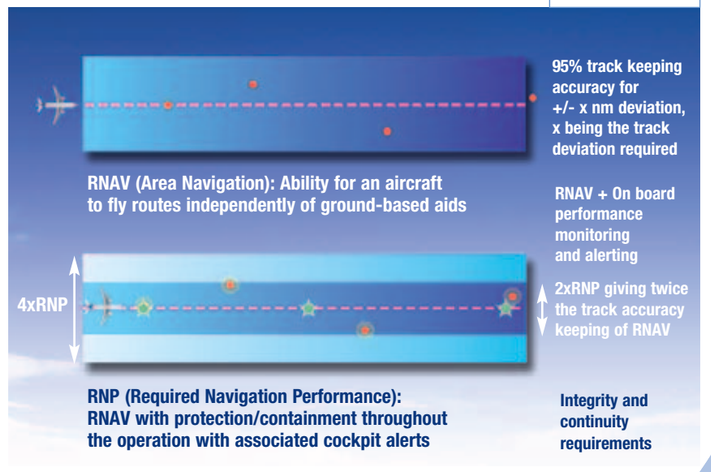


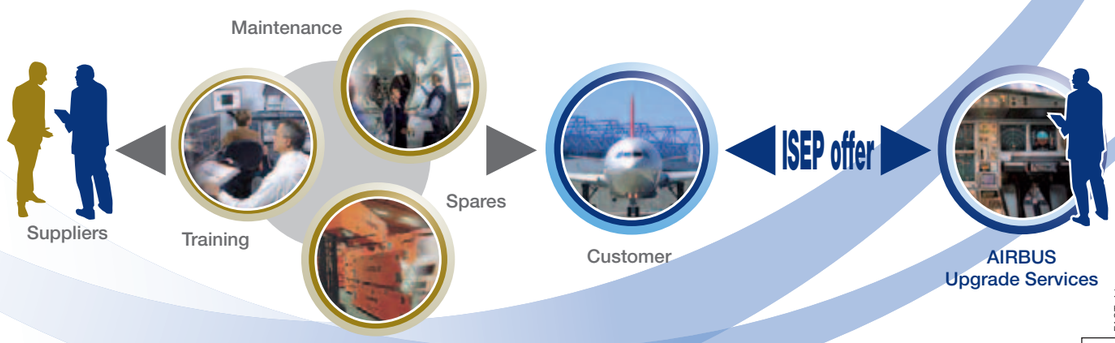
ISEP meets operator requirements

ISEP was developed under the leadership of Airbus in close collaboration with major Airbus suppliers and operators, enabling an integrated, low-risk, and economically attractive solution. As it consists of proven solutions, the ordering process is straightforward like any other Request for Change.

Airbus performs the primary interface and will provide a fleet offer, including the avionics hardware. Maintenance and spares issues however are subject to direct discussion with the appropriate vendors.

Low RNP





The supply chain

Supply chain management was carefully considered during the development phase of ISEP.

Airbus will produce the Service Bulletins and kits and deliver them to a production schedule agreed with suppliers of kit parts.

Airbus could also manage the embodiment of the package via a turnkey solution, involving engineering support and working parties management.

CONTACT DETAILS

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Conclusion

In today's competitive environment and increasingly challenging market conditions, the need to improve fleet efficiency and reliability while reducing operating costs is fundamental for an airline

From this perspective, ISEP can be a powerful and deciding factor to boost operators competitiveness by enhancing operational capability, giving improved Operational Reliability (OR), reduced Direct Maintenance Cost (DMC), lower spares costs, a decreased weight and significant operational savings (reduced track miles and fuel burn, fewer diversions).

ISEP considerably improves air traffic communication and navigation management and gives operators the opportunity to meet the needs of the next ten years or more in the most cost effective manner.

Although simultaneous embodiment of the various Service Bulletins is recommended, operators can decide to retrofit their aircraft progressively by a systems or functions implementation, based on aircraft scheduled maintenance checks.

ISEP is a key means to make a positive impact on A320 Family performance and in-service costs whilst offering a return on investment, compounded by a positive effect on aircraft residual value. It further enhances the extension of aircraft operational life as described in the Extended Service Goal project in the previous article.

AIRBUS

AIRMAN™ Rep@ir Manager for A380

Faster and easier structural damage location and assessment

Damage to aircraft structure can cause severe operational interruption. It can also be difficult to assess damage, find and collect relevant information from a wide variety of data sources and comply with regulatory record keeping requirements.

For the A380 Enhanced Support Initiatives, Airbus designed jointly with airlines a new friendly tool for tracing graphically structural damage. This new tool is called AIRMAN Rep@ir Manager and is integrated into AIRMAN v9.2, the latest release of the Airbus aircraft maintenance diagnosis and troubleshooting tool.

This article describes the objective, benefits and functions of AIRMAN Rep@ir Manager.

Colin Smart
Structure Engineer
SRM Development
Airbus Customer Services

Aurélie Duffort
Structure Repair Engineer
Airbus Customer Services

AIRMAN
integrated into AIRMAN
mini-user guide v9.2

Objective and operational benefits

AIRMAN Rep@ir Manager provides airlines with a simple method to view and locate non-conformities and in-service damage and repairs on the external surfaces of the aircraft and to record details of internal damage and repairs. Its objective is to ease line maintenance's structural damage reporting and to reduce elapsed time to assess damage and authorize aircraft return to service. It allows to speed-up the resolution lead-time, ensuring a cost-effective repair and improving aircraft availability.

Key functions

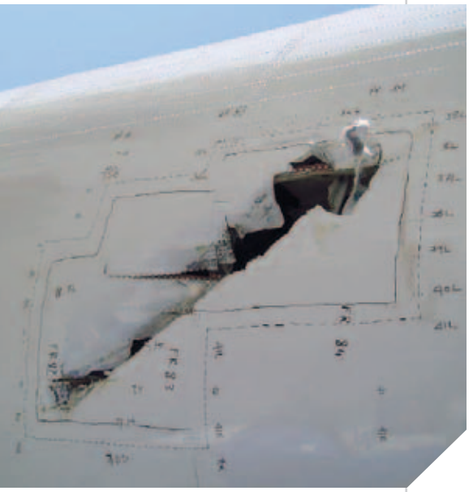
AIRMAN Rep@ir Manager mainly serves two areas of activity within an airline:

- Line and heavy maintenance for damage reporting, assessment and follow up
- Engineering services for assessment, follow up and data analysis.

At any time, a user can directly access to:

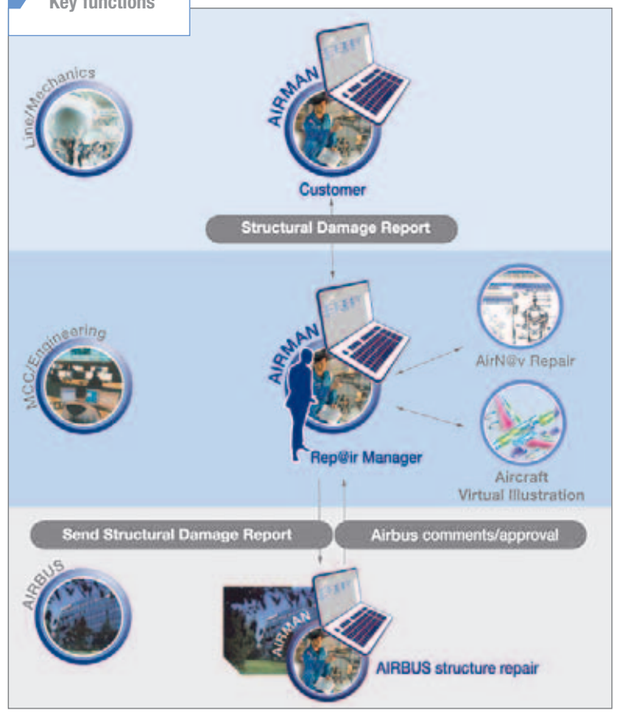
- The structural status (list of open, closed and deferred items) of the entire fleet or a specific MSN (Manufacturers Serial Number)
- The structural damage and repair history of any MSN by accessing all its repair files
- The Dent and Buckle Chart of each MSN.

With a laptop connected to the airline network and a valid access to the AIRMAN-Airline database, when damage is found a user is able to report it through a guiding interface. This guidance provides the required information for damage evaluation and reporting back the necessary data to the airline Maintenance Control Centre (MCC), or Airbus if further investigation is required.



Damage on fuselage skin

Key functions



Capabilities

AIRMAN Rep@ir Manager provides the following capabilities:

STRUCTURAL DAMAGE REPORT ACQUISITION

This guides the user through the different steps of the compilation of a report: Location, description and assessment.

It also helps the user to fill in repair and approval data in the relevant tab of the Structural Damage Report (SDR).

SPECIFIC TOOL FOR ACCURATE DAMAGE LOCATION - AVI

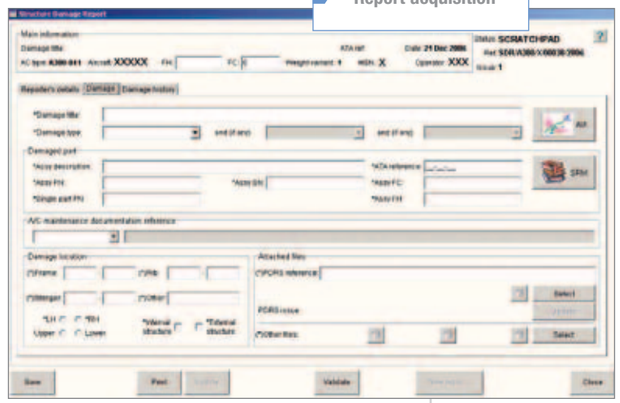
The Aircraft Virtual illustration (AVI) is a graphics tool used to locate the damage/repair on a 2D (two-dimensional) digital mock-up of the structure.

Using the AVI, a user has direct access to the assembly drawings on which structural damage can be localized. The AVI uses a defined set of symbols to differentiate types of damage and colours depending on damage status (scratchpad, open, closed, deferred).

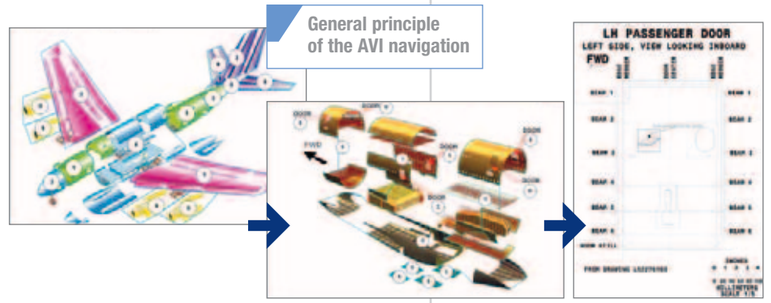
SEARCH FUNCTION

Using search criteria, users can get quick access to all the information stored for a given MSN (open and deferred actions, additional maintenance requirements…), or damage (status, dimensions, allowable, repair and approval documents…) and can then launch the relevant actions if required.

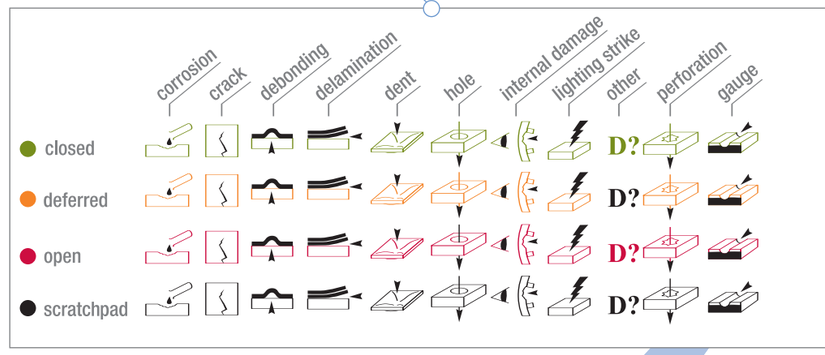
Report acquisition



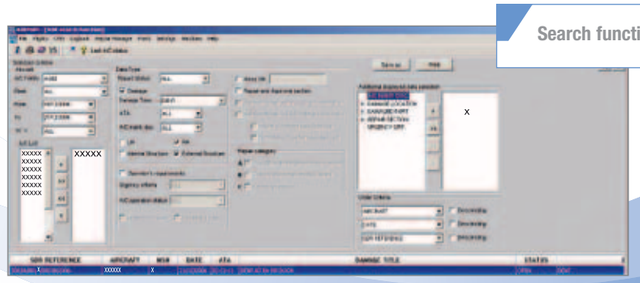
General principle of the AVI navigation

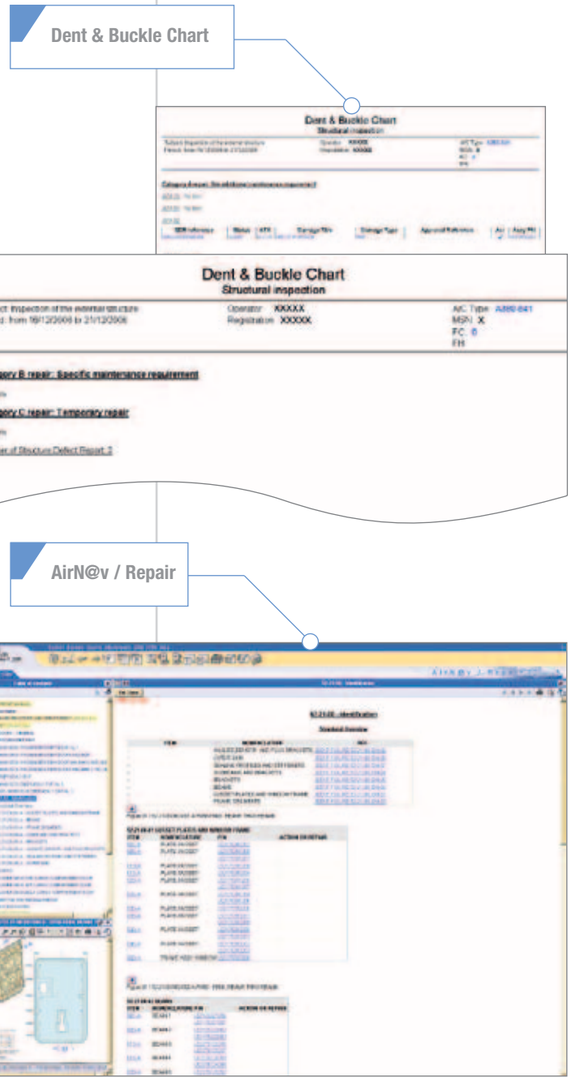


Dedicated symbols according to damage type and status



Search function





DENT AND BUCKLE CHART

A Dent and Buckle Chart can be generated automatically showing a list of all recorded damage classified by ATA chapter and repair category (Category A for 'no additional maintenance', B for 'specific maintenance requirement' and C for 'temporary repair').

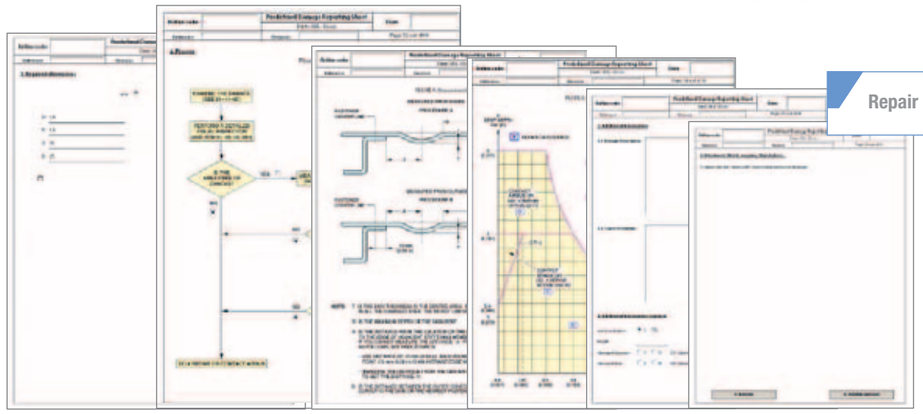
LINK TO AIRBUS TECHNICAL DOCUMENTATION

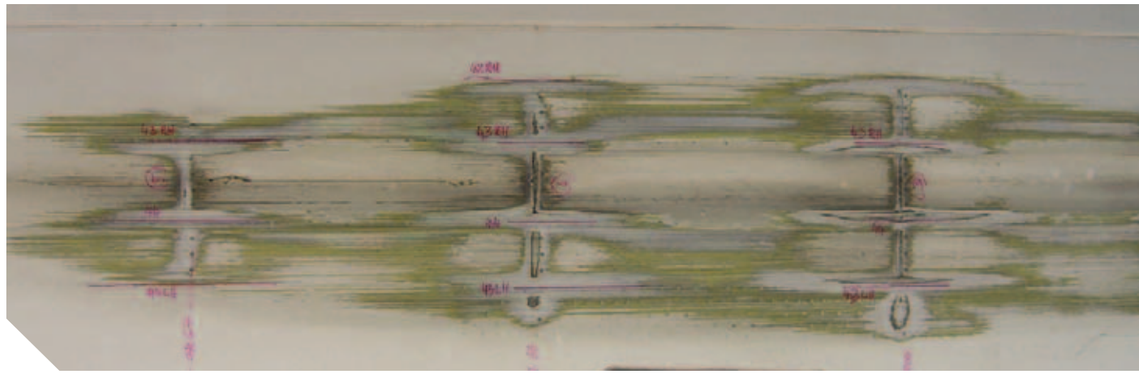
The SDR screen gives direct access to AirN@v / Repair that provides access to the approved documentation data for structural maintenance, such as the Structural Repair Manual (SRM) and Non-Destructive Testing Manual (NTM) for convenient and practical guidance.

AirN@v / Repair and PDRS

AirN@v / Repair is a module dedicated to the SRM and NTM. The manuals presented by AirN@v are envelope documents that can be filtered by MSN effectivity.

The A380 SRM has been developed in AirN@v / Repair, including Pre-Defined Damage Reporting Sheets (PDRS) specific to damage-prone components and customized for common damage types. The PDRS simplifies damage assessment and summarizes important data for reporting structural damage.





Damage from tailstrike *(view looking up from below)*

Workflow

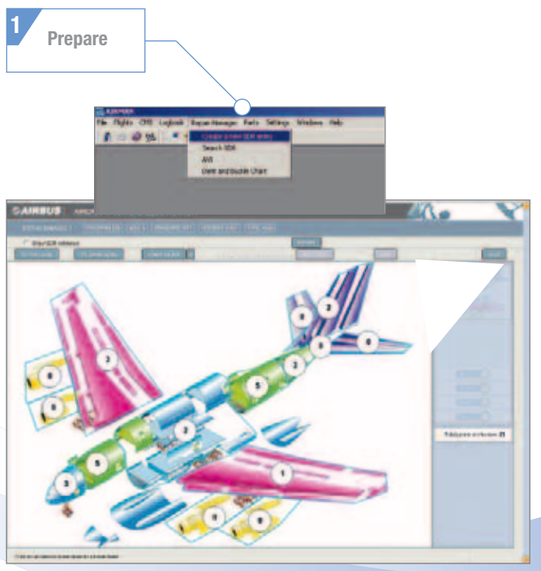
The workflow when damage is discovered is as follows:

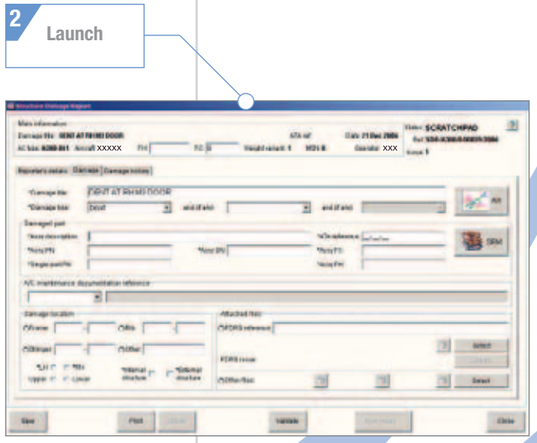
1 Prepare

- Discovery of damage, the user logs onto AIRMAN Rep@ir Manager and accesses recorded damage on the specific MSN.
- User navigates through the Aircraft Virtual Illustration (AVI) and locates the part where the damage has been discovered.

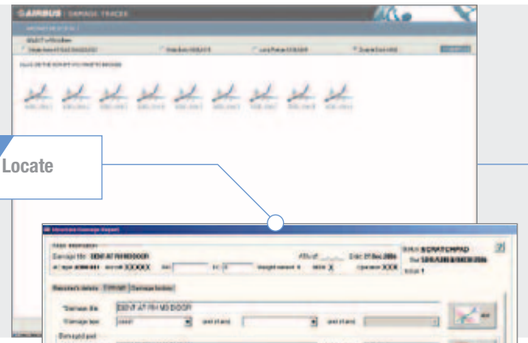
2 Launch

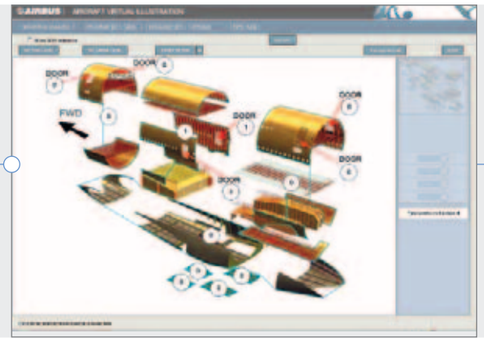
If the damage is not known, a Structural Damage Report (SDR) has to be created and is partially filled with data retrieved from the database.





AIRMAN REP@IR MANAGER FOR A380 - FASTER AND EASIER STRUCTURAL DAMAGE LOCATION AND ASSESSMENT





3 Locate

The user opens the AVI again and locates the damage on the drawing. The identification of the part is retrieved (assembly description, SRM ATA chapter…).

4

The user continues to fill the SDR with the information made available (precise location).

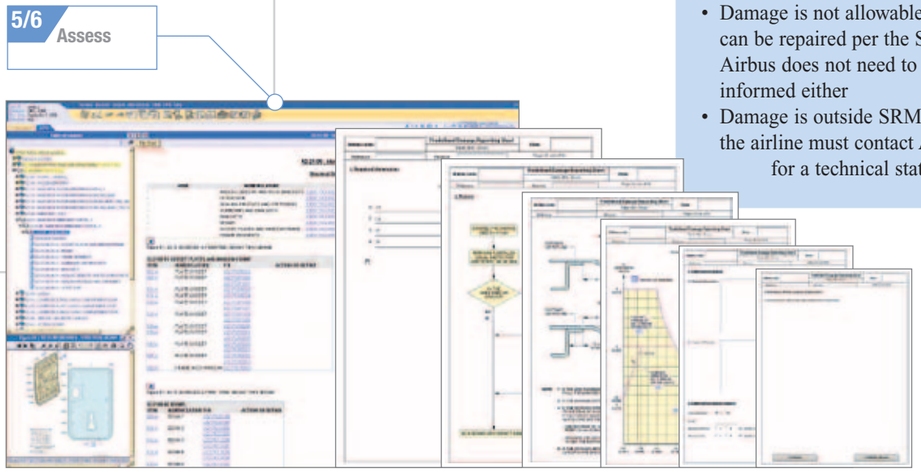
5 Assess

From the ATA chapter and the damage type, AIRMAN Rep@ir Manager opens the SRM through AirN@v / Repair at the relevant identification chapter, where the user selects the associated Pre-defined Damage Reporting Sheet (PDRS) and Assessment Flowchart available in the Allowable Damage Limit task.

6

Using the flowchart, the user fills the PDRS (when available) and assesses the damage (location, size, proximity to specific areas…) and reaches a diagnosis:

- Damage within allowable tolerances. The user can release the aircraft ‘as is’ or do a rework. Airbus does not need to be informed
- Damage is not allowable but can be repaired per the SRM. Airbus does not need to be informed either
- Damage is outside SRM limits, the airline must contact Airbus for a technical statement.

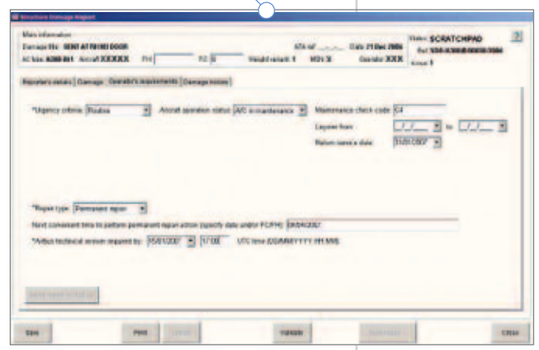


7 Compile

The user saves the PDRS and finishes the damage report with the import of additional documents (sketches, digital pictures and SRM illustration). If Airbus must be contacted, the user fills in the ‘Operator’s requirements’ tab.

8

The user validates the report. The damage report status changes from ‘Scratchpad’ to ‘Open’ (the user can then send the report to Airbus if required).

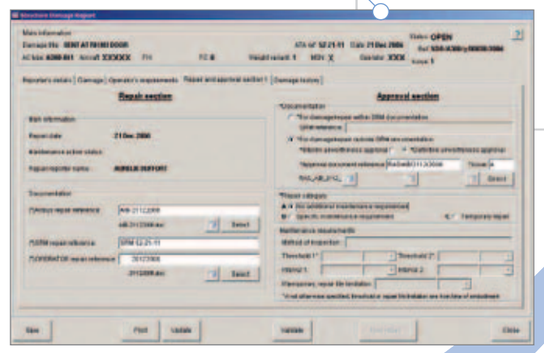


9 Repair and approve

Once the technical statement is available (from Airbus or from the SRM), the user (the same or a different one with the necessary rights) creates a ‘New Repair’ tab to record/attach into the tool the relevant repair recommendation documents.

10

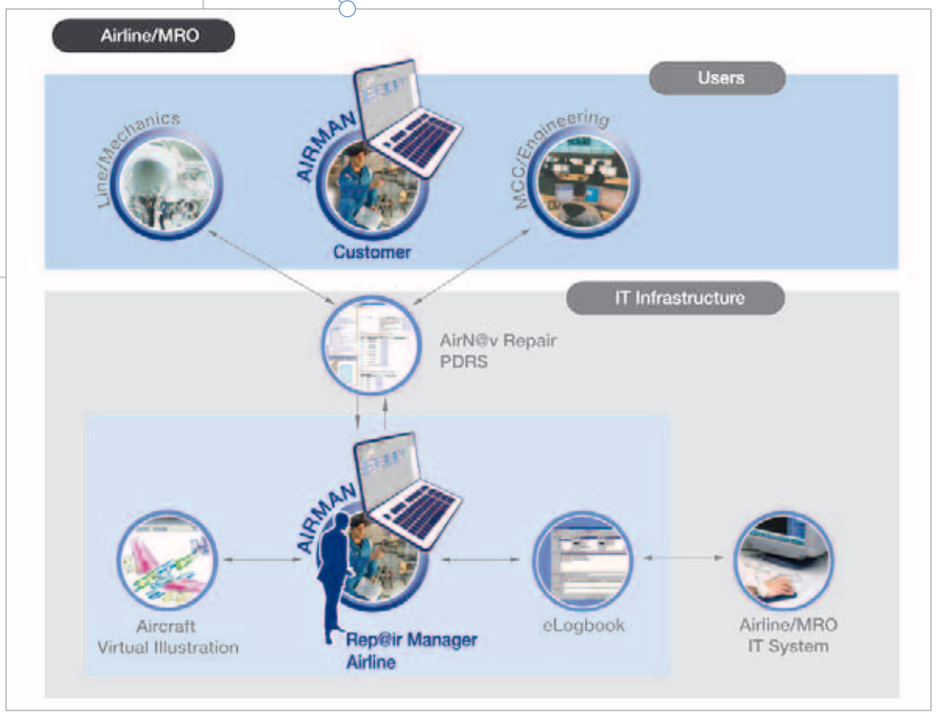
The user can link to any relevant documentation to include it in the ‘Repair’ tab. The ‘Approval’ tab includes the necessary information depending on the damage category. It also allows specifying the type of repair (Temporary or Permanent) and the existence of additional maintenance requirements.



Architecture, pre-requisites and profiles

AIRMAN is a pre-requisite to implement Rep@ir Manager. AIRMAN Rep@ir Manager components are automatically set up and configured during AIRMAN installation/update provided that the airline operates A380. AIRMAN offers the possibility to define specific nominative and secure identification with corresponding rights access (read or write) depending on their level of authorization and activity.

Overview of Rep@ir Manager



AIRMAN REP@IR MANAGER FOR A380 - FASTER AND EASIER STRUCTURAL DAMAGE LOCATION AND ASSESSMENT

AIRMAN Rep@ir Manager delivery

This new tool is delivered to A380 customers integrated together with AIRMAN. The operator will have the possibility to download from the CDIS (Customization and Delivery Information Services) portal into AIRMAN Rep@ir Manager, a record of the relevant data and location of the structural non-conformities occurring during production with suffix R (Restricted) and C (Customer).

Training courses

Two Airbus training courses will present the content of AIRMAN Rep@ir Manager:

- An overview of AIRMAN Rep@ir Manager will be given in the A380 SRM familiarization for line maintenance personal (training reference: LSD1 for 1 day)
- AIRMAN Rep@ir Manager will be presented more in-depth in the A380 documentation and descriptive course (training reference: LSA1 for 5 days)

Rep@ir Manager evaluation

Singapore Airlines, being the first operator of the A380, have recently evaluated AIRMAN Rep@ir Manager and made the following comments:

'The application tool is very user friendly. With enhanced damage reporting features and links to the SRM, the application makes research of information easy, all at the click of the mouse. The feature to allow direct submission of damage reports to Airbus, cuts down a lot of the time wasted on crafting damage reports, which traditionally was done using various other applications. And the best feature in the application is the AVI and the Dent and Buckle Charts, which gives the user an overview of all the repairs associated with a MSN, very much like a structural health report card of an aircraft.

Rep@ir Manager can be deemed as a one-stop application that will ease research and damage reporting. SIA foresees the tool will help to improve aircraft dispatch, as it minimises the time spent on the airline's administrative and operational activities.

Airbus has made major strides with the implementation of this tool. And with the promise of continual development of the tool to enhance the features, SIA is sure Airbus will set the stage for other OEMs to follow.'

Such feedback highly contributes to enhance the application to meet airline expectations. Other A380 customers have requested to test it as well.

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Conclusion

Airlines can benefit from many aspects of AIRMAN Rep@ir Manager:

- The interface is user friendly with intuitive navigation
- Drawings can be manipulated with the navigation window and zoom function
- Creation of a new Structural Damage Report (SDR) is easy with the intuitive navigation and linked to the digital mock-up (AVI) to locate the damage and consult the SRM for the affected part
- An icon symbolizes each type of damage and a colour indicates the relevant status of the repair
- Users can use a function for analysis and filtering data of damage areas
- Users can generate an automatic Dent and Buckle Chart.

AIRMAN Rep@ir Manager is a decision tool for speeding up and easing structural damage report compilation during the assessment phase and allows:

- Simpler and more effective assessment
- Quicker and more accurate reporting
- Compliance with airworthiness authorities regulations for damage record keeping.

AIRMAN Rep@ir Manager is first provided for the A380 and will later be extended to the other Airbus aircraft families.

AIRBUS

Airbus Pilot Instructor Courses (APIC)

The gateway to excellence in pilot training

Embracing new ways of training the trainer: Airbus had in place an existing course, which was a mainly theoretically based introduction to the world of instruction. Customers were expected to complete the training and supervision required for the issue of an instructor rating. In many cases this was difficult to achieve with huge demands on the airline instructor population.

All accredited data points towards a need for new airline ready pilots at the rate of 17,000 per year. This presents a significant challenge to airlines and training organisations alike.

Airbus feels that to secure the best training for pilots, the most effective contribution it can make is by training the customers' trainers, to cascade best practice to the Airbus pilot community.

With these considerations in mind, Airbus has developed and launched a new pattern for instructor training known as APIC, Airbus Pilot Instructor Courses. Applicable to all Airbus fly by wire aircraft, APIC represents a major improvement in the way Airbus trains pilots as Type Rating Instructor (TRI) or Synthetic Flight Instructor (SFI).

Captain Michael Varney
Director Flight Crew Training Policy
Airbus Training and Flight Operations Support & Services
Airbus Customer Services

The basis for development of APIC

The construction of new courses began with an in depth analysis of typical airline instructor tasks, followed by the development of high level aims:

- To develop competence to train aviation-based knowledge, skills and attitudes including human factors
- To train aircraft licence holders with more than 1,500 hours as pilots of multi-pilot aircraft to the level of proficiency necessary for the issue of a TRI rating or SFI authorisation.

From there the objectives were based on the desired trainer competencies, being a combination of Knowledge, Skills and Attitudes (KSA) to the required level to conduct appropriate parts of pilot training:

- Recognize the need for adequate subject knowledge
- Learn how to make adequate preparation
- Develop confidence to use different training techniques
- Learn how to develop effective relationships with trainees
- Clearly define the objectives of a training session
- Understand trainees' needs and how they want to be trained
- Transfer information and key messages effectively and efficiently
- Manage a training session appropriately
- Ensure information and key messages are understood
- Assess a trainee's performance against a defined standard
- Recognize and train human factors and Crew Resource Management (CRM)
- Recognize the importance of making adequate progress reports
- Know how to continuously develop the trainer's own training skills.

The most important objective is for trainee instructors to leave the Airbus training centre with everything they need as instructors, to be able to return to their airline and begin training immediately without the need for the customer to do more.

The modules were constructed carefully with reference to the objectives. No time is wasted in unnecessary theory and trainers are taught throughout in a highly interactive way.

The Instructor/course profile of the APIC brochure issued August 2007.

The French (DGAC) and UK (CAA) Civil Aviation Authorities gave their 'seal of approval' to APIC.

The course is demanding but also very rewarding for the trainees who attain a very high standard on completion.

A unique portfolio of courses

Airbus wants its trainee instructors to be able to conduct an aircraft base training flight and/or a complex simulator session dealing with any trainee weaknesses without intervention to a successful conclusion. This was determined as the final outcome and all modules constructed to bring the trainee instructors to this level of competence.

Classroom session

Full Flight Simulator session

FOUNDATION MODULE

AN INTERACTIVE COMPETENCY DRIVEN COURSE PROVIDING TECHNICAL KNOWLEDGE FOUNDATION FOR FLIGHT CREW TRAINERS

This gives a manufacturer's perspective to the trainers, explaining aircraft design philosophy to deepen the instructors knowledge, as well as refreshing on subjects like aircraft performance, rules and regulations, normal and abnormal procedures. This is to ensure the trainee instructor has the technical and procedural knowledge needed for the training role.

CORE MODULE

AN INTENSIVE PRACTICAL AND COMPETENCY BASED INTRODUCTION TO CORE TRAINING SKILLS

The course is focused on the development of appropriate trainer behaviour in the training and operating roles, and provides the skills for trainers to develop and analyse so-called non-technical skills and behaviour in the flying environment. This is done in a highly practical and plain speaking way that everyone can understand, with the use of video footage and live training examples for trainee instructors to assess.

The training is highly interactive including many trainee instructor led group exercises, giving them chances to practice newly acquired skills and develop confidence. Different training techniques are explored as well as briefing and debriefing skills.

TYPE-SPECIFIC MODULE

THE DEVELOPMENT OF CORE TRAINING SKILLS IN THE TYPE TECHNICAL SIMULATOR ENVIRONMENT

In this module the trainee instructors develop their skills learning how to employ them in the flight simulator. The course tutors take the role of trainees displaying varying levels of skill and behaviour, and this presents some very interesting challenges.

After a short interactive and ground phase there is a series of full-flight simulator sessions for which the training objectives are extracted from the most demanding parts of a type transition course. The trainee instructor briefs and runs a part of each session, aided by a tutor. The second tutor plays the role of a trainee and demonstrates a variety of the difficulties instructors will experience in the training role. The trainee instructors will also be expected to demonstrate flying exercises whilst giving instruction to the tutor in the other seat.

At the completion of this course trainee instructors plan, brief and run a dedicated training session without tutor intervention. This is the final confidence check and successful candidates will have the confidence as well as Knowledge Skills and Attitudes to manage simulator sessions in any customer-training environment.

AIRBUS PILOT INSTRUCTOR COURSES (APIC) - THE GATEWAY TO EXCELLENCE IN PILOT TRAINING

AIRBORNE PHASE

THE ADAPTATION OF TRAINING SKILLS TO THE BASE TRAINING ENVIRONMENT

Once again trainee instructors are subjected to a wide spectrum of possible trainee behaviour in a simulated then real base training environment. The skills of running a base training flight whilst training and debriefing and assuring safety are fully developed.

Feedback from the first courses in Toulouse has confirmed Airbus expectations:

'Formidable amount of tools that can be used not only in aviation related areas'
...Captain from **Air Tahiti Nui**

'Good organized course. A lot of knowledge and skills acquired in a very interesting and practical way. Perfect structure and conduct'
'Very nice interaction, trainee involvement and perfect atmosphere'
...Captain from **Wizz Air**

'Excellent organized training system and excellent trainer (instructor)'
...Captain from **Korean Air**

First APIC trainees in Toulouse

SUCCESSFUL COMPLETION OF APIC PROVIDES FOR IMMEDIATE JAA/EASA OR EQUIVALENT QUALIFICATION, WHICH CAN BE ENDORSED BY THE APPROPRIATE NATIONAL AUTHORITY.

JAA Joint Aviation Authorities

EASA European Aviation safety Agency

CONTACT DETAILS

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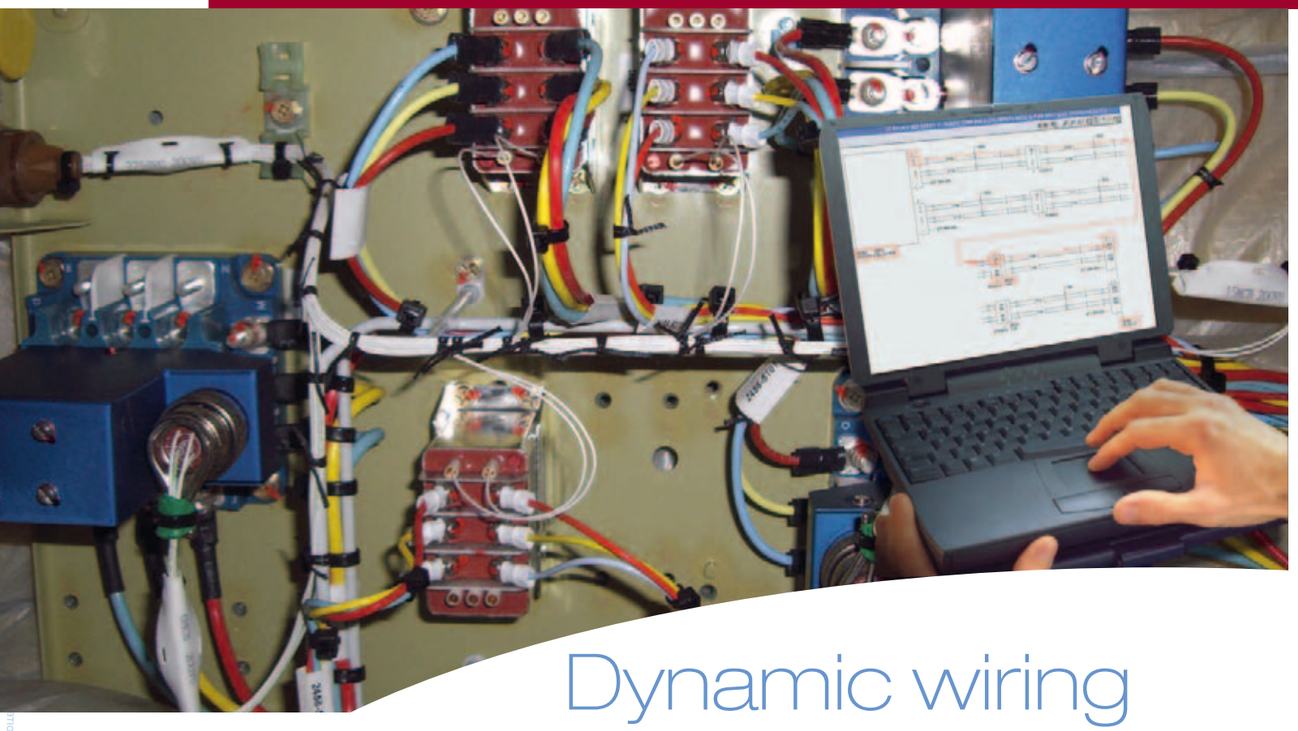
Conclusion

APIC has been running in the Airbus training centre in Toulouse since 11 October 2007. Prior to formal entry into service, more than one hundred trainees have undertaken APIC modules and the preliminary feedback has been universally positive. Many of the trainees during the development phase have been experienced existing instructors, undertaking the course either to renew or refresh qualifications, and they have clearly learned and benefited from this new experience.

One of the major advantages of APIC is that a customer can send their carefully selected trainee instructor to Airbus, confident in the knowledge that in a short period of time they will receive a well trained and highly competent type rating instructor able to immediately take a role in the airline's training programme.

AIRBUS



Dynamic wiring in Airbus Technical Data

Interactive and efficient new navigation through aircraft wiring data

With the development of more complex aircraft and an increase in modern aircraft systems, there has been a corresponding increase in the quantity and complexity of wiring information in the Aircraft Schematic Manual (ASM), Aircraft Wiring List (AWL) and the Aircraft Wiring Manual (AWM). As a consequence, electrical fault diagnosis has also become more complex. This article explains the wide range of functionalities offered by dynamic wiring.

Jean Comte
Senior Engineer
Wiring Manuals & Associated Products
Technical Data
Airbus Customer Services

Since the entry into service of Technical Data in digital format, Airbus provides to all its customers a family of products called AirN@v and amongst these AirN@v / Maintenance is dedicated to maintenance technical documentation. It contains the Aircraft Maintenance Manual (AMM), the Illustrated Parts Catalog (IPC), the Trouble Shooting Manual (TSM), the AWM, the ASM, the AWL, a trouble shooting tool, and a dynamic wiring tool. New functionalities have been developed to help maintenance personnel when fault finding electrical systems.

The dynamic wiring tool, which is available in AirN@v / Maintenance was launched in April 2006 for the A330/A340 Family and was in use with all Airbus aircraft families by June 2007. This new tool rapidly calculates and provides a customized display of physical electrical connections for a specific aircraft. Users are able to navigate in aircraft wiring using as a point of entry:

- A component
- A wire number
- A wire bundle reference (only for A380 so far).

After doing this, by using hyperlinks, the user can navigate to the AWL, then the ASM/AWM and the Electrical Standard Practices Manual (ESPM).

As aircraft wiring information expands and becomes more complex, the use of the dynamic wiring function in maintenance activities proves ever more useful.

Trouble shooting using the traditional method and the dynamic wiring tool

When trouble shooting a fault, maintenance personnel will enter into the trouble shooting function of AirN@v with a Post Flight Report (**1**).

An associated fault isolation task, (**2**) may require a check and then to follow a wire from a component, or between two pieces of equipment using the ASM, and eventually, to repair it with information from the ESPM.

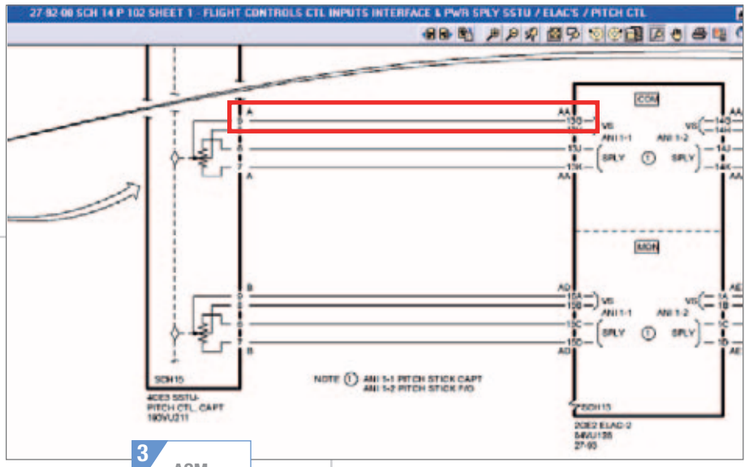
1 Post Flight Report example (A320)

```
+-------------------+
| MAINTENANCE       |
| POST FLIGHT REPORT|
+-------------------+

WARNING/MAINT STATUS MESSAGES
-----------------------------
GMT   FH   ATA
0920  04   27-00 F/CTL ELAC 2 FAULT

FAILURE MESSAGES
----------------
GMT   FH   ATA                          SOURCE   IDENT
0920  04   27-93-34 ELAC 2 OR INPUT OF  EFCS 1   EFCS 2
               CAPT PITCH SSTU 4CE3
```

2 Associated fault isolation task

TASK 27-93-00-810-807
Loss of the Pitch Signal on the CAPT Side Stick for the ELAC 2

1. Possible Causes
2. Job Set-up Information
3. Fault Confirmation
   A. Test
      (1) Do the operational test of the side stick assembly (activation for the BITE test) AMM TASK 27-96-00-710-020 .
      (2) Do the BITE test of the EFCS (Ground Scanning) AMM TASK 27-96-00-740-001 .
4. Fault Isolation
   A. If the BITE test gives the maintenance message:
      ELAC2 OR INPUT OF CAPT PITCH CTL SSTU 4CE3
      - replace the ELAC-2 (2CE2) ,
      AMM TASK 27-93-34-000-001 and AMM TASK 27-93-34-400-001 .
      (1) If the fault continues:
         - replace the SSTU-PITCH CTL, CAPT (4CE3) ,
         AMM TASK 27-92-41-000-002 and AMM TASK 27-92-41-400-002 .
      (2) If the fault continues:
         - do a check and repair the wiring from the ELAC 2 (2CE2) to the SSTU (4CE3)
         ASM 27-92/14 .
   B. Do the operational test and the BITE test given in Para. 3.



3 ASM

The ASM shows wires between these two components, but not all intermediate connections, and will be used to identify in which part the fault is located. Suppose a continuity failure is located between the Side Stick Transducer Unit (4CE3 SSTU) electrical connector A, pin 9 (e.g. contact in position 9 on connector A), and the Elevator Aileron Computer N°2 (2CE2 ELAC-2), electrical connector AA, pin 13G (e.g. contact in position 13G on connector AA) (**3**).

Maintenance will have to identify the involved connector, wire, etc. responsible for the continuity failure by following the signal. This can be found in the AWM which provides all intermediate connections between equipment, their location, wire numbers etc, but can be found easier and faster using the dynamic wiring tool.

Using the traditional AWM

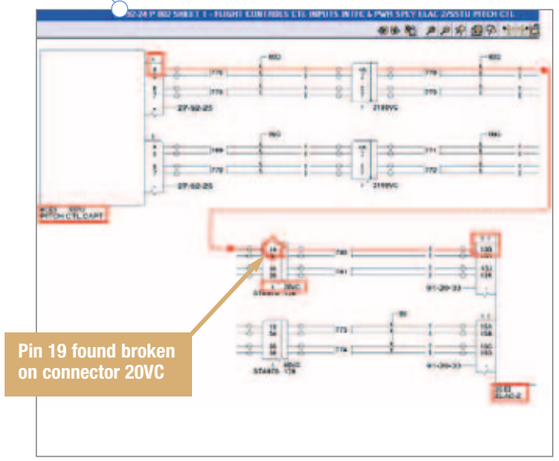
Using the AWM dedicated menus, maintenance personnel have to search in AirN@v / Maintenance for the applicable wiring diagram for deeper investigation.

Here, the result is a pin found broken on the aircraft in connector 20VC, pin 19 (**4**). Identification of the pin with associated repair procedure will be available in the AWL and ESPM.

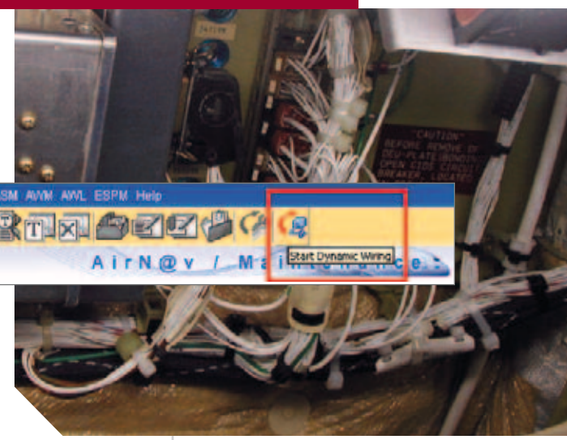
The Aircraft Wiring List is a huge database, which lists all aircraft and engine wires. For each wire, AWL provides the type, gauge, length and contact part number for each wire termination.

The ESPM gives descriptive data and maintenance and repair procedures for the electrical installations on all aircraft of the Airbus family.

4 Applicable wiring diagram for deeper investigation

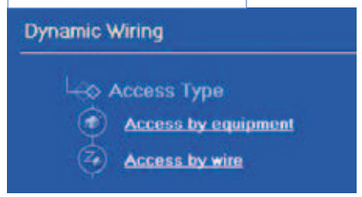


DYNAMIC WIRING IN AIRBUS TECHNICAL DATA - INTERACTIVE AND EFFICIENT NEW NAVIGATION THROUGH AIRCRAFT WIRING



5 Using the dynamic wiring tool

6 Dynamic wiring entry



Using the dynamic wiring tool

Applying the same exercise with the dynamic wiring tool, AirN@v / Maintenance is selected, filtered for the specific aircraft concerned and the dynamic wiring module launched from the banner on the main screen (**5**). This gives the possibility to enter either by equipment or wire number (**6**).

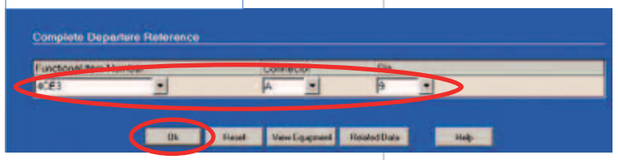
ACCESS BY EQUIPMENT

Select 'Access by equipment', then with the Functional Item Number (FIN) reference of the SSTU 4CE3, the connector A and pin 9, enter the information and click 'OK' (**7**).

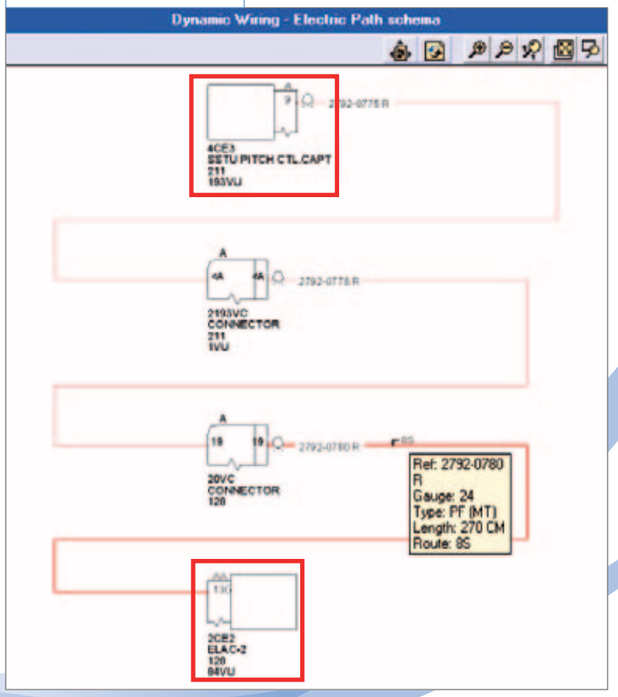
From this FIN departure reference the dynamic wiring tool builds and displays the complete wiring (in colour if applicable) and all intermediate connections from the departure reference to the terminal reference. For this example, the departure reference is the SSTU connector 4CE3-A, pin 9 and the terminal reference is the connector AA, pin 13G on ELAC-2 (2CE2) (**8**).

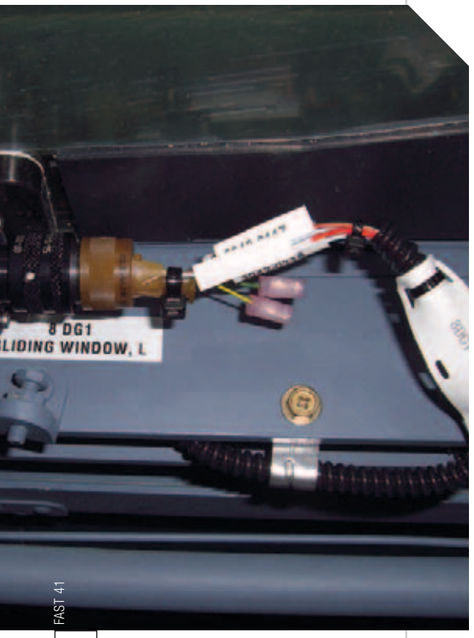
The result is shown as one display compared to the traditional AWM where a few pages could be necessary for a longer path through various cross-references.

7 Access by equipment



8 Dynamic wiring electrical path



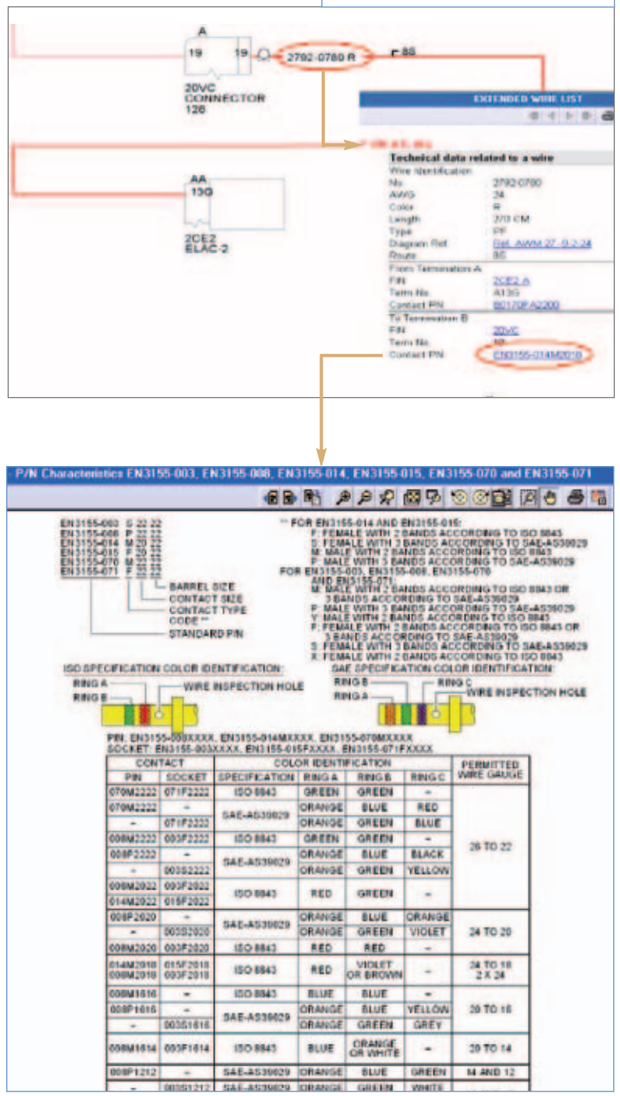


With this interactive environment, dynamic wiring allows navigation on the wire itself, through a hyperlink to the Extended Wire List in the Aircraft Wiring List (wire's characteristic), and again, navigation to the AWM, and the ESPM on the contact part number itself (**9**).

With dynamic wiring, only a few clicks are necessary to display a complete and complex signal path in one shot, whereas by using the traditional AWM, the same path display would need a more detailed search in various wiring diagrams and could generate numerous prints.

With the dynamic wiring's ability to navigate to the AWL by a simple click on the cable or the equipment itself, it results in a time saving (no need to search in the AWL dedicated menus), and ease for engineers and avionic staff.

9 Navigation to AWL and ESPM



ACCESS BY WIRE

Select 'Access by wire' (**6**); the entry point will be a wire number reference (four digits for the ATA, then a dash, followed by four digits for the wire number itself); select 'Search'. Dynamic wiring will display this cable with its two terminations (**10**).

From a hyperlink on the component itself (25GG) dynamic wiring proposes:

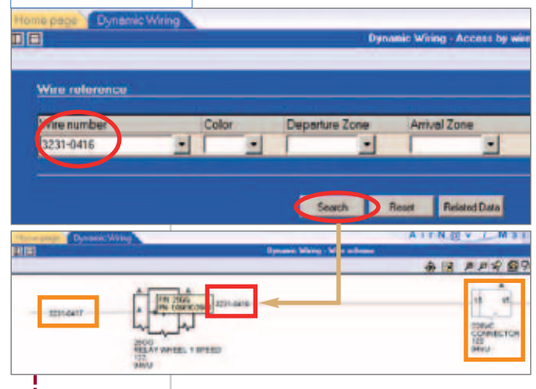
(**11**) A merge of the existing electrical path with a new one (for example FIN 25GG, connector A, pin B

(**12**) An entry in the Equipment List of the AWL, with hyperlink to the ASM and ESPM

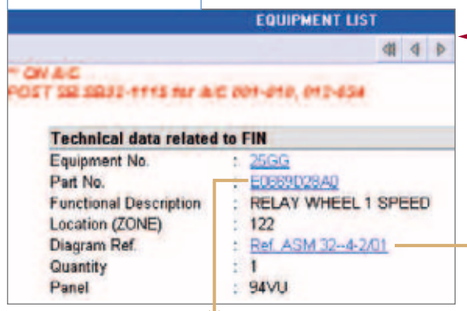
(**13**) A display of all wires connected on this component, with again a hyperlink on a specific cable to the Extended Wire List, as previously seen

It also proposes a hyperlink on the second wire (3231-0417) or the next connector (228VC) to follow the signal (in orange in the illustration **10**).

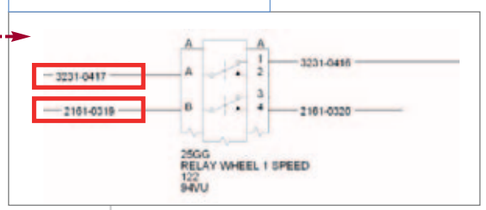
10 Access by wire



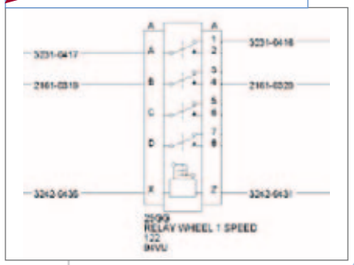
12 Entry in the AWL equipment list

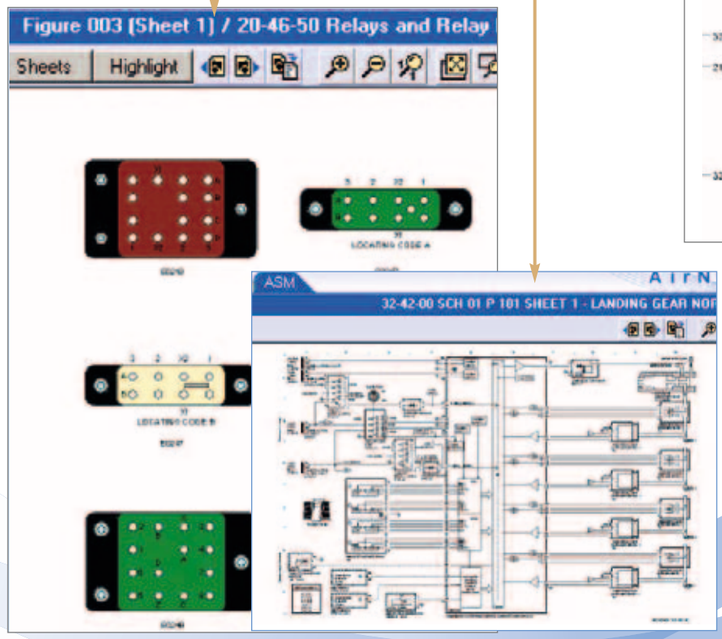


11 Merge of existing and new electrical paths



13 Display of all component wires

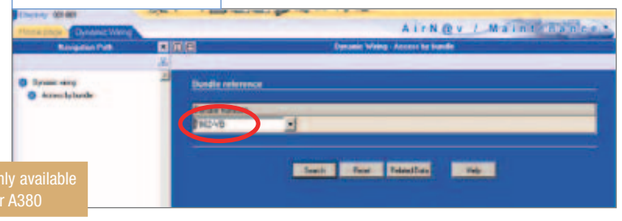




ACCESS BY BUNDLE (A380 ONLY)

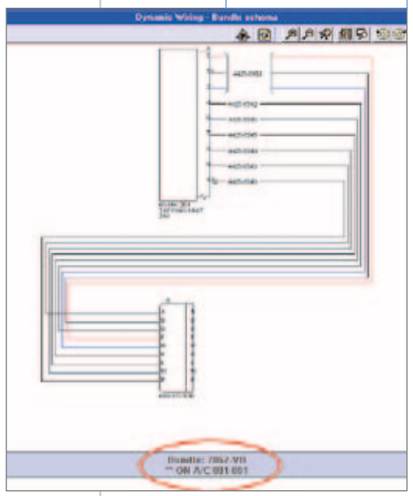
Enter 'Access by bundle', with a bundle identification (**14**), the result is the bundle itself, with all wires inside (**15**); ability to select one specific wire number, an equipment with all functionalities as previously seen.

14 Access by bundle identification



Only available for A380

15 Bundle's wires



Currently data is available only for the A380. Airbus will add access by bundle for other aircraft types as part of the Technical Data Upgrade project scheduled for 2010/2011.

For training purposes a module dedicated to dynamic wiring is available in the new C@DETS (Computer @ssisted Documentation Education Tutorial System), also on AirbusWorld (path: My on-line services/C@DETS / AirN@v) and AirbusSupply.

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Conclusion

The new dynamic wiring tool embedded in AirN@v / Maintenance supplies a flexible, interactive method for all maintenance and engineering needs. It demonstrates how much better, quicker, easier and more efficient the tool is to use than the traditional method. It also provides maintenance and avionic engineers with an original solution, particularly well adapted for wiring trouble shooting purposes, which can be used in parallel with the trouble shooting manual to more quickly assess and rectify aircraft electrical wiring faults.

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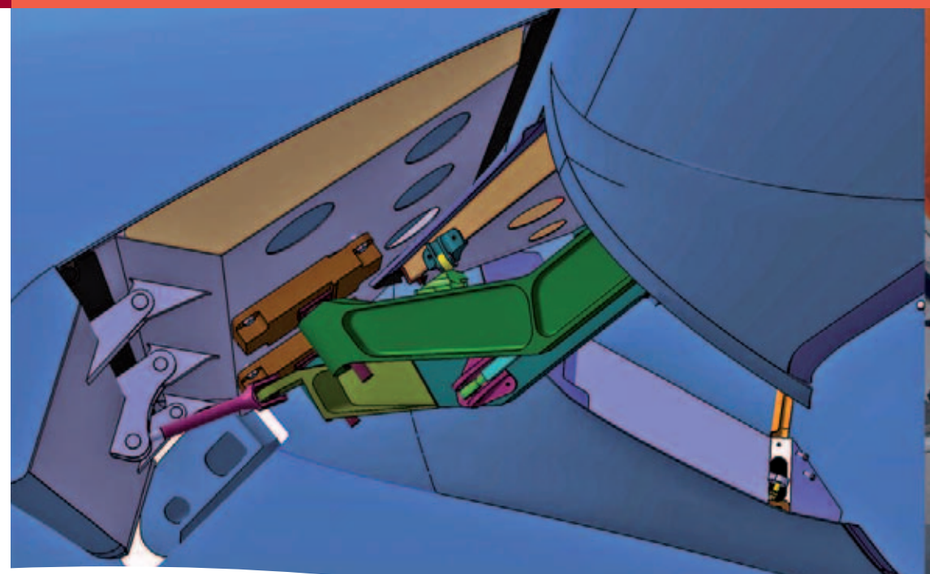
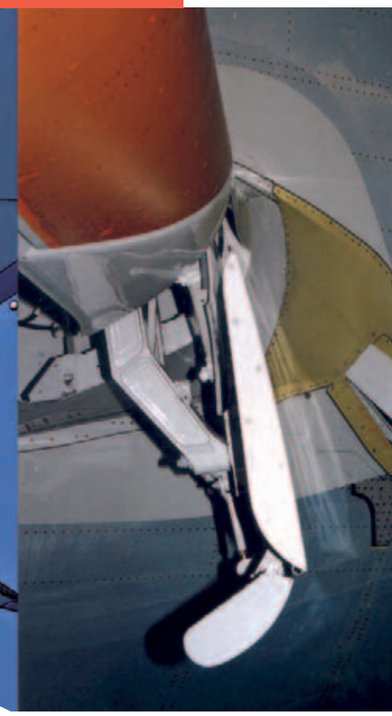




Digital mock-up © Airbus France 2007

A300/A300-600 Krueger flap system

Recommendations to avoid Krueger surfaces interference

The Krueger flap system is a device specific to the A300 and A300-600 that optimizes aerodynamic efficiency in the high lift configuration. In recent years, several cases of Krueger mechanism damage due to surface interference have been reported to Airbus: The Krueger movable vane was found damaged and trapped between the wing leading edge and the Krueger flap panel. If on-site repairs were not possible, an approved temporary repair and the application of MMEL 01-27 (or airline equivalent) allowed dispatch of the affected aircraft to the main base for final fix with the system deactivated in the retracted position. Nevertheless, taking into account the number of occurrences, the repair cost and the repair lead-time, Airbus launched a study to identify all the possible causes of such interference and define preventive measures to avoid re-occurrence. The study conclusion was that improved maintenance advice and recommendations could avoid such interference.

This article describes the function of the Krueger flap system and its subcomponents for a better understanding of the system, summarizes the root causes identified for the damage reported and presents further recommendations/cautions to apply during Krueger maintenance practices.

Valérie Laprime-Baulleret
Engineer
Flight Control Systems
Airbus Customer Services

Location of Krueger and notch flap systems on aircraft

The Krueger flap system

On A300B2/B4 and A300-600 aircraft, there are two Krueger flaps and two notch flaps. The function of the Krueger surfaces with the notch flap is to complete the wing leading edge profile at the wing root when the slats are extended.

The system operates in conjunction with the slats. The Krueger and notch flaps have two positions, fully extended or fully retracted. Their positions are selected from the Slat/Flap control lever on the centre pedestal. The Krueger flap fully extends as soon as the Slat/Flap control lever is selected to 15/0 and fully retracts when this lever is moved to its 0/0 position.

The Krueger flap systems are controlled by the Slat Flap Control Computer (SFCC) and move to the extended or retracted position depending on SFCC commands.

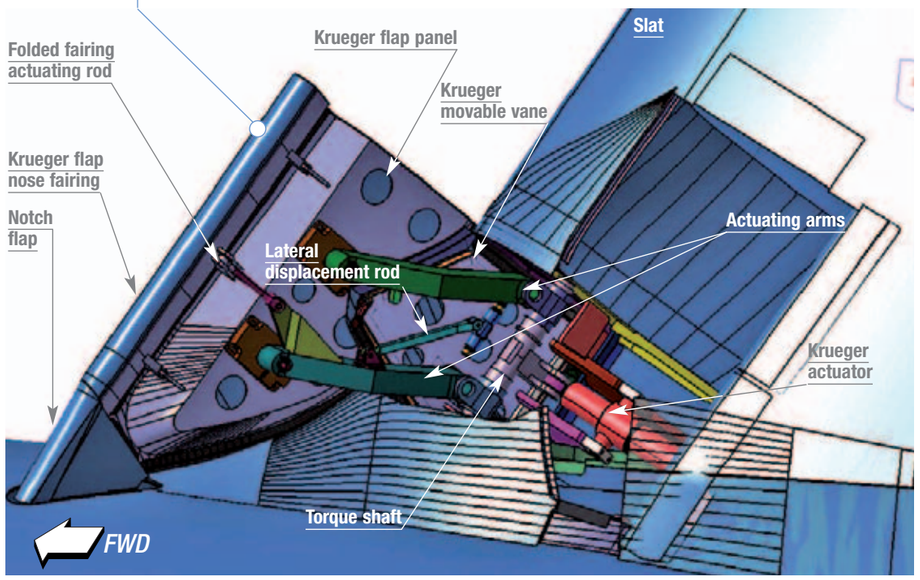
If the Krueger flaps and/or notch flaps are not in the correct commanded position, fault warnings are provided for flight and maintenance crew awareness.

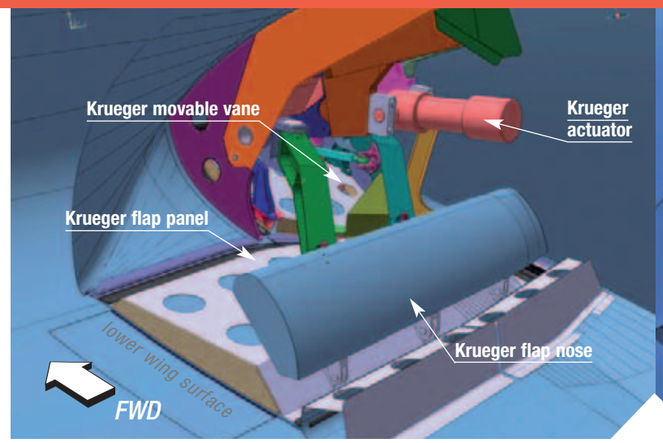
During aircraft operation, these surfaces are extended only during the take-off and landing flight phases.

The Krueger flap surfaces of each wing are operated by one hydraulic actuator via a drive mechanism. When the Krueger flap is in the stowed position with no hydraulic pressure, the actuator of the Krueger flap is mechanically locked in its extended position. When the Krueger flap is in extended position with no hydraulic pressure, the actuator of the Krueger flap is hydraulically locked in its retracted position by the hydraulic fluid trapped in the actuator chamber. Both wing systems are identical.

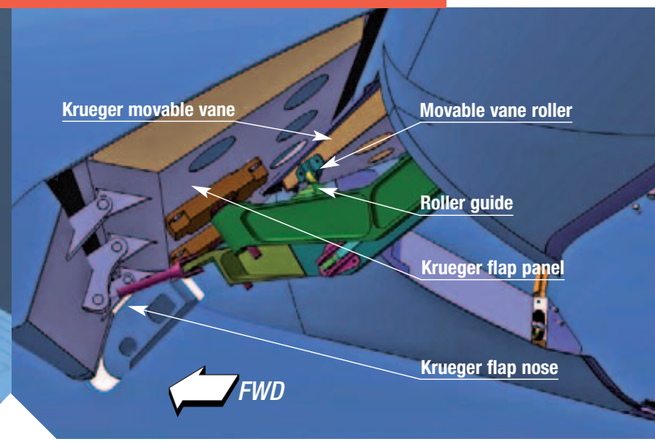
The Krueger flap actuator acts on a lever on the torque shaft of the Krueger mechanism. When the Krueger actuator retracts, it rotates the support arms together with the torque shaft, causing the flap to extend. While the Krueger flap is extending, the lateral displacement rod initiates a lateral movement enabling the Krueger flap, when fully extended, to take up a position against the notch flap.

System description
View looking up from below





Krueger flap in retracted position



Krueger flap in extended position

A movable vane is fitted between the Krueger flap and the wing leading edge.

The vane rotates with the support rods around the torque shaft and is slave driven by a roller mechanism to a position underneath the Krueger flap when the Krueger flap is extended.

When the Krueger is moving out from its retracted position, the vane spring rod releases to its extended position. During the extension of the spring rod, the vane remains in its position and is maintained on the structural stop by the spring force. When the spring rod is completely released, the vane then starts moving. This gives the Krueger flap the time to extend before the vane starts to move from its retracted position. This delay in the vane movement, being a function of the effective stroke of the spring rod from the Krueger/vane retracted position, prevents interference between the vane and the Krueger flap surface during the Krueger flap operation.

The folded fairing actuating rod, connected to one of the rotating actuating arms, progressively unfolds the folding nose fairing as the Krueger flap extends.

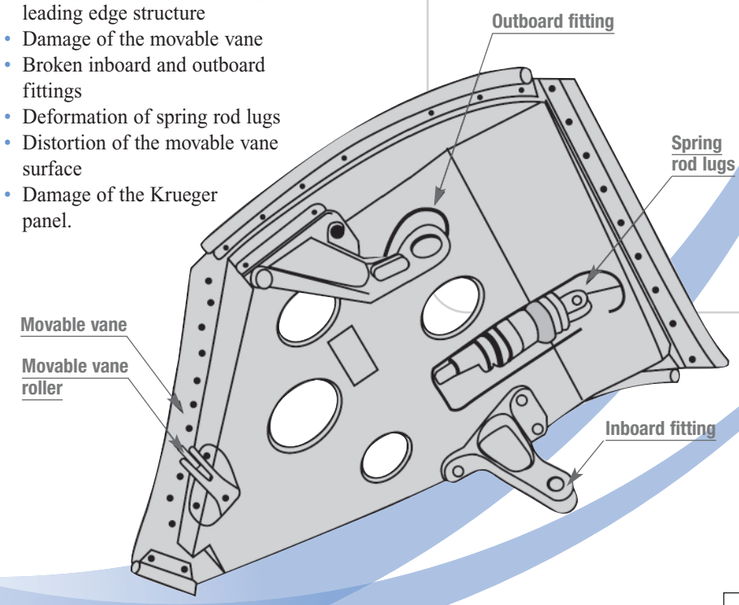
When the Krueger flap has reached its extended position, the notch flap actuator extends and rotates the notch flap about its hinge, to close the gap between the Krueger flap and the fuselage.

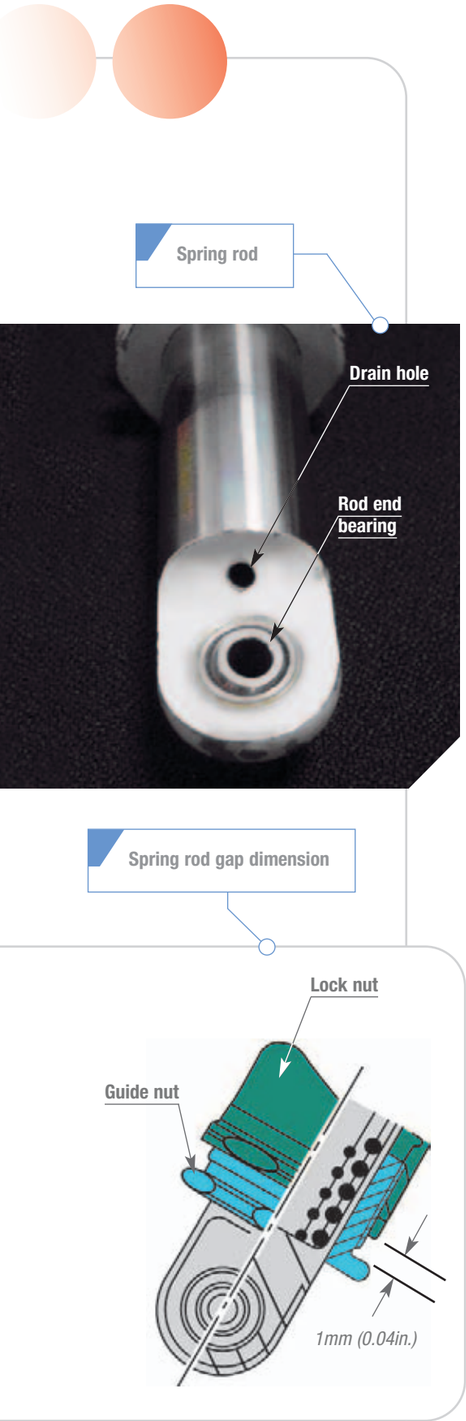
Krueger flap interference

Several operators have reported interference between the Krueger flap panel and the movable vane during extension of the system. Instead of slipping underneath the Krueger flap surface during the extension phase of the Krueger system, the movable vane went over and was caught in between Krueger Flap surface and the wing leading edge, preventing further movement.

The following typical damage to the Krueger flap system was reported:

- Damage of the adjacent wing leading edge structure
- Damage of the movable vane
- Broken inboard and outboard fittings
- Deformation of spring rod lugs
- Distortion of the movable vane surface
- Damage of the Krueger panel.





Interference may also occur between the Krueger flap and the inboard end of slat surface no.1 depending on the position at which the Krueger flap surface has jammed, resulting in damage of the slat surface.

Possible causes

Metallurgical investigation on broken parts removed revealed none of the damage was at the origin of the Krueger system failure: The parts did not fail due to fatigue or corrosion. Therefore, investigation focused on possible causes that could lead to malfunction of the drive mechanism.

The following possible root causes were identified:

- A malfunction of the spring rod
- A maladjustment of a Krueger flap subcomponent such as the movable vane or vane spring rod
- Excessive play in the Krueger mechanism may also be a contributor.

SPRING ROD MALFUNCTION

A malfunction of the spring rod is considered the major root cause for the reported Krueger interference. Its travel defines the sequence of the vane movement during system operation: It delays extension of the movable vane (compared to the Krueger flap panel extension) to allow the vane to slip underneath the Krueger flap panel. If this sequence is disturbed (due to e.g. a jam of the spring rod), the movable vane can go above the Krueger flap panel and is trapped between the Krueger flap panel and the wing structure.

KRUEGER FLAP PANEL OR KRUEGER MOVABLE VANE MALADJUSTMENT OR MISALIGNMENT

Another possible root cause for Krueger vane interference is misalignment or maladjustment of the movable vane or Krueger flap panel with the surrounding wing structure/surface. In-service experience shows the system can tolerate a marginal subcomponent adjustment for a limited period of time.

FREE PLAY IN KRUEGER FLAP MECHANISM

Free play in the Krueger flap mechanism may be a contributing factor to such reported interference.

Airbus recommendations

Krueger system interference could also be attributed to the maintenance practices of installation and adjustment. Therefore, Airbus initiated a review of the maintenance practices with the aim to improve the instructions in the AMM (Aircraft Maintenance Manual). In June 2004, the A300-600 AMM 27-87-12 PB 401 and A300 AMM 27-81-49 PB 401 'Krueger flap movable vane/spring rod removal/installation' procedure was revised.

PREVENTING SPRING ROD MALFUNCTION

To prevent a spring rod malfunction, special care should be taken during spring rod installation:

- The drain hole is not obstructed so any condensation can evacuate freely from the spring rod to avoid malfunction due to ice formation at low temperature
- The rod end bearing is not jammed and can be freely rotated by hand
- The spring rod lugs are not deformed
- The spring rod dimension in the compressed position is verified before installation of the rod on aircraft
- Adjustment is carried out per A300-600 AMM 27-87-12 PB 401 (A300 AMM 27-81-49 PB 401), with special attention to ensure the gap dimension between the lock nut and the guide nut of the spring rod is 1mm. This gap is an indication of the correct operating stoke
- The movable vane cannot be moved by hand in the extension direction when the Krueger flap system is retracted.

When performing a visual check in the Krueger flap system area (e.g. A300-600 Maintenance Planning Document task 574501-01-1), check the spring rod general conditions.

PREVENTING ANY KRUEGER SUB-COMPONENT MALADJUSTMENT OR MISALIGNMENT

When a new part or a new Krueger assembly, such as a spring rod or the movable vane surface with its fairings fitted has to be installed on aircraft, maintenance staff may assume that the assembly/part is pre-adjusted and there is no need to re-adjust it. However, the first installation of a subcomponent (new or used part) requires an adjustment on-wing because of the build-up of tolerances that vary from one aircraft to another. Therefore Airbus recommends that all Krueger flap system subcomponents are installed on aircraft as per the respective AMM task: these adjustments/alignments with the wing surfaces are referenced in A300-600 AMM 27-87-11 PB 401 (A300 AMM 27-81-48 PB 401) and 27-87-12 PB 401 (A300 AMM 27-81-49 PB 401).

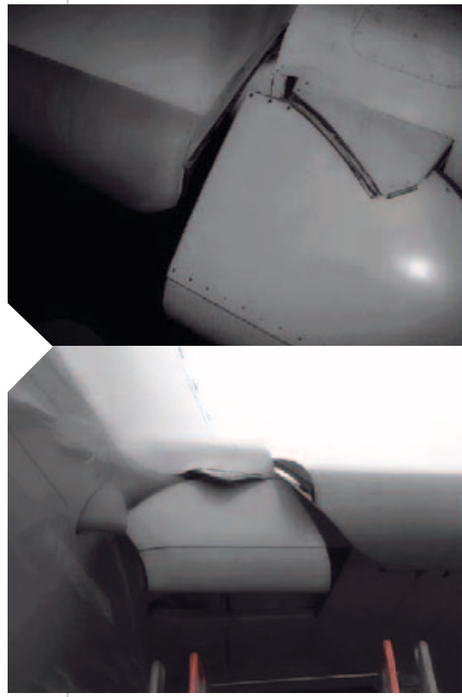
PREVENTING KRUEGER MECHANISM FREE PLAY

During the detailed inspection of the Krueger box area including the Krueger mechanism as per A300-600 MPD 574501-01-1, Airbus recommendations are to:

- Check for any worn bushing, roller, bearing, or any cracks, abrasion, corrosion, scratches or damaged seal
- Move by hand this mechanism and its surfaces to ensure that there is no free play.

In addition, Airbus emphasize that during the detailed inspection as per A300-600 MPD 574501-01-1, Maintenance staff should check that:

- There are no cracks on the Krueger movable vane attachment fairings
- The movable vane roller is not jammed, not worn and there is no flat or traces of a hard contact with the roller guide
- The roller guide is not damaged or worn and that there is a good contact with the roller during extension of the movable vane (shown when Krueger flap surface is removed as per A300-600 AMM 27-87-11 PB 401 or A300 AMM 27-81-49 PB 401).



Typical Krueger flap interference

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Conclusion

The Krueger flap system is specific to the A300 and A300-600 high lift system. In-service reports concerning Krueger interference during operation and investigation of them by Airbus have resulted in Airbus emphasizing that attention should be paid to Krueger maintenance practices.

Operators, with good awareness of the system and its maintenance requirements, plus strictly following Airbus maintenance information, can avoid Krueger flap system interference.

This FAST article is intended to highlight the Krueger flap system maintenance requirements to those who are regularly servicing/maintaining it and that the information is in the AMM, the manual to be used during maintenance.

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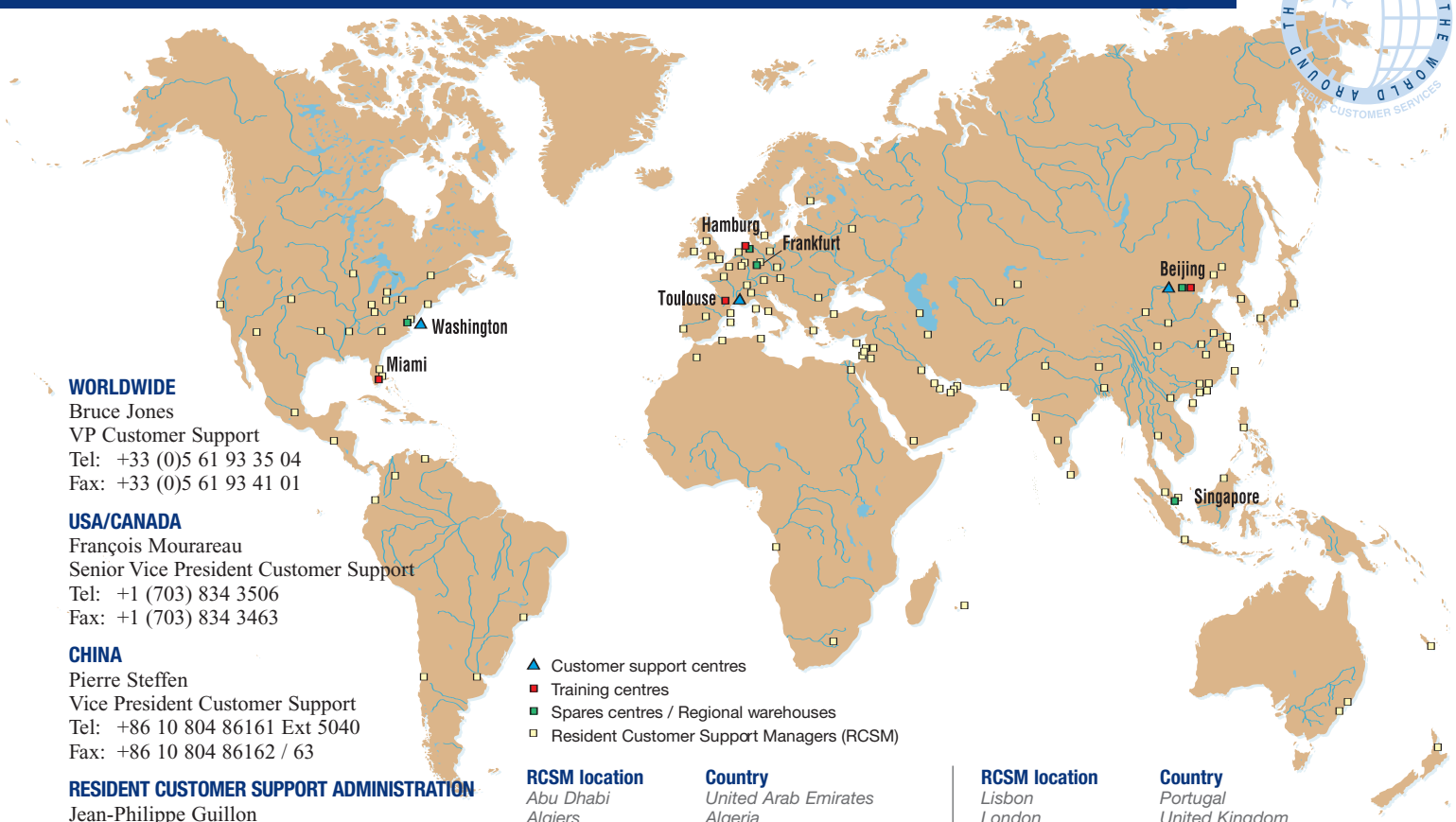
THE GATEWAY TO EXCELLENCE IN PILOT TRAINING PART II

Pilot training was not always as advanced as described in the Airbus Pilot Instructor Courses article on page 20. In the early years of flight it was recognized that new pilots should have some idea of how to control an aircraft before being sent into the air. As a result, the Societe Antoinette introduced the first simulator for training pilots on their aircraft in 1910. Muscle power for simulator movement was provided by ... muscles and the 'fuselage' of the simulator suggested a second use had been found for old wine barrels. Perhaps a glass or two of wine was useful to steady nerves when going aloft in such flimsy aircraft! Nonetheless, contraptions such as this were the beginning of training and flight simulation and led to the enormously efficient training devices of today.



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