



CEFA FAS

Flight data visualization
to complement FDM/FOQA
and enhance flight safety

Used by 100+ airlines!



BEA

Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile



CAST

China Academy of Civil Aviation
Science and Technology

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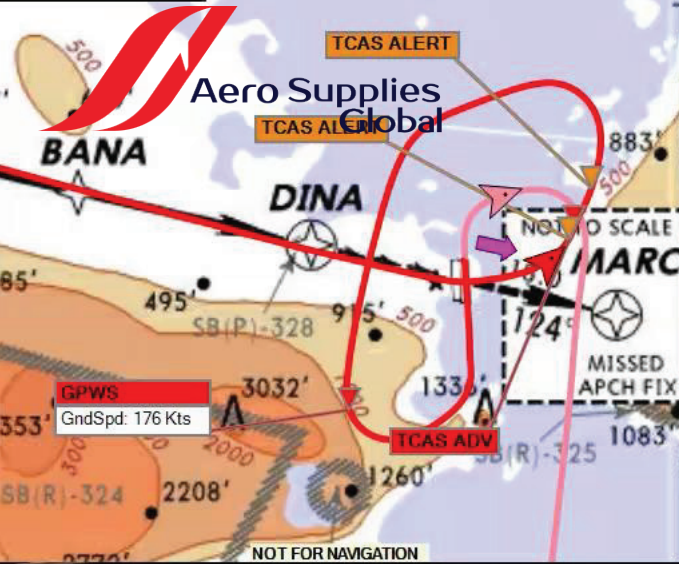


LESSONS LEARNED - VIDEOS

- **A350 (COGNITIVE INCAPACITATION & FLIGHT PATH DEVIATIONS DURING GROUND)**
[HTTPS://WWW.YOUTUBE.COM/WATCH?V=EYTAYHIY3LS](https://www.youtube.com/watch?v=EYTAYHIY3LS)
- **A320 (CAPTURE OF A FALSE ILS GLIDESLOPE ON APPROACH)**
[HTTPS://WWW.YOUTUBE.COM/WATCH?V=C7VCYJFCKGY](https://www.youtube.com/watch?v=C7VCYJFCKGY)
- **B737-800 (LOSS OF ALTITUDE DURING GROUND)**
[HTTPS://WWW.YOUTUBE.COM/WATCH?V=PN2UPWM8D_I](https://www.youtube.com/watch?v=PN2UPWM8D_I)

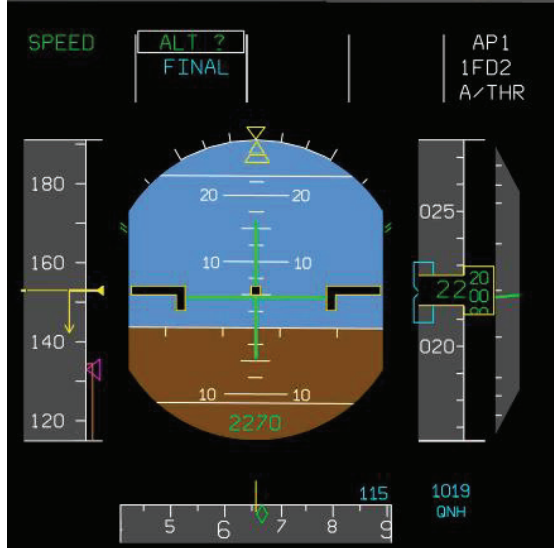
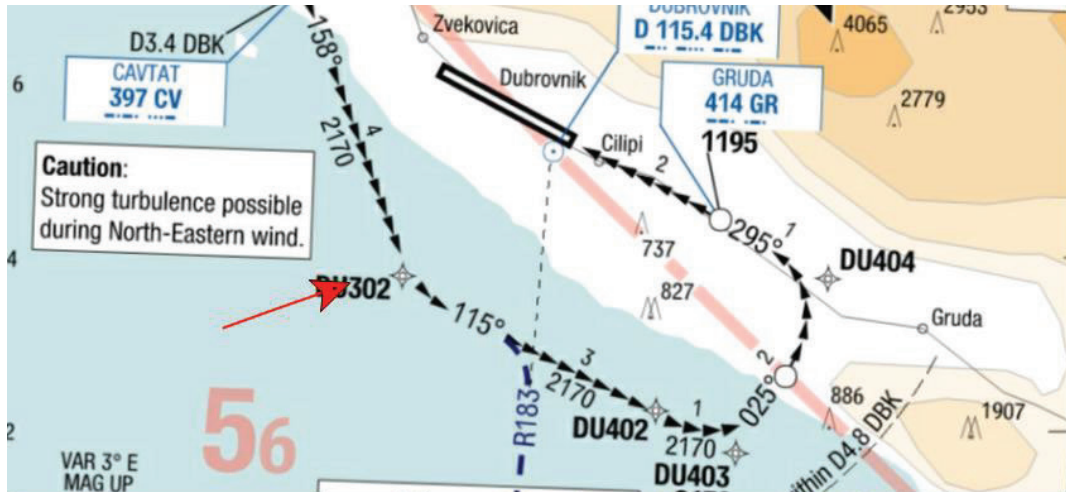
AirSpd: 159 Kts
WindSpd: 13 Kts

VertAcc: 1.07 g
VertSpd: 20 Ft/min



FOQA/FDM ANIMATION

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CEFA AMS

EFB tool for self-improvement and performance analysis

- Allowing individual analysis of own flights, based on **factual data**
- Showing performances in an **easily understandable way** to pilots



TURN EACH FLIGHT INTO A LEARNING OPPORTUNITY



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“Each flight becomes
a learning opportunity...”

 ANA

 RYANAIR

American Airlines 

 EL AL
ISRAEL AIRLINES

+1,000,000
flights replayed!

Flight Debrief

 CEFA
AMS

Aviation Mobile Services



BRING YOUR FLIGHT DATA TO LIFE

FLIGHT ANIMATION SYSTEM FOR
INVESTIGATION, COMMUNICATION
AND PILOT TRAINING



100+
CLIENTS

The most widely
used software to
quickly produce
advanced animations
of data from flight
recorders



HOW TO ENHANCE FLIGHT SAFETY?

Flight data analysis in its primary form, e.g. statistics, tabular data and plots, is essential. However, figures can only give a **limited perspective** of an event, usually rough and leading to a partial understanding. Pilots don't fly spreadsheets!

How was the information displayed on the instruments? Which aural warnings were triggered? How could they be perceived and interpreted by pilots? How did the weather conditions look like? What impact may they have had on workload and stress? Did the flight crew really have time to react? In short, which difficulties were the pilots facing?

Humans must be placed at the center of analysis. That's why investigators from flight safety teams need an approach that goes beyond a purely mathematical and logical method provided by FDM/FOQA systems. It is necessary that this state-of-the-art approach allows for understanding both the **human-machine interface** and **human factors**.



THE WORLD'S MOST WIDELY USED FLIGHT ANIMATION SOFTWARE

For this, investigators and analysts need:

- a tool integrating realistic visual/aural elements and reproducing the **dynamic of the flight** in order to provide a concrete notion of time to each sequence of events (reaction time, workload, etc.). This enables one to get another point of view with previously unexpected information;
- a tool to get closer to the reality of the flight so as to add **subjective elements** to the analysis, still based on real facts, allowing one to understand better how pilots react when confronted with an event and which difficulties they are coping with;
- a tool enabling **efficient communication** within flight safety teams for a rich and fruitful exchange, each member being able to explain quickly her/his vision;
- a tool to visually **debrief** on events with pilots, allowing them to understand better what they had in mind as well as let them comprehend their possible mistakes;
- a tool to raise efficiently and quickly the **management awareness** concerning problems that need rapid action;
- finally, a tool allowing training departments to develop **learning material** based on real facts from the airline. **Prevention** is the most cost-efficient way to enhance flight safety!

CEFA Aviation has been developing for more than 20 years a flight data animation software that aims to meet all of these requirements. This is how this tool is now used by more than 100 customers worldwide.

CEFA FAS (Flight Animation System) is a software:

- which recreates phases of flights for analysis purposes in **high-fidelity** animations based on actual flight recorder data (raw-data and **from FDM software export**)
- with **type-specific cockpit**, advanced flight instrument panel,
- external 3D views of the aircraft and 3D terrain & scenery views
- for **all phases** of flight as needed: take-off, landing or other moments like go-arounds, events...

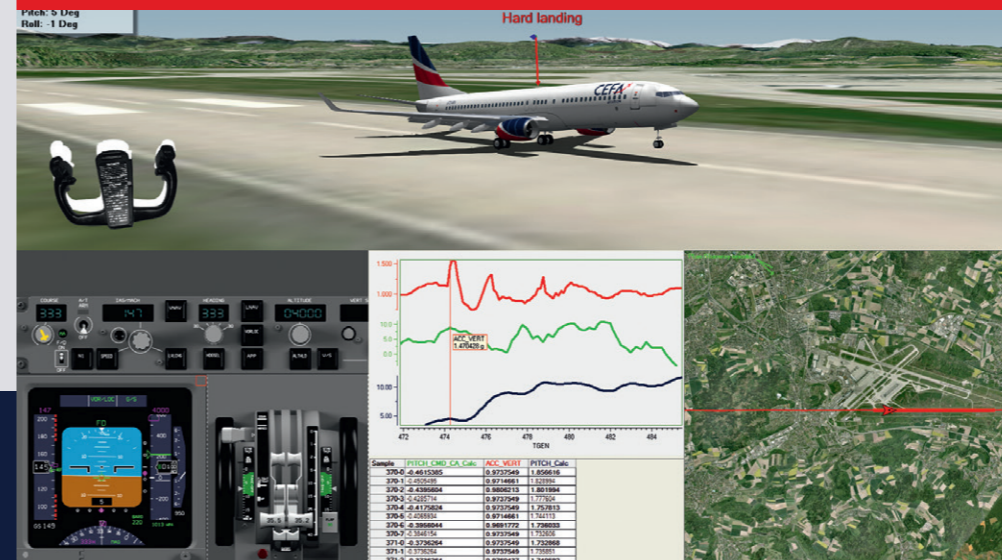


FEATURES THAT MAKE THE DIFFERENCE

REALISTIC

To live the flight again in the pilots' shoes

- complete & precise **cockpit display** of more than 30 aircraft types – ready to use
- aural warning, callouts and engine **sounds** ("traffic", "descent", "400, 300...")
- animated pilot hands & flight controls
- **3D high-resolution terrain**, worldwide satellite imagery & airports
- automatic display of **METAR** & integration of the reported weather and visibility conditions into the 3D animation – up to many different types of clouds!



ANALYTICAL

To better examine and understand flight sequences

- **data plotting** of all possible flight parameters synchronized with 3D animations
- **navigation chart** viewer with the possibility to overlay on the flight paths, events, instant values of selected parameters (event, speed...)
- **events overlay**: display of the sequence of incidents directly inside the 3D animation
- possibility to color the **flight path** according to parameters of choice which can be adapted to the company's SOPs (e.g. stabilization criteria,
- take-off rotation technique, crosswind decrab execution)
- **trajectory** toolbox and automatic adjustment

DIDACTICAL

To be used for training purposes and dissemination of safety messages

- **video studio**: montage station to show best and worst practices based on real-life situations, including the display of all kinds of charts and the possibility to highlight animated control parts
- numerous cameras, AOA animation display, turbulence influence, wind/drift in 3D overlay: among others, for precise airport familiarization, recurrent training, and to
- address specific issues



IN SHORT...

20+
YEARS OF
EXPERIENCE

100
CLIENTS

1 STRENGTHS

- **turnkey** solution: ready to use and adapted to your fleet
- **qualitative & accurate** animations
- **quick**: only a few clicks needed to make an animation!
- **powerful & user-friendly**: intuitive interface with a cutting-edge technology
- **reactive & gold-standard support** with one face to the customer
- **robust & reliable**: a unique expertise in aircraft systems and software engineering & in-depth understanding of the complexity of flight data thanks to 20 years' experience

USAGE

- rapid safety analysis
- on-site and remote debriefings with pilots (thanks to CEFA FAS-E)
- root-cause investigation
- incident communication
- pilot training | airport familiarization
- SOPs / best practices
- special airports approaches
- maintenance
- aircraft manufacturers

15 MILLIONS
FLIGHTS ANALYZED
BY ALL CEFA
AVIATION'S SOFTWARE
USERS YEARLY,
GIVING A UNIQUE
RELIABILITY

30+
DIFFERENT
AIRCRAFT
TYPES



CUSTOMER BENEFITS

- **efficiency**: animations generated in high speed enabling rapid FDM/FOQA
- event validation
- **easy to understand animations** for anyone: perfect communication tool to share experiences | evidence to make the right decisions | enhanced understanding of complex situations
- **improvement of situational awareness** for safety analysis | feeling of living the flight again
- **SOP compliance** for improved safety | **airport familiarization** | **maintenance**
- support for easier aircraft incidents and accident **investigation**
- better awareness of **safety issues** among flight crews and airline management
- possibility to shift the investigation focus **between human and machine**

About us

CEFA Aviation, a privately held French company, enhances pilot training and flight safety, developing **world-leading 3D animation software** and services for the past 22 years.

The innovative solutions developed by its experts recreate flights with high detail and accuracy based on data from aircraft flight recorders.

100 major and regional airlines, cargo operators and investigative authorities on five continents are using the core software of the company, **CEFA FAS (Flight Animation System)**, for safety analysis and pilot training.

CEFA Aviation is an ISO/IEC 27001:2013 certified company.



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ISO 27001

BUREAU VERITAS
Certification



N°FR072772

TURN EACH FLIGHT INTO **A LEARNING** OPPORTUNITY!

SELF-IMPROVEMENT, EFFICIENT TRAINING
AND EXPERIENCE SHARING



THE **1st**
SOLUTION

for line operations
allowing crews to review
own flights instantly
whenever and wherever
wanted!

IMPROVE THE CURRENT APPROACH TO CREW DEBRIEFING,

WHICH IS SOLELY BASED ON PILOTS' PERCEPTION AND MEMORY...
BY USING A MIRROR OF YOUR PERFORMANCE

Based on real-world data from the flight data recorder, CEFA AMS aggregates hundreds of parameters in order to create a reliable animation that everybody can understand.

CEFA AMS is a line operations tool allowing quick and confidential access to the data of your own flights in the form of an animation and as performance graphs for efficient debriefings, self-training, continuous self-improvement, and accurate reporting.

Until today, pilots' debriefings after a flight were only based on own perception and memory, which can erode over time. CEFA AMS allows comparing the perception with real facts.

CEFA AMS is a great EBT tool, allowing the creation of « observation windows » in order to analyze occurrences from regular flight operation.

The 3D animation is like a true movie with all details of the cockpit instruments, visual and aural warnings, pilots' actions, flight control actions, weather conditions, etc.

CEFA AMS is the **first tool having a hand showing pilot's action**, a fantastic way to distinguish between automation expected change, pilot action, or erroneous alterations.



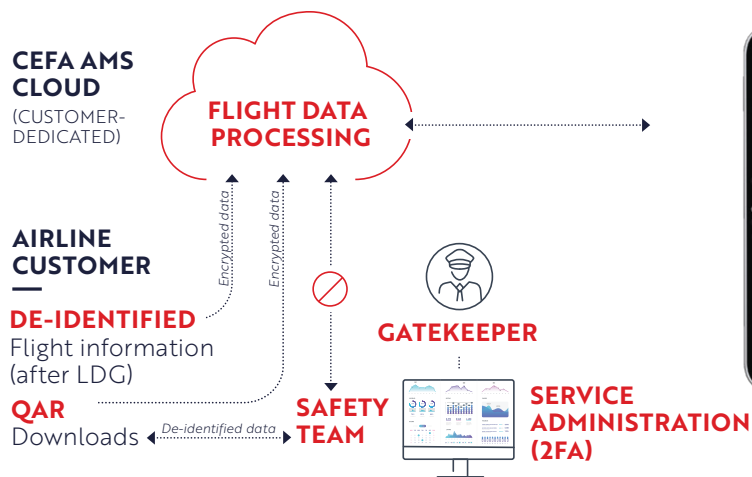
100+
AIRLINES
CUSTOMERS

20+
YEARS OF
EXPERIENCE
IN FLIGHT DATA
ANIMATION

THE 1ST PILOT'S APP

IN THE WORLD TO REPLAY FLIGHTS ON DEMAND !

CEFA AMS (Aviation Mobile Services) is a cloud-based mobile service using accurate and de-identified real-world flight data. The pilots' anonymity is fully guaranteed.





15 MILLIONS
OF FLIGHTS
ANALYZED BY
OUR SOFTWARE
USERS YEARLY

30+
DIFFERENT
AIRCRAFT
COCKPITS



ALL NIPPON AIRWAYS

"ANA envisions a world where each pilot explores safety and improves his own skills. CEFA AMS could be the new style of self-training. This service contributes to the emergence of a new culture of learning and communication. It has revolutionized the company culture regarding debriefings and the use of flight data. It has freed pilots' speech!"

Hideo Morioka, Senior Director of flight operation promotion and standardization

RYANAIR

"We have 500 cadets on training... the feedback from them has been absolutely amazing! The average sector length for cadets up to line check has reduced quite significantly. It's a training tool, it's a safety tool, it's not only just for a cadet, it's for line pilots... Our class 2 and class 3 FDM events have definitely seen a reduction. It's absolutely groundbreaking!"

Chief Pilot – IASS 2021



AMERICAN AIRLINES

CEFA AMS will play a critical role in supporting their pilot improvement program:

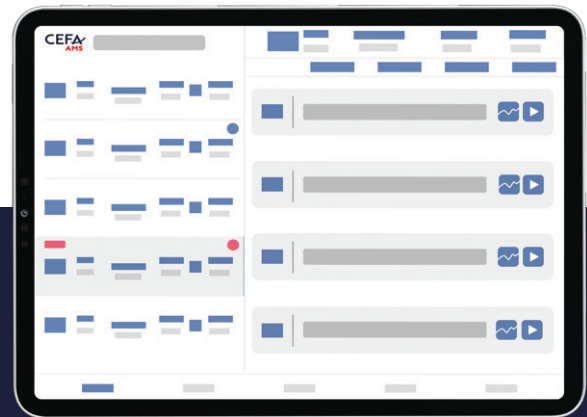
«By choosing the CEFA AMS, we are able to expand the FOQA program in a practical way. This will allow quicker feedback to our pilots and enhance the safety of our flying operation. CEFA AMS will upgrade the concept of immediate crew debriefing, which will improve our safety assurance in SMS.»

Capt. John Deleeuw, Managing Director – Safety and Efficiency

Testimonials

Benefits

- Immediate & objective crew centered **debriefing** using factual recorded data
- Easy **understanding** of flight segments, **showing** complex and/or dynamic situations
- Each pilot has a dedicated access
- **Improved quality of line training** allowing reduction of time and costs
- **Facilitated know-how sharing** (animation database for airport familiarization, best practices)
- **Safety** improvements by allowing pilots to share their view on real flight using factual data



- Pilots' **experience** leveraging & accelerating (home review)
- Ideal vector for **Safety II** implementation at pilot's level. Enables factual and easy reporting removing the doubts of own perception

Answering some questions...

WHAT ARE THE BENEFITS OF AN ANIMATION RIGHT AFTER LANDING?

...the system is conceived to deliver the animation shortly after landing. This is done in a private secured environment (reducing the exposure syndrome as no name is exposed toward the company). Having the crew still together, it's possible to understand not only the result but also, much more important, the process that led to an outcome different than the expectation. The animation also offers the possibility to share best practices and to learn also from minor occurrences that are today not detected with standard FDM software. It's only the crew involved, by analyzing the animation and still knowing the context, that is in the best position to understand occurrences and learn from such events.

HOW CAN SAFETY-II BE IMPLEMENTED AT PILOT'S LEVEL?

...learning from all operations is the new implementation in aviation safety. An animation is the best way of sharing information, usually much easier to communicate than a lengthy report. By having real facts, the doubts can be eliminated, the accuracy and details of the reports are massively improved. It's already demonstrated. Airlines using CEFA AMS see a noticeable increase in voluntary reports. Besides this benefit, statistical data forwarded by CEFA AMS allows the company to realize areas of difficulty before a serious incident occurs (for example, an abnormal high demand of animations for a specific approach).

WHAT ARE THE ADVANTAGES OF USING AN ANIMATION DURING A DEBRIEFING?

... by using the animation, the instructor can act as a facilitator that guides the trainee to understand by themselves the wrongdoings, to help them elaborate corrective behavior and find solutions to occurrences. It is a very simple way to increase the training efficiency during line operation. The same animation can later be used at home to review performances, set gates for future flights, and to confront once again the written debriefing with a mirror of the flight.

HOW CAN AN ANIMATION HELP TO IMPLEMENT EBT DURING LINE OPERATION?

...in opposition to the simulator, where the observation windows are defined by the session, in the real life many interesting moments that present instructive contents are the result of external influences (environmental, ATC, technical, operational constraints...). CEFA AMS allows creating an animation from any moment during the flight. In such circumstances, during the debriefing, the instructor can first ask for the trainee's perception, then look at the animation in a crew-centered debriefing. A great improvement to really understand the crew situation awareness, communication and teamwork, task management and work distribution.

WHAT ABOUT DATA VALIDATION?

...this argument is often asked as it is very important to flight safety when analyzing serious FDM events. CEFA AMS operates at another level; it is intended for normal operations. Events shown for the animation are obvious. They are alarms that have been activated in the cockpit during the flight. As the animation consists of the aggregation of dozens of parameters, a single erroneous value will not corrupt the whole process and can be easily detected by a regular pilot. In case of serious corruption, the software will detect it, and the possibility to create an animation in such case blocked.

WHAT IS THE ADVANTAGE OF THE HAND TOOL OF CEFA AMS?

... one of the unique features of CEFA AMS is the display of an animated hand that helps detect any crew action and, therefore, any automation change resulting from the crew's inputs. Looking at the hand action in real-time is an easy way for understanding the application of procedures, the workload, and the work distribution of the crew.

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A VIDEO WHICH SHOWING HOW IT'S WORK.

Click the link:

[Demo Video link](#)

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AIRCRAFT MODELS AND INSTRUMENTATION AVAILABILITY LIST

Aircraft Type	SP Cockpit	XP Cockpit	Generic
Airbus A220-100, -300		X	
Airbus A300	X		
Airbus A310	X		
Airbus A318/319/320/321 ceo & neo	X	X	
Airbus A330-200,-300, -900neo	X	X	
Airbus A340-200, -300, -500, -600	X	X	
Airbus A350-900, -1000		X	
Airbus A380		X	
ATR42-300, 42-320, 42-500, 72-200, 72-210, 72-500	X		
ATR42-600, 72-600	X	X	
BAE Systems Avro RJ85/100	X		
Boeing B717-200	X		
Boeing B737-200, -300, -400, -500	X		
Boeing B737-600, -700, -800, -900	X	X	
Boeing B737 MAX7, MAX8, MAX9, MAX10		X	
Boeing B747-400, -8F, -8I, -LCF	X	X	
Boeing B757-200, B757-300	X	X	
Boeing B767-200, B767-300, B767-400	X	X	
Boeing B777-200, B777-300	X	X	
Boeing B787-8, B787-9		X	
Bombardier CL600 Series (CL605)			X
Bombardier CRJ-100, -200, CRJ-700, CRJ-900, CRJ-1000	X	X	
Bombardier DHC-8-100, DHC-8-200, DHC-8-300	X		
Bombardier Dash 8-Q400	X	X	
Bombardier Global Express BD-700 (5000, XRS)			X
Canadair CL-415	X		
Comac ARJ21-700, -900		X	
Comac C919		X	
Embraer RJ-135, RJ-140, ERJ-145	X		
Embraer E-170, -175, -190, -195	X	X	
Embraer E2-175, -190, -195		X	
Fokker 50, 70, 100	X		
Falcon 7X		X	
Generic (no cockpit)			
Gulfstream G500, G650			X
McDonnell Douglas MD-11	X		
McDonnell Douglas MD-81, 82, 83, 87, 88, 90	X		