

Let's Use xLS



xLS is a concept that has been developed by Airbus for A320 family, A330, A350, and A380 aircraft to ease the flight crew's task of flying all straight approaches. It is now the standard for all the newly manufactured Airbus aircraft of these types.

This article describes the xLS concept, its various functions, their advantages, and why xLS has been chosen as the standard for flying straight approaches on Airbus aircraft. It addresses operational and training considerations and highlights the benefits of using xLS. It also explains how to retrofit the xLS functions to take advantage of this innovation on earlier produced aircraft.

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xLS CONCEPT

Every day, around the world, many final approaches flown by commercial jet aircraft are Instrument Landing System (ILS) approaches. Flight crews are therefore very familiar with flying ILS approaches. In comparison, Non-Precision Approaches (NPA) represent a smaller proportion of the approaches performed daily. However, 50 % of recorded Controlled Flight Into Terrain (CFIT) during approach and Runway Undershoot accidents occurred while flying an NPA.

In most of these accidents, the identified contributing factors included:

- Lack or loss of situational awareness (lateral or vertical)
- Difficulties to efficiently control, monitor or adjust the vertical flight path
- High crew workload

xLS: A Common Way to Fly all Straight Approaches

To address these factors, Airbus developed the **xLS concept** for A320 family, A330, A350, and A380 aircraft to ease the flight crew's task of flying all straight approaches.

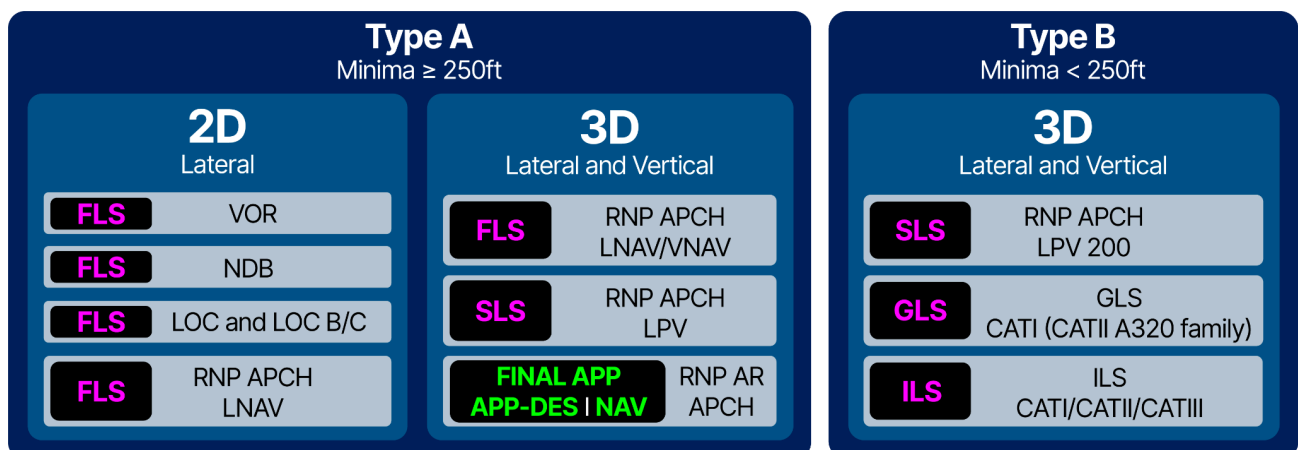
This is why xLS provides a **common and consistent Human-Machine Interface (HMI) and 3D guidance** based on the well-known ILS function for all straight approaches. Aircraft handling with the various xLS functions is identical, allowing operational procedures to be almost identical for all straight approaches.

The xLS concept applies to both 2D and 3D approaches. xLS gathers 4 functions to fly all straight approaches (**fig.1**):

- **Instrument Landing System (ILS)** for ILS approaches,
- **GBAS Landing System (GLS)** for GLS approaches ,
- **SBAS Landing System (SLS)** for RNP approaches with LPV minima, and
- **FMS Landing System (FLS)** for 2D (VOR, NDB, LOC, LOC B/C, RNP with LNAV minima) and 3D (RNP with LNAV/VNAV minima) approaches.

FINAL APP (A320 Family, A330) and **APP-DES I NAV** (A350 and A380) guidance modes remain for flying **curved approaches**.

(fig.1) ICAO Approach types with their corresponding Airbus approach functions



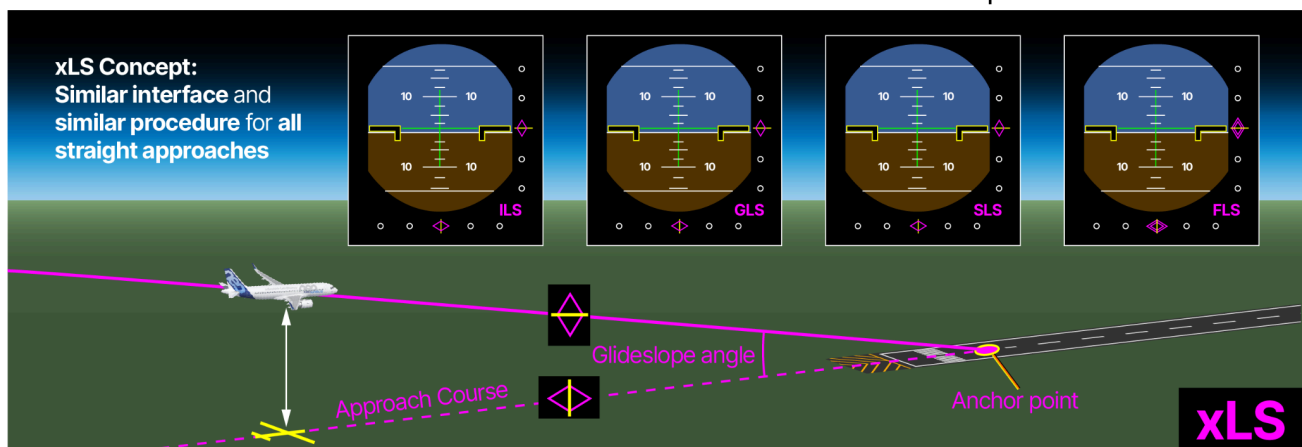
xLS FUNCTIONS

Use of a Virtual Beam for GLS, SLS and FLS

GLS, SLS and FLS have a common principle: the use of a virtual beam, similar to an ILS beam (localiser + glideslope), computed by the Multi Mode Receiver (MMR) **(fig.2)**. The MMR uses an **anchor point**, generally the runway threshold, an **approach course**, and a **glideslope angle**. It then uses the **aircraft's position and altitude** to compute **deviations with regards to the virtual beam**.

The computed **deviations are then displayed on the PFD in a way similar to the ILS deviations**. They are also sent to the autoflight system to compute guidance commands for the Flight Director (FD) and AutoPilot (AP).

(fig.2) xLS concept



Different data sources for virtual beam and deviations computation

The main difference among GLS, SLS, and FLS is the source of the data (aircraft position, aircraft altitude, and virtual beam characteristics) used to compute deviations of the aircraft's position with regard to the virtual beam.



INFORMATION

For more information on the xLS functions, refer to the ["Flying xLS on all Airbus Fleet"](#) video available on the Airbus Worldwide Instructor News (WIN) portal.

FLS function

The FLS function does not depend on any ground navaid to compute deviations.

FLS uses FMS position and barometric altitude for deviations computation

FLS utilizes the aircraft's position, computed by the FMS (A320, A330, A380) or ADIRS (A350) through mixed GPS/IRS (GPIRS), mixed IRS/radio NAVAIDs, or pure IRS, for lateral deviation computation **(fig.3)**. Additionally, FLS uses the aircraft's barometric altitude to compute the vertical deviation.

FLS virtual beam characteristics are stored in the FMS navigation database

FLS uses the virtual beam characteristics that are stored in the FMS navigation database.

FLS glideslope low temperature compensation

An interesting feature is that FLS uses the temperature entered into the FMS APPROACH page to **compensate the glideslope for low temperatures when the OAT is below ISA temperature.**

Specific F-G/S and F-LOC guidance modes for FLS

FLS uses specific F-G/S and F-LOC guidance modes that have similar behavior (engagement and disengagement) to the G/S and LOC modes.

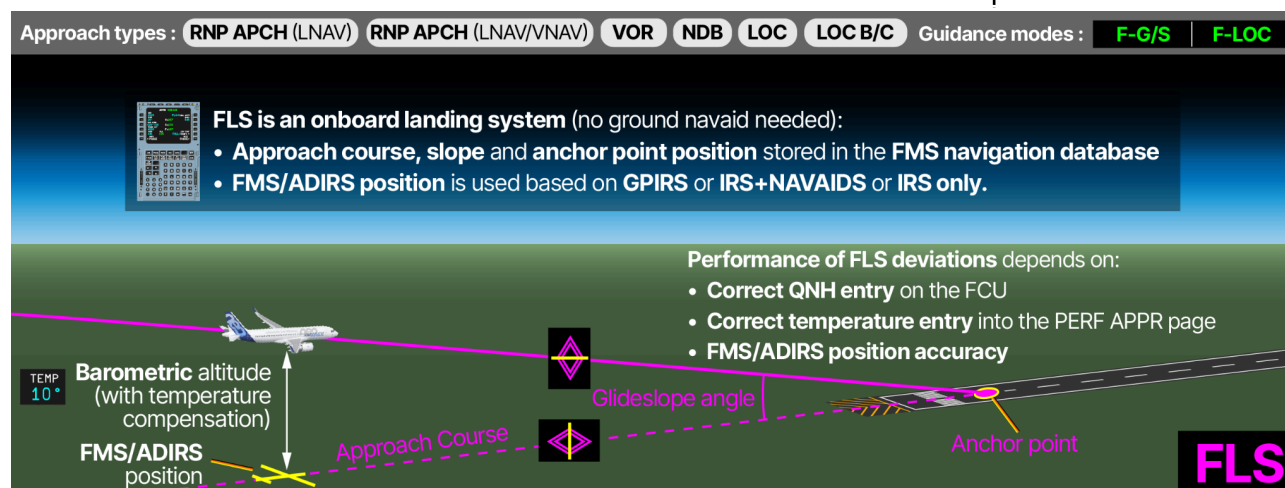
FLS performance

Correct FLS deviations rely on:

- A correct QNH or QFE selection on the FCU
- A correct temperature entry in the PERF APPR page of the FMS for cold temperature compensation
- A good aircraft position performance

The interface is adapted to highlight that FLS does not provide the same performance as for a precision approach. For example, **"Double diamonds"** are used instead of single diamonds to indicate the FLS deviations.

(fig.3) FMS Landing System (FLS)



INFORMATION

For more information on the use of FLS, refer to:

- FCOM "Procedures - Normal Procedures - Standard Operating Procedures - Approach - Approach Guidance Management - Approach using F-LOC F-G/S Guidance",
- FCTM "Procedure - Normal Procedure - Standard Operating Procedure - Approach - Guidance Management - Approach using FLS function", and
- The ["Operational Use of FLS"](#) video available on the Airbus WIN website.

FLS advantages compared to FINAL APP for straight approaches

Using the FLS function offers several advantages compared to the FINAL APP mode:

ILS look-alike

FLS, being part of the xLS concept, offers a similar interface, a similar aircraft guidance, and a similar operational procedure as ILS whereas FINAL APP has a specific interface and a specific behavior that requires a different procedure.

Flexibility of FLS beam capture

FLS beam capture, like ILS beam capture, is independent of flight plan sequencing. It is therefore flexible and can easily cope with ATC constraints (vectoring) or approaches optimization strategies. In comparison, FINAL APP engagement can only be performed within a restricted window and requires proper flight plan sequencing.

FLS can be used when the temperature is below the published minimum OAT

With the FLS's temperature compensation, the managed F-G/S I F-LOC FLS modes can be used when the destination temperature is below the published minimum temperature for an RNP approach with LNAV/VNAV minima, or below the minimum temperature defined by airline policy for temperature correction. FINAL APP mode is not compensated for low temperatures therefore it cannot be used below the published minimum temperature or below the minimum temperature defined by airline policy for temperature correction. Additionally, a manual temperature correction of the intermediate segment's altitude (deceleration platform) could prevent FINAL APP engagement if the aircraft altitude is outside the vertical engagement conditions.

Vertical managed guidance for LOC-only, LOC B/C and ILS with G/S out approaches

The F-G/S vertical guidance mode of FLS can be used in combination with the LOC or LOC B/C mode to provide managed vertical guidance during LOC-only, LOC B/C, and ILS with G/S out approaches. This represents a significant safety improvement compared to the use of selected vertical FPA I LOC or FPA I LOC B/C modes, which require a higher crew workload.

SLS function

SLS function uses geometric position and altitude to compute deviations

SLS uses an augmented GNSS signal provided by both the Global Positioning System (GPS) constellation and a Satellite-Based Augmentation System (SBAS) service to compute the aircraft's position and altitude (fig.4). This increased performance enables the aircraft to fly **RNP APCH with LPV minima down to 200ft (equivalent to CAT I)**.

SLS virtual beam characteristics are stored in the FMS navigation database

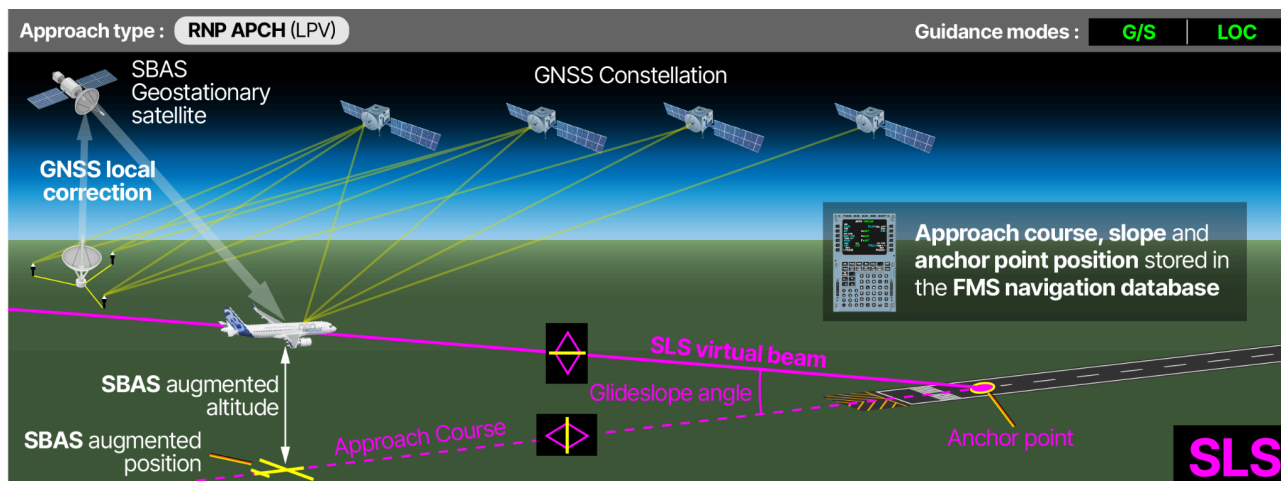
The characteristics of the SLS virtual beam are stored in the FMS navigation database.

G/S and LOC guidance modes

SLS uses the same G/S and LOC guidance modes as ILS.

FLS as a backup

In the event of a loss of the SLS function, the FLS function can be used as a backup to fly the same RNP approach, but down to LNAV/VNAV minima. FLS installation is therefore a prerequisite for SLS.



(fig.4) SBAS Landing System (SLS)

GLS function

GLS function uses geometric position and altitude to compute deviations

GLS uses an augmented GNSS signal provided by both the Global Positioning System (GPS) constellation and a Ground-Based Augmentation System (GBAS) station to compute the aircraft's position and altitude (fig.5). This increased performance enables the aircraft to fly **GLS CAT I (CAT II on A320 family) approaches with autoland**.



NOTE

Like ILS, GLS can be used for takeoff to provide the flight crew with assistance in maintaining the runway axis.

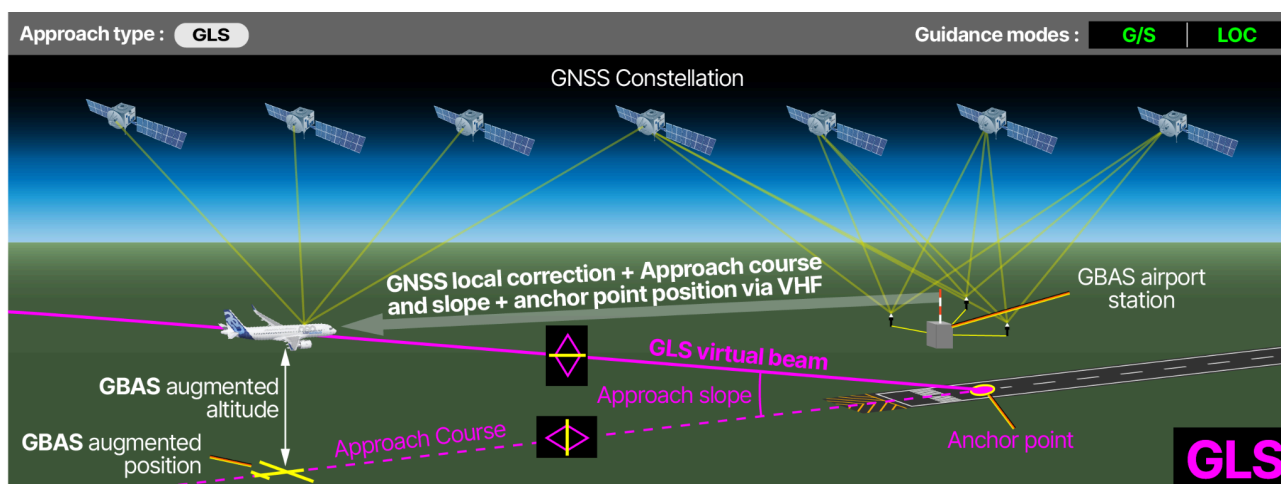
GLS virtual beam characteristics are sent by the GBAS ground station

GLS receives the **virtual beam characteristics from the GBAS airport station** via VHF. Consequently, if the FMS is not available, the flight crew can manually tune the GLS channel on the Radio Management Panel (RMP) to fly a GLS approach, similar to how they can manually tune the ILS frequency for an ILS approach.

G/S and **LOC** guidance modes

GLS uses the same **G/S** and **LOC** guidance modes as ILS.

(fig.5) GBAS Landing System (GLS)



OPERATIONAL CONSIDERATIONS

The introduction of the xLS concept is a significant improvement with minor changes in the flight crew's routine. They need to know which xLS functions are available on the aircraft they are flying, and fly their straight approach like an ILS when the associated xLS function is available.

Which xLS Functions are Installed on my Aircraft

During Preliminary Cockpit Preparation, the flight crew can quickly identify which xLS functions are available on the aircraft by referring to the **Aircraft Configuration Summary** table in the FCOM/QRH **(fig.6)**.

FLS is not mentioned in the table for A350 and A380 aircraft, as it is installed on all aircraft.

(fig.6) The Aircraft Configuration Summary provides the list of available xLS functions

AIRCRAFT CONFIGURATION SUMMARY		
For awareness and for the specified aircraft, the following table provides the flight crew with a list of optional aircraft systems and functions related to flight and aircraft operations.		
Item	System	Installed
If only FINAL APP is available for both straight-in and curved approaches (FLS not installed):		
FLS Function in the FMS	AUTO FLT	No
If only FLS is installed (FINAL APP not available):		
FLS Function in the FMS	AUTO FLT	Yes
If FLS is installed and FINAL APP is available for curved approaches:		
FLS/FINAL APP Coexistence	AUTO FLT	Yes

GLS	AUTO FLT	No
or		
GLS	AUTO FLT	Yes

SLS	AUTO FLT	No
or		
SLS	AUTO FLT	Yes

FLS only vs FLS/FINAL APP Coexistence

In the early stage of FLS introduction on A320 family and A330 aircraft, it was only possible to have either FLS or FINAL APP available due to some computer standard restrictions. The coexistence between FLS and FINAL APP was quickly introduced to enable operators that fly curved approaches to also take advantage of FLS for their straight approaches.

Only 84 A320 family aircraft and 41 A330 aircraft were initially fitted with FLS only. All other aircraft with FLS have the FLS/FINAL APP coexistence.



INFORMATION

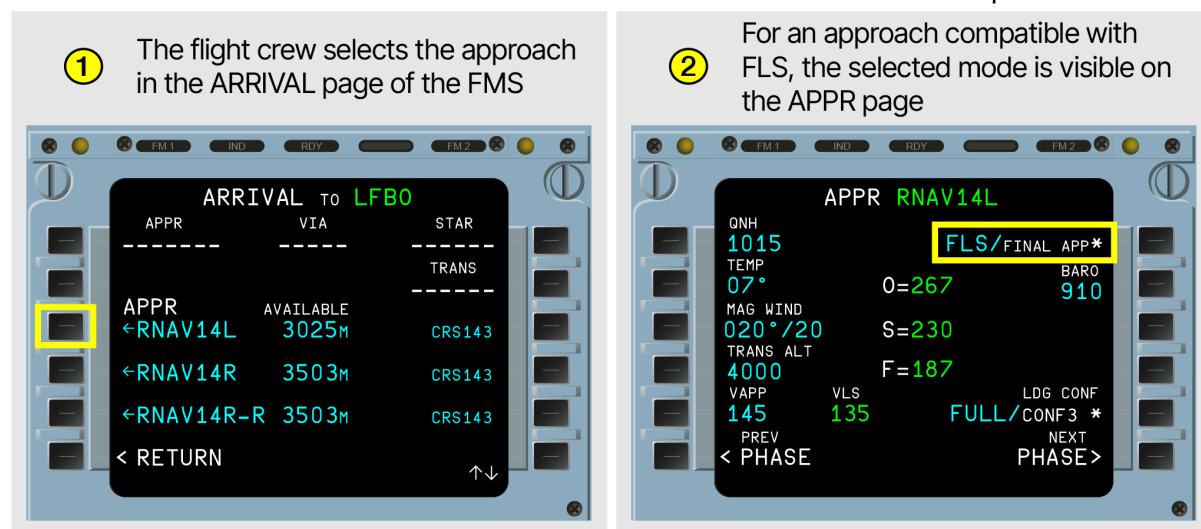
The cross-reference table in the FCOM's "Procedure - Normal Procedures SOP Approach General" chapter provides the recommended guidance mode for each type of approach and a link to the relevant procedure.

Fly your Straight Approaches Like an ILS

If the corresponding xLS functions are available on the aircraft, the methods to fly straight approaches and ILS are similar:

① The flight crew selects the approach in the ARRIVAL page of the FMS. The associated xLS function is automatically selected, if available. ② For an approach compatible with FLS, the selected function is displayed on the APPR page of the FMS.

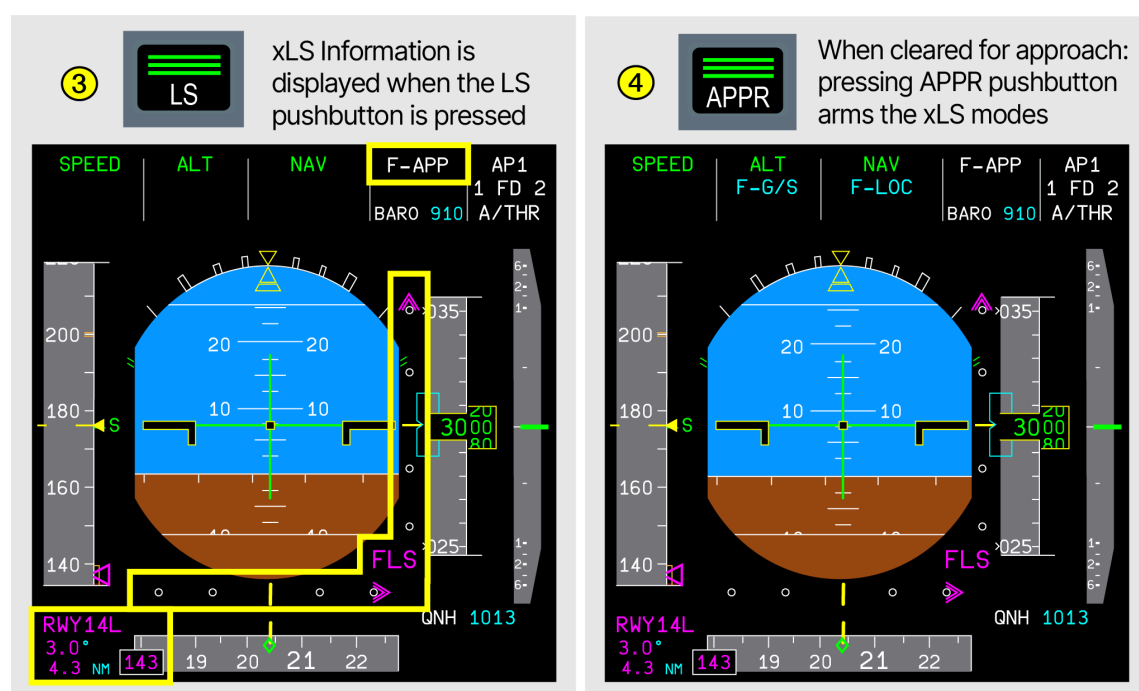
(fig.7) How to fly an approach using xLS - part 1



③ The xLS information appears on the PFD and ND when the flight crew presses the LS pushbutton. ④ When cleared for the approach and on the intercept trajectory to the final approach course, with LOC deviation available, the PF presses the APPR pushbutton to arm the xLS guidance modes:

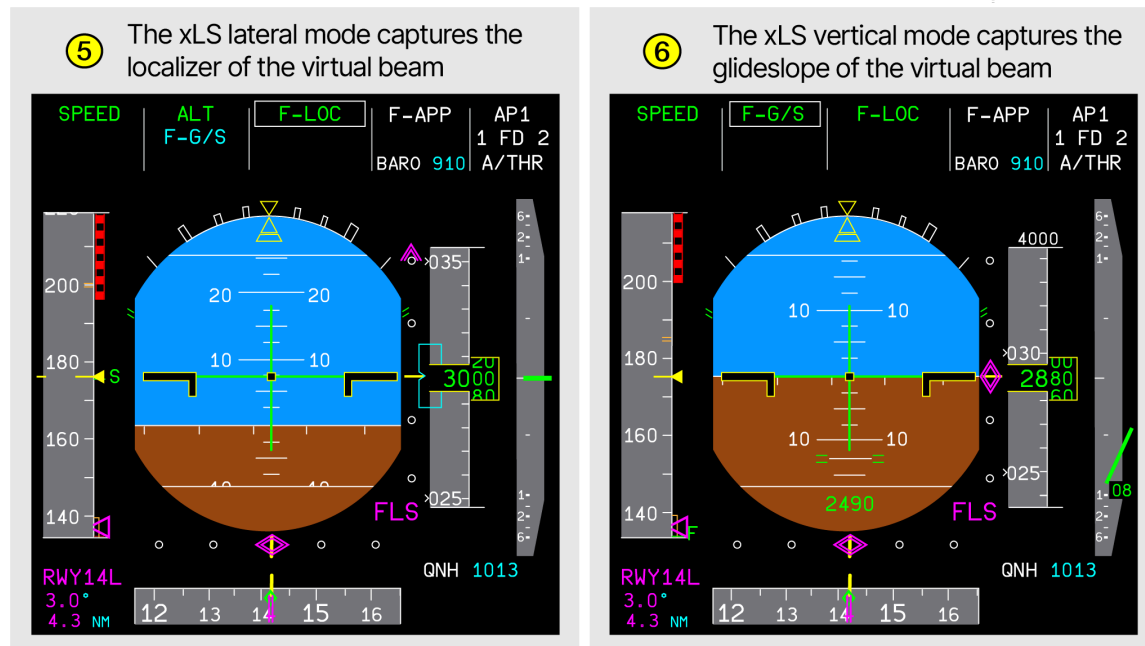
- **F-G/S | F-LOC** modes for VOR, NDB, and RNP approach with LNAV or LNAV/VNAV minima
- **F-G/S | LOC** modes for LOC-only or ILS with G/S out approaches
- **F-G/S | LOC B/C** modes for LOC B/C approaches
- **G/S | LOC** modes for GLS approaches, and RNP approaches with LPV minima flown with SLS.

(fig.8) How to fly an approach using xLS - part 2



⑤ Then, depending on the approach type, the **F-LOC**, **LOC**, or **LOC B/C** lateral mode engages, ⑥ followed by the **F-G/S** or **G/S** vertical mode to start the final descent.

(fig.9) How to fly an approach using xLS - part 3



INFORMATION

The FCOM and FCTM provides all the necessary information on the use of the xLS functions. The cross-reference table in FCOM SOP "Approach" provides the preferred guidance modes for each type of approach.

TRAINING CONSIDERATIONS

Limited training needs

As explained earlier in this article, the only difference between the xLS functions is the source of the data used for the deviations computation. **The way to fly all xLS functions is identical, and the guidance is identical.** The SOP for all xLS functions are therefore almost identical with a slight difference for FLS in the case of a degradation of the aircraft position performance.

This is why only Level A (self-instruction) training is needed for SLS and GLS, and Level B (aided instruction) training is needed for FLS.

Simulator data packages are available

For operators wishing to add the xLS to their simulators, xLS functions are available in the following simulator data package:

Table 1: Simulator data packages for xLS

Aircraft type	FLS	SLS	GLS
A320 family	Std 2.1	Std 2.2	Std 2.0
A330	Std 3.0 (updated in 3.1)	Std 3.1	Std 2.6
A350	Std 1.0	Std 1.0	Std 1.0
A380	Std 1.4	Std 1.5	Std 1.4

xLS FUNCTIONS AVAILABILITY

The sections below indicate for each aircraft type whether the various xLS functions are installed as a standard from aircraft delivery or if they are optional. They also list the minimum computer standards required to retrofit the functions on in-service aircraft.

A320 Family Aircraft

FLS is installed by default on A320 family aircraft manufactured from 2022. It can be retrofitted on previously built aircraft, provided they are equipped with the minimum computer standards.

GLS and SLS are optional. They are available in line-fit (i.e., from the production line) or as a retrofit on in-service aircraft via Service Bulletin.

Aircraft	FLS	GLS	SLS
A320 family aircraft built before 2022	Optional	Optional	Optional
A320 family aircraft built from 2022	Basic	Optional	Optional

Table 2: xLS functions availability on A320 family aircraft

xLS function	FMS		MMR		EIS	TAWS		Other
	HWL	Thales	HWL	Collins		HWL	ACSS	
FLS	H3	S8	iMMR L2	GLU-925 GLU-2100	EIS2 S10 (ceo) EIS2 S12 (neo)	EGPWS -002	T2CAS STD2 T3CAS STD 1.3	FWC H2F4 (ceo) FWC H2F8 (neo) FCU EMM (ceo) FCU Std4 (neo) FDIMU 256 w/s (ceo) FDIMU 1024 w/s (neo)
GLS	H2	S5	iMMR L2	GLU-925 GLU-2100	EIS1 V70 EIS2 S8-2 (ceo) EIS2 S13 (neo)			FWC H2F3 (ceo) FWC H2F8 (neo) RMP Std 3 FCU EMM (ceo) FCU Std4 (neo) FDIMU 256 w/s (ceo) FDIMU 1024 w/s (neo)
SLS	H4 (FG 3G only)	S9 (FG 3G only)	iMMR L2.2	GLU-2100 L4.2	EIS2 S17	EGPWS -002	T2CAS STD2 T3CAS	FWC H2F12 ISIS installed FLS installed

Table 3: Minimum computer standards required for xLS activation on A320 family aircraft

A330 Aircraft

FLS is installed by default on A330 aircraft manufactured from 2020. It can be retrofitted on previously built aircraft, provided they are equipped with the minimum computer standards.

GLS and SLS are optional. They are available in line-fit (i.e., from the production line) or as a retrofit on in-service aircraft via Service Bulletin.

Aircraft	FLS	GLS	SLS
A330 aircraft built before 2020	Optional	Optional	Optional
A330 aircraft built from 2020	Basic	Optional	Optional

Table 4: xLS functions availability on A330 aircraft

xLS function	FMS		MMR		EIS	TAWS		Other
	HWL	Thales	Honeywell	Collins		Honeywell	ACSS	
FLS	P5	T6	iMMR L2	GLU-925 GLU-2100	EIS2 L9	EGPWS -002	T2CAS STD2 T3CAS	FWC T2 (ceo) FWC T8 (-900) FWC T9-1 (-800) FDIU 256 w/s (ceo) FDIMU 1024 w/s (neo)
GLS	P4	T4	iMMR L2	GLU-925 GLU-2100	EIS2 L7 (ceo) EIS2 L11 (neo)			FWC T2 (ceo) FWC T8 (-900) FWC T9-1 (-800) RMP Std 3 FDIU 256 w/s (ceo) FDIMU 1024 w/s (neo)
SLS	P6	T7	iMMR L2.3	GLU-2100 L4.2	EIS2 L13	EGPWS -002	T2CAS STD2 T3CAS	FWC T9-2 FLS installed

Table 5: Minimum computer standards required for xLS activation on A330 aircraft

A350 Aircraft

FLS is installed by default on every A350 aircraft. Coexistence with APP-DES mode is also available to fly curved approaches. GLS and SLS are optional and are available as a single package.

Aircraft	FLS	GLS	SLS
A350 aircraft	Basic	Optional	Optional

Table 6: xLS functions availability on A350 aircraft

A380 Aircraft

FLS was installed by default on every A380 aircraft. Coexistence with APP-DES mode is also available to fly curved approaches on aircraft equipped with Avionic Batch 7 and the RNP AR modification. GLS and SLS are optional.

Aircraft	FLS	GLS	SLS
A380 aircraft	Basic	Optional	Optional

Table 7: xLS functions availability on A380 aircraft

LET'S USE xLS

We have described the numerous operational and safety benefits of xLS to fly all straight approaches, so let's use xLS!

Let's Use FLS

Now that FLS is standard on every newly produced aircraft, let's also benefit from FLS on the previously built A320 family and A330 aircraft.

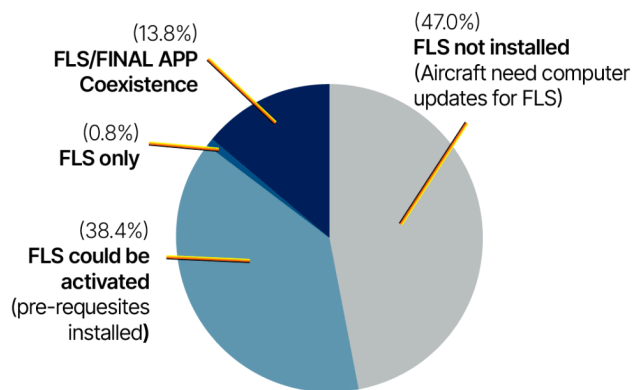
Many A320 family and A330 aircraft can be retrofitted with FLS

38.4% of the current A320 Family aircraft fleet have all the prerequisites to activate FLS. This represents **more than 4,000 aircraft that could easily activate the FLS function.**

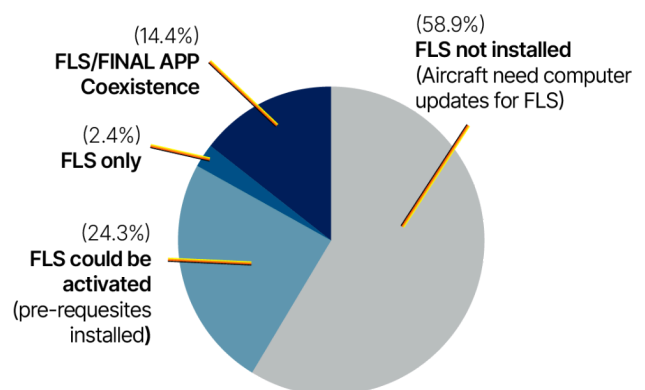
Similarly, 24.3% of the A330 aircraft fleet, which represents **more than 350 aircraft, could activate the FLS function without any additional computer update.**

(fig.10) FLS installation status for A320 family and A330 fleet in April 2025

FLS installation on the A320 family fleet



FLS installation on the A330 fleet



A short grounding time to activate FLS

The maintenance task to activate the FSL function takes 2.5 hours for an aircraft with all the minimum prerequisites.

Attractive commercial conditions for the retrofit of FLS

To encourage operators to retrofit the FLS function on their in-service aircraft, Airbus proposes very attractive commercial conditions for the FLS activation Service Bulletin. Operators can contact their Customer Support Directors for more information and to perform an analysis of their fleet's retrofit possibilities.

Let's Use SLS

An increasing number of published RNP approach with LPV minima

As of early 2025, more than 7 000 RNP approaches with LPV minima are operational in SBAS-covered areas, including Europe, the U.S., South Korea, Japan, and India. The number of RNP approaches with LPV minima is now greater than the number of ILS approaches in the U.S.A. SBAS coverage for Africa, Australia, and China is also planned in the near future.

EASA Regulation for CAT I operation post 2030 in Europe

The European (EU) IR 2018/1048 regulation published by EASA requests exclusive use of Performance Based Navigation (PBN) for non-CAT II/CAT IIIA/CAT IIIB operations. This means that SLS should be selected by airlines to maintain CAT I equivalent operations in Europe after June 6, 2030.

Potential for an SLS CAT I autoland

To increase the availability of automatic landings, Airbus is currently assessing the possibility of certifying an SLS CAT I autoland.

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With thanks to Cedric DESCHEEMAEKER from the Aviation Safety team

The introduction of the xLS concept on A380 and A350 aircraft brought a significant operational and safety improvement by enabling all straight approaches to be flown like an ILS.

In the spirit of continuous enhancement, Airbus decided to also bring xLS to A320 family and A330 aircraft. While SLS and GLS remain optional, FLS is now standard for all newly built A320 family and A330 aircraft, as it is for A350 aircraft.

Many in-service A320 family and A330 aircraft can also benefit from xLS, as more than 4 000 of them have all the prerequisites to activate the FLS function. A significant part of the remaining aircraft could also benefit from FLS but with some additional system updates.

The increasing number of RNP approaches with LPV minima and the EASA regulation requesting the exclusive use of PBN for CAT I operations also highlight the operational benefits of using SLS.

Airbus encourages operators to contact their Customer Support Directors to analyze their fleet and organize the retrofit of their aircraft with xLS.

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