

PDF with 'KLM on Schiphol' on KLM Corporate website

Operational measures taken by KLM to limit noise pollution

For many decades, KLM has taken significant account of the interests of the surrounding area. As a member of the Alders Roundtable, KLM endeavours to limit the environmental impact of aviation as far as possible. The Alders Roundtable cooperative initiative is unique to the Netherlands, providing a consultation platform for government bodies, the airline industry and surrounding residents, upon which basis decisions can be reached affecting the future of the airport. Cooperation of this nature resulted in a two-year experiment being launched in November 2010 to test a new system of standards and enforcement, otherwise known as the 'noise system'. In the new system, takeoffs and landings are distributed across Schiphol's five runways in such a way that noise pollution for local residents is reduced on balance, even as capacity increases.
Aside from the roundtable, KLM also invests energy and manpower into achieving environmentally friendly operations and limiting noise pollution as far as possible.

Quieter aircraft

The International Civil Aviation Organisation (ICAO) has set noise standards for new aircraft. In designing aircraft, noise limits are set for three points: two for departures (one beneath the flight path and one on either side), and one for the approach (beneath the flight path). New aircraft must comply with these more stringent requirements.
KLM is actively engaged in improving the environmental performance of new aircraft in the international arena. Over the past decade, KLM has also shown the way by investing more than three billion euros in a quieter, cleaner fleet.
See also http://www.klm.com/csr/en/.

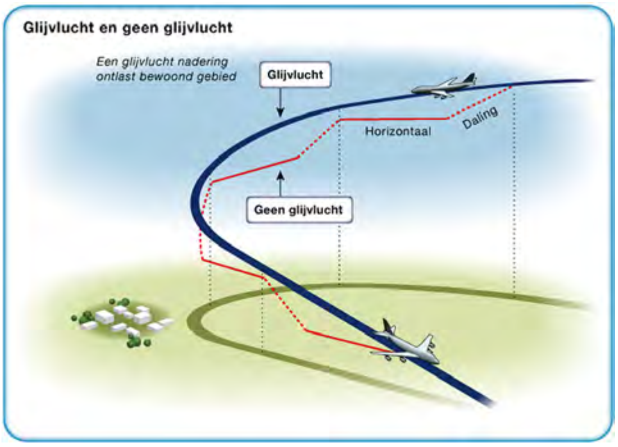
Fixed-radius turn

Schiphol makes use of fixed-radius turns in which aircraft fly away from the airport on a fixed flight path. The aircraft depart along a standard instrument departure (SID) route. There is a limited band of airspace on either side of this 'lane'. As a whole, this forms the flight path. Government establishes these flight paths in aviation legislation. Pilots are obligated to follow the SIDs as accurately as possible in response to the desire to fly through built-up areas. This is beneficial for most people living in the surrounding area. After all, they are spared. However, a small minority beneath these routes are confronted with noise. SIDs are therefore a conscious choice in an effort to concentrate noise in sparsely built-up areas.
At the end of 2010, an experiment was launched for the fixed-radius turn on the path above Spijkerboor, with departing aircraft following the SID closely between Hoofddorp and Nieuw Vennep. The experiment will be assessed after a year. The Netherlands is the first country in the world to apply SIDs to reduce noise pollution. This method is used elsewhere in the world, but only at airports in mountainous regions.

The feasibility of introducing a fixed-radius turn on the flight path between Uithoorn and Aalsmeer was tested previously in practice. Unfortunately, it would not have been feasible to introduce this SID for operational reasons. KLM is aware that introducing a fixed-radius turn would have an impact on local residents. For this reason, KLM continues to invest in and adopt other operational measures such as approach routes above the sea, as well as delayed and reduced flaps procedures.

Continuous descent approach

A continuous descent approach (CDA) hinges on the aircraft gliding towards the runway. This involves starting to descend continuously from a high altitude. A CDA is quieter than a conventional approach, where the aircraft descends step-by-step. Not only is the aircraft lower during a conventional approach, but at the point it is required to fly horizontally it often needs to accelerate. If not, the aircraft's speed would decrease too rapidly as it is not descending. This produces extra noise. When approaching an airport, an aircraft must decrease its speed and altitude. It takes skill to steadily reduce altitude while slowing down: an aircraft tends to speed up when descending. Following a CDA, the aircraft approaches with minimal engine capacity. The on-board computer selects the angle of descent in relation to the ground in such a way as to require as little engine capacity as possible. There is no fixed angle of descent. Newer aircraft types that generate less air-resistance than the older types, generally adopt a more even angle of decent. It's very much like someone on a slide: with smoother clothes you soon slide down too quickly; you either need to slow yourself down or find a less steep slide. The angle of decent is therefore not an accurate gauge of a CDA's success. However, the noise level on the ground is.



What's more, the aircraft follows a fixed route established by law. The on-board computer then calculates the optimal descent approach. CDAs can be followed in a straight line or a curved path. In order to satisfy the wish to fly through built-up areas, fixed flight paths with curves have been established for nighttime approaches. Extra engine capacity is necessary in the curves, which is audible in the relative silence of executing the CDA. This cannot be avoided during flight. Depending on the size and weight of the aircraft, if it's flying against a headwind or with a tailwind, the curve is executed sooner or later, higher or lower. This compares with the turning circle of a car or truck; the faster it travels the wider the curve. Additionally, aircraft sometimes need to divert as a result of a thunderstorm for example. At present, CDAs are only implemented at night in the Netherlands.

Why not during the day?

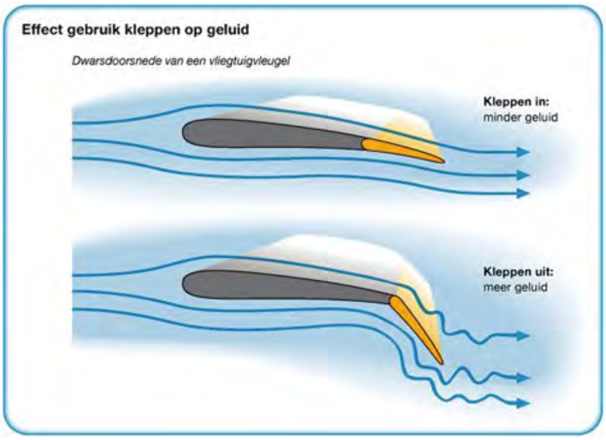
Schiphol competes well with other airports. The sophisticated network, especially that operated by KLM, facilitates the easy transfer of passengers and cargo alike. To this end, air traffic control needs to handle lots of traffic. In other words, because of Schiphol's high hourly capacity, the airport can maintain its competitive edge. And CDAs only serve to reduce the airport's hourly capacity.
This ideal CDA means adhering to a fixed route because this enables the onboard computer to calculate the ideal approach altitude using minimum engine capacity. Fixed routes limit the amount of incoming traffic to Schiphol and this is determined by the way in which air traffic control handles this traffic. Aircraft approach the airport from different directions. At a distance of 10 kilometres from Schiphol, air traffic control 'places' the aircraft neatly in the queue. In order to ensure approach safety, air traffic control can regulate the course, altitude and speed of the aircraft. However, the route and altitude are fixed for CDAs. Air traffic control can therefore only 'adjust' the aircraft speed. Approach safety is of course always the priority. In order to guarantee this, the distance between the aircraft must be sufficient. In other words, the interval time must be extended. This results in lowering the number of aircraft that can be handled and, hence, airport capacity.
At present, a maximum of 24 CDAs an hour can be handled at night. However, during a landing peak, 35 landings an hour are needed to keep KLM's network functioning properly.

Special navigation equipment

Aircraft used to fly from one navigation beacon to the next. The routes between these beacons are fixed as it were, much like the tracks between stations are for trains. In order to execute a CDA, but to do so from above the ocean, advanced navigation equipment is needed on board; it's impossible to place navigation beacons at sea. RNAV, which could be compared to an airborne Tom Tom device, offers a great deal of flexibility in establishing routes because the aircraft can fly from any point in the sky to another without requiring fixed beacons on the ground. The first RNAV equipment was installed across the KLM fleet in the 1970s. Examples of ongoing improvements include Precision P-RNAV (P-RNAV) and Required Navigation Performance (RNP).

Delayed and reduced flaps procedures

'When landing, aircraft always accelerate above my house' is a common complaint expressed by residents who live close to the airport. However, it is not the pilot who does this, but the consequence of a choice to reduce noise elsewhere – in the air or on the runway. An aircraft must reduce speed before



landing. If not, it would be moving too fast to land. Extending the wing flaps reduces an aircraft's speed. This generates greater resistance and slows down the aircraft. But more resistance makes more noise. The space between the flaps makes a whooshing sound. At least half the noise you hear on the ground when an aircraft comes in to land is caused by the flaps and the landing gear. By only using the flaps at a later stage in the approach, the pilot maintains the streamlined form of the aircraft for a longer period of time, therefore minimising noise over a greater distance.

But, when extending the flaps the engine automatically gives more thrust – after all the resistance must be countered. Extending the flaps at a later point therefore means that the engine makes a bigger noise closer to the airport. Reduced flaps means that the flaps are not fully extended. This generates less resistance and therefore less noise. As a result, the landing speed is greater and the runway landing harder. This measure does have an impact on aircraft tyres and brake discs.

Weight & fuel programme

For environmental and commercial reasons, a decision was reached in 2004 to adopt an integral approach towards limiting fuel costs and CO_2 emissions: weight & fuel. A fuel efficiency awareness programme was launched for pilots and ground handling staff.
The auxiliary power unit (APU) – a small engine that drives the air conditioning and electricity in the aircraft when grounded – is only used to start the engines. The power and fresh air come from ground-based systems that are far more economical in terms of energy consumption. The APU is no longer used at all when parking; ground handling staff connect the power supply.
Pilots themselves are doing more to improve fuel efficiency. Taxiing on one engine saves many thousands of tonnes of fuel on an annual basis and also serves to lower noise pollution on the ground. Deferring engine starting until strictly necessary, preventing the aircraft from having to wait with its engines running, also forms part of this programme.
Further assessments will be made concerning departure and approach speeds, weighing up flight speeds against flight time and fuel consumption. It is even conceivable that pilots could request monthly reports to gain insight into their personal fuel consumption.
Accurate refuelling is one of the more recent projects involving refuelling services at KLM Ground Services. Raising refuelling efficiency prevents unnecessary fuel reserves from being carried on board.
Additionally, numerous weight-saving measures have been implemented on board from lightweight packaging and the removal of newspaper trolleys on flights within Europe to cutting the volume of ice cubes carried on board by half. ■