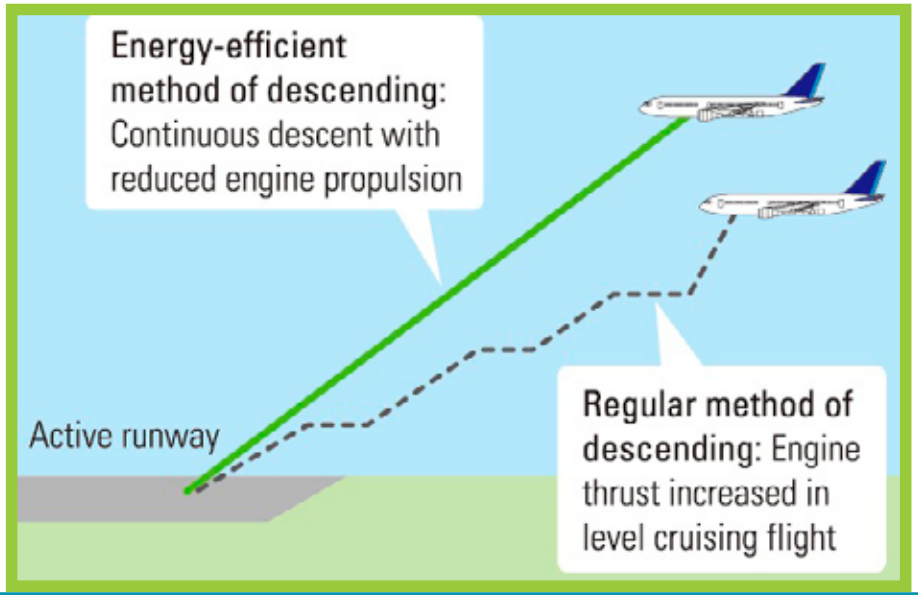
Sustainable Airport Solutions

Continuous Descent Approach

Groningen Airport Eelde - The Netherlands

GSA

Contents



EUROCONTROL

'The effects of aircraft noise and atmospheric emissions can cause constraints at aerodromes and increase operational costs. The implementation of Continuous Descent Approach (CDA) at airfields is acknowledged as being one method that helps mitigate these problems. Consequently, implementation of harmonized, capacity-friendly versions of the CDA technique can be beneficial to all European ATM system stakeholders and is in demand by aircraft operators.'

Introduction

Jos Hillen Managing Director, Groningen Airport Eelde

Groningen Airport Eelde is the regional airport for the northern Netherlands but it is also owned by this region's stakeholders. The airport sees it as a corporate and public task to facilitate their region optimally - from both an economic and social development perspective. This means that we consider the sustainable development of our airport to be top priority.

When considering future plans for development, 'greening' our airport is a key factor. To support our sustainable ambitions we have initiated the international project 'Green Sustainable Airports'. Topics that are investigated within this project include noise abatement, reduction of CO2 emissions and fuel saving measures.

In this publication we would like to highlight the realization of one of our green ambitions, namely the use of Continuous Descent Approaches (CDAs). This is a measure being globally developed in cooperation with all partners in the aviation industry. The idea is that aircraft approach the airport in a gliding mode, engines running idle, to reduce noise and CO2 emissions and save fuel. Groningen Airport Eelde is working in close collaboration with Air Traffic Control the Netherlands (LVNL), EUROCONTROL, the National Aerospace Laboratory (NLR) and transavia.com.

We are proud that Groningen Airport Eelde is contributing to the further development and implementation of Continuous Descent Approaches at regional airports. By doing so we continue to invest in a better environment - at and in the vicinity of our airport.

Joop Atsma, State Secretary for Infrastructure & Environment:

"With the start of the first 'Continuous Descent Operations' (CDOs) at Groningen Airport Eelde, all parties involved will benefit. Groningen Airport Eelde is a frontrunner, being the first to implement this gliding-approach operation at a regional airport. This development is a good example of how economy and sustainability can go hand-in-hand. Airline companies can save fuel with CDOs, resulting in lower emissions and less noise hindrance for residents living nearby. With CDOs the air traffic at Groningen Airport Eelde will become cleaner, quieter and cheaper. The close collaboration between knowledge institutions such as the NLR, Air Traffic Control the Netherlands, airline companies and airports makes this sustainable development possible and strengthens the Dutch aviation industry. The sector has accepted the challenge to further optimize flight profiles. This facilitation and further implementation of CDOs, together with Continuous Climb Departures (CCDs), are an important pillar in the Dutch government 's Aerospace Vision (Luchtruimvisie)."

Green Sustainable Airports

Green Sustainable Airports (GSA) is an international cooperation project, initiated by Groningen Airport Eelde which focuses on accelerating the process of 'greening' airport operations. Within GSA, regional airports, local and regional government authorities, small and medium enterprises and knowledge institutes all work together to stimulate innovation on the subject of sustainability at airports. This European project is co-funded by the Interreg IVB Programme for the North Sea Region.

In close cooperation with all participating airports we aim to establish strategies and policies for eco-efficient regional aviation whilst improving public perception and acceptance and conciliating all stakeholders' interests.
The GSA partners are 'keen and green' - enthusiastic and committed to finding sustainable solutions for reducing the environmental impact of airport operations.

Ben van Os
Provincie Drenthe
Lead Beneficiary of GSA

GSA Partners

The Netherlands: Provincie Drenthe, Groningen Airport Eelde NV | Belgium: International Airport Kortrijk-Welvegem | Germany: ZweckverbandVerkehrsverbund Bremen/ Niedersachsen, FlughafenBremen GmbH, Der Senatorfür Wirtschaft und Häfen, Der Senatorfür Umwelt, Bau, Verkehr und Europa, VerkehrsverbundBremen/Niedersachsen GmbH, BremerStraßenbahn AG | United Kingdom: London Southend Airport Co. Ltd., Kent County Council, Institute for Sustainability, NPL | Norway: Sandefjord Lufthavn AS, Vestfold County Council | Denmark: Billund Lufthavn A/S, Billund Municipality, Thomas Cook Airlines Scandinavia A/S, Billund Varmeværk Amba

For more information: www.greenairports.eu

Continuous Descent Approach

What is a Continuous Descent Approach (CDA)?

A CDA is an aircraft operating technique in which an arriving aircraft descends from an optimal position with minimum thrust and avoids level flight. It is designed to reduce fuel consumption and noise compared with a conventional approach. Instead of approaching an airport in a stair-step fashion, CDA allows for a smooth, constant-angle descent to landing. This reduces noise pollution and saves fuel.
Depending on local circumstances, the effects of aircraft noise and atmospheric emissions can impact on the quality of life of communities close to an aerodrome. Fuel is also a major airline cost element. CDA therefore offers environmental and economic advantages.

All stakeholders benefit

Groningen Airport Eelde is the first regional airport in the Netherlands offering CDA to incoming aircraft. Due to the unique traffic composition at the airport all stakeholders can benefit. CDA can be used not only by the three aviation academies located at the airport to train pilots but also by incoming chartered and scheduled flights.
At the same time air traffic controllers at Groningen Airport Eelde are being trained by Air Traffic Control the Netherlands (LVNL). By offering CDA at Groningen Airport Eelde the newly trained air traffic controllers can incorporate CDA into their training programme.

Supply chain cooperation

In order to realize the successful implementation of Continuous Descent Approaches at Groningen Airport Eelde close collaboration is necessary with all parties involved. Therefore, we are very pleased that further development takes place with our partners at Air Traffic Control the Netherlands, the National Aerospace Laboratory and transavia.com and in continually close collaboration with EUROCONTROL.

Onno de Jong
Airport Manager, Groningen Airport Eelde
Project Manager of GSA

Environmental goals

The aviation industry is under great pressure to reduce its impact on climate change. A small but important step can be made towards more fuel efficient aviation, resulting in lower CO2 emissions and less noise pollution for people living near flight paths.

Therefore the three main reasons for implementing CDAs are:

- **Noise reduction**
- **Reduction of CO2 emissions**
- **Save fuel consumption**

With CDAs significant noise, fuel and emissions reductions can be realized in the areas prior to the point of landing (typically 8 – 25 Nautical Miles), but also a significant reduction in the noise contour area can be expected (up to 5dBA SEL noise reduction over conventional approaches*).

*EUROCONTROL

Current situation of landing procedures at Groningen Airport Eelde
LAmax noise contours of approaching B737 at runway 23

2012-01-25 22:27:19
55.00-65.00
65.00-75.00
> 75.00

New situation of CDA landing procedures at Groningen Airport Eelde
LAmax noise contours of approaching B737 at runway 23

LAmax b738 cda
2012-01-26 15:01:32
55.00-65.00
65.00-75.00
> 75.00

Partners

transavia.com

Groningen Airport Eelde has recently developed a CDA procedure together with Air Traffic Control the Netherlands, the National Aerospace Laboratory and transavia.com.

Using a CDA procedure at Groningen, the descent and approach for the destination airport will not be interfered with by air traffic control. The descent path and route follows a fixed line, enabling the flight crew to plan their descent and approach very accurately. The descent path can be flown with idle airplane engines, resulting in less noise, fuel savings and a reduction of CO2 emissions.

In 2007 Amsterdam Airport Schiphol introduced CDA approaches during night hours. Groningen Airport Eelde will initiate the procedure in February 2012. In Groningen it is designed in such a way that airplanes will gradually descend, being kept as high as possible during approach while following a route that avoids populated areas.

transavia.com integrates social responsibility into its business strategy and aims to minimize the environmental impacts of its operations. transavia.com has, therefore, very willingly contributed to the goals of Groningen Airport Eelde and the 'Green Sustainable Airports' project.

Luchtverkeersleiding Nederland
Air Traffic Control the Netherlands

Air Traffic Control the Netherlands

Designing a CDA with consideration for residential areas

In 2010 Air Traffic Control the Netherlands (LVNL) was requested by Groningen Airport Eelde to develop a procedure for Continuous Descent Approach. The realization of this procedure involved quite some teamwork.

Defining factors

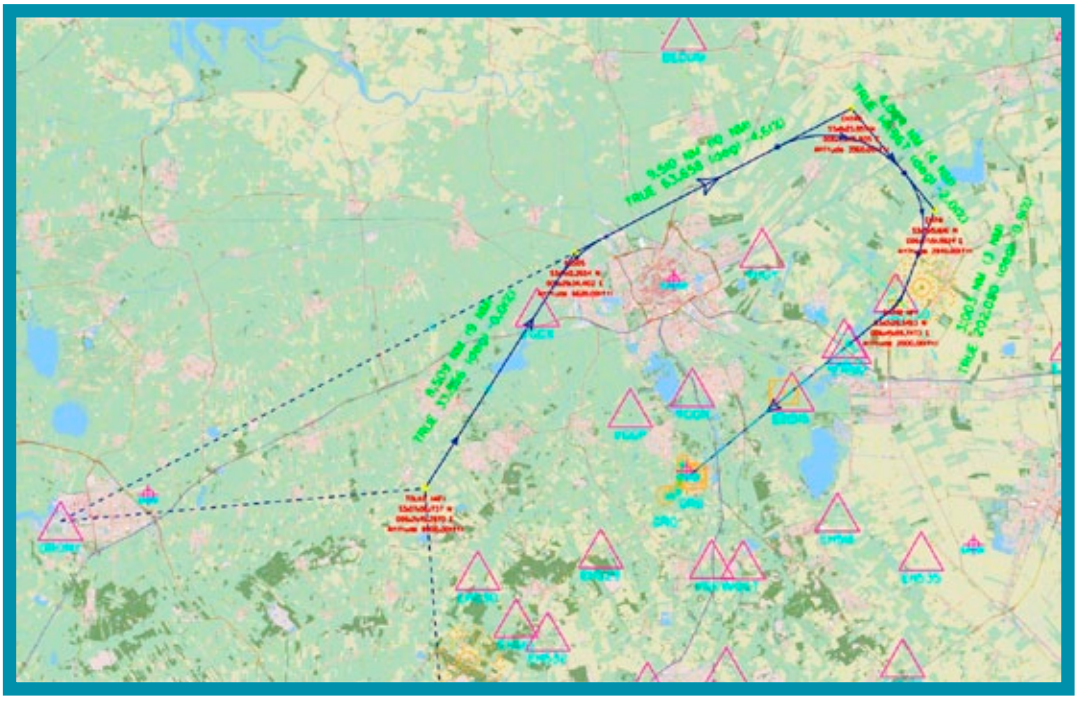
The flight routes to Groningen Airport Eelde are a defining factor when considering the flight trajectory. Departing air traffic must experience no hindrance and form no obstruction for incoming flights following the CDA trajectory. The topography of the provinces was also taken in account – avoiding residential areas is a high priority. Because of the CDA's specific final approach towards Groningen Airport Eelde, the operating procedure was developed in close collaboration with the area control centre responsible for civil aviation in the Amsterdam Flight Information Region.

Planning a CDA procedure

Designing such a procedure involves several stages. Following the initial planning phase, a concept route becomes visible. The various segments are then calculated in more detail using computer software specially designed for planning flight procedures. The planned procedure is then used in a flight simulator and tested by pilots. These test results are then added to the plan and presented to the Human Environment and Transport Inspectorate (ILT). Following approval the CDA procedure can be formally published.

Publication and flying

Publication takes some time. A map has to be drawn and added to the aviation guide; pilots need time to update their flight information and the procedure must be included in air traffic control training programmes. If this has all been achieved then publication is a fact and the procedure becomes operational. Groningen Airport Eelde will have its first CDA flight in February 2012.



About LVNL

Traffic control is the core business of Air Traffic Control the Netherlands (LVNL) . All other LVNL tasks have been set down in the Aviation Act. These tasks include, amongst others, maintaining and regenerating technical systems, supplying information on aviation, providing training for air traffic controllers and supplying flight maps and publications. In short, since 1923 LVNL has been responsible for the management of the Dutch civil airspace and all that it entails. LVNL became an independent administrative authority in 1993. As an independent (semi-state) authority LVNL provides air navigation services according to the instructions of the Ministry of Infrastructure and the Environment, answerable to the Minister in terms of performance and policy. Furthermore, LVNL works closely with, amongst others, the Ministry of Defence, which is responsible for military airspace.

With regards to civil aviation issues, LVNL forms the link between the government and all other parties involved in air traffic control. Together we endeavour to control airspace optimally, with a balanced approach to safety, efficiency and respect for the environment, and the utmost attention for quality.
The Quality and Safety Management System implemented by LVNL complies with the ISO 9001:2000-standard.

Luchtverkeersleiding Nederland
Air Traffic Control the Netherlands

www.lvnl.nl

Partners

National Aerospace Laboratory (NLR)

Continuous Descent Approaches bring Innovation to Aviation

The idea behind Continuous Descent Approaches (CDA) has existed for decades and research into its feasibility for everyday aviation has been done ever since. The environmental benefits of the CDA procedure have always seemed quite obvious: the absence of level flight segments leads to reduced noise nuisance and lower fuel consumption with associated lower emissions.

So why then have they not been widely implemented yet? Because innovations in aviation usually take place at a much slower pace compared to innovations in the consumer market. Safety and complexity are characteristics of aviation that have to be carefully taken into account. No change in aviation systems or procedures is allowed without a safety demonstration. This is no different for CDAs.

As the largest benefits can be expected when used in high density traffic environments, usually around the larger mainports, care has to be taken to maintain aircraft separation. That is a great challenge, given the different performance characteristics of airplanes and the associated diversity of descent profiles and speeds. Therefore, training, new procedures and new tools are required. The National Aerospace Laboratory NLR has been involved in CDA research – and in particular concept validation – from the very beginning.

Using NLR's ATM simulators, flight simulators and laboratory aircraft dozens of trials and concept demonstrations have been conducted, both in European and national research and innovation programmes. As early as 2006 NLR performed CDA flight trials at Groningen Airport Eelde. During these tests NLR assessed the effects of Airborne Spacing for multiple aircraft flying CDAs. This type of research has made CDAs a reality and CDAs are now inserted into daily operations, albeit for low density traffic environments such as Eelde.

NLR continues to work on those requirements that will make CDAs a reality in any type of environment, day or night. In this effort NLR is working for modernization of ATM together with many other partners in the large European research and technology development programme SESAR. Another large programme, CleanSky, will accelerate the introduction of advanced technologies for new aircraft.

Dedicated to innovation in aerospace

About the National Aerospace Laboratory NLR

The National Aerospace Laboratory (NLR) is the key knowledge enterprise for aerospace and air transport technology in the Netherlands. For more than ninety years it has been our mission to ensure greater sustainability, safety and efficiency through innovation in aviation. With world-class expertise and state of the art facilities NLR is highly skilled to fulfil the needs of our stakeholders in the aviation sector, thus strengthening the innovativeness, competitiveness and effectiveness of government and companies. NLR employs around 700 people and is located in Amsterdam and Flevoland. NLR is dedicated to innovation in aerospace!

Results

Preliminary assessment of expected benefits of flying CDAs on Groningen Airport Eelde

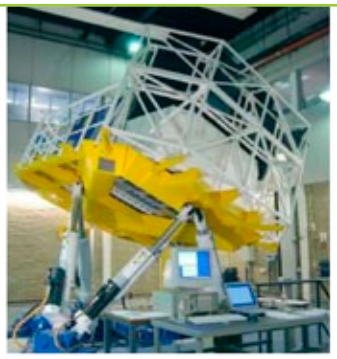
- **Noise reduction**
- **Lower emissions**
- **Less fuel consumption**

In order to assess the environmental and economical benefits of flying CDAs at Groningen Airport Eelde the National Aerospace Laboratory (NLR) is conducting research into the preliminary impact on noise reduction, emissions and fuel consumption.
In the Netherlands CDAs at Amsterdam Airport Schiphol are mainly used during night hours and on a single runway since the late nineties. Inquiries among residents of the area surrounding the airport showed that the noise nuisance during nightly hours has been substantially reduced since the introduction of CDAs. Subsequent studies conducted by NLR supported these inquiries and showed that noise footprints of CDAs are substantially smaller than the footprints of the conventional approach procedures. Also, fuel consumption is about 25-40 % lower during the last 45 km of the flight (which is about 55 kg for a Boeing 737-300/400).
Similar benefits are expected for the situation at Groningen Airport Eelde. Based on annual figures, using a CDA procedure at Groningen will result in noise reduction of 5-7 dB(A) at far distances (> 13 km) and save 10 tons aviation fuel which is equivalent to 32 tons of CO2 reduction.

Environmental benefits of CDA procedures at Groningen Eelde Airport

	Noise reduction in dB(A) at far distances (> 13 km)		Reductions in kg or tons (%)	
Aircraft type	For individual flight LA_{max} in dB(A)	On yearly base L_{den} in dB(A)	Fuel savings	CO2 savings
Boeing 737-800 (1 arr)	6 – 10 dB(A)	-	15 kg (7%)	46 kg
Embraer 135/145 (1 arr)	5 – 9 dB(A)	-	2 kg (2%)	5 kg
Total arrivals (1200 arr/year)	-	5 – 7 dB(A)	10 tons	32 tons


Flexible ATC research simulators


Versatile aircraft research simulator


NLR research aircraft

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