

## Safer flights and reduced waiting times

EUROCONTROL takes delivery of aircraft height monitoring sensors to support a key programme to increase capacity in Europe.



Case study



## Background

EUROCONTROL is the organisation responsible for the safety of air navigation in Europe. Its activities span the entire range of gate-to-gate air navigation service operations and include the implementation of short, medium, and long-term pan-European air traffic management strategies.

EUROCONTROL had responsibility for the introduction of the Reduced Vertical Separation Minima (RVSM), with the aim of enabling commercial aircraft to fly vertically closer together. In time it would take effect all over the world and provide much needed increased capacity in the airways.

## Challenge

The introduction of RVSM would allow aircraft to fly with 1,000 feet separations instead of 2,000 feet, and EUROCONTROL had to ensure the current levels of safety were maintained. Proof of this would be shown in the development of a Safety Case, supported with evidence to demonstrate that aircraft already had sufficient height keeping performance.

Almost every aircraft type, in every fleet operating in Europe, would need to have its height keeping performance evaluated. Not only is that a large number of aircraft, but they had to be monitored at heights of up to 41,000 feet with an accuracy of 25 feet.

## Solution

EUROCONTROL planned to gather this data using both ground based and airborne based solutions. The ground based systems would monitor the bulk of the airline traffic, with the airborne systems being used for aircraft that could not easily overfly a ground system.

Three regions in France and Germany were identified to deploy the ground based systems which would collect the essential aircraft height keeping data. The regions, each more than 8000 square nautical miles in size, were selected as they were at the intersections of major airways, and between them would monitor 65% of all traffic.

Roke won a contract to provide two of the three ground based systems. The company had already proven its technology to EUROCONTROL by deploying two similar height monitoring sensors in Wales and Canada for the North Atlantic RVSM programme. However, for deployment in the mountains of Europe they needed to be significantly modified. Timing is everything, and the height monitoring sensors were no exception. In order to determine the height of an aircraft the receivers that make up a ground sensor all needed to have exactly the same time. The receivers at the sites in Wales and Canada could see each other, and so a timing signal was used to synchronise their clocks. However, in the mountains the receivers had no line of sight between them, so an alternative method had to be found.

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To ensure EUROCONTROL's deadlines were met with the minimum of risk, Roke concentrated on developing its own advanced timing solution. The aim was to achieve an incredible accuracy of one nanosecond between the receivers. Some research into this technology had already been ongoing at Roke prior to the European RVSM programme, but a fully developed solution now had to be implemented rapidly.

## Result

During the summer of 2000, two height monitoring sensors were installed in the Nattenheim and Geneva regions. The first of these sensors was commissioned and declared operational by EUROCONTROL as early as November. Final handover took place in April 2001 after the two monitoring sensors successfully passed flight trials, with one of them significantly outperforming the requirements by achieving an accuracy of 10 feet.

The two sensors installed by Roke tracked a total of more than 1000 flights per day during the monitoring period. This level of coverage meant that many aircraft were automatically monitored, saving valuable resources, and providing the necessary evidence to EUROCONTROL to support the Safety Case for RVSM.

The successful introduction of RVSM in January 2002 has allowed additional flight levels to be used by commercial aircraft, increasing capacity, and reducing delays. The airlines also benefit by reducing their operating costs, as it allows their aircraft to fly at more optimal altitudes which reduces the amount of fuel burnt, which in turn benefits the environment.

The story doesn't end there - the height monitoring units will remain operational for at least seven years, ensuring that safety levels are maintained for us all when we next fly in Europe.

From miniature GPS receivers which integrate into the new generation of smart phones, to complete systems which track aircraft, Roke offers world-class expertise in positioning, tracking and timing technologies. If you would like to find out more about our capabilities in this area, please contact us.

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