NLR Air Transport Safety Institute

Research & Consultancy

The NLR Air Transport Safety Institute is an independent, non-profit research and consultancy organisation that offers customer focussed services which are backed up by thorough and objective research.

Our mission is to deliver pragmatic but well-founded advice to resolve safety and operational issues in full recognition of the requirements and constraints the client has to meet.

The institute supports airports with identifying, assessing, and mitigating safety and operational risks. The needs of the customers are the starting point of every consultancy assignment.

Customers of the Safety Institute include airports, air navigation services providers, airlines, aviation authorities, and governments around the world.

Does safety matter for your airport?

Our services

- **Aeronautical studies**: Flight technical and operational assessments of the safety aspects of operations and procedures. Safety impact of non-compliance with (inter)national standards and regulations (e.g. ICAO Annex 14). Development of solutions to achieve acceptability of non-compliance. A good example of the type of aeronautical studies performed by the Safety Institute are obstacle clearance risk assessments.
- **Safety assessments**: Qualitative and quantitative assessments of the safety performance of new or changed operations to support decision-making about safety risk, either by the customer organization or to provide the evidence needed to comply with regulations.
- **Safety management**: We support the assessment of the safety management system (SMS), its design, the organization, resources and procedures, and the development of specific elements of an SMS such as safety policies, safety performance monitoring, and safety assessments.
- **Safety culture**: Safety culture is an essential element of safe operations. The Safety Institute assists in understanding, measuring, and improving safety culture. We have developed a Safety Culture Assessment Tool which can be applied in all sectors of the aviation industry, including airports.

Our added value

- **We speak your language**. We bring together a team of internationally recognised experts with a background in aviation safety, airport operations, Air Traffic Management, procedure design, regulations and standards, complemented with airline/test pilots and air traffic controller experience.
- **We understand your business**. We have developed an excellent understanding of your processes and constraints through our work with international customers, ranging from airports, air navigation service providers, and airlines, to governments and regulators.
- **We have the most currents insights and information**. We have a well-established network within the aviation industry through our participation in national, European, and many global safety initiatives and think-tanks. The Safety Institute is part of the National Aerospace Laboratory NLR, providing us with immediate access to the knowledge and experience of hundreds of specialists in all fields of aerospace.
- **We have the tools**. We employ a range of models and techniques, including simulations to analyse airport and aircraft operations under various operational conditions.
- **We have the data**. We use high quality safety data from the NLR-ATSI Air Safety Database. The database is one of the largest safety data repositories in the world. It allows us to provide objective proof in support of quantitative and qualitative risk assessments.

How we spend our spare time

- European Commercial Aviation Safety Team (ECAST) of the European Strategic Safety Initiative (ESSI)
- Joint Safety Analysis Teams on controlled flight into terrain (CFIT), loss of control and runway incursions organised by the US Commercial Aviation Safety Team (CAST) initiative
- Flight Safety Foundation Task Forces on CFIT and approach and landing accidents (ALAR)
- Flight Safety Foundation Runway Safety Initiative (RSI)

- European Advisory Committee of the Flight Safety Foundation
- ICAO working group on safety indicators
- CAST/ICAO Common Taxonomy Team (CICTT)
- User group of ECCAIRS (European Co-ordination centre for Accident and Incident Reporting Systems)
- International Society of Air Safety Investigators (ISASI) and European Society of Air Safety Investigators (ESASI)
- Runway Friction Task Force

NLR Air Safety Database

The Safety Institute maintains a large database with aviation safety related data. Air safety data are all data that characterise the activities of the air transport system. The Air Safety Database contains detailed information on accidents and incidents of fixed wing aircraft and helicopters from 1960 and onwards. The database contains information on more than 37,000 accidents and serious incidents that occurred worldwide.

In addition to data on accidents and serious incidents the database also contains over 310,000 commercial airline safety reports for both fixed wing aircraft and helicopters. Furthermore, the Air Safety Database contains worldwide non-accident related data, including airport databases, flight exposure data (flights/hours at the level of airlines, aircraft type, and departures/arrivals at airports), airport weather data, aircraft fleet data, and more.

The Air Safety Database has been used many times to make the difference in the acceptation of new procedures. Examples of studies that have benefited from the use of the database can be found in our track record below.

Snapshot of our work in support of airports

- Flight technical assessment for Reykjavik airport in the context of a re-arrangement of the airport, including obstacle clearance, instrument departure and arrival route design, noise impact, and land use (Air Safety Database (ASD) used).
- Obstacle clearance assessment for a new building in the vicinity of the airport Basel/Mulhouse (see last page).
- Study for Amsterdam Airport Schiphol, identifying and quantifying the risks that an aircraft could be damaged by a large object on the strip (ASD used).
- Safety study into runway incursions, providing mitigating measures, for Eurocontrol (ASD used).
- Aeronautical study for an airport in Europe about the non-compliance with ICAO annex 14 concerning the runway transversal slope (see last page).
- Development of a runway incursion vulnerability assessment tool for airports in Europe (ASD used).
- Study on A-SMGCS and ground movements for Taiwan Taoyuan International Airport.
- Obstacle density study for Schiphol airport. The study concerned the establishment of possible criteria for granting exemptions to buildings violating Obstacle Limitation Surfaces in light of increasing obstacle density at Schiphol.
- A second opinion for Zurich airport was performed, including the review of the safety classification given to future development options of the airport.
- Study into rearrangement of a local airport in the Netherlands in relation to residential area development.
- A study for local airport in the Netherlands on the safety aspects of developing a wind turbine park near the airport (ASD used).
- Safety assessments for three uncontrolled airports in Norway regarding existing services and the foreseen changes in ATM operations.
- Ground safety review: by concentrating on the interfaces between the different disciplines that contribute to ground handling, the Safety Institute established the main risk factors at Schiphol (ASD used).

Obstacle clearance assessment for new building in the vicinity of airport Basel/Mulhouse

- **Situation**: A large pharmaceutical company wanted to build high rise buildings near the airport to accommodate their research laboratories. The desired height of the buildings conflicted with the appropriate Obstacle Limitation Surfaces.
- **Problem**: The company requested to investigate what the highest possible building height at the given location would be, without affecting the safety and regularity of the operations at the airport. Also it was requested to assist in the (combined Swiss/French) regulatory process for getting approval for the proposed building height.
- **Solution**: An aeronautical study was conducted by the Safety Institute to show that protrusion of the so-called Inner Horizontal Surface would not affect the safety and regularity of the operations at the airport. All applicable instrument and non-instrument procedures were analysed to determine the maximum building height for which these procedures remain fully unaffected. Also future developments, in terms of planned new precision approach procedures have been taken into account.
- **Findings**: It was found that the maximum allowable building height was much higher than originally expected (around 120 instead of 63 meters). This allowed the company to revise and optimise the entire building plan. Based on the study the Swiss and French authorities accepted the new building plan.

Aeronautical study of the transverse slope non-conformity of a runway

- **Situation**: A large European airport planned to renovate one of their major runways.
- **Problem**: The transversal slope of this (grooved) runway was less than the recommend slope given by ICAO. Due to economical reasons the existing transversal slope could not be increased. The Civil Aviation Authorities would not accept reopening of the renovated runway if this matter was not resolved.
- **Solution**: An aeronautical study was conducted to assess the impact of the non-compliance. A number of accident scenarios related to the non-compliance were identified and analyzed. For each scenario it was examined if there was an increase in the level of risk associated with the transversal runway slope. If necessary, mitigating measures were examined and proposed to attain an equivalent level of safety.
- **Results**: The study showed that the deviation from the ICAO recommended transversal slope introduced an increase in risk. Therefore an equivalent level of safety could not be attained without the introduction of mitigating measures. The study showed that an equivalent level of safety could be attained when the average runway groove depth was increased to a certain depth while maintaining the other groove dimensions.

Connection with NLR

The Air Transport Safety Institute is embedded in the National Aerospace Laboratory NLR. The NLR is the central organisation in the Netherlands for aerospace research and development. Key NLR facilities such as fast-time and real-time ATC simulators (tower and en-route), and moving-base flight simulators are used for training and validation of concepts and systems, supporting safety assessments for the whole chain of air transport. The NLR research aircraft are available to perform flight tests for new operational procedures, the evaluation of avionics, and new air traffic management concepts.

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