On expanding your airport

new runway, new runway equipment, new approach and departure procedures

Airports operate in a constant love-hate relationship with their neighbors: the people living in the communities around the airport. Airports generate jobs and economic growth, but are also the cause of annoyance. This relation can be held up for a long period in a status quo, but when the airport starts to discuss expansion plans, resisting voices in the surrounding communities usually become stronger and opponents are getting more organized.

The most difficult airport expansions are runway-related. Extending a runway, building a new runway, or installing new equipment (e.g. ILS) is a time consuming process, as this directly influences the noise nuisance of the communities. Their say in the process is essential and communities have the possibility to delay the process for many years (land acquisition, traffic patterns discussion) through forums that all have their say in the process.

All extensions end with firm agreements, sometimes enforced by law, on traffic figures and traffic patterns allowed on the use of the new or extended runway or procedure/equipment. The process to come to these agreements is one of involving and informing communities through existing and new channels. Each proposal will be pondered and decisions often are compromises between the parties.

Simulations

To support the process, calculations on noise exposure need to be done. The use of analytical and simulation tools is required. Starting from high level calculations where it can be determined in general terms where noise can be expected, the process ends with detailed fast time simulations to make a good estimation of the effect of new or changed routes on the noise nuisance that can be expected in different parts of the communities around the airport.

Use of NARSIM simulator

As the attention is mostly focused on the noise experience, often forgotten are the detailed simulations that should be performed to assess the traffic patterns at the airfield itself. New or changed operations lead to different aircraft taxi patterns that may cause hotspots at the airfield and consequently cause delays in traffic. Rerouting traffic over an airfield may lead to bottlenecks around terminal buildings or at complex taxiway/runway crossings.

Tools to support analytical and fast-time simulations are MACAD, TAAM and Airtop. Tools to support real-time simulations are NARSIM and ESCAPE.

Enforcement

To enforce the newly agreed procedures/rules/laws, the ANPS usually monitors traffic over a certain period of time and reports the use of runways and routes to the communities in environmental reports. Reports can be provided on weekly, monthly or yearly basis. As most agreements concern traffic intensity agreements over a one-year period, usually yearly reporting is mandatory.

The reports will not only serve the communities, but are also provided to other decision makers, like the government.

Rules concerning yearly runway use may look like:

- Runway 01 may be used for a maximum 15% of landing traffic
- Runway 01 may not be used in the night period
- Runway 01 may … of the time

This is mostly expressed in a preferential runway system (PRS), which may take different forms (e.g. Schiphol with preferential combinations 1..n for different operational conditions at the airport or Brussels with the first configuration defined per time of day or simpler).

The new agreements often limit operations. ATC does not get full freedom to use the new runway or to use new procedures and routes the way they want to. ATC has to deal with preferred runway combinations based on limiting traffic over certain areas, communities, regions or even different countries. Of course, safety can never be compromised and ATC will have to make decisions on runway use that may be conflicting with the PRS. Other reasons for deviating from the PRS may be the traffic demand that exceeds the capacity of the preferred runway configuration or temporarily unavailability of runways, because of works or incidents.

Using the independent advices of RAAS, the ANSP can be more transparent to communities and government about runway allocation. A better understanding for deviations from the PRS can be achieved.

RAAS (Runway Allocation Advice System)

NLR has developed RAAS as a support tool for ATC supervisors RAAS offers real-time decision support in allocating of runways, based on all relevant operational parameters.

The system offers live runway advice for ATC supervisors but can, when linked to MET-forecasts, be used to give a forecasted runway advice as well. This helps ATC to prepare runway changes thus avoiding these changes during periods of large traffic demand.

RAAS takes into account all operational parameters for runway configuration allocation:

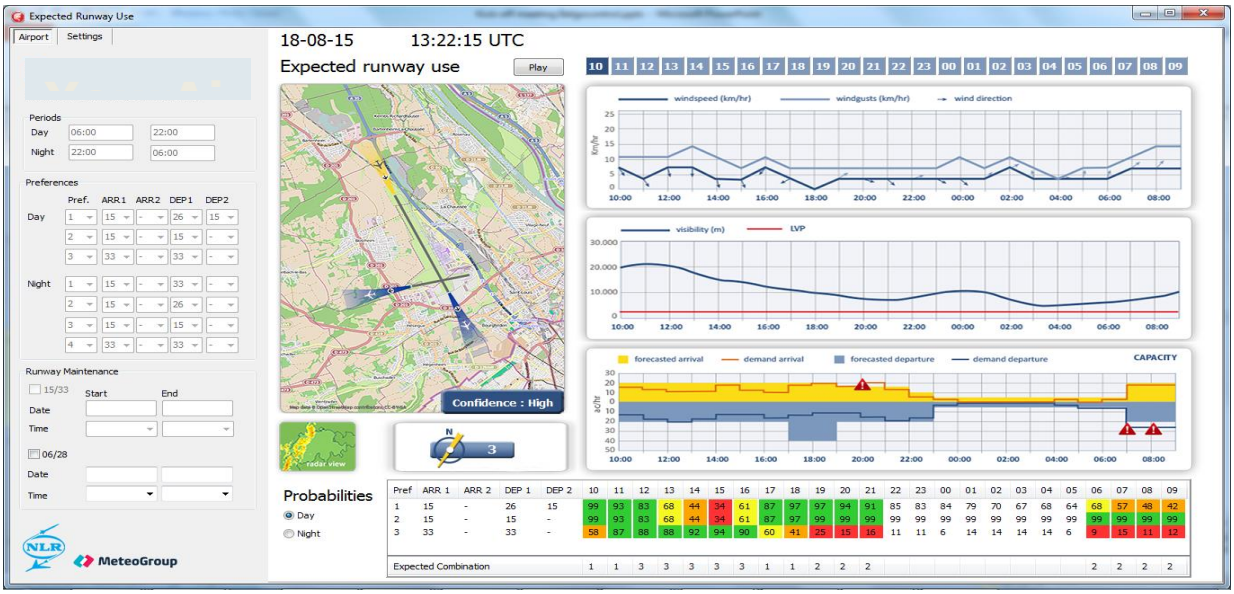
- MET information on wind and visibility conditions
- Wind aloft
- MET forecast information
- Cross- and tailwind limits

- Runway availability
- Traffic demand
- The Preferential Runway System

RAAS reports contain information on runway use and compliance to the PRS. In cases of non-compliance, all relevant parameters will be given to allow the reader of the report an assessment of the operational situation at the moment of the deviation. It is possible for the system to log motivations from the ATC supervisor, who can enter this information when he considers this to be relevant. Automatic reasons for deviation can be provided by RAAS. This information can be used for reporting, including deviations from the preferred runway system, possibly motivated by RAAS or by the supervisor.

RAAS is a flexible tool that can be applied at any airport with a preferential runway system or where the community/government requests information on the operational use of runways, in comparison to the agreements made between ATC and the surrounding communities.

RAAS is available as software tool that will be tailored for every implementation.



Example user interface for RAAS

More information

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