Interaction between Runway Loading and Effective Speed of Arriving Aircraft

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We analyzed a special-purpose dataset containing times at which flights crossed concentric circles at various distances from six major US airports in July 2001. We converted the circle-crossing information into effective speeds along four flight segments defined by the circles. Working with data in 15 minute intervals, we correlated the segment speeds with runway loading, defined as expected arrival demand relative to runway capacity. We find that effective speeds of arriving traffic vary with their physical distance from the runway and their temporal distance from runway congestion. These traffic flow characterizations are made visible in a new data display developed in this paper. We thus have developed a new spatio-temporal characterization of arrival traffic flow that should be useful in efforts to understand the operation of this complex system.

Benefits of Advanced Surface Movement Guidance and Control Systems (A-SMGCS)

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The occurrences of runway incursions and weather dependent airport throughput have led to the development of the Advanced Surface Movement Guidance and Control Systems (A-SMGCS) concept. A-SMGCS will support air traffic controllers (ATCOs) as well as pilots and vehicle drivers – when fully implemented – in the functions of surveillance, control, routing (planning) and guidance in a holistic way. A stepwise implementation approach allows the partial application of this concept today, giving early benefits to airports, Air Navigation Service Providers and airlines, while the higher level functions are still under research and development. ICAO has published the concept in its document 9830, describing operational, functional and performance requirements. An assessment of the A-SMGCS benefits is a key factor in deciding about the implementation of such systems. Results concerning the benefits of A-SMGCS obtained during the European Commission project BETA (operational Benefit Evaluation by Testing A-SMGCS) are analysed and compared with those of NASA and EUROCONTROL projects in this paper. An outlook to the future A-SMGCS development is given at the end.
Integrated Airport Performance Analysis Through the Use of the OPAL Platform

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The increasing airport demand and its associated consequences, in conjunction with technical, physical, and political constraints in providing sufficient capacity, have stimulated vigorous policy discussions towards assessing and monitoring the airport performance with respect to various measures of airport effectiveness. At present, airport stakeholders lack modelling capabilities of the integrated set of airport processes, decisions, and their interdependencies that are necessary to cope with the mismatch between demand and supply, and to effectively deal with the trade-offs between the various measures of airport effectiveness. Therefore, there is an urgent need for a decision support system that will allow decision makers and analysts to evaluate the efficiency of the entire airport complex simultaneously by considering trade-offs between measures of airport effectiveness. The objective of this paper is fourfold: i) to introduce the concept of total airport performance analysis, ii) to describe the architecture of an integrated computational platform capable of addressing the requirements of total airport performance analysis, iii) to present an overview of the platform capabilities, and iv) to provide an operational proof-of-concept on the basis of two case studies for the platform demonstration in Amsterdam Airport Schiphol and Madrid-Barajas Airport.