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## PREFACE

The textbook “Airports and their operation” is offered for higher education seekers studying in the in the fields of study J “Transport and services”, C “Social Sciences, Journalism and Information”, and D “Business, Administration and Law”.

The subject “Airports and their operation” is an integral part of the theoretical basis of knowledge and skills for mastering technical subjects in training specialists in the field of air transportation management and transports systems.

Main target to study the subject is provision of decision making by a specialist in the practice of airports, giving knowledge from principles of safe airport operations, measures and processes for environmental protection, principles and norms of international aviation law in carrying out airport activities.

The textbook contains 8 sections – The airport as a system, International regulation of airport activities, Innovative business models for the development of international airports, Forms of ownership and management of airports, Airport master planning, Development of airport passenger complexes, Planning and equipment of the main functional areas of the passenger terminal, and A green airport concept.

In the first section characteristics of the aircraft as they affect international airports, airport site selection, recommended standards for the operation and management of civil-use airports, airport classification and certification, airports and airlines relationship, development and management of airport non-aeronautical activities were considered.

The second section covers air transport policy and regulation, IATA manuals and regulations for airport management, operation, and development, ICAO manuals for airport management, operation, and development, Boeing and Airbus guidance materials on airport management, operation and development.

In the third section traditional airport business model, airport business model components, and innovative business models of airports were considered.

The fourth section includes information about ownership, control and governance of airports, public private partnerships, the business of airports, and airport groups.

In the fifth section airport development planning, the process of master planning, purpose of an airport master plan, airport layout design, and airport regulatory model selection were examined.

The six section includes information about function of airport passenger terminal, passenger terminal areas, IATA airport passenger terminal recommendations, passenger and baggage flow system, and airport passenger terminal design concepts.

In the seventh section vertical separation arrangements of passenger and baggage flows, space requirements for individual facilities, models in passenger terminal functional areas, terminals for low-cost carriers, parking configurations and apron layout, apron facilities and requirements were considered.

The eight section includes information about a green airport model, airport carbon accreditation program, sustainability initiatives in airports, examples of using green technologies at airports, airport carbon credits analysis.

Also, textbook contains tests, case studies and discussion questions, which should facilitate the practical mastering of the material and the ability to solve particular practical problems.

Contribution of the authors is as follows: S. Lytvynenko personally developed preface, section 3; V. Voitsehovskiy personally developed section 2; I. Vasylenko personally developed section 1; A. Viniukov-Proshchenko personally developed section 4; L. Lytvynenko personally developed section 8; S. Lytvynenko and I. Vasylenko jointly developed section 6; S. Lytvynenko and V. Voitsehovskiy jointly developed section 7; L. Lytvynenko and A. Viniukov-Proshchenko jointly developed section 5.

The authors express their sincere gratitude for the assistance in preparing the textbook for publication to collectives of the Air Transportation Management Department of the State University “Kyiv Aviation Institute”, as well as to professors A. Novikova and V. Yanovska. Authors of the textbook will be grateful for critical comments, recommendations and suggestions.

# 1. THE AIRPORT AS A SYSTEM

## 1.1. CHARACTERISTICS OF AIRCRAFT AS THEY AFFECT INTERNATIONAL AIRPORTS

In a conventional air transport system, aircraft and airports are dependent on each other in providing a service for the passenger. In the past, the system evolved largely with separate planning of the airport, route structuring, and aircraft technology. Advances in technology, the major factor in the growth of the mode, have been quickly utilized by the airlines in expanding their route structures and improving their efficiency in terms of real cost per seat-kilometre supplied [1].

Advances in engine and airframe technology have allowed significant reduction in the real cost of air travel and at the same time have led to improvements in system performance. These improvements in speed, range, ticket price, comfort, and reliability have been responsible for the high growth rates. This has resulted in a natural trend for the airports to accommodate any changes in aircraft design and performance that could maintain the trend to lower aircraft direct operating cost (DOC). The result is illustrated in Fig. 1.1, which shows how the runway lengths of major international airports would have had to change to conform to the requirements of the expected operational fleet [1].

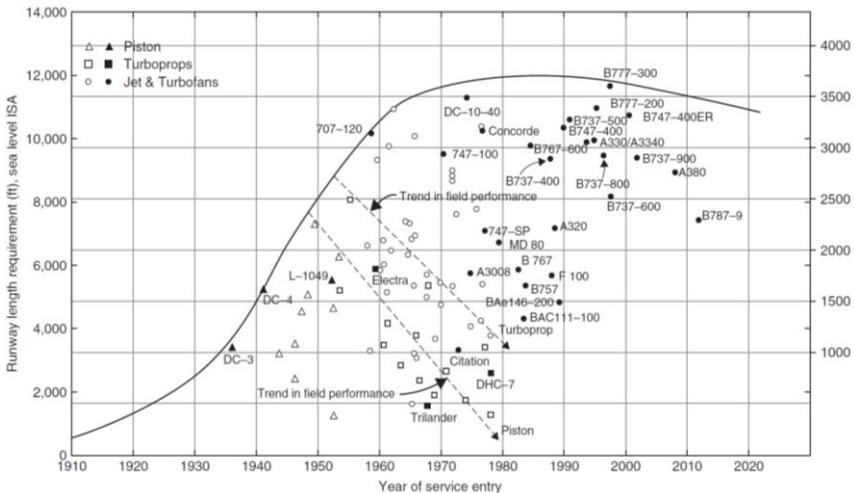


Fig. 1.1. Trends in the airport runway length [1]

Environmental considerations focused primarily on the neighbourhood of the airport, caused compromises between, on the one hand, the design of aircraft and, on the other, the scale and location of the airport. In the 1990s much speculation took place about the design of future aircraft carrying 800–1000 passengers, but in 2009, the Airbus 380 with a maximum certified capacity of 853 passengers was introduced into service. There had been considerable resistance from airport operators to the introduction of aircraft with double-decked access or greatly increased wingspans. Rising land values and construction costs increased the airport contribution to the total system capital costs, which was already considerably greater than its contribution to operating costs. The increasing cost and scarcity of capital added importance to the correct definition of the role of the airport to the total system. In addition, there has been a trend towards involving an increasing number of airports with relatively low frequency of operation and relatively short leg lengths in the air route system [1].

In parallel with advances in type and efficiency of aircraft power plants have come increases in absolute power. In particular, speed capability has increased (Fig. 1.2) [1].

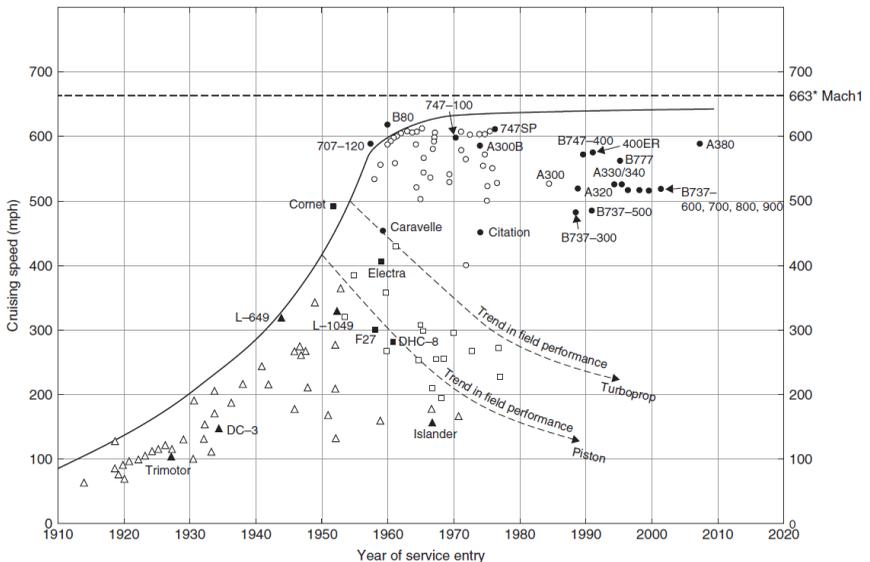


Fig. 1.2. Trends in cruising speeds of subsonic passenger transport aircraft [1]

Since air density falls with increase of either altitude or temperature, for operation at maximum take-off or landing weights, higher take-off and landing speeds must be used, requiring greater field length. If additional field lengths are not possible, landings and take-offs must be carried out at lower weights to compensate for the lower generated lifts. This is demonstrated in Table 1.1 [1].

*Table 1.1*

Increases in field length (ft×1000) due to changes in altitude and temperature [1]

Aircraft	Takeoff				Landing			
	Sea Level		4000 ft		Sea Level		4000 ft	
	ISA	ISA + 15°C	ISA	ISA + 15°C	ISA	ISA + 15°C	ISA	ISA + 15°C
B747-400	3000	3150	4000	4200	2400	2400	2650	2650
B767-300	2600	3400	4400 <sup>a</sup>	4400 <sup>b</sup>	1720	1720	1900	1900
A340-600	3150		3900	3900 <sup>a</sup>	2125	2125	2350	2350
767-200	1720	1860	2350	2620	1450	1450	1630	1630
B737-900	2300	2400	3150	3100 <sup>a</sup>	2100	2100	2300	2300
A321-200	2750	2900	3800	3850 <sup>a</sup>	1625	1625	1830	1830
MD 90-30	2150	2275	2650	2800	1850	1850	2800	2800
De Havilland Dash8	1300	1440	1640	2000	1050	1050	1150	1150

<sup>a</sup>Break energy limitation, reduced TOW in some cases.

<sup>b</sup>Take-off weight limitation.

The characteristics of aircraft using an airport have an important effect on the capacity of runway systems as well as that of passenger processing terminal facilities [1].

## 1.2. AIRPORT SITE SELECTION

The construction of a new aerodrome or an enlargement of an existing one represents extensive investments and building works. It is therefore necessary to design the entire aerodrome project for the longest period possible. The maximum possibilities of the airport development in the proposed locality should be considered, within the limits of the airport's critical constraints. With ensuring that the capacity and operational requirements are met safely, the issues concerning the airport and its surroundings should be considered, particularly the impact of the airport on the nearby population and environment. The locality selected for the airport and orientation of the runway system should facilitate a long-term development of the airport at the lowest cost in terms of money and social impacts [2].