ERNEST BAZIJANAC, D. Sc.
E-mail: baza@fpz.hr
JASMINA PAŠAGIĆ, M. Sc.
E-mail: jpasagic@fpz.hr
TINO BUCAK, D. Sc.
E-mail: tino.bucak@fpz.hr
Sveučilište u Zagrebu, Fakultet prometnih znanosti
Vukelićeva 4, 10000 Zagreb, Republika Hrvatska

Technology and Management of Traffic
Review
U. D. C.: 656.7:338.47
Accepted: Sep. 2, 2005
Approved: Sep. 6, 2005

INFLUENCE OF AIRCRAFT A380 ON AIR TRAFFIC TECHNOLOGY

ABSTRACT

Owing to the implementation of increasingly advanced and efficient transport technologies, air traffic in the world is showing continuous growth and an increasing number of significant results. Since it is a very complex process which requires adequate synchronization of numerous factors in all the phases of the traffic process, it is very important to know all the components of the process. One of the fundamental determinants in the success of the mentioned development lies also in the necessity of constant increase in the level of productivity as the best response to an increasingly severe competition of other transport branches, and the increasingly expressed requirements for even more efficient effects.

The development of technology, organization and through implementation of science the productivity of performance is increased also in general in any activity including the air traffic activity.

Air traffic is a system with a very complex structure, the interior and exterior elements of which are interconnected and they interact. Air traffic can be considered also both as a technical and technological system.

Both in the technical and technological system the aircraft is the basic means of air traffic, its active part, the main and unique link in the transport manufacture, thus conditioning its effect on the efficiency of all the air traffic subsystems. The efficiency of the aircraft as a transport system is considered regarding two criteria. One of these criteria is safety, and the other is the efficiency of air traffic.

KEY WORDS

air traffic, new technologies, handling

1. ECONOMIC FEATURE OF AIR TRAFFIC

From the aspect of traffic-technological and exploitation characteristic of air transport development, some typical examples can be used for the aircraft power plant to be quantified according to their dynamic productivity changes.

Therefore, according to the presented spreadsheet indicators the efficiency of the most productive B747 is greater compared to the least productive initial model of a piston aircraft 3.3 times measured by transportation speed, more than 25 times measured by payload, over 31 times measured by the number of available seats, and more than 84 times measured by hourly productivity. The supersonic Concorde increased the productivity measured by transportation speed almost 8 times, but its available capacity is 5-6 times reduced compared to B747-300, and approximately half the hourly productivity.

A 380 features the average movement speed which equals the B747. Maximum payload of A380 is 85t. These data have been obtained by multiplying the

Table 1 - Productivity indicators of aircraft of different power plants

Propulsion	Year of introduction	Type of aircraft	Average speed movements	Maximal payload	Seat capacity	Hourly productivity
Unit:			km/h	t	number	tkm/h
Piston	1936	DC-3	282	2.7	21	527
Piston	1952	Lockheed 1049	499	11	70	3789
Turbo-Fan	1956	Britannia 310	569	15.6	92	6050
Jet	1983	B747-300	947	67.8	660	44352
Supersonic	1976	Concorde	2236	12.7	110	19346

maximum number of passengers by 100 kg. Compared to B747, it has 1.3 times greater maximum payload. The seat capacity of A380 amounts to 853 which is 1.3 times more than for B747.

2. EXPLOITATION AND PRODUCTION REQUIREMENTS

Since the aircraft turnaround time is regarded as "unproductive" from the point of view of traffic, it is in the interest of the airlines to ensure in the contracts signed with airport companies which perform the handling activities that the aircraft turnaround time be as short as possible in practice as well. This, however, should not affect negatively the flight safety.

When the new A380 is considered, in order to allow a large number of passengers to board the plane and to disembark in the shortest time possible, Airbus has designed the passenger doors double the width of the doors on the existing aircraft. After very serious analyses, Airbus claims that the parallel use of two gates will ensure the same turnaround as for B747.

3. AIRCRAFT MANUFACTURE ECONOMY

Manufacture requirements represent such a technological procedure of manufacture which allows the lowest possible aircraft manufacturing price. In order to achieve this, the standard elements with high level of tolerance are maximally used in the design and manufacture processes, thus eliminating additional activities during the aircraft assembly. Besides, wherever possible, semi-products manufactured by the rolling, pressing and casting processes are used, which reduces the machining time and the total manufacture and aircraft assembly time. Wherever possible, inexpensive materials are used, and materials which do not require complex and expensive processing procedures. In order to realize an actual minimal manufacturing price of an aircraft, a greater number of manufacturers from different countries are involved in the manufacturing process of a single type.

Airbus has already sold 154 aircraft, including 22 cargo versions ordered by 15 airline companies. Due to the high costs of development, as much as USD 13 billion, the new aircraft will cost 280 million dollars. The first A380 will be delivered to Singapore Airlines. This aircraft will operate on the Singapore – San Francisco relation. The biggest order of 43 aircraft was placed by the United Arab Emirates flag carrier, Emirates Airlines.

A380 can carry 200 passengers more than B747, and the air-carriers estimate that they could make a saving of up to 15 percent by changing to Airbus aircraft.

At London Airport Heathrow, it is expected that the introduction of the new Airbus could increase the number of passengers by 10 million annually by the year 2016, without having to increase the number of operations.

4. INFLUENCE OF NEW TECHNIQUE ON THE CHANGE IN THE HANDLING TECHNOLOGY

Because of its gigantic dimensions A380 would find it impossible at the moment to land at the major-

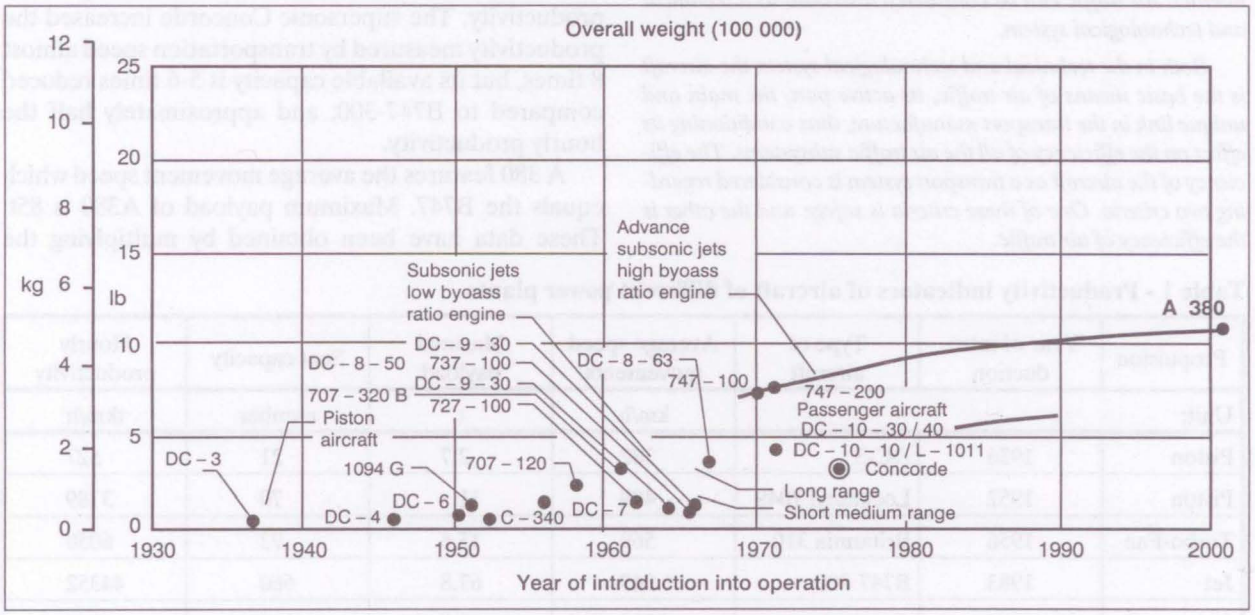

Figure 1 - Increase in the total aircraft weight

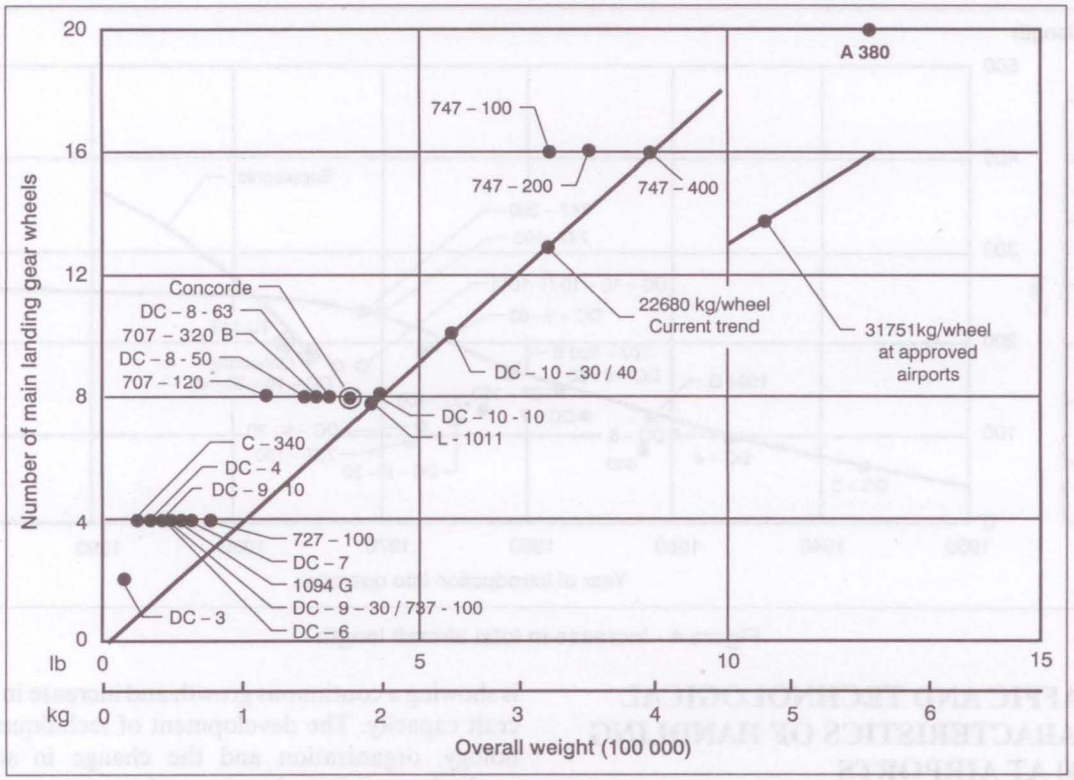

Figure 2 - Trend of loading on the aircraft main landing gear wheels

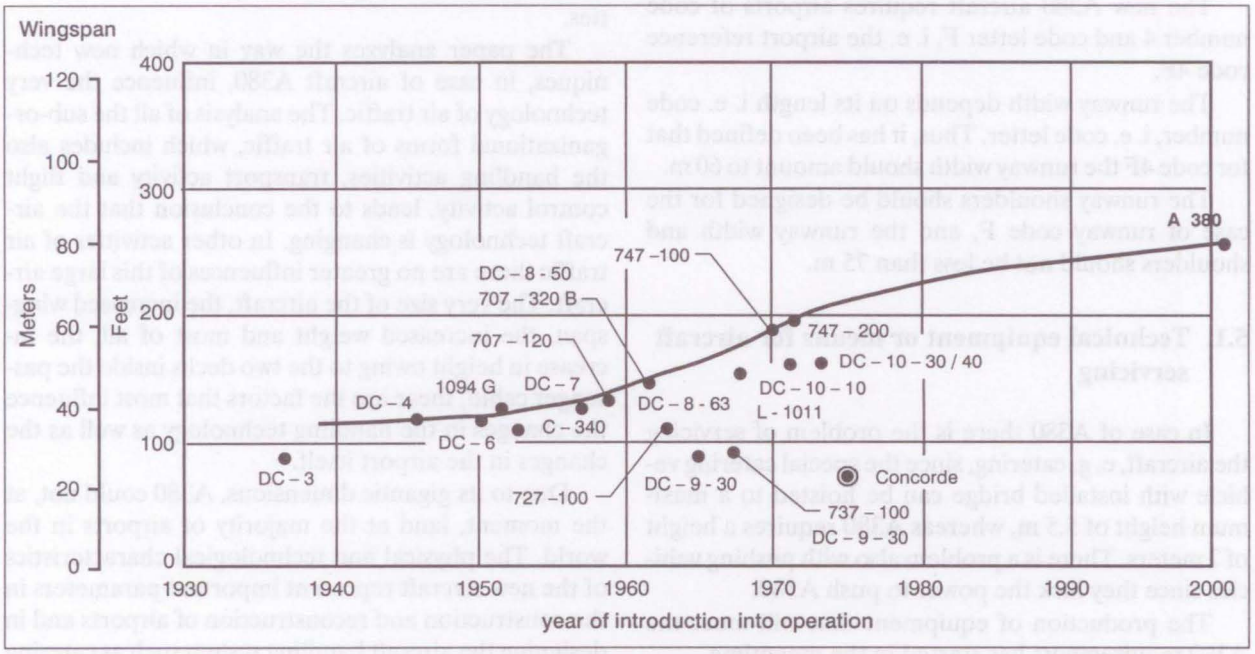

Figure 3 - Increase in wingspan

ity of the airports in the world. In the countries of former Yugoslavia there is not one airport that could accommodate this new superjumbo according to the recommendations of the international civil aviation organization.

Physical and some other characteristics are extremely important in planning airports. For the needs of this paper, the forecasts of the mentioned characteristics of the CTOL aircraft have been selected, that is, aircraft that are mostly encountered in the commercial flying today (DC-9, B-727, DC-10, A-300, B-747) published by ICAA – International Civil Airports Association. This has been supplemented by additional considerations regarding the impact of technical characteristics of the new A380.

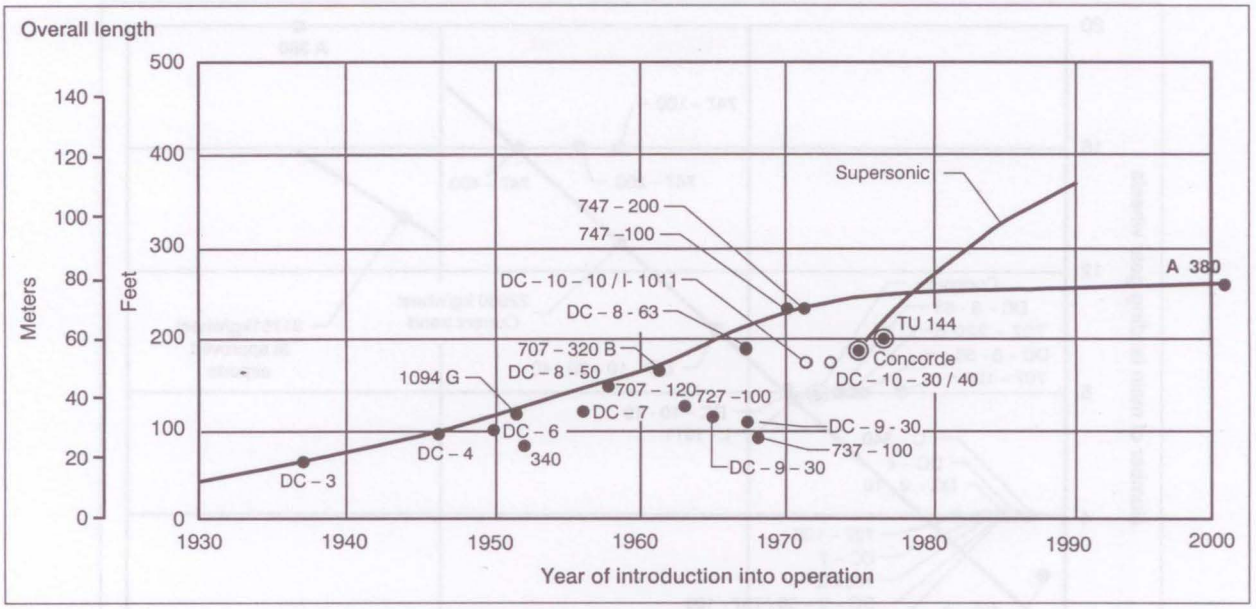

Figure 4 - Increase in total aircraft length

5. TRAFFIC AND TECHNOLOGICAL CHARACTERISTICS OF HANDLING A380 AT AIRPORTS

The new A380 aircraft requires airports of code number 4 and code letter F, i. e. the airport reference code 4F.

The runway width depends on its length i. e. code number, i. e. code letter. Thus, it has been defined that for code 4F the runway width should amount to 60 m.

The runway shoulders should be designed for the case of runway code F, and the runway width and shoulders should not be less than 75 m.

5.1. Technical equipment or means for aircraft servicing

In case of A380 there is the problem of servicing the aircraft, e. g. catering, since the special catering vehicle with installed bridge can be hoisted to a maximum height of 5.5 m, whereas A380 requires a height of 7 meters. There is a problem also with pushing vehicles since they lack the power to push A380.

The production of equipment that will meet the A380 requirements has started in the meantime.

6. CONCLUSION

A general conclusion may be made that, owing to the implementation of more and more advanced and efficient transport technologies, air traffic in the world is showing a continuous growth and increase in the aircraft capacity. The development of techniques, technology, organization and the change in scientific methods regarding planning and management, result in an increase of the productivity of air traffic activities.

The paper analyzes the way in which new techniques, in case of aircraft A380, influence the very technology of air traffic. The analysis of all the sub-organizational forms of air traffic, which includes also the handling activities, transport activity and flight control activity, leads to the conclusion that the aircraft technology is changing. In other activities of air traffic there are no greater influences of this large aircraft. The very size of the aircraft, the increased wingspan, the increased weight and most of all, the increase in height owing to the two decks inside the passenger cabin, these are the factors that most influence the changes in the handling technology as well as the changes in the airport itself.

Due to its gigantic dimensions, A380 could not, at the moment, land at the majority of airports in the world. The physical and technological characteristics of the new aircraft represent important parameters in the construction and reconstruction of airports and in designing the aircraft handling system such as catering vehicles and push-out vehicles.

Since the size of aircraft is increasing, i. e. aircraft of higher transportation capacities are being built, there is a big problem arising, and that is the safety of the passengers. Today, witnessing the horrible consequences of terrorism, the safety issue of such big aircraft is of extreme importance.

ERNEST BAZIJANAC, D. Sc.
E-mail: baza@fpz.hr
JASMINA PAŠAGIĆ, M. Sc.
E-mail: jpasagic@fpz.hr
TINO BUCAK, D. Sc.
E-mail: tino.bucak@fpz.hr
Sveučilište u Zagrebu, Fakultet prometnih znanosti
Vukelićeva 4, 10000 Zagreb, Republika Hrvatska

SAŽETAK

UTJECAJ ZRAKOPLOVA A380 NA TEHNOLOGIJU ZRAČNOGA PROMETA

Zračni promet u svijetu, zahvaljujući primjeni sve suvremenijih i efikasnijih transportnih tehnologija, iskazuje kontinuirani rast i sve značajnije rezultate. Budući da se radi o vrlo složenom procesu koji zahtjeva primjerenu sinhronizaciju brojnih čimbenika u svim fazama prometnog procesa, vrlo je važno poznavati sve komponente tog procesa. Jedna od temeljnih odrednica uspješnosti spomenutog razvoja jeste i nužnost stalnog povećanja razine produktivnosti kao najbolji odgovor na sve oštriju konkurenciju ostalih prometnih grana, te sve izraženije zahtjeve za još efikasnijim učincima.

Razvojem tehnike, tehnologije, organizacije, te primjenom znanosti, povećava se i općenito produktivnost rada u bilo kojoj djelatnosti pa i u djelatnosti zračnog prometa.

Zračni promet je sustav sa veoma složenom strukturom čije su unutarnji i vanjski elementi međusobno povezane i u međusobnoj interakciji. Zračni promet može se promatrati i kao tehnički i kao tehnološki sustav.

I u tehničkom i tehnološkom sustavu avion je osnovno sredstvo zračnog prometa, njegov aktivni dio, glavna i jedinstvena karika prometne proizvodnje i to uvjetuje njegov utjecaj na efikasnost svih podsustava zračnog prometa. Efikasnost aviona kao transportnog sustava promatra se po dva kriterija. Jedan od tih kriterija je sigurnost, a drugi je ekonomičnost zračnog prometa.

KLJUČNE RIJEČI

zračni promet, nove tehnologije, prihvat i otprema

LITERATURE

[1] **Tatalović, M.**: *Prometno-tehnološki čimbenici optimalizacije produktivnosti zrakoplovne tvrtke*, Doktorska disertacija, Sveučilište u zagrebu, Fakultet prometnih znanosti, Zagreb, 2004.

[2] **Radačić, Ž., Suić I.**: *Tehnologija zračnog prometa*, Fakultet prometnih znanosti, Zagreb, 1992.

[3] **Pavlin S.**: *Aerodromi I*, Fakultet prometnih znanosti, Zagreb, 2002.

[4] **Stratford D, A. H.**: *Air Transport Economics In The Supersonic Era*, The Macmillan Press, London, 1973.

[5] **Jelinović, Z.**: *Ekonomika zračnog prometa,* Viša zrakoplovna škola, Zagreb, 1976.

[6] **Prebežac, D.**: *Poslovna strategija zrakoplovnih kompanija*, Ekonomski fakultet, Zagreb, 1998.

[7] **Gvozdenović, S.**: *Vazduhoplovna prevozna sredsta I dio,* Univerzitet u Beogradu, Saobraćajni fakultet, 1995.