

ELEVENTH AIR NAVIGATION CONFERENCE

Montreal, 22 September to 3 October 2003

Agenda Item 4 Capacity-enhancement : measures

DEVELOPMENT OF CAPACITY MEASURES

(Presented by Brazil)

SUMMARY

This paper presents the capacity-enhancement strategy developed and implemented by Brazil since 1995 to cope with the increase of air traffic in the core airports of the country, a situation that had led some of them to a saturation point.

Action by the conference is in paragraph 6.

1. INTRODUCTION

1.1 At the end of 1995, Congonhas Airport, Sao Paulo, faced increased air traffic with a growth rate of 61% in comparison with the same period of the previous year. Delays on flight operation schedules were very common and some incident reports were filed in by pilots and air traffic controllers. The media published a lot of articles about unsatisfactory situation of air traffic in the Sao Paulo Terminal Control Area.

1.2 High density of local traffic at Congonhas Airport caused saturation of Sao Paulo Terminal airspace, where there were already two other airports with high demand of traffic: Sao Paulo International Airport, second in air traffic movements, and Campo de Marte, the third one. As the initial approach segments are common to those three airports, APP was not able to speed up air traffic flow in some periods of the day and, as a result, could not accept the transfer of traffic as proposed by ACC. Such fact resulted in the saturation of ACC sectors and in the transferring of the traffic overload problem from Congonhas Airport to the other airports.

1.3 To overcome those problems, Brazilian Aeronautical Administration activated a Working Group with the following terms of reference:

- a) to implement a slot time allocation procedure for Congonhas Airport;
- b) to develop a model for analysis of installed infrastructure in airports and ATC systems, in order to assess their capacity;
- c) to study the major Brazilian airports and recommend action for demand and capacity balancing actions; and
- d) to provide a basis for air traffic flow management implementation.

1.4 The WG strategy was to perform the recommended activities separately in two subgroups, one for capacity studies and the other one for development of actions as required. Some members of sub-groups acted as a connecting link between them.

2. IMPLEMENTATION OF SLOT TIME FOR CONGOHHAS AIRPORT

2.1 As of December 1995, studies of capacity for Congonhas Airport were initiated, due to saturation on certain periods of the day with a high workload for the air traffic controllers and a high demand for airport services. In April of the following year, the airlines were advised that slot time would be applied, and some flight schedules would have to be changed. In fact, in June 1996 a limit of 35 movements per hour was established for that airport, effectively causing a reduction of its air traffic movement.

2.2 The surface movement was less than optimal and was responsible for the accumulation of aircraft on certain points of taxiway and on the apron. Some changes were put into effect on the runway system, such as the construction of a taxiway between thresholds and new gates on the apron, improving its capacity. In the airspace segment, the departure and approach procedures were redrawn, and STARs were adopted, improving ordering and flow of aircraft through Sao Paulo TMA airspace. At the beginning of 1998, it was possible to increase the declared capacity of Congonhas airport to 44 movements per hour.

2.3 Meanwhile, air traffic controllers from ACC received updated training, increasing their ability to sequence air traffic, so that traffic transference between ACC and APP could be made in more harmonious way. Interchange of information among controllers from different control agencies and between pilots and controllers was encouraged.

3. DEVELOPMENT OF A MODEL OF INSTALLED INFRASTRUCTURE ANALYSIS IN AIRPORTS AND ATC SYSTEMS

3.1 Other States, ICAO and FAA experience, was used as basis for the development of a model for analysis of airports infrastructure and ATC systems, as an instrument of capacity assessment of the main Brazilian airports.

3.2 In order to aid the Brazilian expertise in this area, *inter alia*, international consultancy¹ was contracted in October 1999. The contract also foresaw the supply of hardware and software for analysis of the air traffic flow, aircraft movement, airport and aerospace simulation, tools for elaborating instrument approach procedures and for planning airports modelling.

3.3 Analysis would initially be conducted separately, for airport capacity and for ATC capacity. After that analysis, the lowest capacity found would be defined as the airport capacity.

3.4 Runway, apron and terminal building capacities would be analyzed as input from airport capacity. ATC capacity would be assessed from analysis of TWR, APP and ACC capacities. Representatives of major airports joined the subgroup, establishing indispensable link between air and ground segments.

3.5 For the determination of the runway capacity, some planning factors would be used, such as time of runway occupancy, sequencing by aircraft type, destination, traffic circuit, meteorological conditions, flight rules, arrangement for threshold, runway in use, final speed (V_{ref}) and interference in surrounding airports.

3.6 For apron capacity, the maximum number of utilization of aircraft parking positions in a specific aerodrome would be established according to operation type and aircraft type, under determined conditions, for specified periods of time. The figures would be converted into take-off and landing aircraft movements allowable at every 60 minutes.

3.7 Terminal building capacity would be defined from factors such as passenger terminal configuration, area of every constituent part, number and type of installations and available equipment and time of occupation during embarkation and disembarkation procedures, as well as the international parameters used for adjustment and monitoring of comfort levels in airports, considering passengers, flights and services profiles.

3.8 The specific control tasks performed by the air traffic controller and his assistant, as well as the different configuration of sectors, would be analyzed for ATC capacity. Factors such as time spent in a specific sector, time of air-ground communication, simultaneous control of aircraft and sector complexity would be considered important for the determination of air traffic facilities capacity. TWR, APP and ACC capacity would be evaluated separately.

4. ANALYSIS OF MAJOR BRAZILIAN AIRPORTS AND BALANCING MEASURES

4.1 Once the model had been validated, the major airports in the Southern region, where 65% of all national air traffic pass through, were submitted to the analysis of their available infrastructure and their capacity was assessed.

¹ MITRE Corporation

4.2 In this way, airports such as Santos Dumont (SBRJ), in Rio de Janeiro; Pampulha (SBBH), in Belo Horizonte; Congonhas (SBSP), in Sao Paulo, as well as the international airports of Brasilia (SBBR); Sao Paulo (SBGR) and Rio de Janeiro (SBGL) were analyzed and their capacity values determined. Optimization steps of operational procedures were listed and some of them have already been implemented, while others are still underway due to the financial costs of infrastructure in airports.

4.3 Important airports in the South region were also studied, such as Curitiba International Airport (SBCT) and Porto Alegre International Airport (SBPA). The utilization of airspace between those airports and in their TMA was reformulated and new procedures were adopted, resulting in the improvement of air traffic flow.

4.4 Smaller airports that present high demand of aircraft in certain periods of the year due to regional events are also submitted to an infrastructure analysis, so that the balancing between capacity and air traffic demand should be kept during these seasonal peaks, maintaining the safety of air and ground operations.

5. AIR TRAFFIC FLOW MANAGEMENT BASIS

5.1

According to the CNS/ATM concept, air traffic flow management activities were defined as from October 1997, when requirements for automated tools were developed using national technology, in order to allow for management actions to be taken in a centralized manner for the whole Brazilian airspace.

5.2

In accordance with its term of reference, the development subgroup, in partnership with specialists from Instituto de Protecao ao Vôo - IPV, has developed a management tool, named Sistema de Análise de Situação - SAS (Situation Analysis System), which, after being tested, has permitted the listing of new requirements, producing another version of the software from the former one. At this moment, a Brazilian company is developing a third version of the SAS from the other operational requirements that were added to the former ones.

5.3

In July 2001, the Air Navigation Management Centre - CGNA was activated in Sao Jose dos Campos, adding human and material resources aiming at the implementation of advanced ATM concepts in Brazil.

5.4

CGNA already performs duties of air traffic flow management, airspace management and monitoring of air operation safety. In December 2002, Brazil was assigned by GREPECAS to install and operate CARSAMMA - Monitoring Agency for CAR/SAM Regions, under the auspices of CGNA. The aims and composition of CGNA may be known at www.cgna.gov.br.

5.5

The model is gradually incorporating new technologies and the operational recommendations from ICAO, benefiting as well from the operators' participation in key decisions.

5.6

In spite of the restrictions on the air traffic demand initially imposed, the Brazilian capacity model was developed aiming at the safe, regular, orderly and economic flow of air traffic operations, gradually removing restrictions as soon as better use of system capacity could safely be achieved.

6. **ACTION BY THE CONFERENCE**

6.1 The conference is invited to:

- a) consider the points from this paper in the discussion(s) on the capacity enhancement measures.

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