kładności badań był nieosiągalny przy użyciu tradycyjnych metod pomiarowych (il. 1).

Słowa kluczowe: projektowanie terminali pasażerskich, symulacja przepływu pasażerów

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COMPUTER-ASSISTED DESIGNING OF PASSENGER TERMINALS

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One of the crucial aspects of designing terminals is to coordinate the size of the particular areas of passenger service so that they can both be used most effectively and provide best service. This means searching for a happy medium between the costs and the standard of service.

Early terminal design was based on statistics and observation. Airport managers monitored the flow of passengers and modified the existing infrastructure accordingly. All that was used for such monitoring was simply a stopwatch, a notebook and a pencil;[1] the researcher went through all the stages of the check-in procedure and entered the results in special charts. Although such a system produced a general picture of passenger flow, it did not account for some crucial factors, such as the weather, the season of the year or the impact of holidays. It showed average ratios, while mathematical analyses prove that in many simulations of the same average the components can differ significantly. In other words, passenger flows fluctuate.

Using results of such long-term observations designers were able to calculate the hourly capacity of particular service desks and decide how many are necessary. Unfortunately, there was no way to predict the correct size of the waiting area before a particular counter. In sum, failing to include all the variables, estimates thus obtained were imprecise and did not answer some of the key questions.

At the end of the 1990s the increasing use of computers led to the development of software to simulate passenger flow. At first these were simple programmes limited to a single zone but with the increase in computing power they became simulations of the functioning of whole terminals and airports. Modern programmes, e.g. ARCPort, provide a full monitoring of passengers' movement from the car park in front of the terminal to the take-off of the plane. They can also take into account local political, climactic and cultural factors.[2]

In the process of simulation particular procedures can be modified in many ways and thus the resultant data are much more detailed. Initially, service capacity was estimated for a specified period, for instance for the peak hour divided into fifteen-minute periods.[3] Now, it is possible to asses it for every minute, which in fact means constant monitoring. A report of the work of such a programme also predicts the quality of service for 95% of the passengers.[4] Obviously, no comparable precision was

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[1] *Time and motion*, "Passenger Terminal World", no. 1, 2004, p. 74–75.
[2] R. de Neufville, A. Odoni, P. Belobaba, T. Reynolds, *Airport Systems: Planning, Design and Managment*, McGraw-Hill Education 2003, p. 65.

[3] Landrum & Brown, National ReserchCouncil (U.S.). Transportation Research Board, Airport Cooperative Research Program, United States. Federal Aviation Administration, – *Airport Passenger Terminal Planning and Design: Guidebook*, Washington 2010, p. 196.
[4] *Time and motion*, op. cit.

achievable with the traditional monitoring method (Fig. 1).

Keywords: designing of passenger terminals, simulate passenger flow

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