Summary

The design of an airport baggage handling system is complex. A good way to give an indication of size and costs of a baggage handling system is to make a computer simulation. With such a model a number of characteristics and variables can be determined.

The simulation model used for this report focuses merely on the Early Baggage Storage system in the handling system. An EBS allows passenger bags to be checked in hours before flight time with the flexibility of retrieving the bag automatically at any time. An EBS system also manages peak volumes.

An EBS system exist of different components: the EBS Inlet, Carousel, EBS Lanes and EBS Outlet. The EBS lanes are conveyers next to each other with a surrounding Carousel. The EBS inlet puts bags on the Carousel, the Carousel will put the bags in and out of the EBS lanes and the EBS Outlet will remove bags from the Carousel out of the system.

The goal of the model is to answer the following question: *What is the optimal way of filling and emptying an EBS system and what are its dimensions with a certain bag offer?*

The model is kept generic; it is applicable on different situations. The situation on the airport can be described with:

- the time a bag has to travel to the EBS system;
- the time a bag has to leave the EBS;
- the time a bag will skip the EBS system and will go right to the airplane;
- the number of bags a European/intercontinental flight brings to the EBS;
- the speed of the Carousel;
- the length of the EBS inlet;

The simulation of the EBS aims to determine the dimensions of an EBS system working optimally with a certain bag offer. Different storage approaches can be used to find an optimal system:

- The EBS system can be filled right up; each incoming bag will be placed in the first free spot in the EBS.
- The EBS can be filled with flight number specific lanes; the first bag in the lane determines the flight number of the lane.
- The EBS can be filled by looking at the departure time of the flight of the bag; a bag can only enter a lane when the bag in the lane has an equal or earlier departure time.

When a filling procedure is chosen, other variables should be entered into the model:

- the number of EBS lanes next to each other;
- the length of the EBS lanes;

- the time the bags take to leave the EBS;
- the levels; how many EBS lanes can be place upon each other;
- the maximal percentage of trays filled.

With the trial and error method the optimal EBS system now can be found. Some conditions of the model should be taken into account to get to this:

- A bag cannot leave too late. To achieve this, the bags have to leave some time before they all have to be gone. This bag leave time has to be as small as possible.
- The fact that the EBS inlet cannot store a large number of bags. The EBS system is the storage device not the EBS inlet. In the model 30 bags can be in the EBS inlet.

To reduce the costs:

- The dimensions of the EBS system should be as small as possible.
- An extension of an EBS lane is desired above an extra EBS lane. An extra EBS lane would be more costly than a longer one.

For a regular day at Schiphol airport the model has been used to find the optimal EBS system. The results found lead to the following conclusions:

- The EBS should be filled with regard to departure time of the bags;
- The Carousel should be used as a buffer;
- Different levels should be used.