Summary

Problem background
The walking distances for passengers at Amsterdam Airport Schiphol (AAS) are large and rated below average by passengers. The distances will become even larger in the near future (2007 - 2015). Despite this increase the Minimum Connecting Times (MCTs) for transfer passengers will have to be maintained. Automated People Mover (APM) systems can be helpful to solve this problem, but they are very expensive. Accelerated Moving Walkways (AMWs) are believed to be a cheaper solution for this problem. AMWs are applied at speeds three to four times greater than speeds used by Conventional Moving Walkways (CMWs). To ensure safe operation, people enter the system at the currently used low speed (0.60-0.75 m/s) and are then accelerated to higher speeds (2.0-2.5 m/s). Before exiting the system, the treadway will decelerate to the initial speed.

Research objective
The research objective was to find out if AMWs can safeguard the MCTs at Schiphol and improve the perception of the passengers on the walking distances.

AMWs in general
First the AMWs are analyzed in general. Different aspects of the AMWs were researched like energy consumption, safety and acceptance by passengers. A more theoretical approach was used to determine the main characteristics of the system resulting among others in the effective capacity of the system (6,900 passengers/hour for a treadway width of 1.4 m). AMWs are used for distances between 150 m and 3000 m. For the shorter distances there will be an overlap with CMWs and for the longer distances with APMs. The main advantage over an APM is the continuous character of the AMW. People do not have to wait on the system, it is always available. Therefore the average transport time is competitive with the APMs despite the higher speeds of APMs (4 – 14 m/s). The difference in transport time between a CMW and AMW is shown in Figure 0-1 related to the distance. The transport time is shown for walking and standing still on the system or bypassing the system.

This reveals the additional advantage of AMWs with respect to CMWs on top of the reduction in transport time. People standing still on the AMW are still faster than people bypassing the system. At CMWs these people are slower than the people bypassing the system. This benefits both the people standing still and the people that like to walk on the system but get blocked by people standing still. (Used parameters: Walking speed: 1.34 m/s; CMW speed: 0.75 m/s, AMW entry speed: 0.62 m/s, high-speed 2.5 m/s).

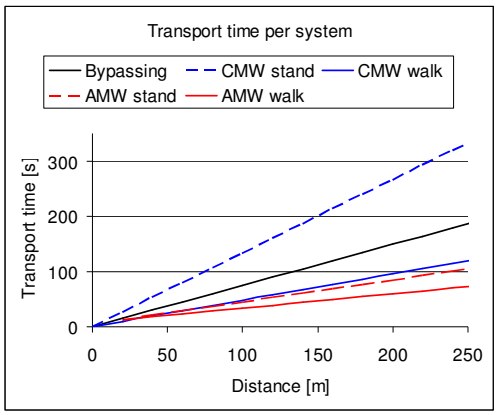

Figure 0-1 Transport time per system

Market research revealed that there are two manufacturers producing AMWs nowadays. Several manufacturers have attempted designs of AMWs, but were unsuccessful. The first manufacturer producing AMWs is CNIM; they have a system operational at a metro/train station in Paris (Montparnasse). This system is operational since July 2002 and has struggled with safety problems that have been solved by now. The system uses steel rolls to accelerate the people before they are transferred to a high speed rubber belt. The second manufacturer is ThyssenKrupp; they will introduce their first system in June 2007 at Toronto Pearson International Airport. The treadway consists of steel pallets, which can be extended by auxiliary pallets to accelerate the people. Both systems use handgrips that move with synchronized speeds with respect to the treadway. Besides the

distinct treadways there are several differences between the systems. CNIM uses a higher speed ratio resulting in a higher time benefit. However, the steel rolls of CNIM do not allow the safe use of high-heels. The ThyssenKrupp system has no such restrictions. Only the ThyssenKrupp system will be available in treadway widths of 1.40 m in stead of the current 1.20 m. (1.40 m is preferred by AAS). The energy consumption of the ThyssenKrupp system is 300% compared to a CMW, the CNIM system consumes only 150-200% compared to a CMW. Maintenance costs of the CNIM system are nowadays 400% compared to CMWs, but will become lower in the future. For ThyssenKrupp maintenance costs are unavailable. The initial costs of both systems are between 200-250% compared to a CMW.

AMWs at Schiphol

At Schiphol the AMWs can be used in most of the corridors and two piers (DII and E). The piers will require an additional floor served by Inclined Moving Walkways or escalators. The main issue to apply an AMW at Schiphol is the maximum distance to a fire exit. This distance is restricted to 30 m by governmental regulations resulting in a maximum length of 60 m of a CMW or AMW. Current CMWs are already longer (up to 100 m). To allow the use of AMWs beyond 60 m additional measures have to be taken concerning fire prevention and minimizing the development and spreading of smoke. Other issues are all related to the current infrastructure: blocking baggage systems in the underlying floor, blocking fire walls and for future expansions, blocking buildings and installations (e.g. fuelling point). All these issues can be solved and concepts for the design of locations with AMWs are generated based on these solutions.

Two locations have been studied more thoroughly. Firstly the ‘Holland Boulevard’, which is a corridor within the existing building and secondly the AB-corridor, which will connect the future A-pier expansion. The generated concepts for these locations with AMWs can achieve reductions in transport time of 30%-54%. In absolute time this is 48 s – 82 s which can be used by passengers to cover an extra distance of 67 m – 93 m. The ability of AMWs to safeguard the MCTs could not be verified due to the lack of information on the details of the MCTs.

The passengers’ perception on the walking distances will be improved, since several aspects that determine the perception are influenced by the installation of AMWs. These aspects are: ‘sufficiency of moving walkways’, ‘surprising surroundings’ and the ‘walking time’. The exact improvement can only be determined by empirical research.

Conclusion and recommendations

AMWs can contribute to safeguard the MCTs. Further research into the details of the MCTs is needed to determine the exact result. The passengers’ perception on the walking distances will be improved by the application of AMWs at Schiphol. The feasibility of applying AMWs at Schiphol will firstly depend on further research of the restriction on the maximum emergency exit distance. Secondly the missing data of the ThyssenKrupp system will need evaluation after experience is gained with the system in Toronto. This concerns data on the availability of the system, the acceptance of the system by passengers at an international airport and the operational costs.