

## Summary

Conveyor transport is used in a wide variety of applications, ranging from production lines to baggage transport at airports. Often relatively straightforward configurations evolve to very complex structures. These structures have numerous performance indicators, such as throughput, waiting times and the length of queues. The analysis of these complex structures by means of waiting/queuing theory is a very complex and time-consuming operation. Reverting to using simulation models greatly increases the flexibility and possibilities of an analysis.

The research assignment pursued the development of a simulation model of the components of a conveyor system. These components act as the building blocks and enable the user to create any desired conveyor configuration and analyse its performance indicators.

The second goal of the research was to analyse whether using dual, parallel, conveyors could reduce the total process time when offloading large (600+ items) batches of baggage at an airport.

The components of the simulation model were developed and verification showed that it was possible to model the function of individual as well as the combined function of multiple connected components.

With the components of the simulation model a circular reclaim conveyor was configured. Validation showed that the configuration could produce realistic results and thus an experiment could be performed. This experiment compared the total process time of a batch of baggage for two scenarios. The default reclaim conveyor as the first and a system with two reclaim conveyors as the second scenario. The results showed that the system with two reclaim conveyors makes it possible to significantly reduce the total process time of a batch of items. Especially when it is possible to reduce the inter arrival time of items to the system the dual conveyor setup is advantageous. It is however less likely that the total occupation time of reclaim conveyors, since the throughput of the individual conveyors was not increased. Whether the system is successful thus depends on the possibility of increasing the throughput of the baggage handling before the reclaim conveyor.

The research on the dual reclaim conveyor system provided a first insight in the possibilities. Although the results do not look very promising at a first glance, such a configuration could provide a feasible solution in some situations. It is thus interesting to investigate when this is the case and to what extent a system can be improved. This could well lead to a fast and cost effective solution for airports to keep up with the current developments in aircraft size.