Executive summary

Immediate cause for the integration of Airmail and Equation

After the merger of KLM and Air France, the airlines induced the exchange of best practises. A study on the integration of the Airmail and equation (EQ) department at freight building 1 (FB1) at Schiphol was started in 2006. EQ is an express cargo product, with a high service level and guaranteed booking on a flight. The airmail product is not booked on a specific flight and has a lower priority than EQ. In FB1, KLM Cargo is receiving and sorting export, transit and import airmail and EQ.

Proposed Integration

After the proposed integration, the **small** EQ shipments will use the mechanized conveyor belt with manual sorting at the mail department. This implies both airmail and **small** EQ are sorted via the same conveyor belt system in the future. The handling of large and/or heavy EQ shipments will not change, nor will the handling of import EQ. The proposed integration includes changes to the lay-out of FB1 and extension of the conveyor belt system.
The expected benefits of the integration are: reduction of the labour costs, improvement of customer service, increased load factor of departing planes due to the FIFO-principle, the possibility to test the integrated operation prior to the movement of the freight buildings of KLM cargo to another location at Schiphol (the JUMP) and reduction of the required space for the operations of mail and EQ.

Problem specification

KLM Cargo is facing two problems, one short-term (ST) and one long-term (LT) problem:

- ST: It is uncertain what effects the integration will have on the performance of the airmail and EQ operations, therefore it is not possible to determine whether the benefits of the integration until the JUMP, justify the required investments.
- LT: KLM Cargo would like to integrate the EQ and mail department after the JUMP. At the new terminal, KLM Cargo can design a new tailor-made process for the combined operation. The changes due to the JUMP would be very large and KLM Cargo wants to prepare the movement and gain experience with the integrated situation to identify potential bottlenecks beforehand.

Research goal and methodology

An integral approach is used to determine the effects of the integration, which gives due weight to the interrelations between variables. The goal of this research is:

Determining the effects of the integration of the airmail and EQ departments on the overall performance of the physical KLM Cargo operations in FB1

The effects of the integration are evaluated on the following four performance areas in this research: resource utilization, handling times, number of re-bookings and space requirements. Discrete simulation in Arena is used to quantify the effects of the integration. The current situation is modelled first and the corresponding simulation results are used as a base case when calculating the future effects. This base model will be expanded step-by-step in order to isolate the effects of different causes of uncertainties.

Results

The simulation outcomes of the current situation, the integrated situation excluding new processes and the integrated situation including new processes lead to the following main results.

Resource utilization
The simulation results show a higher efficiency of the combined operations of the mail and EQ initially. The total number of working hours required for the same production decrease with 8%. The addition of new processes however will undo almost all gained efficiency again.
The removal of temporary storage shows an important reduction in the workload at EQ, because double handling for one shipment is prevented in the new situation. Applying the FIFO-principle at EQ makes the removal of the temporary storage possible.

Handling times
Average handling times are a good indicator of the quality of the operation. The integration will improve the handling times in FB1 for all EQ shipments. However the integration will be more beneficial for large EQ shipments than for small EQ shipments.
The introduction of the FIFO-principle and the increased flexibility with regard to the booking of EQ make early departures possible which reduce the average turnaround times with more than 5 hours.

Number of re-bookings
The total number of mailbags missing their initial flight is reduced considerably when the moment of collection is advanced to 90 minutes before flight departure.
The total number of EQ shipments missing their flight will increase by the integration. Simultaneously almost 17% of all EQ shipments will leave Schiphol prior to their booked flight.

Space requirements
The simulation results together with the composed tree diagram prove that the required space along the carousels is larger than the available capacity after the integration. This proves not all small EQ shipments can be sorted via the conveyor belt after the integration and therefore the efficiency gain will become smaller than the expected 8%. The introduction of the FIFO principle will reduce the required number of belly wagons at the EQ storage yard by more than 50%.

Advice to KLM Cargo

The results of this thesis give no reason to assume large efficiency gains can be realized by the integration of the physical operation of airmail and EQ. This contradicts the expectations of the initial business case on the integration. The expected financial benefits of the integration will therefore be much smaller than assumed by KLM Cargo until now.
The NPV analysis shows that the Capex in the physical operation cannot be earned back by the lower Opex in the physical operation the coming five years. This proves the integration of the physical operation should not be executed for financial reasons. Only in case the investment is required to create possibilities to gain other financial benefits outside the physical operation, KLM Cargo should consider the investment in the conveyor belt.
The simulation of the current situation with a new operational setup has indicated possibilities to realize advantages of the integration without investments in new infrastructure. KLM Cargo is advised to: make all departing flights accessible for both mail and EQ, introduce the FIFO principle at EQ, advance the collection of mail to 90 minutes before flight departure, remove the temporary storage at EQ and open belly wagons for a destination at the EQ storage yard only when actual cargo has arrived. The improved performance could improve the competitive position of KLM Cargo, in case the customers are willing to accept the FIFO principle. This new setup creates the possibility for the operational workforce of KLM Cargo to get used to some aspects of the integrated operation, which will result in valuable knowledge and experience for the JUMP. KLM Cargo is advised to postpone the investment in the extension of the conveyor belt system in FB1, adjust the current operational setup and proceed with the integration outside the physical operation.