



# BERGEN AIRPORT, NORWAY

## PULLING BAGGAGE INTO THE FUTURE

Located in Western Norway, Bergen Airport is the country's second largest airport and has seen a dramatic increase in passenger numbers. As part of Norway's National Transport Plan, a new terminal was opened in 2017 to support an increase in passenger numbers from 4 million to 7.5 million per year.

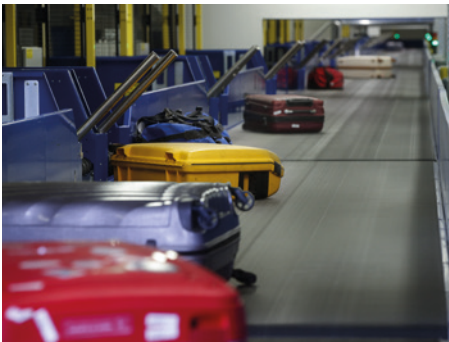
One of the core objectives of the new terminal was for the Baggage Handling System (BHS) to deliver the highest levels of operational and environmental efficiency. BEUMER Group's innovative end-to-end system integrates the latest baggage handling technologies to enable the airport to achieve this goal.

As one of the first airports in the world to install a system which uses a 'pulled' baggage flow, Bergen Airport's BHS combines key next-generation features. These features include check-in with automated self bag drop, CrisBag® sortation with in-tote ECAC Standard 3 security screening, dynamic baggage storage CrisStore® with automated, batch built baggage retrieval for make-up.

### HIGHLIGHTS

- › 'Pull-based' baggage handling system delivers high efficiency with tote-based storage and sortation to speed loading positions.
- › CrisBag-based BHS provides energy savings and operational efficiency from check-in to make-up.
- › ECAC Standard 3 compliant in-tote screening with two tote sizes.
- › Bergen Airport uses data analytics for optimisation and predictive maintenance.

# BAGGAGE HANDLING INNOVATION



## TENDERING FOR INNOVATION

Bergen Airport invited tenders for a tote-based baggage handling solution and requested a clear specification for the energy consumption of each proposed BHS. From the two final tenders, the contract to design and install the baggage handling system was awarded to BEUMER Group.

The integration of the latest BHS technology into BEUMER's CrisBag system met the airport's environmental goals to minimise energy consumption and the total cost of ownership. The modular design of the CrisBag system requires minimal spare parts and reduces maintenance costs to enable low Operating Expenses (OPEX).

"The electricity consumption of BEUMER Group's CrisBag system was found to be considerably lower than that of the competitors and our aim was to have a 'green' airport project," says Petter Hope, Project Manager for Terminal 3 at Bergen Airport.

## BAGGAGE ON DEMAND

Based on the tote-based CrisStore system, the BHS uses the innovative concept of 'pulling' baggage through the system in response to down-stream demand.

The flow of baggage through the CrisBag system starts with the option of the passenger using automated self bag drop at check-in. Inside the system, each bag remains in the same tote during ECAC Standard 3 security screening. The dynamic baggage storage design provides a buffer which allows handlers to retrieve bags to create a batch for speed-loading onto trolleys.

This type of "baggage on demand" operation reduces the need for a high number of destination chutes which gives the airport a more compact footprint for the system.

## FLEXIBILITY FOR EFFICIENCY

The CrisBag baggage handling system delivers a capacity of 3,500 bags per hour and integrates an Explosives Detection System (EDS) with in-tote screening.



The system supports high capacity sortation and has redundant routes. With two sizes of totes, CrisBag handles standard bags as well as bags which are up to 1,400 mm long. To increase handling efficiency, standard and oversize bags are transported on the same track and at the same speed. This level of flexibility reduces the number of bags which are transported on the lines for oversize items.

Flexibility is provided by the CrisStore® dynamic Early Baggage Storage (EBS) which holds up to 600 bags and allows individual bags to be retrieved on-demand by the operator. CrisStore also enables the airport to enhance passenger satisfaction by offering the flexibility to check-in early. For the airport, the dynamic EBS enables an increase in productivity, efficiency and security. Easy scalability allows a second layer of racking to be installed to deliver additional EBS capacity.

“The BHS exceeds our efficiency goals. The inclusion of the dynamic EBS meant that we were able to reduce the number

of sorting bins, save space and allow the ground handler to plan the loading process more efficiently,” says Petter Hope, Project Manager for Terminal 3 at Bergen Airport.

#### SPEED LOADING FOR MAKE-UP

The 100% tracking delivered by CrisBag is extended to the bags which are in the CrisStore racking system. As each bag is stored in an individual tote, tracking provides operators with accurate real-time inventory and allows the operator to decide the most efficient time to retrieve each bag.

The control system alerts the operator when there are 40 bags in storage to be sent to make-up for the same flight. By use of on-demand bag retrieval, the operator releases the bags for efficient speed loading of trolleys. The system has three speed loading lines while other bags are discharged using the adaptive CrisBag discharge to 42 make-up chutes.

#### VISUAL BHS ANALYTICS

Dashboards in the BHS control room enable Bergen Airport to use data

analytics for optimisation and predictive maintenance.

The system automatically monitors the BHS in real time and alerts the operator with recommendations for operational decisions, replacing the need for the operator to monitor the BHS. Created as a joint project by airport operator Avinor and BEUMER Group, the analytical dashboards are customised to further optimise the operational costs of the system.

The real-time visualisation gives the small and agile Avinor duty team automatic notifications of any abnormality before a system alert is triggered. The data analytics also enable the team to predict BHS maintenance routines and to focus resources on delivering higher team efficiency and system availability.

On a day-to-day basis, the data analytics provide complete transparency of operational performance and incidents which adds significant benefits to the handler, airlines and the airport.

## KEY FEATURES

Opened in 2017, the new terminal added 63,000 square-meters of space for Bergen Airport. The combination of the latest baggage handling technologies provides the capacity for the airport to support 7.5 million passengers annually.

The baggage handling system has full controls with real-time visualisation of the following:

- › Two redundant CrisBag® sorting loops with capacity of 3,500 bags per hour.
- › Two tote sizes:  
Standard bags up to 1,100 mm (43.3in).  
Large bags up to 1,400 mm (55in).
- › Standard and large bags carried on the same track, at the same speed.
- › CrisStore® dynamic baggage storage holds 600 bags with on-demand retrieval. Modularity enables CrisStore to be extended to almost double capacity.
- › 24 check-in counters and eight self-service bag drop kiosks.
- › Five arrivals carousels with dedicated CrisBelt loading lines.
- › In-tote security screening to ECAC Standard 3 for standard and large bags.

