



Baggage position control and measurement using a 3D sensor

Summer time is peak travel season. During this busy time of the year, maximum efficiency is paramount for airports all over the world. Fast and reliable handling of large amounts of baggage must be ensured to meet the tight flight schedule, with bags sometimes travelling several kilometres between check-in and aircraft. Each delayed flight not only costs nerves and time, but also a lot of money. In a high-speed baggage handling system of the BEUMER Group, 3D sensors from ifm ensure highest levels of efficiency and an error-free performance.

The BEUMER Group is an international manufacturing leader in intralogistics in the fields of conveying, loading, palletising, packaging, sortation and distribution technology. The BEUMER Group and its group companies and sales agencies provide their customers with high-quality system solutions and an extensive customer support network around the globe and across a wide range of industries, including airport baggage handling.

With its autover® Independent Carrier System, the BEUMER Group offers the right solution for the daily baggage handling challenge. On a passive rail system, intelligent transport vehicles called BEUMER autoca® carriers, which are driven by contactless power transmission, transport each item of checked baggage safely to its correct destination. BEUMER autover® is already in use at major airport hubs such as Dubai, Moscow, Nice, Gdansk and Montreal. With Denver and London Stansted, further hubs will soon be putting the system into operation.



3D safety check for the suitcase roller coaster



“With a throughput of up to 900 items of baggage per hour and transfer point, our system achieves a high handling speed,” says BEUMER Group HLC Software Engineer **Michael Baumeister**, who is responsible for constantly improving the BEUMER autover®.

Hundreds of BEUMER autoca® carriers can travel simultaneously at speeds of up to 10 metres per second along the roller coaster-like rail system with its tight curves, steep inclines and declines of up to 18° and long straights to transport the passengers' suitcases, bags and out-of-gauge baggage.

“Each carrier collects a single item of baggage, providing 100% tracking and traceability during transport.”

■ Optimal placement of baggage

The second important factor besides reliable tracking is the correct positioning of the baggage items. From check-in, the baggage items are carried by conveyor belt to the BEUMER autover® system. Before being picked up by a BEUMER autoca® carrier, each piece of baggage is detected and measured by an O3D camera positioned above the conveyor belt. The camera operates on the time-of-flight principle. While laser scanners, which rely on a similar principle, use only one pixel for the measurement, the O3D camera has 23,000 pixels arranged in a matrix. In this way, the camera can detect objects and scenes in three dimensions at a glance.

■ Optical detection improves performance of BEUMER autover®

“We use the camera to check compliance with the permitted outer dimensions, that is, length, width and height of the baggage items”, says **Baumeister**. *“We do this because we can reach physical limits when transporting baggage due to the very high transport speeds, for example in bends. This is why it is important for us to determine the baggage position, e.g. whether a suitcase is in an upright position before it enters our transport system. The O3D camera from ifm allows us to do this very reliably before loading.”*

If an upright suitcase is detected, the staff in charge at the airport is either advised to bring the suitcase into the correct lying position or the travel behaviour, especially the speed in bends, of the BEUMER autoca® is adjusted preventively due to the expected instability.

ifm's O3D camera convinced Michael Baumeister and his team because of its highly accurate recognition and measurement capabilities, but also because of the potential the image evaluation offers in terms of perspective.

“Theoretically it is also possible to determine the position by means of a light grid”, says **Baumeister**. *“However, the use of the 3D camera has a decisive advantage. The temporary storage of the captured images helps us in the rare case of a complaint from a passenger or the airport. On the one hand, we can determine to the nearest second when and in what*

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condition a piece of baggage was fed into the BEUMER autover®. For this purpose, we also store the dimensions and positions. Another benefit is the easy parameter setting of the camera and the evaluation of the image data using the ifm Vision Assistant, which can display the measured baggage items in various 2D and 3D views. This allows us to analyse warning messages that occur and to continuously improve the control system.”

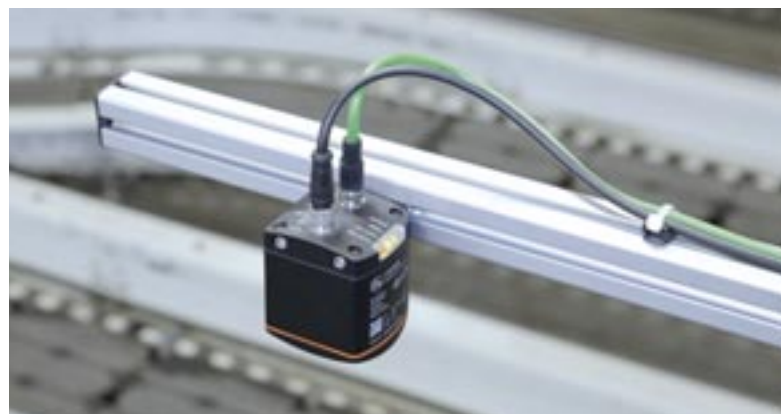
According to Baumeister, the optical baggage detection system will be capable of indicating rare scenarios such as extended trolley handles even more reliably in the future.

“This situation hardly ever occurs, as this is already monitored at check-in. But there is still the possibility that the trolley gets jammed in the system, which would cause a delay in the process. We want to avoid even such unlikely scenarios at all costs.”

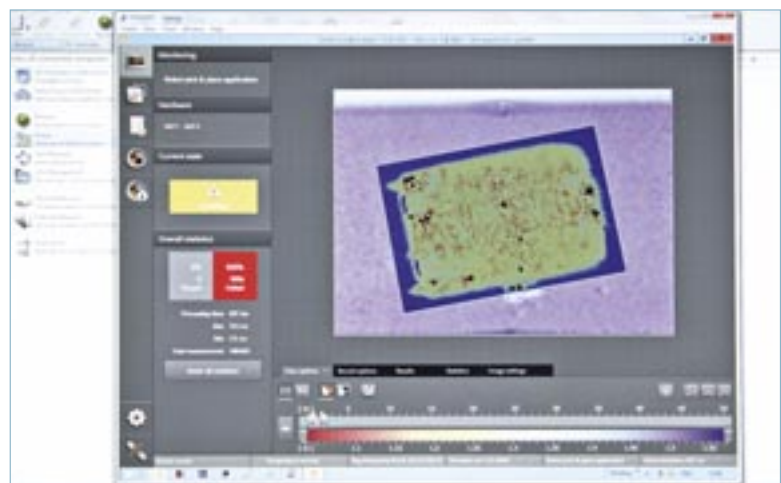
Conclusion

With the O3D camera from ifm, the BEUMER Group is able to ensure the correct placement of baggage items at a critical interface – the baggage transfer from the in-feeding conveyor belt to the independent carrier system. The system can then fully harness its high degree of efficiency – to the benefit of the airport operator, the airlines, and the passengers.

3D inspection: Thanks to 23,000 pixels, baggage items are displayed in three dimensions.



The O3D camera detects the three-dimensional dimensions of the piece of luggage from above.



The baggage position can be checked with the ifm Vision Assistant using a 2D image. The camera also provides distance and grey-scale images.

