It’s a cold evening in a recently completed baggage hall within Amsterdam Airport Schiphol and Mark Lakerveld, the airport’s Senior Manager of Baggage, is hoping all is well. Tonight, his main focus is not on whether passenger luggage is flowing as it should through Europe’s fifth busiest airport in terms of international passenger traffic, although that’s never far from his mind. Instead, Lakerveld is hoping that the hundred plus guests he is hosting at this after-hours gathering are well fed on a meal he had a hand in preparing. The occasion is payback for a job well done, directed to the extended team responsible for getting the new facility—the latest in a series of baggage control process initiatives—fully operational under a tight time frame. The guests come from nearly every part of Schiphol’s operation, which reflects how tightly baggage management is interwoven with other key airport processes.
The benefits of Schiphol’s smart baggage management solution

- 40% increase in baggage handling capacity, enabling Schiphol to handle 70 million baggage items per year with the same physical footprint predicted for the future
- 80% increase in hourly baggage handling capability (from 5,000 bags to 9,000 bags)
- Improved quality of performance and improved physical working conditions for baggage handlers

Keeping the connection

A major source of Schiphol’s passenger volume—indeed, the key to its vision of becoming Europe’s preferred airport—is the handling of transfer passengers, those making connections to other destinations. Compared with origin/destination baggage (that which has Schiphol as either the origin or final destination), the handling of transfer flight baggage presents a whole new level of complexity. Fundamentally, no matter what the flight, baggage management is all about preventing the connection between passengers and their bags from breaking. In the case of transfer flights, baggage from one flight generally has to be taken to several different connecting aircraft, often within a very short timespan. This combination of orchestration and tight timeframes makes transfer baggage inherently more complex to handle.

Schiphol and KLM recognized that the systemic nature of the process challenge meant that as passenger volume increased—an important business goal for both parties—the problem of baggage capacity would only be exacerbated. They realized that only a systemic solution would resolve this critical capacity constraint and remove the most significant barrier to their long-term passenger growth from a baggage point of view. “In short,” Lakerveld explains, “it’s only through a structural, sustainable increase in baggage processing capacity that Schiphol can gain a license to grow as a major hub airport in Europe.”
Rethinking the baggage flow

With joint resolve, Schiphol and KLM worked together to reenvision the baggage management process. Underpinning their efforts was the recognition that the fragmentation of baggage management into separate and discrete process segments—with Schiphol, KLM and their suppliers each, in essence, controlling their own “turf”—made intelligence-based optimization practically impossible. The key was to proactively manage the baggage processing flow to mitigate the effect that peaks and valleys can have on process efficiency. The team realized that for such an orchestration to occur, process integration and collaboration of all the key players—spanning the entire process flow—was absolutely essential.

For anyone who has spent time in an airport, it’s fairly easy to distinguish between a passenger racing frantically to his gate to make a connecting flight and a connecting passenger with plenty of time to kill in the airport lounge. One passenger is in the fast lane, so to speak, and the other in no rush at all; most others fall somewhere in the middle. Schiphol’s innovation was to introduce this same concept to the parallel realm of moving baggage. By using real-time sensors, managers would be able to trace the location and status of a baggage item at any point in the flow, thus easily identifying bags at risk of missing close connections. Intelligent routing rules—the other key element of Schiphol’s smart baggage vision—would then compare an item’s current status to where it needs to be to make a connecting flight, and then automatically direct it to the appropriate pathway.

A new era of closeness

Schiphol’s smart baggage initiative was part of a broader, multiyear program known as 70 MB, aimed at increasing the airport’s capacity to 70 million passenger bags annually. Only by adopting a smarter baggage handling solution could Schiphol achieve its growth ambitions. Working together to achieve the 70 MB objectives was only the first in a series of joint initiatives that marked a new era in Schiphol’s relationship with KLM. Governance is crucial, with a joint baggage steering committee meeting every two weeks to discuss operational performance indicators, share 70 MB program updates, and make joint decisions on issues related to 70 MB implementation. To Lakerveld, though, the spirit of togetherness is best captured in the subtle details of the airport’s everyday activities. “We consider our really close contact with KLM to be a key success factor,” explains Lakerveld. “Our
control rooms are next to each other. My operations manager is in close contact with his KLM counterpart, and our operational people are in continuous contact with theirs. We’re seeing the same things and speaking the same language.” Rob Holdorp, Schiphol’s Strategic Advisor for baggage handling process and systems, likes to point out that there are two worlds in an airport—“the world that the passenger goes in, and the world of processes like baggage handling.” By making the latter more efficient and optimized, Schiphol’s smart baggage solution makes the world of passengers a more satisfying place. One dimension of this is the prevention of baggage mishandling, the bane of connecting passengers. Staff in Schiphol’s operational control room can see a color-coded bag in imminent danger of missing its connecting flight and automatically direct that bag along the fastest path to the waiting aircraft. That’s the benefit of prevention.

Perhaps the most important way the solution has increased Schiphol’s baggage handling capacity is by enabling a fundamental shift in the process model. The inherent disadvantage of the traditional “push” model—under which flight arrivals trigger the movement of baggage through the process—is the effect of flight cyclicity, which produce peaks and valleys of activity. In addition to the difficulties of workforce optimization, a peak-prone process flow can also exacerbate bottlenecks. 70 MB implemented new technology that better supports efficient use of available capacity and introduces innovations like the robot and baggage buffers, which change the way the crew operates the baggage process.

Schiphol: The parameters of smarter baggage processing

# Instrumented
Sensors track the luggage of connecting flights, enabling real-time traceability at all points in the connection pipeline.

* Interconnected
The solution seamlessly integrates data from Schiphol’s own systems as well as from airlines and third-party ground services providers.

✨ Intelligent
By comparing a bag’s location with underlying routing rules, Schiphol can identify potential problems and keep bags from missing their owners’ connecting flights.
“It’s really important for everyone to believe in the new concept we’re embracing,” says Lakerveld.

Because it provides intelligence on where bags need to be in the process, Schiphol’s smart baggage solution enables controllers to focus on the flow of bags through the process and efficiently manage the available capacity. By alleviating bottlenecks and enabling the more balanced deployment of labor resources, the “peak shaving” enabled by the solution increases Schiphol’s baggage processing capacity.

**Getting all airline and airport personnel on board**

When asked about the project’s important lessons, Lakerveld doesn’t have to think long and hard. One answer, he says, is the importance of engaging early and deeply with all employees on not just the broad benefits of the project, but on its immediate consequences for them. “It’s really important for everyone to believe in the new [smart baggage management] concept we’re embracing,” says Lakerveld. Another is the importance of training all employees from the earliest stages of the project, and doing so in the most hands-on way possible. We needed to give training in different areas to make sure all employees are able to work accordingly. Employees were to be trained about managing a robot to handle the baggage process for them and thus grow to be an operator/director instead of loading the bags themselves. Other employees needed to be trained into managing the baggage flow instead of managing the system, like they used to do.

“We’re not talking about sending [employees] to a room with a PowerPoint presentation,” says Lakerveld. “They have to train in an on-the-job setting to really learn the new system and be successful.” Airline pilots have flight simulators to learn the ins and outs of new aircraft in a realistic, yet safe and controlled environment. For Schiphol’s baggage employees, the equivalent tool is a virtual test and training environment that accurately simulates the experience of using the new solution, including the ability to perform the kind of what-if simulations that Lakerveld views as especially valuable. To Lakerveld, the takeaway is clear: “I look at Schiphol’s relationship with KLM as a poignant symbol of how bringing processes together and making them smarter can transform and improve both companies and make life better for their customers in the process.”

Schiphol’s smart baggage management solution includes...

**Software**
- IBM® Rational® Software: DOORS, ClearCase, ClearQuest, RequisitePro, SoDA, Software Architect, COTM
- IBM Tivoli®: Composite Application Manager for Applications, Monitoring, Storage Manager, Access Manager for Operating Systems

**Servers**
- IBM System p5®, System x®

**Services**
- IBM GBS® Aviation Competence Center, IBM Global Technology Services

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