WHITEPAPER

Lightening the load for baggage handlers
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Manual operations have long been the traditional mechanism for moving baggage from conveyors into carts, containers and uniform loading devices (ULDs) at flight make-up locations. However, this process comes at a physical cost to the handlers who must move luggage at awkward angles for extended periods. Manual loading aids are available as alternatives to this practice and a variety of ergonomic technologies exist to reduce the stress on handlers. This white paper will consider the current situation within make-up areas, the impact on airports of maintaining a solely manual loading operation, and the benefits of the various equipment available on the market.

Inherent concerns
The rise in passenger numbers across the world continues to put additional pressure on the capacity of existing airport terminals and infrastructure. As airports adjust to meet today’s demand for short turnaround times and higher throughput rates, the need for an efficient baggage handling operation also intensifies. However, the reality is that at the majority of airports, sophisticated baggage systems still rely on manual handling to complete the end-of-line movement of luggage.

At airports of all sizes, health and safety considerations surrounding the manual loading of baggage are becoming increasingly prominent. For staff that continue to lift and manoeuvre baggage manually, the risk of injury is considerable. Periods of sickness absence owing to musculoskeletal problems, as well as lower back pain are still too common for manual operators.

Having to frequently handle items weighing around 32-50kg (70-110lb) creates high levels of physical stress. In addition, factors such as size, grip and material have an impact. Having to repeatedly reposition luggage at awkward angles, and to strict deadlines, the chance for handlers to suffer a work-related injury becomes immediately apparent. In fact, an operator can sometimes become a ‘bottleneck’ in the system through the variable handling rates of baggage at such a crucial area. This can lead to operational inefficiencies in an environment that puts increasing pressure on capacity (growing passenger numbers).

Injuries received during these manoeuvres account for around half of the reported absences of European airport ground staff. This not only causes physical and emotional distress for individual operators, but also has financial implications for their employers – the cost per back injury amounted to $11,236 as early as 1992 (Dell, 1998).

Another early study highlighted that work-related injury and disability had “[...] enormous consequences in terms of distress and economic costs of absence from work and reduced productivity.” (Martimo et al 2008). It can only be assumed that with rising passenger numbers, these problems have only become more evident.

<table>
<thead>
<tr>
<th>Year</th>
<th>1992</th>
<th>1993</th>
<th>1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of baggage handlers</td>
<td>19430</td>
<td>30257</td>
<td>29099</td>
</tr>
<tr>
<td>Average hours worked/person/week</td>
<td>38.0</td>
<td>38.4</td>
<td>38.4</td>
</tr>
<tr>
<td>Number of lost time back injuries</td>
<td>1570</td>
<td>2408</td>
<td>2405</td>
</tr>
<tr>
<td>Annual cost ($US)</td>
<td>17,639,857</td>
<td>23,697,170</td>
<td>21,710,953</td>
</tr>
<tr>
<td>Lost time injury frequency (per 10 hours worked)</td>
<td>42.5</td>
<td>41.5</td>
<td>43.5</td>
</tr>
<tr>
<td>Average cost per back injury ($US)</td>
<td>11,236</td>
<td>9841</td>
<td>9027</td>
</tr>
</tbody>
</table>

The frequency and Cost of Back injury among airline baggage handles. Source: Dell, 1997
Operational risks
There are also other risks involved should staff still be required to move baggage manually. If loading aids are not introduced as a fundamental aspect of this phase of a baggage handling operation, it is probable that a continuous stream of new employees willing to do the work cannot be guaranteed.

A lack of fresh recruitment can result in an ageing workforce not being replaced in a healthy cycle. Senior members of staff are also more prone to physical distress. This was described in a recent study in which: “A strong linear association [was found] between regional musculoskeletal symptoms and seniority […] consistent with a long-lasting or chronic effect of cumulated exposure to heavy lifting,” (Bern et al 2013). Additional costs may be incurred if other members of staff have to be retrained to plug this skills gap, or if longer breaks from physical exertion are required. Inefficiencies in workforce planning can also be introduced through task rotation, in response to the ongoing ergonomic challenges.

In a worst-case scenario, such as cases of hospitalisation and after-care (physiotherapy), the implications can be significant if a contractor must facilitate this treatment while coping with the subsequent skills shortage in daily operations. The pressure to cope with increasingly strict health and safety legislation must be factored in, alongside the demand to increase throughput. In most cases, the construction of new infrastructure is not an option and increased efficiencies can only be achieved by making maximum use of existing resources. If left unattended, operations remain at risk from ongoing financial and strategic hazards.
IATA Resolution 753

The introduction of IATA 753 (concerning baggage tracking) will also impact upon the manual scanning process. IATA members must maintain accurate baggage inventories by monitoring incoming baggage through to final delivery. This means they must demonstrate the acquisition/delivery of baggage when custody changes, provide an inventory of bags upon departure, and be capable of exchanging this information with other airlines as required.

This higher level of accuracy will allow members to reduce mishandling rates by determining the custody of each bag at all phases of the baggage chain. By speeding up reconciliation and flight readiness, passenger satisfaction levels are also enhanced. This makes the viability of a purely manual operation (with its inherent inefficiencies) increasingly harder to justify.

Additional challenges

The process of scanning labels manually stands to benefit from the introduction of loading aids. For efficient baggage reconciliation, all bags must be scanned – often manually – prior to being loaded on a flight, which reduces the volume of mishandled items. Traditionally performed using a handheld scanner, this is a slow process that requires a high number of staff, creating operational inefficiencies. There is also the possibility that scanners can be misplaced or broken.

One of the biggest challenges in a manual scanning operation is that handlers are not permitted to lift the items of luggage they are scanning with only one hand. This creates a laborious procedure in which the handler puts away the scanner after each use, before the bag is correctly manoeuvred. Evidently, ergonomically designed loading aids are vital in improving baggage handling efficiency rates, reducing instances of absence and satisfying tough health and safety legislation.

In the past, loading aids have been met with a sense of apprehension. In some cases, it has been reported that lifting aids – though installed – are often unused. This is because they have perhaps been perceived as unhelpful, or a hindrance. In addition, there is even an impression that such technology restricts the lifting process, and has the effect of slowing operators down. This points to the fact that while the technology is sound, a shift of attitude and behaviour remains one of the defining issues in this field.

Operator acceptance is therefore highly important, and ground staff would respond positively to any loading aid that combines speed, ergonomics and automated scanning. This would reduce loading times significantly and be as fast as a traditional, manual operation. Met with such practical evidence, it would be impossible for manual handlers to ignore the beneficial characteristics of such technology.
A human-centred approach

The ideal loading aids are designed from an ergonomic perspective. Careful consideration must be given to a human-centred approach, with the ultimate aim of developing an innovative solution driven by accommodating the baggage handler’s situation. They must be able to work intuitively and easily, without bearing heavy loads or having to manoeuvre luggage awkwardly.

If we consider speed (that is, high baggage throughput rates) to be the biggest benefit of a manual loading operation, the argument for introducing loading aids gathers serious momentum. While it can be argued that ‘muscle power’ is certainly quicker than a loading aid during peaks, this pace is not sustainable (on average, only for 10-15 minutes). Fatigue and health risks are inevitable in such an environment, so breaks and reduced activities must be scheduled in accordingly. If baggage reconciliation is required, manual shift capacity is reduced still further, which makes a strong case for technology that increases loading speeds while integrating automated scanning.

Loading aids deliver reliable throughput rates and a consistent performance. Several variants arrived on the market as a result of new legislation in many countries, and were primarily designed to reduce ergonomic risks (but rarely to facilitate increased capacity). Ideally, an ergonomic loading aid should also increase the capacity per shift, per handler.
Different solutions
Vertical loading aids – devices that grab bags from above by a vacuum or hook – offer benefits, but have innate drawbacks. While they are ideal for loading carts with open tops, lifting luggage into a container is difficult due to the requirement to lift from above. Loading the top levels of containers is also not possible. Vertical loading aids are popular as they require a low investment and can be retrofitted, but are also cumbersome. Vacuums struggle with softer bags, which pose a safety risk when they fall to the floor (around 20% of all lifts), while hooks can rip handles from bags. This means that – though well-received – they cannot be seen as a gentle handling solution, nor have they been proven on a diverse enough range of operations. The high power consumption, maintenance costs and noise levels are also an operational concern.

Horizontal loading aids, however, support baggage from below and are ideal in brown- and greenfield sites next to carousels and lateral conveyors. They guarantee a 100% lift of all bags into both open and closed ULDs. Baggage is loaded smoothly onto a small platform that can be raised or lowered to the required height, which the handler moves into the correct position within the ULD – effectively as an extension of their own arm. This can be performed intuitively as handlers effortlessly move items of luggage on top of the platform. Horizontal loading aids are designed intentionally to invite human interaction, and allow complete freedom of control for operators, which is distinct from more machine-driven processes. Such user-friendliness requires minimal operator training.

The results are increased productivity, minimised physical workload and more effective handling of peak loads.

Semi-automated loading is another strategy, and sees operators load baggage into a ULD on an extendible conveyor. This can be partially positioned within the ULD itself. By utilising a semi-automated loading device, the strain on operators is minimised. Such technology functions with minimal noise levels and is capable of transferring any item of luggage, including the heaviest objects. However, initial investment is comparatively high. Make-up areas must be completely redesigned to incorporate new processes and the conveyors themselves, creating a larger footprint than vertical and horizontal aids. Alongside this, only one container can be loaded at any one time, and ‘batch’ building also needs to be incorporated for maximum effectiveness.

Lastly are fully automated loading aids, which use the eyes and ears of an operator, and no longer their physical input. By utilising robotic technology, operators are upgraded to the position of supervisor and take responsibility for several loading units at once. Full automation is by far the most ergonomic and sustainable solution, and requires the fewest operators. However, it also demands the highest initial investment and the largest footprint in the make-up area. This means that the costs incurred will only yield dividends at airports with the highest passenger capacities and percentage of transfer baggage.
Conclusion

As the pressure to cope with ever-increasing passenger volumes continues to rise globally, airports must prepare to embrace innovative technology to ensure maximum efficiencies at every operational hotspot. Baggage loading during make-up is no exception, and the decision to invest in loading aids is more a question of when rather than if.

It is imperative that airports select the correct equipment to support their ground staff when making the transition from a manual only loading operation. This will not only dramatically reduce inefficiencies, but create a safer working environment. At the same time, not all aids guarantee a departure from manual scanning processes. Therefore, the logical first step seems to be horizontal loading aids, which not only deliver human-centred benefits and integrated automated scanning, but also help airports of any size handle peak demand.

Bibliography


About Vanderlande

Vanderlande is the global market leader in baggage handling systems for airports. Its systems move 3.2 billion pieces of luggage around the world per year, and are active in 600 airports. It was the first company to introduce robotic loading at airports, which delivers a higher level of automation, improves employee working conditions, and increases process quality.

In addition, the company’s STACK@EASE is a highly flexible and ergonomic loading aid solution that takes the heavy lifting out of baggage loading in flight make-up environments. It has also been designed from the perspective of baggage handlers. Vanderlande has already installed 245 units, and thanks to its expertise and experience, it helps customers define the most appropriate loading solution for any situation.