INTERNATIONAL ASSOCIATION OF IABSC BAGGAGE SYSTEM COMPANIES

Safety Committee

Best Practices Guide on Risk Assessment for Equipment Used in Baggage Handling Systems

Risk Assessments are the first step in providing both safe equipment and a safe working environment for employees. Risk Assessment is the process of documentation and evaluation of tasks and hazards associated with the operation (handling, installation, set up, commissioning, maintenance, etc.) of machinery. They are a standard common practice used in numerous industries throughout the world. There are national standards (American National Standards Institute - ANSI) and international standards (International Organization for Standardization - ISO) that document the Risk Assessment process. These standards are very similar in content and easy to perform. When done properly, they can provide many benefits to the End Users, OEMs and Integrators of the machinery and systems.

For years, North American Standards, in addition to International Standards, have included the required implementation of Risk Assessments. Unfortunately however, they are constantly ignored. While there may be potential cost increases associated with properly conducting and documenting risk assessments, the benefits (safer equipment and work environment) clearly outweigh the cost overall.

Why are Risk Assessments not being performed?

There are various reasons commonly given as to why Risk Assessments are not being performed on a regular basis throughout the Baggage Handling Industry (BHS) industry. After further investigation by the IABSC Safety Committee, we have found the following to be the top three primary reasons:

- Lack of Knowledge
- Lack of Enforcement
- False Perception of Cost Avoidance

Lack of Knowledge

Equipment manufacturers (OEM's) and Integrators are often unfamiliar with the current existing standards related to Risk Assessment. The **ANSI RIA15.06 2012 clearly specifies that risk assessments are no longer optional (Robotic Industries Association – RIA)**. Additional noted consensus standards such as ANSI PMMI B155.1, ANSI B11.0 also specify such assessments.

In order to support the development and utilization of Risk Assessments, there are several standards (ANSI B11.0, ANSI B11.19, ANSI PMMI B155.1, ANSI RIA 15.06, ISO 13849-1, and

IEC 62061) that provide various methodologies to perform these assessments. Various software packages are also available to assist companies in their execution of the required risk assessment.

Lack of Enforcement

OSHA does not proactively and systematically inspect for machine Risk Assessments at the present time. However, if an inspection were to occur as a result of an accident, OSHA may request to see any Risk Assessment documentation in place for the machine or system on which the accident occurred. Unfortunately, until OSHA starts enforcing and inspecting to assure these assessments are in place, the completion of these critical assessments will not be performed by all companies involved with the manufacturing, installation and use of the equipment.

An additional contributing factor to these assessments not taking place is due to the End User not making it common practice to request or require that Risk Assessment (or general safety) documentation be provided by the OEM (or Integrator) for ALL equipment and components during the quotation and purchasing process. Until more End Users require these assessments and furthermore utilize these assessments as part of their internal Final Risk Assessment, many OEMs will continue to refrain from investing resources to complete this important product usage evaluation as a part of their standard practice.

False Perception of Cost Avoidance

In the United States of America, machine safety is somewhat deemed to be the End User's responsibility. Because of this there are OEM's and Integrators in existence that share the opinion that they are not obligated to perform or to meet any Risk Assessment requirements. A common misconception among these OEM's and Integrators is also their belief of "lack of return on investment" by performing a Risk Assessment. While the execution of a Risk Assessment on their product or system might lead to a required product or system redesign or modification for additional functional safety, the calculation commonly being used to determine their return on investment only takes into account the potential additional cost to their product or system. What is often left out of this equation is the value added with the inclusion of properly designed safety functions in their machine design that can increase Overall Equipment Effectiveness (OEE). OEMs and Integrators that will proactively take such measurements and educate their End Users/Customers on the reasoning and the benefits (overall system and process cost savings) that their Risk Assessment processes provide will not only provide a superior product, but will also bring recognition by End Users/ Customers leading to preferred supplier status.

What is a Risk Assessment?

Risk Assessment is a process executed by a team of individuals, who are familiar with the tasks associated with the use of the machine and/or system (operation, maintenance, set up, sanitation requirements, etc…) is formed to identify and evaluate all possible hazards associated with any potential human interaction with that machine and/or system. These task-hazard "pairs" are then to be documented in order to complete a risk reduction strategy. This is referred to as a team based, task based Risk Assessment. There are multiple standards that

provide guidance on the methodology of performing a risk assessment such as ANSI B11.TR3, ASNI B11.0, ANSI RIA 15.06, ANSI PMMI B155.1, ISO 12100, ISO 13849-1 and IEC 62061.

If Risk Assessment is a process – what is the process?

The Risk Assessment process is outlined in each of the above referenced consensus standards. Although the referenced standards were written by separate industry committees, the process steps in each of them are very similar and any of these can be used/ referenced to complete this process.

The following examples illustrate the similarities between the various documented Risk Assessments.

See Figure 1 below, for the outlined Risk Assessment process presented by ANSI B11.0.

1) Prepare for and set limits of the assessment (see 6.2);
2) Identify tasks and hazards (see 6.3);
3) Assess initial risk (see 6.4);
4) Reduce risk (see 6.5);
5) Assess residual risk (see 6.6);
6) Achieve acceptable risk (see 6.7);
7) Validate solutions (see 6.8);
8) Document the process (see 6.9).

FIG. 1 - ANSI B11.0 OUTLINE FOR RISK ASSESSMENT PROCESS

See Figure 2 below for the flow chart displaying the Risk Assessment process presented by ANSI B11.0.

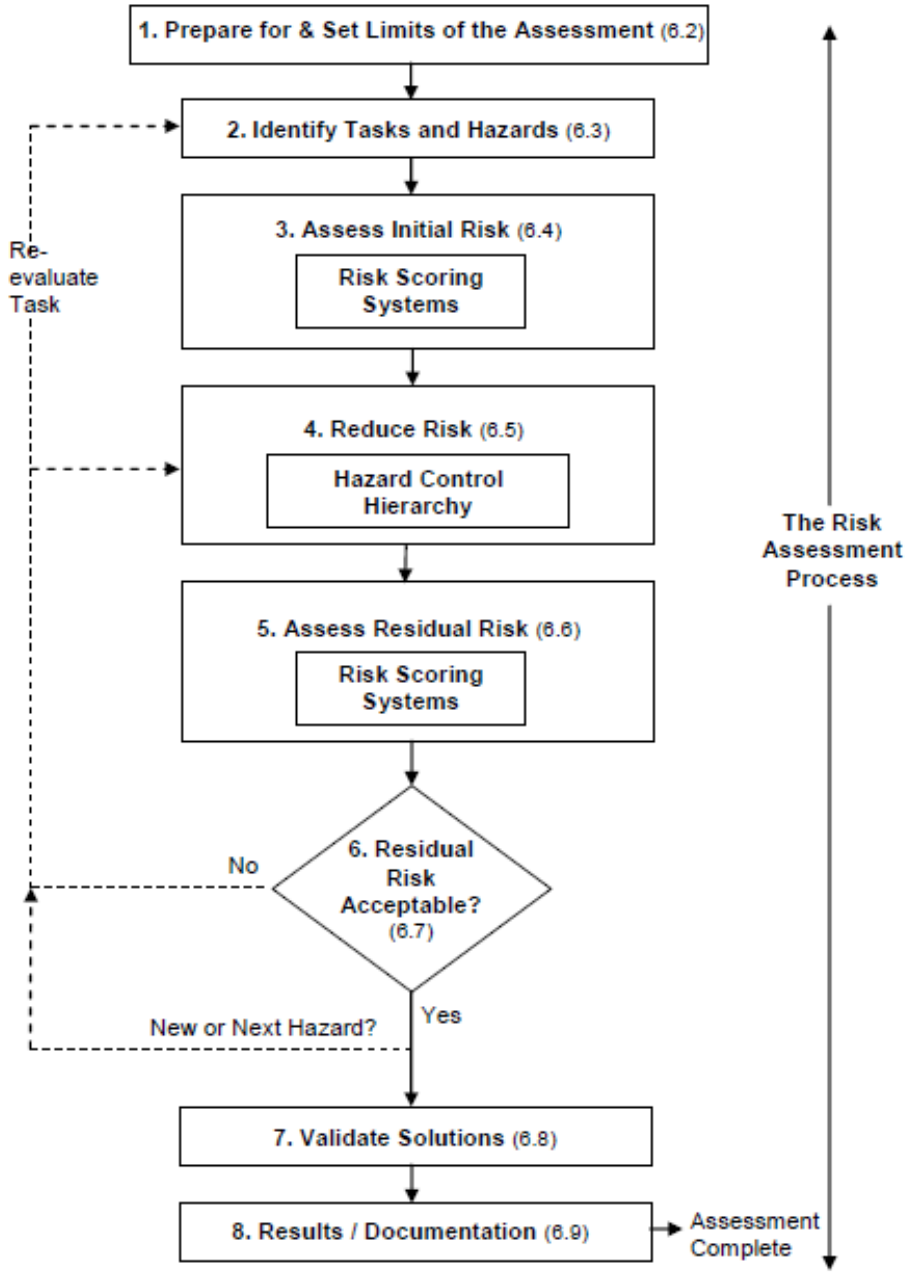
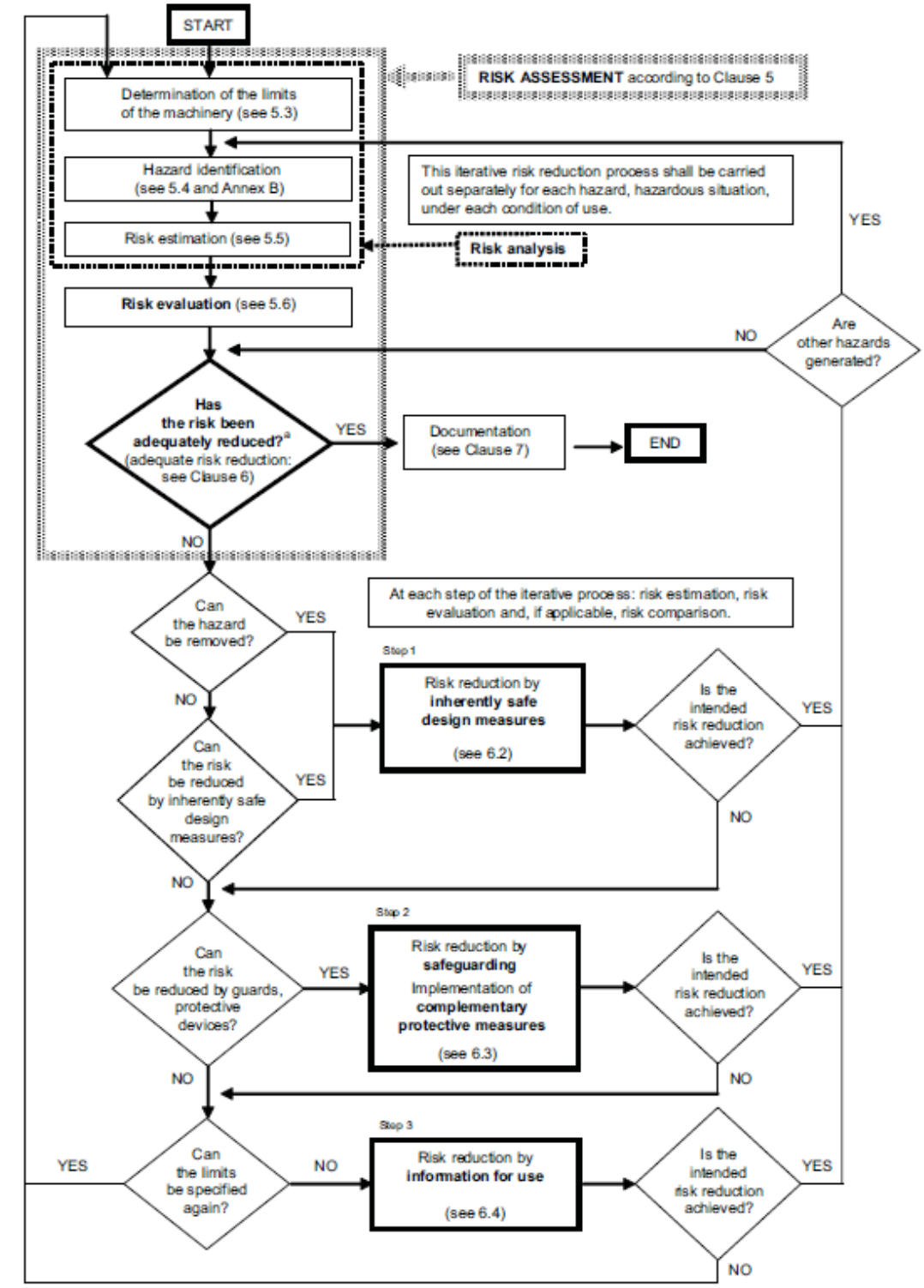


FIG. 2 – ANSI B11.0 FLOW CHART REPRESENTATION OF THE RISK ASSESSMENT PROCESS

A second example of the Risk Assessment process can be referenced from ISO 12100. See the chart below in Figure 3, for the Risk Assessment process described in ISO 12100.



a The first time the question is asked, it is answered by the result of the initial risk assessment.

FIG. 3 – ISO 12100 FLOW CHART REPRESENTATION OF RISK REDUCTION PROCESS

A similarity comparison between the ANSI B11.0 and ISO 12100 standards can be noted and summarized as a 5-step approach.

A) Determine the machine limits

   a. Machine Model Number, Serial Number
   b. What the machine was designed to accept as raw material
   c. What rates, speeds, feeds, cycle rates, etc. that the machine was designed to operate at and what values were utilized in the risk assessment
   d. What energy sources are utilized on the machine?

B) Identify Hazards

   a. Identify the personnel that will be interacting with the machine

      i. Operators and Operator Helpers
      ii. Maintenance Personnel
      iii. Engineers / Technicians
      iv. Trainees, Supervisors, Quality Control
      v. Passer-by, Sales People, Administrative individuals

   b. Identify potential tasks these individuals may have with the machine

      i. Loading, Unloading, Packing, Unpacking
      ii. Installation, Start-up, Commissioning
      iii. Set up, Teach, Operation in all modes
      iv. Tool change, Planned and Unplanned Maintenance

C) Risk Estimation

   a. Severity
   b. Frequency
   c. Probability of avoidance

D) Risk Evaluation

   a. Is risk at an acceptable level?
   b. If risk is not an acceptable level proceed to E

E) Risk Reduction

   a. Design it out
   b. Fixed or Enclosed Guarding
   c. Monitoring Access or Interlock Gates
   d. Awareness Means, Training and Procedures
   e. Personal Protective Equipment

Are there any benefits to baggage handling equipment or baggage handling systems by performing a risk assessment?

There are many benefits to the baggage handling system consulting firms, the OEM of the baggage handling equipment, the integrators, and ultimately the End User of the completed system.

- Compliance of International Standards
- Increased efficiency of machine and system design
- Increased probability of Overall Equipment Effectiveness (OEE)
- Highly functional machinery and systems inclusive of mitigation techniques that have a lower probability of being defeated.
- Superior product and system differentiation
- Safer machinery and systems resulting in lower downtime costs due to lower injury occurrence rates and lower associated costs with such incidents

NOTE: The greatest benefit attained by conducting a Risk Assessment and properly implementing a Risk Reduction Strategy is the added assurance that the employees working with the safe machinery and systems remain unharmed and productive. There is also the added assurance that machinery and systems themselves, remain safe and productive. Both result in increased overall efficiency, productivity and ultimately increased PROFITABILITY for all parties involved.

Summary

In conclusion and as the result of extensive research on the overall subject of Risk Assessment by the IABSC Safety Committee, it is the recommendation of the IABSC Safety Committee that a Risk Assessment be performed on all the components of the Baggage Handling System (BHS), as well as a “Final Risk Assessment “be performed on the entire system as part of the commissioning phase of the BHS based on the relevant consensus safety standards noted and referenced in this document.

Annex 1

Example risk evaluation tools

RIA TR R15.306-2014

Table 2 – Risk level decision matrix

Severity of Injury	Exposure to the Hazard	Avoidance of the Hazard	Risk Level
S1 - Minor	E1 - Low	A1 - Likely	NEGLIGIBLE
		A2 - Not Likely	LOW
		A3 - Not Possible	
	E2 - High		
S2 - Moderate	E1 - Low		MEDIUM
	E2 - High	A1 - Likely	
		A2 - Not Likely	HIGH
		A3 - Not Possible	
S3 - Serious	E1 - Low		
	E2 - High	A1 - Likely	
		A2 - Not Likely	
		A3 - Not Possible	VERY HIGH

Table 5 – Minimum functional safety performance requirements as a function of the risk level

Risk Level	Minimum SRP/CS requirements	
	PL_r	Structure Category
NEGLIGIBLE (see 5.6.1)	c	1
LOW	c	2
MEDIUM	d	2
HIGH	d	3
VERY HIGH (see 5.6.2)	e	4

Table 1 – Injury severity, exposure, and avoidance categories

Factor	Rating	Criteria (Examples) – choose most likely *Read criteria from the top for each factor*
Injury Severity	Serious S3	Normally non-reversible; likely will not return to the same job after recovery from incident: – fatality – limb amputation – long term disability – chronic illness If any of the above are applicable, the rating is SERIOUS
	Moderate S2	Normally reversible; likely will return to the same job after recovery from incident: – broken bones – severe laceration – short hospitalization – short term disability – loss time (multi-day) – fingertip amputation (not thumb) If any of the above are applicable, the rating is MODERATE
	Minor S1	First aid; no recovery required before returning to job: – bruising – small cuts – no loss time (multi-day) – does not require attention by a medical doctor If any of the above are applicable, the rating is MINOR
Exposure	High E2	– Typically more than once per hour – Frequent or multiple short duration – Durations/situations which could lead to task creep and does not include teach If any of the above are applicable, the rating is HIGH
	Low E1	– Typically less than or once per day or shift – Occasional short durations If either of the above are applicable, the rating is LOW
Avoidance	Not possible A3	– Insufficient clearance to move out of the way and safety-rated reduced speed control is not used – The robot system layout causes the operator to be trapped, with the escape route toward the hazard – Safeguarding is not expected to offer protection from the process hazard (e.g. explosion or eruption hazard) If any of the above are applicable, the rating is NOT POSSIBLE
	Not likely A2	– insufficient clearance to move out of the way and safety-rated reduced speed control is used – obstructed path to move to safe area – hazard is moving faster than reduced speed (250 mm/sec) – inadequate warning/reaction time – might not perceive the hazard exists If any of the above are applicable, the rating is NOT LIKELY
	Likely A1	– sufficient clearance to move out of the way – hazard is incapable of moving greater than reduced speed (250 mm/sec) – adequate warning/reaction time – positioned in a safe location away from the hazard If any of the above are applicable, the rating is LIKELY

References

ANSI B11.0 – 2010 Safety of Machinery; General Requirements and Risk Assessment

ANSI B11.19 – 2010 Performance Criteria for Safeguarding

ANSI B11.TR3 – 2000 Risk Assessment and Risk Reduction – A guide to estimate, evaluate and reduce risks associated with machine tools

ANSI / RIA R15.06 – 2012 Industrial Robots and Robot Systems – Safety Requirements

ISO 12100 – 2010 Safety of machinery—General principles for design—Risk assessment and risk reduction

ISO 13849-1:1999 Safety of machinery – Safety-related part of control systems – Part 1: General Principles for Design

IEC 60204-1 – Safety of electrical equipment of machinery used for general electrical safety aspects

IEC 62061 - Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems

ANSI/PMMI B155.1 – 2011 – Safety Requirements for Packaging Machinery and Packaging-Related Converting Machinery

This white paper is meant as a guide only. When implementing any safety measures / risk assessments, we recommend consulting a safety professional.

IABSC Safety Committee