Job Safety Analysis (JSA)

Every day workers are exposed to hazards as they go about their normal job duties. A job safety analysis (JSA) is simple way to use a process called "task based risk assessment" to identify the hazards a worker is exposed to while performing specific tasks.

JSA's start with describing the task (job) a worker is to perform. Then you identify the hazards the worker may be exposed to while performing the task. Once a hazard has been identified it is possible to rate the hazard by using a risk scoring system. Risk scoring can be kept quite simple by determining how severe an injury could result from the hazard. Very few workers are medical specialist however it is not difficult for you to use the following scoring system to determine how badly someone could be injured.

- Catastrophic – death;
- Serious - severe injury or illness that results in permanent irreversible damage (e.g., amputation, paralysis etc.);
- Moderate - injury that requires medical care (hospital stay, emergency room visit) but does not result in permanent damage (e.g., broken bones, stitches etc.);
- Minor - injury that requires no or minimal medical care (minor first aid at the plant).

After the hazard is identified and "scored" an appropriate risk reduction method is selected.

A JSA is simply a risk assessment on a specific task. The following example is for the job of changing a glue nozzle on a hot melt glue system.

Sample Job Safety Analysis Form

Job Safety Analysis **Job Description** – changing a plugged hot melt glue nozzle.			
Step	**Hazard**	**Severity**	**Possible Risk Reduction Methods**
Accessing the glue gun	Unintended startup or machine movement	Severe	• Stop the machine • Activate the E-Stop • Open interlocked Guard • LOTO

Changing the glue nozzle	Burn from contact with hot melt glue caused by activation or contact with the glue gun	Severe	• Perform LOTO on the pneumatic (air) supply
			• Automatically turn off the air and dump (exhaust) the system pressure.
			• PPE
			  ○ special gloves
			  ○ face shield

One important consideration is hazards which have a high severity but low probability. A good example is something that causes and accidental start up or machine movement. Injuries that occur under this circumstance usually cause the most severe injury or even death. The OSHA regulations state LOTO is to be performed when:

> **1910.147(a)(2)(ii)(B)**
>
> An employee is required to place any part of his or her body into an area on a machine or piece of equipment where work is actually performed upon the material being processed (point of operation) or where an associated danger zone exists during a machine operating cycle.
>
> Note: **Exception to paragraph (a)(2)(ii):** Minor tool changes and adjustments, and other minor servicing activities, which take place during normal production operations, are not covered by this standard if they are routine, repetitive, and integral to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection.

The underlined section is why it is important to provide redundant protection (e.g. maintained contact e-stop, interlocked door guards, time delay start button with annunciate horn etc.) against accidental start up. There is no substitute for LOTO however they type of redundant control can provide effective protection.

Annex B (informative) Additional information for identifying hazards

The following information may assist in preparing for the risk assessment (see 6.3).

Set the scope of the assessment

In addition to personnel safety, the scope of the risk assessment can be expanded or narrowed to include:

- operational states (e.g., shut down);
- specific tasks;
- a specific portion of the life cycle;
- who can be harmed (e.g., public, personnel);
- what can be damaged (e.g., property, equipment, productivity, the environment).

Where appropriate, foreseeable uses of the machinery by persons identified by sex, age, culture or language, dominant hand usage, or limiting physical abilities (e.g., visual or hearing impairment, size, strength) may be included.

Form a team

Assessing risk relies on the reasoned judgment and expertise of individuals familiar with the tasks and hazards associated with packaging machinery. To minimize individual biases (e.g., an individual attuned to noise hazards), a team approach is recommended.

For best results, risk assessments should be conducted by a team of as many affected functions as reasonably practical. The team members may include:

- workers, customers or end users;
- maintenance or field service;
- team leaders;
- engineers;
- safety practitioners;
- management;
- representatives from component suppliers or machinery users;
- legal counsel;
- consultants;
- insurers and others.

Gather appropriate information

To conduct the risk assessment, the team should obtain necessary resource information. The information for risk assessment should include, but not be limited to, the following:

- function or purpose of the machinery;
- the agreed set of specifications for the particular application of the machinery;
- list of affected persons and their interaction(s) with the machinery (see 6.3.2.1 and 6.3.2.2);
- limits of the machinery;
- requirements for the lifecycle of the machinery;
- design drawings, sketches, system descriptions or other means of establishing the nature of the machinery;
- design layout and proposed system(s);
- information concerning energy sources;
- any accident and incident history;
- information on product materials to be used;
- system layout and proposed building/existing system(s);
- integration of subsystems and other equipment;
- applicable local regulations for the machinery and process.

Before beginning a new assessment, the risk assessment team should identify any existing risk assessment conducted on prior version(s) or for similar products that might be applicable.

Risks of one machine can be compared with risks of a similar machine provided the following criteria apply:

- the similar machinery has risks reduced to an acceptable level;
- the intended use and the operational characteristics of the machinery are comparable;
- the hazards and the elements of risk are comparable;
- the technical specifications are comparable;
- the conditions for use are comparable.

The use of this comparison method does not eliminate the need to follow the risk assessment process as described in this standard for the specific conditions of use (e.g., when an auger used for grinding meat is compared with an auger used for grinding grain, the risks associated with the different material shall be assessed).

Determine the limits of the machinery

Before the team begins an assessment, the parameters of the project should be clearly understood. Project parameters will be set by management with input from the risk assessment team. Limits can include:

use limits such as:

- determined by the intended use of the machinery;
- production rates;
- product size;
- container size;
- material types;
- number of operators;
- product weight;
- cycle times;
- speed;
- forces;
- different machinery operating modes;
- phases of use/machinery life;
- the different intervention procedures for the operators;
- the reasonably foreseeable misuse of the machinery;
- the consequences of reasonably foreseeable malfunction;

space limits such as:

- floor plan;
- maintenance access;
- facility location;
- range of movement;
- space requirements for machinery installation;
- maintenance;
- operator-machinery interfaces;

time limits such as:

- hours/year operating time;
- maintenance schedule;
- replacement parts;
- maintenance and wear of tools;
- mechanical and electrical components;
- the foreseeable "life limit" of the machinery;

environmental limits such as:

- temperature;
- humidity;
- noise;
- location;
- corrosion;
- abrasion;

interface limits such as:

- energy sources (electrical, pneumatic, steam);
- other machinery or auxiliary equipment.

Annex C (informative) List of packaging machinery hazards

This Annex identifies specific hazards that should be considered when designing, constructing, reconstructing, modifying, using or maintaining packaging machinery. (see 6.4) The list is in alphabetical order. Not all hazards will apply to a particular packaging machine. This list is not all-inclusive.

Hazard category	Potential hazards	Notes
Biological / health	• bacteria (e.g., listeriosis, E. coli) • blood borne pathogens • mold • viral	
Chemical, material or substance hazards	• acute health affects (e.g., ammonia) • chemical emissions / splash • chronic health affects • delayed affects of chemical exposure • found in or used by the machinery (e.g., mercury, alcohol) • generated by the machinery (e.g., emissions, radiation, mist) • handled by the machinery (e.g., flammable, toxic, flour dust) • mixing incompatible chemicals	Chemical hazards can result from the product being handled, the packaging machinery, or machinery nearby
Container breakage or product spillage	• container breakage • product spillage	
Control systems	• dropping or ejection of a mobile part of the machinery or of a workpiece clamped by the machinery • failure to stop moving parts • machinery action resulting from defeating or failure of safeguarding devices • uncontrolled speed change • unintended / unexpected start-up	The correct design of machinery control systems can avoid unforeseen and potentially hazardous machinery behavior. Typical causes of hazardous machinery behavior are: • an unsuitable design or modification (accidental or deliberate) of the control system logic • a temporary or permanent defect or failure of one or several components of the control system • a variation or a failure in the power supply of the control system • inappropriate selection, design and location of the control devices
Electrical / electronic hazards	• direct contact with normally energized machinery (direct contact) (e.g., direct contact from normally live parts) • electrical noise • electrostatic discharge • flash hazard • improper wiring/grounding • inadvertent contact • insulation failure (e.g., from vibration or thermal cycling)	Electric hazards can also cause falls of persons (or of objects dropped by persons) as a result of the surprise induced by electric shock.

	• jumpered switches • liquid/wet locations • overvoltage/overcurrent • parts live from fault condition (indirect contact) • shorts/arcing/sparking • software errors • undervoltage (e.g., unpredictable machinery operation) • unexpected start up/motion	
Environmental	• asphyxiants • carcinogens • corrosion • emissions • hazardous waste /by-product • ozone depleting substances • poisons • solvents • trace metals	
Ergonomics / human factors	• controls difficult to read/understand/operate (e.g.,: confusing displays, hard to operate) • excessive reach • language/cultural difficulties (e.g., translations, communications) • lifting/bending/twisting (e.g., dynamic movements to do work, excessive exertion) • poor access/clearance • repetition/personnel fatigue) • static posture (e.g., static standing positions, awkward to get to • vibration (whole body or hand/arm)	Ergonomics/human factors should be considered by the supplier and user during the design phase and in developing work practices. Operator and maintenance personnel activities required for normal operation change over, setting up and routine maintenance should be considered. See also ANSI B11 TR1 for additional information on ergonomic hazards.
Fire and explosion	• dust • electrical arcs • explosion/implosion • flames • flammable vapors/gas • hot surfaces • smoke • sparks • spontaneous combustion • static electricity	
Fluids	• hydraulics fluid injection • liquid/vapor hazards • pneumatics • rupture/leakage • surges/sloshing	

Glue systems	• cleaning of the glue system • filling the glue system • hot melt glue • the release of glue	
Handling of container, product or material	• handling of container • product and material	
Heat / temperature / thermal	• burns/scalds • cold material/severe cold • cold work environment • hot material/severe heat • hot work environment • refrigeration	
Lasers	• eye exposure • laser generated air contaminants (LGACs) • UV skin exposure	
Material handling	• high speed operations • lifting/moving equipment • robot movements • unstable stacking/storage	
Mechanical hazards	• broken or falling machinery components (e.g., breakage, loosening, and falling, or the release of mechanical energy) • component fatigue/wear • crushing/impact • cutting/severing • entanglement • friction/abrasion • head bump • in-running nip points • Intermittent/on demand cycle (machinery that cycles automatically) • machinery instability • magnetic attraction/movement • pinch points • stabbing/puncture • unexpected start	Mechanical hazards associated with packaging machinery can include machinery parts or surfaces, tools, workpieces, loads, or projected solid or fluid materials such as: • gears • chains • belts • handcranks • power-driven handwheels • grippers • projecting shaft ends • knives, shears and cutters • power driven rollers • starwheels • turntables • augers • screwfeeds
Natural hazards / Environment of use	• humidity • loss of power/control/lighting • moving/overturning equipment • seismic	
Noise	• continuous or intermittent noise level • instantaneous/impulse noise level • interference with communications or awareness devices • noise level over 8 hour work day	Measure according to ANSI B11.TR5

Radiation	• infrared radiation • interference from other equipment (e.g., cardiac pacemaker, magnetizable prostheses) • non-ionizing • other uncontained ionizing particles • radio frequency/microwave energy • ultraviolet light • uncontained x-rays • visible light • α, ß, rays, electron or ion beams, neutrons	
Slips / trips / falls / egress	• debris • fall hazard from elevated work • floor/wall openings • poor lighting • slippery surface	
Ventilation / confined space	• air contaminants/smoke • inadequate ventilation • lack of oxygen • wrong airflow direction (e.g., back drafts, underpressure, recirculating air)	