

P202X-000
LR Mate Kitting Cell
Risk Assessment
Sample Report

LR Mate Kitting Cell

Customer Name
Machine Location



Safe-T-Sense
1665 N. Penny Ln.
Schaumburg, IL 60173
Month Day, 202X

Project Number: P202X-000
Machine Name: LR Mate Kitting Cell
Attention: Euchner / Safe-T-Sense

Dear Mr. Customer,

Safe-T-Sense is a machine safety services company with over 25 years of machine safety and controls experience. We are pleased to provide you with a copy of the results of the risk assessment conducted at your City, State location by a member of our safety engineering team. The Risk Assessment was completed in accordance with local and or nationally recognized safety standards to aid in reducing the associated risks that machine operators or nearby personnel may be exposed to.

This report shall be included in the technical file for the LR Mate Kitting Cell. You may also choose to include sections of this report within your OSHA job safety analysis for employee training and documentation of hazards and their existing mitigation.

This report contains information and details that are considered confidential and proprietary knowledge of both Safe-T-Sense and Euchner / Safe-T-Sense. This report shall be used to aid in the operation and maintenance of the LR Mate Kitting Cell.

We look forward to assisting you with creating a safer, productive, and more efficient work environment. Please review the details included within this report. Any questions or concerns will be addressed by the lead safety engineer assigned to your project via a virtual meeting to provide explanation or clarity within two weeks of report delivery.

Best regards,



Mike Poynter
Engineering Manager
Safe-T-Sense
734-626-8261
mpoynter@safe-t-sense.com

Table of Contents

Table of Contents	2
List of Figures	3
1 Project Documentation	4
1.1 Project Details	4
1.2 Version History	4
1.3 Customer Documentation Provided.....	4
1.4 Contributing Members	5
1.5 Reasonably foreseeable misuse	6
1.6 Risk assessment exclusions	6
2 Limits of Machine	7
3 Machine Overview Picture.....	9
4 Risk Assessment.....	10
5 Non-Compliance Items.....	17
6 Visual report	18
6.1 Symbol Key	18
6.2 Risk Reduction Summary.....	19
6.3 Safety Device Overview	20
6.4 Visual Report.....	21
7 Reference Photographs	22
8 Summary.....	23
9 Appendix A.....	24
9.1 General Description of Risk Assessments	24
9.2 Risk Assessment According to Hazard Rating Numbers.....	26
9.2.1 Procedure according to EN ISO 13849-1	28
10 Appendix B.....	29
10.1 Safety Terminology	29
11 Signature.....	31

List of Figures

Figure 1 - Machine Overview 9

Figure 2 - Visual report Symbol Key 18

Figure 3 - Figure 6, The Risk Assessment Process taken from B11.0.....25

Figure 4 - Parameters for the classification of the Performance Level according to EN ISO 13849-1 28

1 Project Documentation

1.1 Project Details

Project Name:	LR Mate Kitting Cell
Project Number:	P202X-000
Version:	V1.0
Date:	Month Day, 202X

1.2 Version History

Version	Date	Author - Title	Description
V0.0	xx-xx-xxxx	Mike Poynter – Engineering Manager	Document Template Creation – Overall layout, format and included information.
V1.0	xx-xx-xxxx	Mike Poynter – Engineering Manager	Initial document generation

1.3 Customer Documentation Provided

Documentation Type	Provided	Not Provided
Machine Layout Drawing(s)	☒	☐
Control Drawings (Mechanical, Electrical, Fluid Power)	☒	☐
Emergency Procedures	☒	☐
LOTO Procedures	☒	☐
Safety Program	☐	☒
Risk Assessment	☐	☒
Safety Functional Requirement Specification	☐	☒
SISTEMA Verification	☐	☒
Safety Validation	☐	☒

1.4 Contributing Members

STS Safety Engineer	
Name:	Mike Poynter
Company:	Safe-T-Sense, LLC
Address:	1665 N. Penny Lane Schaumburg, IL 60173 USA
Title:	Engineering Manager
Total Yrs. Exp.	18 years
Telephone:	1-224-404-6610
E-mail:	info@safe-t-sense.com

Customer Primary Contact	
Name:	Matt Clark
Company:	Euchner-USA
Address:	1665 N. Penny Lane Schaumburg, IL 60173 USA
Title:	Director of Sales
Total Yrs. Exp.	22 years
Telephone:	315-701-0315
E-mail:	customercare@euchner-usa.com

1.5 Reasonably foreseeable misuse

- The machine is not intended to be used with tampered, faulty, or bypassed safety devices.
- The machine is not intended to be used in buildings without adequate ventilation, e.g. by means of exhaust systems.
- The machine is not intended to be used with non-standard workpieces or objects not foreseen.
- Personnel shall not be allowed in the machine area without training per the ANSI B11.0 requirements for machine training.
 - Improper training can lead to more severe injuries and a higher probability of injury than values listed below.
 - Ensure proper steps are followed, procedure is reviewed on a yearly basis and all first responders are properly qualified to help avoid additional hazards.

1.6 Risk assessment exclusions

The following items are excluded in the scope of work for the LR Mate Kitting Cell.

- Hazards related with a forklift used to lift or move material.
- Hazards which impose risk(s) beyond a simple contact point (for example, gaseous exposure, electrical discharge, explosion, or fire) are not documented within this report.
- Noise levels requiring PPE were not measured.
 - This shall be measured by a qualified individual using certified equipment, and PPE shall be required per the results of the test.
- Intentional misuse of the machine is not considered.
- Adjustments or changes to the machine function or engineering controls are not considered.
 - An additional assessment shall be performed when changes are made to software, hardware, or physical aspects of the machine.

2 Limits of Machine

PROJECT DATA:	
Manufacturer:	Fanuc / Euchner-USA
Machine description	Robot packs and unpacks containers
Model:	FMW-MT00006-00
Serial number:	N/A
Manufacture date:	December 31, 2023
Location:	N/A
Product produced:	N/A
Product input:	N/A
Product output:	N/A
Production rate:	N/A
Modes of Machine Assessment:	
Start-up:	Inspection
Setup / Adjustment:	Setup – Approximately once a shift
Operation (Normal / Abnormal):	Normal Operation – Packs and Unpacks containers continuously
Maintenance with limited energy:	Maintenance – As needed, performed under LOTO.
Sanitation:	Cleaning – Approximately once a week.
Anticipated Training, Qualifications and Experience for associated personnel:	
Operators:	Personnel are likely to have a good awareness of the specific hazards, such as operators of adjacent machinery.
Maintenance:	Personnel are likely to have a good awareness of the specific hazards, such as operators of adjacent machinery.
Sanitation:	Personnel are likely to have very little awareness of the machine hazards or the site safety procedures, such as visitors or members of the general public, including children.
Engineer / Technician:	Personnel are likely to have a good awareness of the specific hazards, such as operators of adjacent machinery.
Supervision:	Personnel with little awareness of the specific hazards but likely to have a good awareness of site safety procedures, authorized routes, etc., such as administration staff.
Other Personnel:	Personnel with little awareness of the specific hazards but likely to have a good awareness of site safety procedures, authorized routes, etc., such as administration staff.
Special Physical Requirements:	Requires fork truck to move the robot demo kitting cell.
Environmental Limits:	
Temperature:	60-75F
Humidity:	50-60%; None condensing.
Elevation:	1000' above sea level
Range of Movement:	Maximum reach – 550 mm

External Space Requirements (perimeter/overhead):	52" x 48" x 67"
Exposure to other airborne contaminants:	N/A
Vibration Levels (qualitative estimates):	Minor vibration
Noise levels:	75 dB
Energy Sources:	
Electrical power circuits:	120 VAC / 15A
Electrical control circuits:	24 VDC
Pneumatic supply feed/condition:	3 scfm@ 60 psi
Hydraulic supply feed/condition:	N/A
Vacuum:	N/A
Steam:	N/A
Water:	N/A
Other:	N/A
Confined Spaces:	
Confined Spaces:	N/A

3 Machine Overview Picture



Figure 1 - Machine Overview

4 Risk Assessment

This section details the systematic analysis and evaluation of the potential hazards associated with the LR Mate Kitting Cell.

Safe-T-Sense adheres to the methodology described in ANSI B11.0-2020-Safety of Machinery, which is a task-based risk assessment. The task-based methodology includes input from the operator(s) or other personnel regarding the tasks they perform on the machine. This includes tasks performed routinely (for example, loading and unloading) and those performed less frequently (for example, changing tools or dies). Once the tasks are identified, the hazards that personnel are exposed to while performing the tasks are documented.

The risk assessment report has the following structure for each task / hazard pair:

- Zone name where the task is performed.
- Picture identifying the zone.
- Task description
- Hazard to which the operator is exposed to during the task.
- Hazardous Energy as the source of hazard movement
- Current risk level of that specific hazard
- Solution(s) to mitigate the hazard.
- Performance Level required (PLr) if the solution is controls based.
- Risk level achieved after applying the suggested mitigation measure(s).

Note: The risk assessment is a living document. Any new tasks or tasks that were not identified during the original assessment may be added to the report later.

The risk level estimation is done in two parts, Risk Before and Risk After. Risk Before estimates the risk level of the machine before any risk reduction measures are implemented. This establishes the worst-case scenario in case risk reduction measures are removed. In addition, the Performance Level required (PLr) for the safety function of any controls-based risk reduction solution is obtained from the initial risk rating(s). A Performance Level is not applicable to risk reduction measures such as mechanical guards or work procedures, as these are not controls-based.

The Risk After rating indicates the risk level achieved if the risk reduction solutions recommended within this report are implemented. If they are not designed or integrated correctly according to the relevant safety standards, then the Risk After rating may be higher than what is documented within this report.

Further details on the Risk Assessment process can be found in sections 9 and 10 of this report, including a general description of risk assessments and the numerical values associated with the risk levels documented in the risk assessment.

ID	Zone	Picture	Task	Hazard	Hazardous Energy Source	Risk Level Before						Existing Risk Reduction Measures	Solution	Action Required	PL _r	Risk Level After					
						Severity (S)	Frequency (F)	Occurrence (O)	Persons (P)	Hazard Rating	Risk Level					Severity (S)	Frequency (F)	Occurrence (O)	Persons (P)	Risk Level Hazard Rating	Risk Level
1	Zone 1	LR MKC_001	Inspection - Personnel inspects Robot demo for debris / defects.	---Slips / trips / falls / egress---	Gravitational	S3	F4	O4	P1	10	Low	Robot kitting cell is properly mounted to the floor.	Add a yellow and black striped tape around the edge of the cell to act as a visual indicator of potential trip hazard.	No	-	S1	F4	O1	P1	0	Negligible
2	Zone 1	LR MKC_002	Normal Operation - Robot performs sorting / picking function	Crushing / impact / knock over from robot	Electrical	S7	F6	O7	P2	1500	Very High	Personnel are separated from the kitting cell by fixed and movable guarding (Polycarbonate perimeter panels). Movable front access door is equipped with a safety rated Euchner MGB interlock switch. Movable rear access door is equipped with a safety rated Euchner CTP interlock switch. All safety devices are integrated within a Control Reliable safety architecture. Awareness Means provided to indicate the status of the Robot kitting cell. Fanuc robot and controller is equipped with safety rated DCS software to limit programmed path.	Confirm that DCS is provided by Fanuc and appropriately programmed in compliance with the clearance requirements of RIA R15.06-Part 2. Confirm that the colors used for the indicator lights are in accordance with NFPA 79 Table 10.3.3.3. Document the safe stop time / safe distance calculation for the Fanuc robot.	No	e	S1	F6	O1	P2	0	Negligible
3	Zone 1	LR MKC_003	Normal Operation - Robot performs sorting / picking function	Cuts / Laceration from contact with sharp edge(s)	Mechanical	S2	F6	O6	P2	40	Medium	Personnel are separated from the kitting cell by fixed and movable guarding (Polycarbonate perimeter panels). Movable front access door is equipped with a safety rated Euchner MGB interlock switch. Movable rear access door is equipped with a safety rated Euchner CTP interlock switch. All safety devices are integrated within a Control Reliable safety architecture. Awareness Means provided to indicate the status of the Robot kitting cell.	Personnel shall consider using cut resistant gloves as part of PPE when working within the the Kitting Cell. All sharp edges contained within the Kitting cell may be colored red to act as an awareness means to indicate a potential hazard.	No	c	S1	F6	O1	P2	0	Negligible

ID	Zone	Picture	Task	Hazard	Hazardous Energy Source	Risk Level Before						Existing Risk Reduction Measures	Solution	Action Required	PL _r	Risk Level After					
						Severity (S)	Frequency (F)	Occurrence (O)	Persons (P)	Hazard Rating	Risk Level					Severity (S)	Frequency (F)	Occurrence (O)	Persons (P)	Risk Level Hazard Rating	Risk Level
4	Zone 1	LR MKC_004	Normal Operation - Robot performs sorting / picking function	Crush / Trap from unexpected robot movement	Electrical	S5	F6	O6	P2	480	High	Personnel are separated from the kitting cell by fixed and movable guarding (Polycarbonate perimeter panels). Movable front access door is equipped with a safety rated Euchner MGB interlock switch. Movable rear access door is equipped with a safety rated Euchner CTP interlock switch. All safety devices are integrated within a Control Reliable safety architecture. Awareness Means provided to indicate the status of the Robot kitting cell. Fanuc robot and controller is equipped with safety rated DCS software to limit programmed path.	Confirm that DCS is provided by Fanuc and appropriately programmed in compliance with the clearance requirements of RIA R15.06-Part 2. Confirm that the colors used for the indicator lights are in accordance with NFPA 79 Table 10.3.3.3. Document the safe stop time / safe distance calculation for the Fanuc robot.	No	e	S1	F6	O1	P2	0	Negligible
5	Zone 1	LR MKC_005	Normal Operation - Robot performs sorting / picking function	Impact - Projectile of kitting parts	Pneumatic	S5	F6	O6	P2	480	High	Personnel are separated from the kitting cell by fixed and movable guarding (Polycarbonate perimeter panels). Perimeter panels (Normal 0.25 inch thick) intended to contain projectile.	Kitting Cell shall be reviewed by trained and qualified personnel within the established interval for Preventative Maintenance.	No	-	S1	F6	O1	P2	0	Negligible
6	Zone 1	LR MKC_006	Abnormal Operation - Pneumatic pressure falls below normal 3 scfm@ 60 psi	Impact from projectile of kitting parts	Pneumatic	S5	F6	O6	P2	480	High	Personnel are separated from the kitting cell by fixed and movable guarding (Polycarbonate perimeter panels). Perimeter panels (Normal 0.25 inch thick) intended to contain projectile.	Integrate a safety rated pneumatic dump valve monitored within a control reliable safety architecture.	No	e	S1	F6	O1	P2	0	Negligible
7	Zone 1	LR MKC_007	Abnormal Operation - Complete loss of Pneumatic pressure	Impact from projectile of kitting parts	Pneumatic	S5	F6	O6	P2	480	High	Personnel are separated from the kitting cell by fixed and movable guarding (Polycarbonate perimeter panels). Perimeter panels (Normal 0.25 inch thick) intended to contain projectile.	Integrate a pressure sensor to monitor the pneumatic supply and initiate a stop command to the robot if the supply falls below a minimum set value.	No	-	S5	F1	O2	P2	2	Negligible

ID	Zone	Picture	Task	Hazard	Hazardous Energy Source	Risk Level Before						Existing Risk Reduction Measures	Solution	Action Required	PL _r	Risk Level After					
						Severity (S)	Frequency (F)	Occurrence (O)	Persons (P)	Hazard Rating	Risk Level					Severity (S)	Frequency (F)	Occurrence (O)	Persons (P)	Risk Level Hazard Rating	Risk Level
8	Zone 1	LR MKC_008	Abnormal Operation - Separation of pneumatic air hose	Uncontrolled impact / whipping (Eye Injury)	Pneumatic	S5	F3	O6	P2	144	High	All pneumatic supply lines are secured with polymeric ties to prevent uncontrolled whipping in the event of a separation. May also be enclosed in flexible conduit, cable trays or work cell housing.	Kitting Cell shall be reviewed by trained and qualified personnel within the established interval for Preventative Maintenance.	No	-	S1	F3	O1	P2	0	Negligible
9	Zone 1	LR MKC_009	Abnormal Operation - Electrical power loss and restoration	Unexpected robot movement	Electrical	S7	F3	O5	P2	225	High	Fanuc robot controller requires a monitored manual reset and an additional specific intentional human action to permit auto cycle to restart.	No further recommendations	No	-	S1	F1	O1	P2	0	Negligible
10	Zone 1	LR MKC_010	Abnormal Operation - Electrical power loss and restoration	Electric shock	Electrical	S7	F3	O5	P2	225	High	Capability has been provided on the kitting cell for the isolation of electrical power via lockable disconnect.	No further recommendations	No	-	S1	F1	O1	P2	0	Negligible
11	Zone 1	LR MKC_011	Abnormal Operation - Fault in E-Stop circuit	Safety devices may not respond as expected, potential for multiple hazards	Control System	S7	F3	O5	P2	225	High	Safety control system monitors the E-Stop safety function and initiates a stop command to the Fanuc robot upon the detection of a fault condition.E-stop safety control architecture has been designed to meet the minimum requirements for a Control Reliable safety architecture.Awareness Means provided to indicate the status of the Robot kitting cell. (Red color used to indicate a fault condition)	Confirm that the colors used for the indicator lights are in accordance with NFPA 79 Table 10.3.3.3.Document the safe stop time / safe distance calculation for the Fanuc robot.	No	c	S1	F1	O1	P2	0	Negligible

ID	Zone	Picture	Task	Hazard	Hazardous Energy Source	Risk Level Before						Existing Risk Reduction Measures	Solution	Action Required	PL _r	Risk Level After					
						Severity (S)	Frequency (F)	Occurrence (O)	Persons (P)	Hazard Rating	Risk Level					Severity (S)	Frequency (F)	Occurrence (O)	Persons (P)	Risk Level Hazard Rating	Risk Level
12	Zone 1	LR MKC_012	Abnormal Operation - Fault in E-Stop device	Safety devices may not respond as expected, potential for multiple hazards	Control System	S7	F3	O5	P2	225	High	Safety control system monitors the E-Stop safety function and initiates a stop command to the Fanuc robot upon the detection of a fault condition. E-stop safety control architecture has been designed to meet the minimum requirements for a Control Reliable safety architecture. Awareness Means provided to indicate the status of the Robot kitting cell. (Red color used to indicate a fault condition)	Confirm that the colors used for the indicator lights are in accordance with NFPA 79 Table 10.3.3.3. Document the safe stop time / safe distance calculation for the Fanuc robot.	No	c	S1	F1	O1	P2	0	Negligible
13	Zone 1	LR MKC_013	Abnormal Operation - Fault in safety gate circuit	Safety devices may not respond as expected, potential for multiple hazards	Control System	S7	F3	O5	P2	225	High	Safety control system monitors the Safety Gate (MGB / CTP) safety function and initiates a stop command to the Fanuc robot upon the detection of a fault condition. Safety Gate (MGB / CTP) safety control architecture has been designed to meet the minimum requirements for a Control Reliable safety architecture. Awareness Means provided to indicate the status of the Robot kitting cell. (Red color used to indicate a fault condition)	Confirm that the colors used for the indicator lights are in accordance with NFPA 79 Table 10.3.3.3. Document the safe stop time / safe distance calculation for the Fanuc robot.	No	c	S1	F1	O1	P2	0	Negligible

ID	Zone	Picture	Task	Hazard	Hazardous Energy Source	Risk Level Before						Existing Risk Reduction Measures	Solution	Action Required	PL _r	Risk Level After					
						Severity (S)	Frequency (F)	Occurrence (O)	Persons (P)	Hazard Rating	Risk Level					Severity (S)	Frequency (F)	Occurrence (O)	Persons (P)	Risk Level Hazard Rating	Risk Level
14	Zone 1	LR MKC_014	Abnormal Operation - Fault in safety gate device	Safety devices may not respond as expected, potential for multiple hazards	Control System	S7	F3	O5	P2	225	High	Safety control system monitors the Safety Gate (MGB / CTP) safety function and initiates a stop command to the Fanuc robot upon the detection of a fault condition. Safety Gate (MGB / CTP) safety control architecture has been designed to meet the minimum requirements for a Control Reliable safety architecture. Awareness Means provided to indicate the status of the Robot kitting cell. (Red color used to indicate a fault condition)	Confirm that the colors used for the indicator lights are in accordance with NFPA 79 Table 10.3.3.3. Document the safe stop time / safe distance calculation for the Fanuc robot.	No	c	S1	F1	O1	P2	0	Negligible
15	Zone 1	LR MKC_015	Abnormal Operation - Robot Position / Robot Programming error	Crushing / impact / knock over from robot	Electrical	S7	F2	O6	P2	240	High	Fanuc robot and controller is equipped with safety rated DCS software to limit programmed path. Perimeter panels (Normal 0.25 inch thick) intended to minimize contact with the robot.	Confirm that DCS is provided by Fanuc and appropriately programmed in compliance with the clearance requirements of RIA R15.06-Part 2.	No	d	S1	F2	O1	P2	0	Negligible
16	Zone 1	LR MKC_016	Abnormal Operation - Robot Position / Robot Programming error	Perimeter panel impact from separation from structural member(s).	Mechanical	S4	F2	O6	P2	64	High	Fanuc robot and controller is equipped with safety rated DCS software to limit programmed path. Perimeter panels (Normal 0.25 inch thick) intended to minimize contact with the robot.	Confirm that DCS is provided by Fanuc and appropriately programmed in compliance with the clearance requirements of RIA R15.06-Part 2.	No	b	S1	F2	O1	P2	0	Negligible
17	Zone 1	LR MKC_017	Cleaning - Robot Kitting cell with a dry cloth	Crushing / impact / knock over from robot	Electrical	S7	F3	O5	P1	113	High	Capability has been provided on the kitting cell for the isolation of electrical power via lockable disconnect. Personnel training and procedures provided to all who work on or near the kitting cell.	Confirm instruction manuals supplied for the Kitting cell properly identify all electrical isolation points and document all precautions for cleaning activities. Instruction manual shall specify to only use dry cloth.	No	-	S1	F3	O1	P2	0	Negligible
18	Zone 1	LR MKC_018	Cleaning - Robot Kitting cell with a dry cloth	Electric shock	Electrical	S7	F3	O5	P1	113	High	Capability has been provided on the kitting cell for the isolation of electrical power via lockable disconnect. Personnel training and procedures provided to all who work on or near the kitting cell.	Confirm instruction manuals supplied for the Kitting cell properly identify all electrical isolation points and document all precautions for cleaning activities. Instruction manual shall specify to only use dry cloth.	No	-	S1	F3	O1	P2	0	Negligible

ID	Zone	Picture	Task	Hazard	Hazardous Energy Source	Risk Level Before						Existing Risk Reduction Measures	Solution	Action Required	PL _r	Risk Level After					
						Severity (S)	Frequency (F)	Occurrence (O)	Persons (P)	Hazard Rating	Risk Level					Severity (S)	Frequency (F)	Occurrence (O)	Persons (P)	Risk Level Hazard Rating	Risk Level
19	Zone 1	LR MKC_019	Maintenance - Teaching / Programming of Robot	Crushing / impact / knock over from robot	Electrical	S7	F3	O7	P1	225	High	Fanuc Robot teaching shall be performed at a reduced speed not to exceed 250 mm/second. 3-Position enabling device integrated on the Fanuc teach pendant. Fanuc robot and controller is equipped with safety rated DCS software to limit programmed path. Kitting cell clearance shall comply with 0.5 M space to comply with Fanuc DCS safe soft limits.	Confirm that DCS is provided by Fanuc and appropriately programmed in compliance with the clearance requirements of RIA R15.06-Part 2. Confirm that instruction manuals supplied for the Kitting cell include safety precautions for all maintenance activities.	No	d	S1	F3	O1	P2	0	Negligible
20	Zone 1	LR MKC_020	Maintenance - Teaching / Programming of Robot	Unexpected robot movement	Electrical	S7	F3	O7	P1	225	High	Fanuc Robot teaching shall be performed at a reduced speed not to exceed 250 mm/second. 3-Position enabling device integrated on the Fanuc teach pendant. Fanuc robot and controller is equipped with safety rated DCS software to limit programmed path. Kitting cell clearance shall comply with 0.5 M space to comply with Fanuc DCS safe soft limits.	Confirm that DCS is provided by Fanuc and appropriately programmed in compliance with the clearance requirements of RIA R15.06-Part 2. Confirm that instruction manuals supplied for the Kitting cell include safety precautions for all maintenance activities.	No	d	S1	F3	O1	P2	0	Negligible
21	Zone 1	LR MKC_021	Emergency Condition	Delay in extracting personnel may result in a greater risk of injury	Environmental	S7	F3	O7	P2	450	High	First responders are available within the facility for medical attention and to assist as needed. No capability has been provided for the emergency movement of the robot arm without drive power (Break Release).	Obtain a Fanuc Brake Release box and ensure there is a power source nearby the Kitting cell to permit use of the Brake Release Box during an emergency condition.	No	-	S1	F3	O1	P2	0	Negligible
22	Zone 1	LR MKC_022	Emergency Condition	Improper procedures followed for extracting personnel may result in a greater risk of injury.	Environmental	S7	F3	O7	P2	450	High	First responders are available within the facility for medical attention and to assist as needed. No capability has been provided for the emergency movement of the robot arm without drive power (Break Release).	Obtain a Fanuc Brake Release box and ensure there is a power source nearby the Kitting cell to permit use of the Brake Release Box during an emergency condition.	No	-	S1	F3	O1	P2	0	Negligible

5 Non-Compliance Items

Compliance Issues					
ID	Zone	Picture	Standard for Compliance	Issue	Solution
1	Zone 1	LR MKC_001	NFPA 79 (2024) - 5.1.11.1-2	The disconnect is missing the required handle.	<i>Replace the broken disconnect with one that has an external operating means that is readily accessible.</i>
2	Zone 1	LR MKC_002	NFPA 79 (2024) - 13.2.2.1	The ground wire is not green	<i>Replace all grounding wires with wires that are green or green with yellow stripe.</i>
3	Zone 1	LR MKC_003	NFPA 79 (2024) - 13.1.6.2	The adjustable lamp cord is ran near moving components that can damage the cable and conductors inside.	<i>Mount the cable such that it is supported and protected by normal equipment usage.</i>
4	Zone 1	LR MKC_004	NFPA 79 (2024) - 16.1.2	There are no safety signs installed on the electrical enclosure.	<i>Install warning signage that complies with the requirements of NFPA 79 and NFPA 70E.</i>
5	Zone 1	LR MKC_005	NFPA 79 (2024) - 10.1.2.2	The operator panel is located in an area not easily accessible to the machine operator.	<i>Relocate the operator panel (start and stop machine functions) to the platform above the flywheel.</i>

***NOTE:** The data shown above does not reflect the status of the LR Mate Kitting Cell. It is included as an example to portray the details included in a risk assessment report provided to you when you partner with Safe-T-Sense.

6 Visual report

6.1 Symbol Key

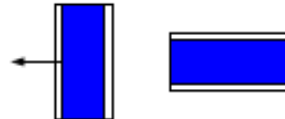
Indication Lights		Fixed Guarding	
Indication Device (sound)		Movable Guarding	
Trap key block		Detail Line	
Interlock RA		Conveyor	
Interlock ENG Guard Locking		Stairs	
Interlock ENG Non-Contact		Light Curtain	
E-Stop		Muting LC	
Rope Pull E-Stop		Safety Mat	
Two-Hand Controls		Safety Panel	
Laser Scanner		Enabling Device RA	
Enabling Device ENG		Footswitch	

Figure 2 - Visual report Symbol Key

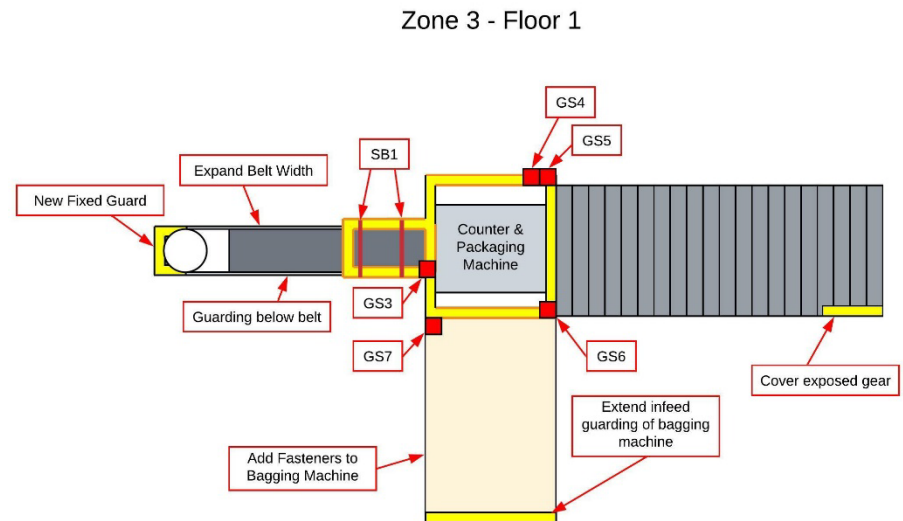
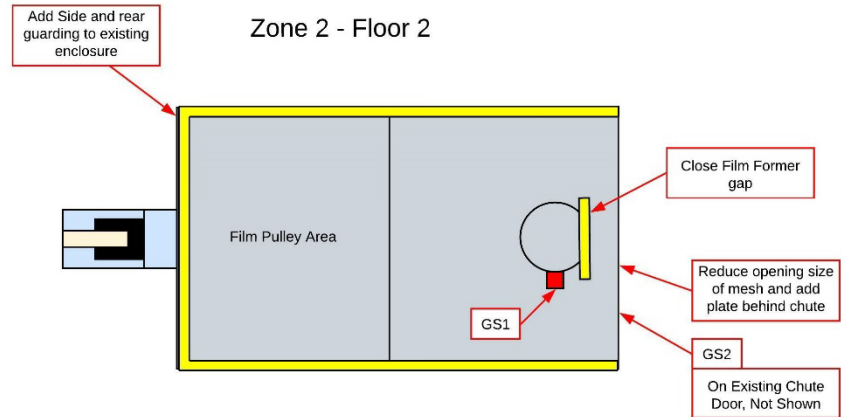
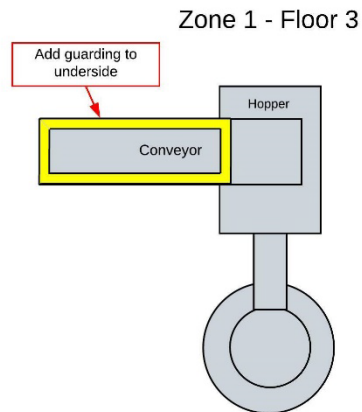
6.2 Risk Reduction Summary

Example Only

Risk Reduction Summary

Gate switch (non-locking interlock) (qty 7)

Rated safety beam (qty 1)



6.3 Safety Device Overview

Example Only

Safety Device Overview

***NOTE:** The data shown above does not reflect the status of the LR Mate Kitting Cell. It is included to reflect the type of data within a risk assessment report provided by Safe-T-Sense.

Safety Device Name	Safety Device Type	Hazardous motions controlled	PLr
GS1	Locking interlock	X Belts XX Belts XXX Motions	d
GS2	Non-Locking interlock	X Belts XX Belts XXX Motions	d
GS3	Non-Locking interlock	XXX Cylinders	d
GS4	Non-Locking interlock	XXX Cylinders XXX Cylinders XXX Jaw XXX Plate	c
GS5	Non-Locking interlock	X Belts XX Belts XXX Motions	d
GS6	Non-Locking interlock	XXX Cylinders XXX Cylinders XXX Jaw XXX Plate	e
GS7	Non-Locking interlock	XXX Belts	b
SB1	Safety Rated Beams	XXX Cylinders XXX Bar	d

6.4 Visual Report

LR Mate Kitting Cell – Zone 1

Risk Assessment Report – ID 1, 2, 4, 5, 7, 8, 17, 18, 20, 21

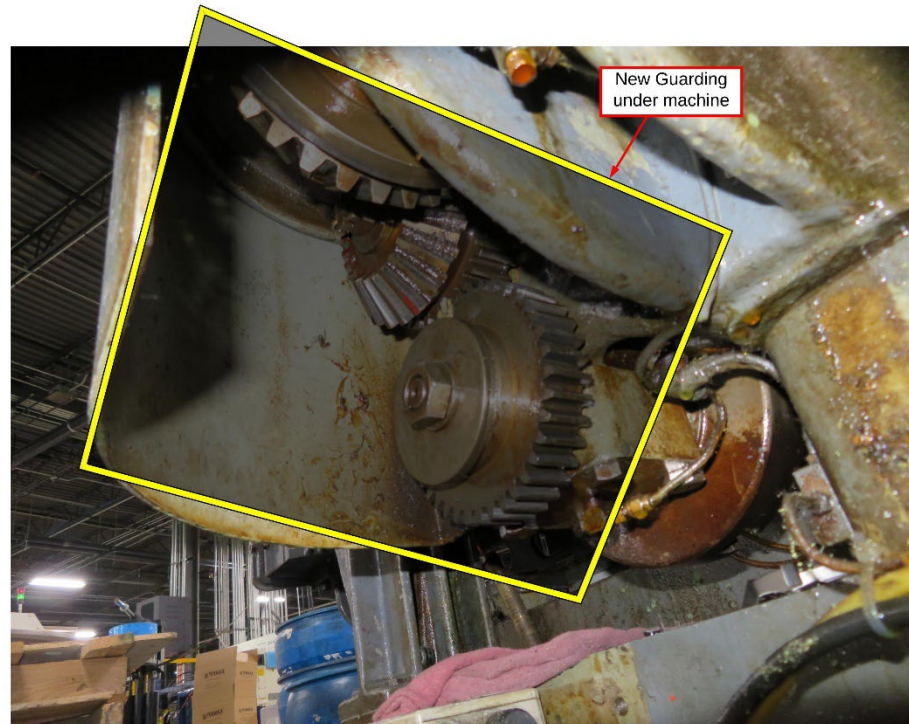
Visual Report ID - 1

Solution: The existing guarding around the machine covers 3 of the 4 shaft gear points. Install fixed guarding under the opening that prevents access to the hazard by reaching underneath or around.

This will reduce the possibility of operators contacting the hazardous area.

The guarding shall be installed such that tools are required to remove.

NOTE: This data does not reflect the status of the LR Mate Kitting Cell. It is included as an example of the data you will receive within a report delivered by Safe-T-Sense.



7 Reference Photographs



8 Summary

This Risk Assessment report provides you with a basis to begin your machine's safety function design. It is STS's recommendation that you follow the next step in the safety life cycle and develop the safety concept that defines the specifications and functionality associated with the recommended risk reduction measures included within this report. The safety concept complements the risk assessment and aids the engineers involved in the design of the safety system.

Machine Stop Time and Safe Distance Calculations are not included within the scope of this risk assessment. All non-separating safeguard recommendations shall be designed and installed such that the hazard cannot be accessed.

This risk assessment report should be reviewed by your team to ensure that administrative controls - such as the development and documentation of training and procedures, physical printed checklists, and awareness means - are implemented and completed. You must ensure that the proper Personal Protection Equipment (PPE) is being provided to all machine operators and nearby personnel, including properly rated gloves and special tools as recommended by the risk assessment. The implemented solutions shall be validated as part of completing the steps to the safety lifecycle.

The LR Mate Kitting Cell e energy isolation procedures shall be reviewed and enforced under all circumstances defined under OSHA CFR 29 Part 1910.147. The isolation procedure(s) shall be documented and validated for all energy sources used on the LR Mate Kitting Cell (e.g., spring-stored, gravitational, electrical, pneumatic, and hydraulic energy, as applicable).

Service and maintenance tasks not defined as routine, repetitive, or integral to production, as described within ANSI Z244.1-2016 (R2020), section 1.2 and 1.3, shall only be performed after completing the proper energy isolation procedures. Tasks that are documented within this report as routine, repetitive, and integral may be performed using alternative methods to mitigate the risk associated with the hazards associated with those tasks.

This Risk Assessment report is a living document. Future changes to the LR Mate Kitting Cell, layout, configuration, or operation requires a review of the report to see if the changes or modifications will require any updates to keep the report current.

9 Appendix A

9.1 General Description of Risk Assessments

As per clause 5 in ANSI B11.0, suppliers and users are required to perform a risk assessment to reduce risk to an acceptable level. The method selected shall conform to the requirements of clause 6. There are several methods available to conduct a risk assessment and many companies/industries use different risk assessment methodologies. Regardless of whichever method is chosen and used, it shall include the fundamental steps of 6.1.3 and the applicable requirements of clauses 7 through 10. The risk assessment consists of

- Risk analysis, including
 - determination of the limits of the machine,
 - systematic identification of tasks and hazards,
 - risk estimation.
- Risk evaluation.

The risk analysis provides information needed for the risk evaluation; with the aid of this information decisions can be made about whether a risk reduction is necessary. These decisions must be based on a qualitative or, where appropriate, a quantitative estimation of the risk related to the hazards caused by the machine.

It can be necessary to repeat this procedure so that, by implementing protective measures, hazards are eliminated as far as possible, risks reduced sufficiently, and no new hazards are created.

According to ANSI B11.0 chapter 6, the results obtained from the risk assessment and risk reduction must be documented. The documentation shall demonstrate the procedure that has been followed, the hazards identified, and the risk reduction measures employed to reduce the risk to an acceptable level.

A summary of the risk assessment process is shown below.

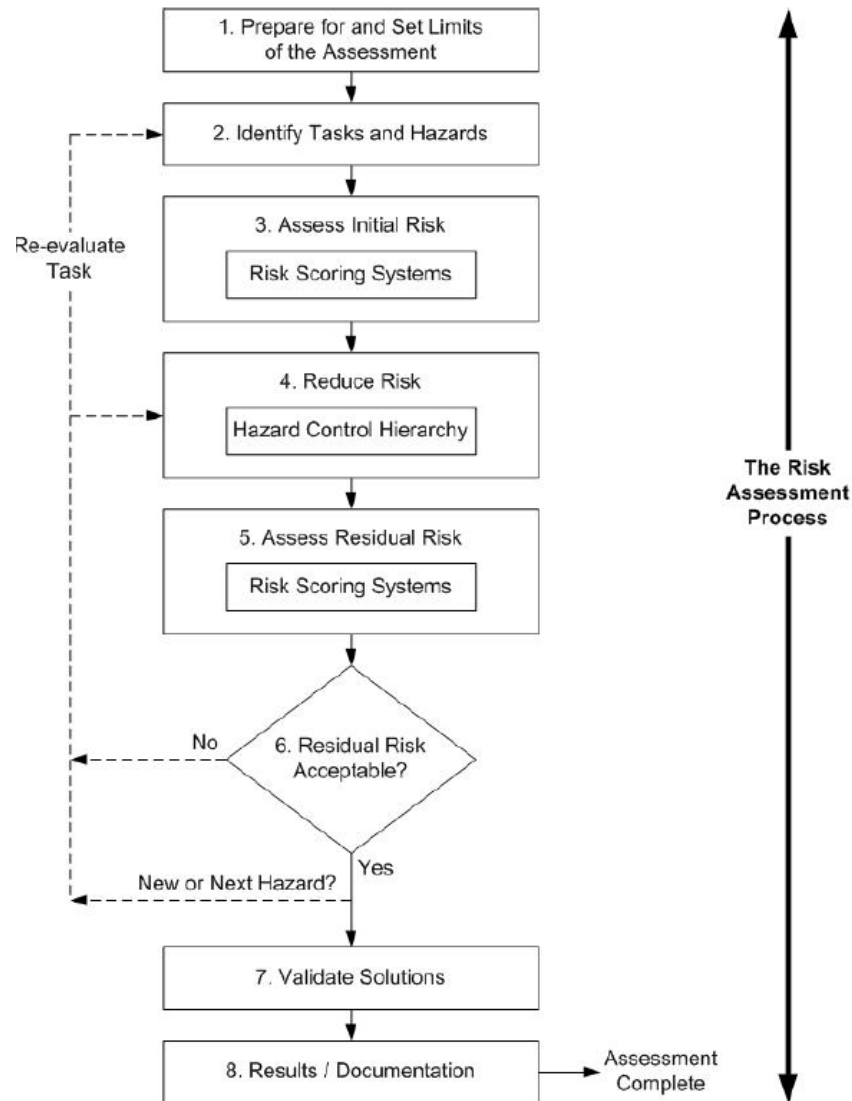


Figure 6 — The Risk Assessment Process

Figure 3 - Figure 6, The Risk Assessment Process taken from B11.0

9.2 Risk Assessment According to Hazard Rating Numbers

Severity of the possible injury (worst case) (S)	Level	Hazard rating
Scratch / bruise	S1	0.1
Laceration / Mild ill health effect	S2	0.5
Fracture minor bone - finger/toe or minor illness (temporary) - more than first aid	S3	1
Fracture major bone - hand, arm, leg, or major illness (temporary)	S4	2
Loss of 1 or 2 fingers, toes (permanent), Minor permanent illness	S5	4
Amputation, leg/hand partial loss of sight/hearing	S6	8
Amputation, 2 legs/hands, total loss of sight/hearing	S7	10
Critical or permanent illness	S8	12
Fatality	S9	15
Frequency of exposure (F)		
Annually	F1	0.5
Monthly	F2	1
Weekly	F3	1.5
Daily	F4	2.5
Hourly	F5	4
Constantly	F6	5
Probability of occurrence of the hazard (O)		
Almost impossible – possible under extreme circumstances	O1	0.033
Highly unlikely – though conceivable	O2	1
Unlikely – but could occur	O3	1.5
Possible - but unusual	O4	2
Even chance – could happen	O5	5
Probable – not surprising	O6	8
Likely – to be expected	O7	10
Certain – no doubt	O8	15
Number of persons exposed to the hazard (P)		
1-2 persons	P1	1
3-7 persons	P2	2
8-15 persons	P3	4
16-50 persons	P4	8
50+ persons	P5	12
Risk level (R) = S x F x O x P		
Negligible		0-5
Low, but present		6-50
Medium		51-250
High		251-500
Very High		>500

Meaning of the risk level present in the machine:

Risk level	HRN	Meaning
Negligible	0-5	There is no foreseeable risk of harm to health and safety. Normal production activities should not be affected by this risk.
Low, but present	6-50	The risk associated with the hazard is present, but low. Ensure that administrative measures are in place which further reduce the risk. Periodically review that risk levels have not increased.
Medium	51-250	The risk associated with the hazard is substantial enough to require residual risk measures. Measures should be defined, and action should be taken at the next suitable opportunity which needs to occur within a reasonable time frame.
High	251-500	The risk associated with the hazard is enough to require risk reduction measures. Remediation action should be taken in a short time frame to reduce the risk to acceptable levels.
Very High	>500	Risk to health and safety is present at a very high level, which requires residual risk measures to be implemented urgently. The equipment is not safe to run and it is highly recommended an internal discussion take place to decide if the equipment should be locked out and remediation action should be taken immediately to reduce the risk before resuming production.

9.2.1 Procedure according to EN ISO 13849-1

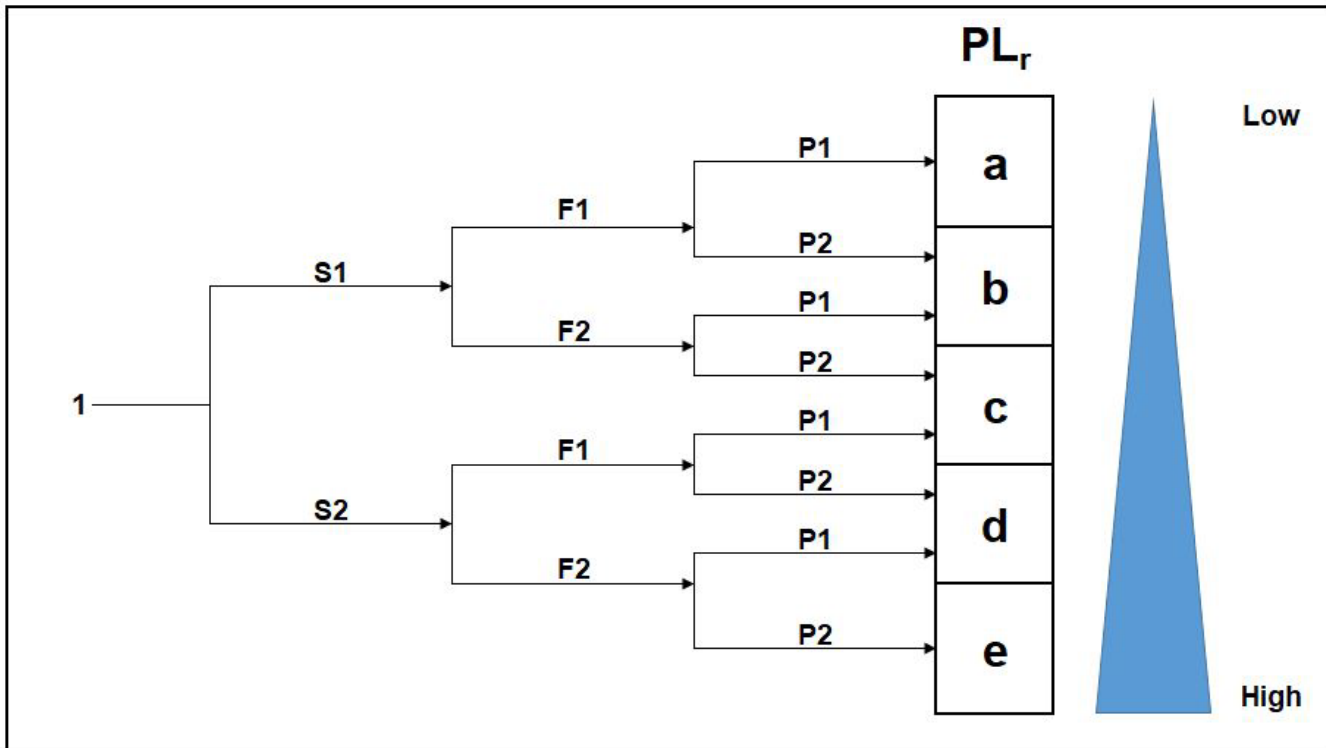


Figure 4 - Parameters for the classification of the Performance Level according to EN ISO 13849-1

EN ISO 13849-1	EN ISO 13849-1	Parameter
Severity of injury		
S1	0.1 / 0.5 / 2 / 4	Slight normally reversible injury
S2	6 / 10 / 15	Serious normally irreversible injury including death
Frequency and/or exposure to hazard		
F1	0.5 / 1 / 1.5 / 2.5 / 4	Seldom-to-less-often and/or exposure time is short Interventions not higher than once per 15 minutes or the accumulated exposure time does not exceed 1/20 of the total duration of the operation of the machine.
F2	5	Frequent-to-continuous and/or exposure time is long Interventions more than once every 15 minutes or 1/20 of the total duration of the operation of the machine.
Possibility to avoid the hazard		
P1	0.033 / 0.266 / 1.5 / 2 / 5	Possible under specific conditions
P2	8 / 10 / 15	Scarcely possible

10 Appendix B

10.1 Safety Terminology

Safety terminology		
Term	Explanation / definition	Standard
Information for use	Protective measure consisting of communication elements (e.g. text, words, characters, signals, symbols, diagrams) that are used individually or together to pass information onto the user.	EN ISO 12100
Electro-sensitive protective equipment	Arrangement of devices and/or components working together for access protection or presence-sensing purposes and comprising at a minimum: A sensing device, Controlling/monitoring devices, Output switching devices	EN ISO 13855
Intended use	Use of a machine in accordance with the information provided in the information for use.	EN ISO 13849
Movable guard	Guard which can be opened without the use of tools.	EN ISO 12100
Fixed guard	Guard affixed in such a manner (e.g. by screws, nuts, welding) that it can only be opened or removed using tools or by destruction of the means of fastening.	EN ISO 12100
Escape release for guard locking	Possibility of manually unlocking the guard locking without help from within the protected zone to leave this zone.	EN ISO 14119
Auxiliary release for guard locking	Possibility of manually unlocking the guard locking with the aid of a tool or a key from outside the protected zone in the event of a malfunction.	EN ISO 14119
Sufficient risk reduction	Risk reduction that is at least in accordance with legal requirements, taking into consideration the current state-of-the-art.	EN ISO 12100
Inherently safe design	Protective measure which either eliminates hazards or reduces the risks associated with hazards by changing the design or operating characteristics of the machine without the use of guards or protective devices.	EN ISO 12100
Emergency unlocking for guard locking	Possibility of manually unlocking the guard locking without the aid of a tool from outside the protected zone in the event of an emergency.	EN ISO 14119
Emergency stop function	Function that Is intended to avert an impending hazard for personnel, damage to the machine or work in progress, or to reduce existing hazards, and That is to be triggered by a single person.	EN ISO 13850
Emergency stop device	Manually actuated control device for triggering an emergency stop function.	EN ISO 13850
Performance Level	Discrete level used to specify the ability of safety-related parts of control systems to perform a safety function under foreseeable conditions.	EN ISO 13849
Risk analysis	Combination of the specification of the limits of the machine, hazard identification and risk estimation.	EN ISO 12100
Risk assessment	Overall process comprising a risk analysis and a risk evaluation.	EN ISO 12100
Risk evaluation	Judgment, based on risk analysis, of whether the risk reduction objectives have been achieved.	EN ISO 12100
Protective measure	Measure intended to achieve risk reduction, implemented: By the designer (inherently safe design, technical protective measures and complementary protective measures, information for use) and/or By the user (organization: safe working procedures, supervision, permit-to-work systems; provision and use of additional safeguards; use of personal protective equipment; training)	EN ISO 12100
Safety function	Function of a machine whose failure can result in an immediate increase of the risk(s)	EN ISO 13849
Technical protective measure	Protective measure involving the use of guards to protect personnel against hazards that cannot be eliminated in an appropriate manner by means of an inherently safe design, or to protect against risks that cannot be adequately reduced by this means.	EN ISO 12100
Reasonably foreseeable misuse	Use of a machine in a way not intended by the designer, but which can result from readily predictable human behavior.	EN ISO 12100

Safety terminology		
Term	Explanation / definition	Standard
Interlocking guard with guard locking	In the machine's control system the following functions are implemented: The hazardous machine functions "covered" by the guard cannot operate until the guard is closed and locked. The guard remains closed and locked until the risk due the hazardous machine functions "covered" by the guard has disappeared; and The hazardous machine functions "covered" by the guard can operate as soon as the guard is closed and locked. (The closing and locking of the guard do not automatically trigger the hazardous machine functions).	EN ISO 14119
Guard locking device	Guard locking device with the purpose of holding a guard in the closed position and that is connected to the control system.	EN ISO 14119
Enabling device	Additional manually operated device used in conjunction with a start control and which, when continuously actuated, allows a machine to function.	EN ISO 12100

11 Signature

Safety Services Engineer

Joe Engineer
SAFE-T-SENSE, LLC



Office, 3/6/202X , Signature

Reviewed by

Mike Poynter
Engineering Manager
SAFE-T-SENSE, LLC



Office, 3/6/202X, Signature

With this document version, all predecessor documents lose their validity.