

Phase of life		Hazardous event	Measure	Directives/standards	Risk estimation EN ISO 13849-1						
Task	Hazard				Se	Fr	Pr	O	PLr	PL	
						Comments					
<b>1 Operation</b>											
1.1 Transporting a pallet	Machinery mobility: - crushing, shearing - impact	Operator or bystanders may be hit by pallet or industrial truck	Type of measure: Instructions in operating manual (IIIc):  Oral instruction of operator who must have a license to pilot the industrial truck. Keep to appropriate speed limits.								
1.2 Placing of a pallet with raw workpieces by the operator, using an industrial truck	Approach of a moving element to a fixed part: - crushing, shearing - impact	Operator may be crushed between moving robot and pallet or machine parts.	Type of measure: Combination of guards and protective devices (IIc):  The hazard zone is enclosed by a guard fence that prevents intentional and unintentional access. A door is provided for access, which serves as movable guard. The movable guard is provided with interlocking and guard locking that holds the door closed until robot and machine movements in the hazard zone have stopped. The machine cannot start as long as the door is still open or not locked. The door switch must be provided with an escape release lock.	1.3.7 - Risk related to moving parts  1.4.2.1 - Fixed guards 1.4.2.2 - Interlocking movable guards  EN ISO 12100: 2010: sections 6.3.3.2.2 and 6.3.3.2.3	2	1	2	2	d	d	
			Type of measure: Warnings (signs/stickers) (IIIb): Access for authorised persons only!  								1.7.2 – Warnings of residual risk
1.3 Workpieces are picked from the pallet by the robot and are placed on the conveyor.	Approach of a moving element to a fixed part: - crushing, shearing - impact	An operator present in the hazard zone may be hit crushed by the robot.	Type of measure: Combination of guards and protective devices (IIc):  See measure under 1.2.								

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	Kinetic energy: - impact	The robot may lose a part which may be ejected and hit persons.	Type of measure: Mechanical guard (IIa): The guard fencing must be capable of holding back ejected parts. Expected impact energy is approx. 200 J (4 kg weight of parts ejected at max. 10 m/s).	1.3.3 - Risks due to falling or ejected objects 1.4.2.1 - Fixed guards EN ISO 12100: 2010: sections 6.3.3.2.2 and 6.3.3.2.3						
1.4 Workpiece is transported by the conveyor	Approach of a moving element to a fixed part: - crushing, shearing - entanglement, drawing in	Operator may be injured between moving parts of the conveyor and the workpieces.  Fingers, hands may be drawn in.	Type of measure: Inherently safe design (I): All pinch points < 6 mm, workpiece is lightweight, force required to divert is lower than 75 N and 4 J. See Figure 2	1.3.7 - Risk related to moving parts EN ISO 13857: 2019: table 4 EN ISO 14120: 2015: 5.2.5.4						