BAB V
RESULT AND DISCUSSION

After collecting and processing data, an analysis is carried out regarding this matter. This chapter consists of an analysis of the research results that have been obtained, namely the analysis of RRN (Risk Rating Number), analysis of the impact of risk control at the Capacitor Production Department of PT Indonesia Chemi-con.

Risk assessment is carried out using the HAZOP method. Risk assessment is carried out by calculating the Risk Priority Number (RPN) which is obtained from the product of the severity and probability of a hazard occurring. Risk is stated based on the priority level in the form of extreme, high, moderate, and low.

5.1 RRN Analysis (Risk Rating Number)

Based on the results of the RPN calculation, there are five extreme risk categories, 18 high risk categories, 12 moderate risks, and two low risks. One form of risk in the extreme category is cutting the operator's finger when setting up the slitting machine with an RPN value of 12. This value is obtained from the severity of four and the occurrence rate of 3. This can occur because the operator sets up the cutter blade manually and routinely before operating the machine, so the chance of an accident is quite large. What's more, the currently available PPE hand gloves are made of latex cloth material which is easy to tear if it is hit by the cutter blade and can injure the operator's hands. Then, there is a high category risk, one of which is the operator slipping due to liquid paste and liquid material scattered on the floor with an RRN value of 9. This value is obtained from the product of the severity level of 3 and the occurrence rate of 3. This risk can occur because the operator often passing through the production department aisles to move materials. However, the drums used leak several times a year, resulting in spilled material causing the operator to slip and suffer bodily injuries. In addition, there is also a moderate priority risk, one of which is the operator's finger that can be stucked between the conveyor gaps when picking up material scrap in machine cleaning activities with an RPN value of six. This is because the operator does machine cleaning without using tools such as tweezers and finger coats that can make the work safer and there is no safety sign of the danger of fingers being pinched around the conveyor to urge operators to be more careful when working. There is also a low level risk, one of which is excessive

sweating, dehydration, and decreased concentration levels when working in a high temperature area with an RRN of 4. This is due to the slitting & winding process work station adjacent to the rubber melting room. The temperature of the surrounding work station to become hot. The company does not provide drinking water stations that are easily accessible to operators. If done continuously, the operator will become dehydrated and lose concentration while working. However, the dangers of excessive sweating, dehydration and loss of concentration are experienced by the operator only occasionally and result in a low level of risk.

5.2 Risk Control Analysis

Risk control aims to find out how to manage risks that could potentially occur in the area of the Capacitor Production Department of PT Indonesia Chemi-con. The risk control strategy is intended for employees of the Production Department, especially operators who carry out work activities in the production area. The following is an analysis of the impact of risk control based on the hierarchy of control.

5.2.1 Risk Control for Extreme Risk

Extreme risk is potential risk that leads to permanent injury or fatality. This risk also tend to occur frequently on the production process. The risk control from extreme risk are as follows:

A. Adding Machine Guarding

Contact between the operator's body and the machine can pose risks such as pinched, slashed, or cut fingers. An activity that poses a potential hazard to the Capacitor Production Department is when the operator replaces the foil roll (B2) and puts the adhesive tape (E1) with his hand too deep and touches the rotating part of the roll gap. Then, the arrangement of element paper (B7) can also cause the operator to cut the fan blade because the winding fan is close to the roll placer.

The danger of machine slashing fingers can be prevented by replacing the fully automatic winding & slitting machine. However, controlling this machine substitution requires a large cost which becomes a constraint for the company's consideration. Thus, the

risk control that can be done is to carry out engineering engineering in the form of installing machine guarding on the machine. In accordance with PERMENAKER 38 of 2016 Article 8 that machines that rotate, move up and down, move forward and backward, as well as open and closed must have machine guarding. Installation of machine guarding is carried out to prevent approaches to hazardous areas during the operation process, protect against wrong operating actions, and streamline the production process.

Figure 5.1 Machine Guarding

Table 5.1 Cost and Benefit Tabulation of Machine Guarding

ACCIDENT COST (2017-2020)						INVESTMENT COST		
Accident Area	**Lost working hour (Rp) 4.200.000/ month**			**Medication Cost (Rp)**		**Investment Type**	**Cost**	
Winding Machine	1.05	Rp	4,390,909	Rp	7,300,000	Machine Guarding (48 x 25 x 37)	Rp	3,480,960
Winding Machine	0.23	Rp	954,545	Rp	1,800,000	Machine Guarding (22 x 8 x 10)	Rp	702,720
Taping Machine	0.36	Rp	1,527,273	Rp	2,100,000	Machine Guarding (18 x 8 x 10)	Rp	602,880
						Instalation	Rp	1,000,000
						Maintenance	Rp	1,000,000
TOTAL COST	**Rp**				**18,072,727**	**TOTAL COST**	**Rp**	**6,786,560**
TOTAL COST/YEAR	**Rp**				**4,518,182**	**TOTAL COST/YEAR**	**Rp**	**678,656**

Procurement of Machine Guarding can eliminate the possibility of the operator cutting the fan on the winding machine or pinching the finger on the roll placer when placing the foil roll and adhesive tape on the machine. This is because the dangerous parts of the machine are covered by machine guarding, so there will be no contact between the operator's hand and the fan winding machine or roll gap. Based on Table 5.1, the cost incurred by the company to handle accidents on the winding machine & taping machine is Rp. 4,528,182 per

year, while the costs incurred for procuring machine guarding are Rp. 678,656 per year. Thus, the benefit to cost ratio obtained is:

$$BCR = \frac{\text{Cummulative Current Cost}}{\text{Cummulative Mitigation Cost}}$$

$$= \frac{\text{Rp } 4.528.182}{\text{Rp}678.656}$$

$$= 6.67$$

The result of calculating the benefit cost ratio for the procurement of machine guarding is 6.67. The value of the benefit cost ratio is greater than 1, so that engineering risk control in the form of machine guarding is feasible to implement. A detailed table regarding the cost & benefit ratio of machine guarding can be seen in the **Appendix A.**

B. Provide Emergency Stop on Engine Parts

In the process of setting up slitting case (A2), there are still operators who are negligent and neglect security. Based on the recapitulation of accident data, it is known that the operator's finger was cut by the upper cutter when setting up but did not realize that the machine was on. The risk of fingers being cut by the upper cutter of the slitting machine is very dangerous, so it is necessary to take engineering risk control measures through the installation of emergency stop devices. According to PERMENAKER 2016 no 38 article 58, production machines that are electric-driven cutters, grinders, and crushers must have a motor stop device that can stop the machine in an emergency and cause the machine to be unable to run until the shift belt or machine stop device in deactivated.

Figure 5.2 Button & Kick Plate Emergency Stop

The right type of emergency stop for a slitting machine is a kick plate emergency stop that can be placed under the cutter slitting machine. The operator can easily step on the

emergency stop in an emergency. This can be useful so that the operator can keep the machine off without the help of another person. Through Emergency Stop, the condition of the operator who has an accident can be immediately handled without movement or rotation of the machine which can cause a bigger accident for the operator. The existence of an emergency stop can also prevent accidents from abnormal processes in machine movement, so that operators feel safe and comfortable when working using slitting machine.

Table 5.2 Cost and Benefit Tabulation of Emergency Stop Button

ACCIDENT COST (2017-2020)									INVESTMENT COST			
Accident Area	Number of Accident	Number of victim	Lost working hour (Rp) 4.200.000/ month			Medication Cost (Rp)			Investment	Cost		
Slitting Machine	3	3	1.32	Rp	5,536,364	Rp	27,700,000		Emergency Stop Kick Plate	Rp	5,000,000	
									Instalation & Testing	Rp	1,800,000	
									Maintenance	Rp	2,000,000	
TOTAL COST	**Rp**							**33,236,364**	**TOTAL COST**	**Rp**	**8,800,000**	
TOTAL COST/YEAR	**Rp**							**8,309,091**	**TOTAL COST/YEAR**	**Rp**	**880,000**	

The results of the calculation of costs and benefits in **Table 5.2** show that the costs incurred by the company to handle accidents on the slitting machine are Rp. 8,309,091 per year, while the costs incurred for the procurement of emergency stop push buttons are Rp. 518,000 per year. The benefits to cost ratio obtained are:

$$BCR = \frac{\text{Cummulative Current Cost}}{\text{Cummulative Mitigation Cost}}$$

$$= \frac{\text{Rp 8.309.091}}{\text{Rp880.000}}$$

$$= 10{,}5$$

The benefit to cost ratio of emergency stop push button procurement is 10,5. This number is greater than 1, so the procurement of emergency stop push buttons can be said to be feasible. A detailed table regarding the benefit to cost ratio of emergency stops could be seen in the **AppendixA.**

C. Installing a Required Area Using PPE Display

In the work area, there are still operators who do not use PPE, such as in slitting and taping activities. This could be due to a lack of operator awareness regarding OSH. PERMENAKER no 18 of 2012, Article 5 states that companies are required to announce in

writing and put up signs regarding the obligation to use PPE in the workplace. Administrative risk control by installing a display area that is required to use PPE is intended as an appeal and increasing awareness of operators to work safely in the work environment using PPE.

Figure 5.3 Display Area Required to Use PPE

D. Substitute Hand Gloves Material

In the slitting activity, the operator manually inserts the aluminum wire coil into the machine and sets up the slitting case which can cause contact with the machine blade (A2). The slitting process in the production of capacitors requires the use of machines currently used by the company. Thus, risk control by eliminating the source of danger cannot be carried out. However, the PPE gloves used in the slitting process are made of cotton fabric. The cotton base material tends to tear easily so it cannot protect the operator's hands properly when operating the machine. According to OSHA, the gloves used to protect cuts from sharp objects are metal mesh gloves. Controlling the risk of glove substitution with metal mesh material can minimize the risk of injury to the operator's hands when in contact with the cutter slitting machine.

Figure 5.4 Metal Mesh Hand Glove

5.2.2 Risk Control for High Risk

High risk is potential risk leads to high injury that require long time for recovery and also cause major financial loss. This risk may occur often times or once in a while in production process. The risk control from extreme risk are as follows:

A. Substitute Mask Material

Respiratory protective equipment used in the impregnation process is a regular mask. Regular use of masks cannot protect the operator from the pungent chemical smell. Labeled substances found in paste liquids such as Potassium hydroxide (KOH), Sodium hydroxide (NAOH), and calcium chloride (CaCl2) can cause suffocation and respiratory problems if inhaled continuously. The capacitor production process requires the use of specified chemicals, so that risk control in the form of chemical elimination or substitution cannot be carried out. However, the use of respiratory protective equipment which was originally a mask can be replaced with a gas mask respirator. The use of a gas mask respirator can bind to chemical molecules so as to protect the operator from the pungent odor of chemicals that can interfere with breathing.

Figure 5.5 Gas Mask Respirator

B. Substitute Ladder with Handrailed Ladder

When picking up material on the shelf, the operator uses a ladder to reach material up to 3 meters high (F8). However, the ladders currently used by employees are not equipped with handrails. This poses a danger of falling from a height. The replacement of the ladder type into a handrail ladder is carried out to provide security for the operator so as not to fall from the right and left corners of the ladder and prevent the operator from falling from the ladder due to lack of balance.

Figure 5.6 Hand Railed Ladder

C. Providing Safety Helmet dan Anti-Slip Rubber Boots

The impregnation workstation area consists of processes that involve the use of liquid materials. Liquid paste material that is scattered on the floor can cause the floor to become wet and slippery. This can pose a slipping hazard for the operator (C4). In accordance with PERMENAKER NUMBER PER.08/MEN/VII/2010 that companies are required to provide PPE to prevent work accidents experienced by employees. Risk

control at the level of PPE in the form of providing anti-slip rubber boots aims to prevent the danger of falling due to slipping of liquid that is scattered on the floor. While the PPE safety helmet aims to prevent the operator from experiencing the danger of being injured due to being hit by containers and objects falling from the shelf material.

Figure 5.7 Safety Helmet & Rubber Boots

A. Setting Cable Manager

The unorganized state of the cable can cause a hazard to production activities. Scattered cables can hit hot engine parts such as engine motors. This can cause the wires to melt and sparks from short-circuiting (B5, C1, D3). The cable layer will also be easily peeled off due to being run over by a trolley and stepped on by operators passing along the production area. Peeled cable coating can cause electric shock to the operator who touches the cable or a short circuit if the cable is exposed to direct liquid droplets (F4, F5). Controlling the risk of scattered cables can be done by installing a cable manager in the production area. The purpose of the cable manager installation is to keep cables neatly arranged and maintain cable quality from various damages that can cause short circuit hazards.

Figure 5.8 Cable Manager

Table 5.3 Cost and Benefit Tabulation of Cable Manager

ACCIDENT COST (2017-2020)						INVESTMENT COST	
Accident Area	**Lost working hour (Rp) 4.200.000/ month**		**Handling Cost (Rp)**		**Medication Cost (Rp)**	**Investment**	**Cost**
Winding Machine	0.2	Rp 840,000.00	Fire Hydrant	Rp 500,000.00	-	Cable Manager	Rp 270,000.00
Impregnation			Cable changing	Rp1,500,000.00	-	Cable Manager	Rp 135,000.00
Production Department			Cable setup	Rp1,000,000.00	-	Cable Manager	Rp 810,000.00
						Maintenance	Rp 1,000,000.00
TOTAL COST	**Rp**				**3,000,000.00**	**TOTAL COST**	**Rp2,215,000.00**
TOTAL COST/YEAR	**Rp**				**750,000.00**	**TOTAL COST/YEAR**	**Rp 221,500.00**

Damage to the cable can pose a risk in the form of a short circuit to fire. Based on the results of the calculation of costs and benefits in **Table 5.3**, it is known that the costs incurred by the company to deal with accidents on the winding machine are Rp. 750,000.00 per year, while the cost to procure a cable manager to the machine is Rp. 221,000. The following is the calculation of the cost & benefit ratio:

$$BCR = \frac{\text{Cummulative Current Cost}}{\text{Cummulative Mitigation Cost}}$$

$$= \frac{\text{Rp 750.000}}{\text{Rp221.000}}$$

$$= 3{,}4$$

The value of the benefit to cost ratio for the procurement of cable manager is 3.4. This number is greater than 1, so the procurement of a cable manager on the machine can be said to be feasible. A detailed table regarding the benefit to cost ratio of emergency stops can be seen in the **AppendixA**.

B. Providing Dust Collector

In the slitting process, rolls of aluminum wire and dielectric paper that are cut using a cutter can produce scrap that is scattered in the production area. Scrap debris in the production area can pose a potential danger of eye irritation due to scrap entering the operator's eyes (A3) and scrap particles mixed with the air inside the lungs. The body's natural mechanism system cannot remove these particles and will settle in the lungs. Particles that accumulate will lead to risks such as shortness of breath and respiratory problems in the long term. (A4).

Figure 5.9 Dust Collector

Controlling the risk of eye irritation and respiratory problems due to scrap granules can be done through engineering in the form of a dust collector at a slitting work station. Dust collector technology can filter scrap particles contained in the production area. The working principle of the dust collector is to suck the dust in the air using a pump and flow it into the dust collector. Then, clean air is blown out of the engine gap.

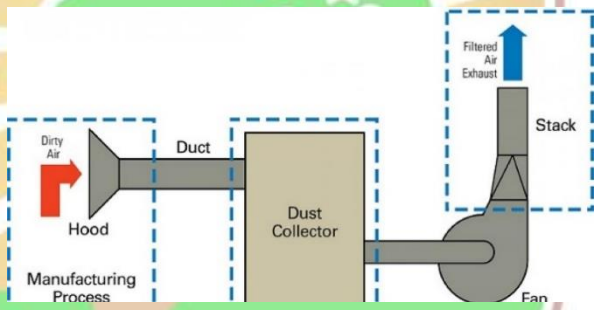

Figure 5.10 Dust Collector Working Principle(Source: Powder & Bulk Solids)

Table 5.4 Cost and Benefit Tabulation of Dust Collector

ACCIDENT COST (2017-2020)					INVESTMENT COST		
Accident Area	**Lost working hour (Rp) 4.200.000/ month**		**Medication Cost (Rp)**		**Investment**	**Cost**	
Slitting Machine	0.41	Rp 1,718,181.82	Rp	5,300,000.00	Dust Collector (636 Watt)	Rp	3,200,000.00
Winding Machine	0.36	Rp 1,527,272.73	-		Electricity (Month)	Rp	102,631.32
					Maintenance	Rp	300,000.00
TOTAL COST	**Rp**			**8,545,454.55**	**TOTAL COST**	**Rp**	**49,147,275.20**
TOTAL COST/YEAR	**Rp**			**2,136,363.64**	**TOTAL COST/YEAR**	**Rp**	**1,638,242.51**

Based on the results of the calculation of costs and benefits in **Table 5.4**, it is known that the costs incurred by the company to handle accidents due to scrap on the winding & slitting machine is Rp. 2,136,363.00 per year, while the cost for the procurement of cable manager on the machine is Rp. 1,638,242 per year. The following is the calculation of the cost & benefit ratio:

$$BCR = \frac{\text{Cummulative Current Cost}}{\text{Cummulative Mitigation Cost}}$$

$$= \frac{\text{Rp } 2.136.363}{\text{Rp}1.638.242}$$

$$= 1{,}3$$

The value of the benefit to cost ratio for the procurement of dust collectors on the machine is 1.3. This number is greater than 1, so the procurement of a dust collector on the machine can be said to be feasible. A detailed table regarding the benefit to cost ratio of dust collectors can be found in the **AppendixA**.

C. Adding Safety Fence

Welding and aging processes in capacitor production are carried out automatically by machines. When the machine is operating, sparks can arise from welding activities and hit the operator's body (B4). This is caused by the operator being too close to the machine or the slitting result is less than perfect so that the wire surface is rough. Meanwhile, sparks from the aging process can occur if there is an error in engine operation (B6) and charging voltage (B4 & B6). Thus, there is a safety fence between the machine and the operator with a distance of 1 meter. Engineering risk control in the form of providing a safety fence is carried out to minimize the risk of the operator's body being exposed to sparks that arise at any time during the aging process.

Figure 5.11 Safety Fence

Based on Table 5.5 it is known that the costs incurred by the company to deal with accidents due to sparks in the joining process are Rp. 405,000.00 per year, while the cost to procure a cable manager on the machine is Rp. 35,000.00 per year. The following is the calculation of the cost & benefit ratio.

Table 5.5 Cost and Benefit Tabulation of Safety Fence

ACCIDENT COST (2017-2020)				INVESTMENT COST			
Accident Area	**Lost working hour (Rp) 4.200.000/ month**		**Medication Cost**	**Investment**	**Service Life (year)**		**Cost**
Winding Machine	0.1	Rp 420,000.00	Rp 1,200,000.00	Safety Fence	10		Rp 350,000.00
Aging Machine		Rp -		Safety Fence	10		Rp 350,000.00
TOTAL COST	**Rp**		**1,620,000.00**	**TOTAL COST**		**Rp**	**700,000.00**
TOTAL COST/YEAR	**Rp**		**405,000.00**	**TOTAL COST/YEAR**		**Rp**	**70,000.00**

$$BCR = \frac{\text{Cummulative Current Cost}}{\text{Cummulative Mitigation Cost}}$$

$$= \frac{\text{Rp } 405.000}{\text{Rp } 70.000}$$

$$= 5.78$$

The value of the benefit to cost ratio for the procurement of a safety fence is 11.6. This number is greater than 1, so the provision of a safety fence at work stations can be said to be feasible. A detailed table regarding the benefit to cost ratio of emergency stops can be seen in the **AppendixA.**

5.2.3 Risk Control for Moderate Risk

Moderate risk is a potential risk that medical treatment and occur once in a while in production process. This risk may or may not cause financial loss for the company. The risk control from extreme risk are as follows:

A. Installing a Safety Sign Danger of Pinched Fingers and Prohibition of Putting Hands on Machines

When performing seiso on a machine conveyor, a negligent operator may experience a finger pinching between the conveyor gap (B3) and pinching between the roll placers when attaching adhesive tape (E1). Operators who do not perform safe work procedures such as placing their hands carelessly on the belt clipper when setting up the motor belt also have the potential to experience the danger of getting their fingers caught between the machine belt

clipper (B8). According to Law No.1/1970 Article 14 letter (b) Companies are required to install safety signs in places that are easy to see and read according to the instructions of supervisory staff or work safety experts.

Figure 5.12 Safety Sign Danger of Pinched Finger

Administrative risk control by installing a safety sign for the danger of pinched fingers is carried out on the motor belt and conveyor body parts so that they are easily visible. The installation of the safety sign for the danger of pinched fingers and the prohibition of placing hands on the machine aims to show hazard information that may not be visible and to increase awareness and concern for workers or other people in the company area about hazards in the workplace.

Figure 5.13 Safety Sign Keeping Hands Away from Machine

B. Installing a Hot Surface Hazard Safety Sign

Capacitor production activities consist of drying capacitors using an oven. At this stage, the operator has low awareness of the importance of OSH by not using gloves while working can run the risk of burns by direct contact with the oven. As for the operator who lacks concentration and is careless in his work, he touches the hot surface of the oven. Administrative risk control by installing a hot surface hazard safety sign is carried out to

increase operator awareness of potential hazard information in the oven area and urge operators to always work safely using PPE gloves.

Figure 5.14 Safety Sign Danger of Hot Surface

D. Adding Material Label

The impregnation process involves the use of a flammable chemical ethanol. Ethanol is a clear, odorless substance that is difficult to distinguish from other liquids. Currently, the ethanol drum material in the capacitor production area is not equipped with a characteristic label (C8). This can lead to potential non-compliance with the treatment of ethanol such as misuse and placement which can cause hazardous risks.

In accordance with the DECREE OF THE MINISTER OF MANPOWER R.I. NO.KEP. 187/MEN/1999 Article 9 Symbol for B3 classification is flammable. The basic color is white with a thick red border. The symbol image is an image of a white and black flame. Administrative risk control by placing a label on the material drum aims to make it easier for operators to classify material types and adjust the form of material management based on their characteristics.

Figure 5.15 Flammable Material Label

E. Fix Machine SOP

In the winding process, the operator often changes the foil roll while the engine is running. This can create a danger of fingers getting caught between the roll gaps when the operator inserts the foil into the machine. The same thing can happen when the operator inserts adhesive tape into the machine. Administrative risk control by improving SOP is carried out by adding foil roll replacement instructions that must be carried out when the engine is off. Improvements to the SOP aim to prevent the operator from being pinched by the rotating foil roll. Improvements to the SOP roll placer can be found in the **AppendixA**.

F. Relayout Fire Extinguisher Position

The position of fire extinguisher at several points in the production area is still not as it should be. The fire extinguisher is located 144 cm from the floor surface and is in the corner of the production area so that it is difficult to be seen and reached by employees (B5,C1,F2). According to PERMENAKER No: PER.04/MEN/1980 article 4, fire extinguishers must be placed a maximum of 125 cm from the floor base just above one or so that they are easily accessible. Then the distance from one fire extinguisher to another must not exceed 15 meters. Currently, the company has implemented the placement of distances between fire extinguishers in accordance with established regulations. This can make the process of extinguishing fires easy to carry out thereby reducing the possibility of environmental damage, assets and loss of life.

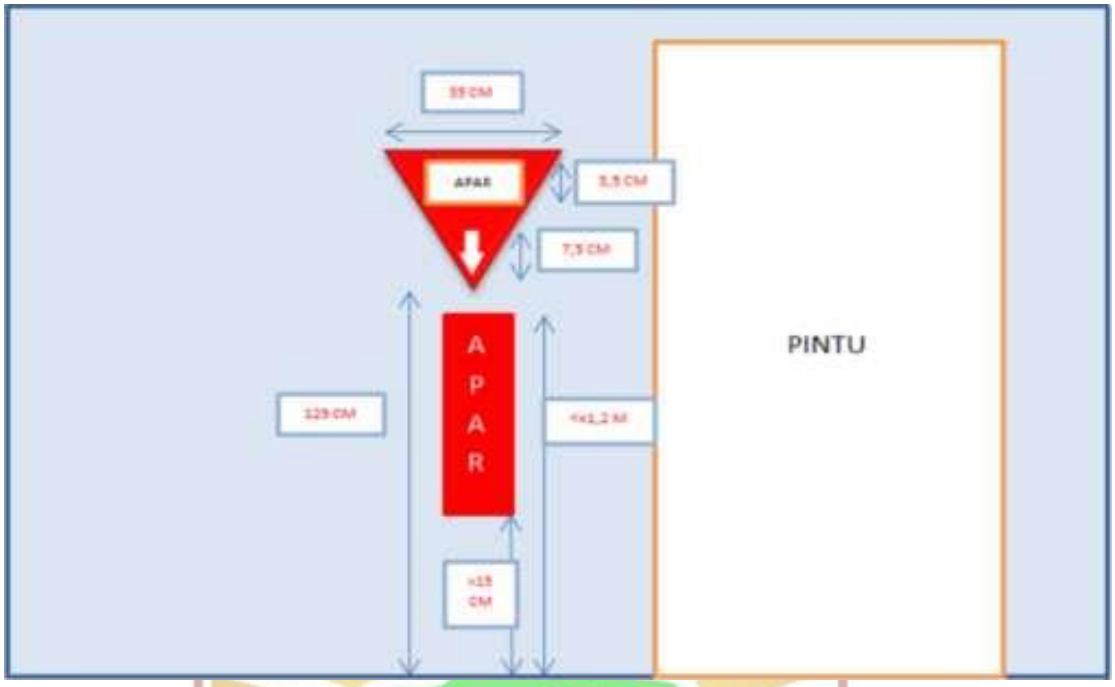

Figure 5.16 Fire Extinguisher Position According to Law

G. Improving Lighting & Providing Lup Work Aids at Work Stations

The quality checking appearance process is done manually by the operator of the Capacitor Production Department (G1). Based on the results of discussions with the quality checking operator, the operator stated that he often experienced dizziness and felt uncomfortable at work due to poor lighting levels. Based on KEP-MENKES RI No. 1405/2002 activities that require careful inspection require lighting with a level of 300 lux. Capacitors also have various sizes with the largest length of 23 cm and the smallest length of 1 cm. Thus, the provision of a lup is also needed to make it easier for operators to observe the appearance of small capacitors.

H. Providing OperatorPedestrian Path

The Capacitor Production Department provides one useful path for material movement as well as for pedestrians. The combined material and pedestrian paths cause collisions or the operator's feet are run over by the moving material trolley (F6). In addition, the operator can also hit the machine due to too narrow a lane (F7). This can cause injury and bodily injury to the operator.

Engineering risk control in the form of providing pedestrian paths in the Capacitor Production Department is illustrated in Figure 4.12. With the pedestrian path, operators can move freely between work stations. In addition, separate pedestrian paths can minimize the potential danger of being hit by a machine or being run over by a trolley of material due to the limited and narrow path availability.

Figure 5.17 Jalur Pejalan Kaki

I. Held Regular Safety Patrol & Training for Employee

Operators of the Capacitor Production Department still often commit K3 violations such as not using PPE and not carrying out work processes according to SOPs (C6, C7, C8, E2). Safety Patrol activities can be carried out by empowering the P2K3 team to determine operator discipline towards K3 at PT Indonesia Chemi-con. Administrative risk control activities through safety patrols aim to increase employee awareness and discipline in working safely according to work instructions. Work Safety Supervision Activities include:

a) Safety Inspection to identify potential hazards so that they can be repaired immediately before an accident occurs.

b) Incident Investigation to prevent accidents and incidents from happening again by making repairs.

c) Behavior safety audit to identify behaviors that need improvement before these behaviors develop into accidents

d) Give verbal and written warnings for those who violate the rules intentionally.

Currently the company conducts K3 training only during the orientation of new employees. According to the Occupational Safety and Health Administration (OSHA), every company needs to carry out at least four levels of OSH training, including initial training for new employees, annual OSH training is required for certain types of work, including medical and environmental related work, implementation of repetitive training rework for old employees is carried out at least once a year, as well as training to identify potential hazards which is carried out every time the company identifies a hazard in a new workplace. Thus, companies need to carry out OHS training also needs to be given to old employees as a form of refreshment in restoring employee knowledge and increasing employee awareness of the importance of HSE

J. Performing Periodical Drum Quality Checking

Currently, drum replacement is only carried out if there is a drum leak report by the operator. This can cause losses for the company because there is no risk prevention effort such as leakage of fluid from the drum material which can cause a slip hazard. Potential hazards such as slipping due to spilled material from a leaking drum or failure that hinders the production process.

5.2.4 Risk Control for Low Risk

Low risk control is a potential risk that require no medication or first aid medication for the worker. Low risk also may not require any financial loss for the company and only seldomly occur. However, this risk should be put in consideration for accident prevention in the future. The risk control from extreme risk are as follows:

A. Providing Tweezer& Finger Coat

Operators carry out machine cleaning activities manually without being equipped with work aids (B3). Scrap taking on machines or conveyors without tools can pose a danger of pinching fingers between the machine gaps. PPE level risk control in the form of providing tweezers work tools can make it easier for operators to take scrap without reaching the machine gap directly. While the provision of finger protection in the form of a finger coat

aims to protect the operator's fingers from being injured by machine parts, conveyors, or sharp scrap surfaces.

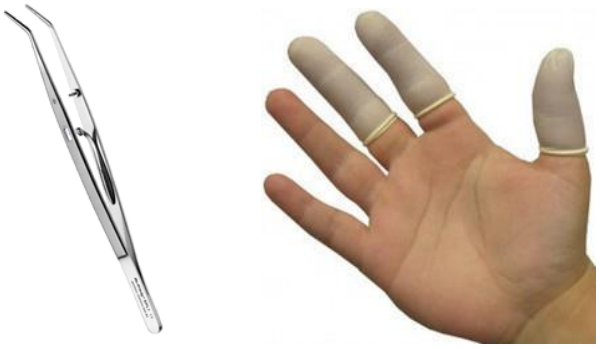

Figure 5.18 Tweezer& Finger Coat

B. Urging Operator to do Body Stretching

The Quality Checking activity is carried out by the operator in a static body position standing for a long time (G2). Working in a standing position for long periods of time and is done repeatedly carries the risk of ankle pain, leg swelling, varicose veins, muscle fatigue, low back pain, back muscle pain to stiff neck and shoulders. So, operators need to be encouraged to stretch the body regularly, every 30 minutes or once an hour. Stretching is done to reduce pressure on the legs, shoulders, neck, and head (Kroemer and Grandjean, 1997 in Hasrianti, 2016).