

Hazard Identification and Risk Analysis of a Garment Finishing Unit

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Abstract- Hazard Identification and Risk Analysis were carried out in different dry and wet processing areas of a garment finishing factory. Risk rating has been calculated from the point of view of the severity, probability and frequency of occurrence. Risk rating was been divided into three categories. Low, medium and high risk rating were assigned depending upon the severity of occurrence and categorized as 1 to 7, 8 to 14 and 15 to 20, respectively. It has been found from this study that there is medium risk associated in running a garment finishing unit. Different control measures were identified and suggested to ensure safety of the workforce in the factory.

Keywords: Hazard, risk, mechanical, electrical, thermal, biological, environmental, gravitational.

I. HAZARD IDENTIFICATION:

Hazard identification of different activities in a garment finishing unit has been carried out. Activities have been classified under 13 categories and risk assessment has been carried out based on the severity, probability and frequency of occurrence. Major activities and sub categories are listed below.

II. MECHANICAL / KINETIC

- A. Engaged with plant/parts
 - 1. Washing Machine loading stations
 - 2. Garment & Stone loading conveyor
 - 3. Pressing Machine
 - 4. Laser Machine
 - 5. Bench Grinding Machine
 - 6. ROBOT Spray Machine
 - 7. Damage machines
- B. Engaged with pointed objects/edges
 - 1. Tagging Guns
 - 2. Pallets edges
- C. Engaged with equipment for material handling
 - 1. Fork lift
 - 2. Stackers
 - 3. Manual pallet truck
- D. Mechanical scratch to services, PPE or other items
 - 1. Tearing of Hand gloves
 - 2. Blockage of mask cartridge.

III. GRAVITATIONAL

- A. Fall from height
- B. Movement of object from height
 - 1. Falling of chemical tanks from the fork lift while handling
 - 2. Falling of materials from storage racks
 - 3. Falling of coconut from trees in the premises

IV. THERMAL AND / OR EXPLOSIVE

- A. Fire/Explosion
 - 1. Fire due to diesel storage,
 - 2. Fire due to chemical storage,
 - 3. Fire due to Paints & solvents,
 - 4. Fire due to electrical short circuit,
 - 5. Fire due to Waste storage [Chindi, paper, plastic bag]

V. ENGAGED WITH HOT/COLD STUFF/PARTS

- 1. Pressing machines
- 2. Boiler surface
- 3. Steam line

VI. ELECTRICAL

- A. Engaged with live electrical parts
 - 1. Transformer Yard
- B. Contact with high fault currents
 - 1. Main control Panels,
 - 2. Sub-Control Panels,
 - 3. Distribution Boards,
 - 4. Battery Bank & Battery bank charges.
- C. Mechanical scratch to power leads/permanent electrical wiring
 - 1. Diesel Generator
- D. Opening of water into electrical components

VII. SOUND AND / OR TREMBLING

- A. Contact to increased sound (levels that may cause hearing damage)
 - 1. Washing Machines area
 - 2. Diesel Generator
- B. Contact with vibrating plant/vehicle/tools/objects

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VIII. RISK ANALYSIS:

Risk analysis of different activities in the Garment Finishing unit is given below.

Risk Analysis								
Severity 1 = Minor 3 = Seriously (normally reversible) 6 = Major (normally not reversible) 10 = FATAL	Probability 1 = Unlikely 2 = Possible 4 = Probable 6 = Certain	Frequency 1 = No recorded Occurrence 2 = one occurrence 3 = two occurrences 4 = more than two occurrences		Risk Rating 1-7 = Low 8-14 = Medium 15-20 = High]				
Activity Description	Hazard	Who is at Risk	Controls	Severity	Probability	Frequency	R. R.	Additional controls
				1-10 (X)	1-6(Y)	1-4 (Z)	X+Y+Z	
Mechanical/Kinetic:								
A. Contact with moving plant/parts								
Washing Machine	Contact with opening of door	Employees working in department	Door opening speed is very slow and this has been automated in view of not to open while machines is ON.	1	1	1	3	Awareness given to employees about the SOP and Periodical checking of functioning of sensors.
Garment & Stone loading conveyor	Contact with moving of conveyors and doors.	Employees working in department	Safety limit switch are provided to stop immediately. Complete system is protected with safety guards and authorized entry is restricted.	1	2	1	4	Awareness given to employees about the SOP and Periodical checking of functioning of limit switches.
Pressing Machine	Contact with moving bed.	Employees working in department	Access to the moving bed is avoided by moving frames and limit switches are provided for safety.	1	2	1	4	Awareness given to employees about the SOP and Periodical checking of functioning of limit switches. Awareness given to employees about the SOP.
Laser Mannequins	Contact with rotating mannequins	Employees working in department	Automatic distance sensors & Safety limit switches are provided to stop before collision.	1	1	1	3	Awareness given to employees about the SOP and Periodical checking of functioning of sensors & limit switches
ROBOT Spray Machine	Contact with moving mannequins.	Employees working in department	Emergency stop switch provided.	1	2	1	4	Awareness given to employees about the SOP and Periodical checking of emergency switch.



Bench Grinding Machine in work Shop	Breakage of grinding stone	Employees working On the machine.	Safety guard provided.	1	2	1	4	Awareness given to employees about the SOP and safety guard inspection to be done regularly.
Damage machines	Contact with rotating shaft	Employees working On the machine.	Safety guard provided.	1	2	1	4	Awareness given to employees about the SOP and safety guard inspection to be done regularly.
B. Contact with sharp objects/edges								
Needles of Tagging Guns	Injury to fingers	Employees working On the machine.	Finger Guards are provided.	1	2	1	4	Awareness given to employees about the SOP.
Pallets edges	Injury	Employees working In the department.	Pallets are moved manually.	1	2	1	4	Awareness given to employees about the SOP.
C. Contact with moving material handling equipment								
Movement of fork lift	Injury	Employees working In the department.	The way is restricted & Blocked by barricade while forklift is moving and movement alarm is provided.	1	2	1	4	Awareness given to employees about the SOP.
Movement of Stacker	Injury	Employees working In the department.	The way is restricted & Blocked by barricade while Stacker is moving.	1	2	1	4	Awareness given to employees about the SOP
Movement of Manual Pallet truck	Injury	Employees working In the department.	Manual Movement.	1	2	1	4	Awareness given to employees about the SOP
D. Mechanical damage to services, PPE or other items								
Tearing of Hand gloves	Injury	Employee using PPE.	Limited usage	1	2	4	7	Refresher awareness given to employees about the importance of PPE usage.
Blockage of face mask cartridge	Injury	Employee using PPE.	Limited usage	1	2	1	4	Refresher awareness given to employees about the importance of PPE usage.
Ear Plugs damage	Injury	Employee using PPE.	Limited usage	1	2	1	4	Refresher awareness given to employees about the importance of PPE usage.
Gravitational								
A. Fall from height								

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Fall from height	Major injury	Maintenance Employee working at height	Educated maintenance to use proper safety belts and also he has to assist by another employee to monitor the work.	6	2	1	9	Awareness given to employees about the SOP during working at height.
B. Falling object from height								
Falling of fabric rolls from the stacker while handling,	Major Injury	Employees working In the department.	Rolls are stacked horizontally and change of falling is isolated. The way will be always closed by barricade to avoid movement of employees.	6	2	1	9	Awareness given to employees about the risk involved.
Falling of materials from storage racks,	Major Injury	Employees working In the department,	Materials are stored properly and closed by mesh to avoid falling. The way will be always closed by.	6	2	1	9	Awareness given to employees about the risk involved.
			barricade to avoid movement of employees					
Falling of coconut from trees in the premises,	Major Injury	All employees	Regular plucking of coconut will be done.	6	2	4	12	Planned to put mesh to avoid falling and evacuation route is obstructed by it.
Thermal and/or Explosive								
A. Fire / Explosion								
Fire due to diesel storage,	Major	All employees	Diesel storage area is entry is restricted to authorized trained persons and sufficient fire protection equipments, fire hydrant system are provided as per the requirement of government.	6	2	1	9	Awareness about do's and don'ts for diesel storage is given.
Fire due to Chemicals,	Major	All employees	Sufficient fire protection equipments are provided in addition to smoke detectors.	6	2	1	9	Awareness given to employees about fire safety
Fire due to Paints,	Major	All employees	Sufficient fire protection equipments are provided in addition to smoke detectors.	6	2	1	9	Awareness about do's and don'ts for chemical storage is given.
Fire due to electrical short circuit,	Major	All Employees	Sufficient fire protection equipments are provided in addition to smoke	6	2	1	9	Awareness about do's and don'ts for electrical points and connections is

			detectors.					given and periodical inspection will be done.
Fire due to Waste storage [paper, plastic bag]	Major	All Employees	Sufficient fire protection equipments are provided in addition to smoke detectors. Wastes are disposed regularly and stored separately based on the property	6	2	1	9	Awareness about do's and don'ts for waste storage is given.
Contact with hot / cold object/parts								
Pressing Machine hot bed	Contact with hot bed.	Employees working in department	Access to the moving bed is avoided by moving frames and limit switches are provided for safety.	1	2	1	4	Awareness given to employees about the SOP and Periodical checking of functioning of limit switches Awareness given to employees about the SOP.
Boiler Surface	Contact with hot surface.	Employees working in department	It completely covered by heat insulation and it will avoid heat transfer.	1	2	1	4	Awareness given to employees about the SOP and Periodical checking of emergency switch
Steam Line	Contact with hot surface.	Employees working in department	It completely covered by heat insulation and it will avoid heat transfer.	1	2	1	4	Awareness given to employees about the SOP and Periodical checking of emergency switch
Electrical								
A. Contact with Live electrical part								
Transformer Yard	Electrical shock	Maintenance employee	Yard entry is restricted to authorized persons only. Maintenance staffs have been given expert training and awareness. Operated by Experience/qualified operator and necessary safety gadgets have been provided.	6	2	1	9	Awareness given to employees about the handling the maintenance work of transformer yard and Periodical awareness are being given also periodical inspection will be carried and all the necessary repair work will be done under supervision of safety officer.
B. Exposure to high fault current								
Main Control Panels	Electrical shock	Maintenance employee	Earth fault relays have been installed. All safety gadgets are provided.	6	2	1	9	Awareness given to employees about the handling the maintenance work of transformer yard and Periodical

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								awareness are being given also periodical inspection will be carried out by Electrical engineer along with the safety officer.
Sub Control Panels	Electrical shock	Maintenance employee	Earth fault relays have been installed. All safety gadgets are provided.	6	2	1	9	Awareness given to employees about the handling the maintenance work of transformer yard and Periodical awareness are being given also periodical inspection will be carried out by Electrical engineer along with the safety officer.
Distribution Boards	Electrical shock	Maintenance employee	Earth fault relays have been installed. All safety gadgets are provided.	6	2	1	9	Awareness given to employees about the handling the maintenance work of transformer yard and Periodical awareness are being given also periodical inspection will be carried out by Electrical engineer along with the safety officer.
Battery bank and battery Chargers	Electrical shock	Maintenance employee	Earth fault relays have been installed. All safety gadgets are provided.	6	2	1	9	Awareness given to employees about the handling the maintenance work of transformer yard and Periodical awareness are being given also periodical inspection will be carried out by Electrical engineer along with the safety officer.
C. Mechanical Damage to power leads/fixed electrical wiring								
Diesel Generator / Main LT cable duct.	Electrical shock	All Employees	Power leads, bus bars connected from transformer to main panel and DG to main panel are properly conducted and separated cable ducts are being laid safely.	6	2	1	9	Periodical inspection being done to check any damages and precautions are taken that they are not mechanically damaged.
D. Ingress of water into electrical components								

Main Control room	Electrical Short Circuit	Maintenance employees	Complete control room surrounded by wall and entering of water to this place is eliminated. All the probable causes are isolated to overcome this.	6	1	1	8	Awareness given to employees about the handling the maintenance work of transformer yard and Periodical awareness are being given also periodical inspection will be carried out by Electrical engineer along with the safety officer.
Sub-control panels	Electrical Short Circuit	Maintenance employees	Sub-control panels are installed in such way that entering of water to this place is eliminated. All the probable causes are isolated to overcome this.	6	1	1	8	Awareness given to employees about the handling the maintenance work of transformer yard and Periodical awareness are being given also periodical inspection will be carried out by Electrical engineer along with the safety officer.
Noise and Vibration								
A. Exposure to increased noise [level may cause hearing damage]								
Washing Machines Area	Hearing Damage	Employees working in department	Proper PPE's are provided and awareness is given to employees.	3	1	1	5	Refresher awareness given to employees about the importance of PPE usage
Spray Area	Hearing Damage	Employees working in department	Proper PPE's are provided and awareness is given to employees.	3	1	1	5	Refresher awareness given to employees about the importance of PPE usage
Brushing area	Hearing Damage	Employees working in department	Proper PPE's are provided and awareness is given to employees.	3	1	1	5	Refresher awareness given to employees about the importance of PPE usage
Diesel Generator	Hearing Damage	Employees working in department	DG set is provided with acoustic enclosure which isolates the increased noise and also ear muffers, provided and awareness is given to employees.	3	1	1	5	Refresher awareness given to employees about the importance of PPE usage
B. Contact with vibrating plant/vehicle/tools/objects								
Good Vehicles movement	Injury	Employee moving around	Speed is restricted inside the factory and it is frequently monitored in CCTV about violation of rules. Movement of vehicles is restricted	6	1	1	8	Awareness is given to the employees who drive the vehicle.

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			during employees' movement time.					
Environmental								
A. Air/Ground/water Contamination (Including Spills, Uncontrolled release, etc)								
Contamination of chemical water drained from washing machine and spray booths.	Contamination	Employees working in the department and ground water contamination	The waste water is transported to treatment plant by closed pipe line system which directly connects concrete tanks.	6	1	1	8	Entire ETP is having concrete floor and contamination to ground is isolated. Proper environment awareness is given to employees working in the treatment plant and periodical inspection underground pipe line is being done.
Exhaust of air from spray booth	Contamination	Environment	Adequate filtration measures have been adopted. The chemical spray fumes are passed through water curtain and it separates the chemical and fresh air will be let out.	6	1	1	8	Periodical inspection & cleaning of spare booth is being done and awareness is given to maintenance employees about the importance of environment contamination.
Exhaust of smoke from chimney	Contamination	Environment	Adequate measures have been adopted and proper fuel is used.	6	1	1	8	Periodical stack monitoring will be done and awareness is given to maintenance employees about the importance of environment contamination.
B. Release of harmful solid, liquid or gas during transport on/off site								
C. Incorrect waste Disposal								
ETP Sludge	Contamination	Environment	Adequate measures have been adopted and it is disposed to government authorized agency for land fill.	6	1	1	8	Periodical test reports are monitored and awareness is given to maintenance employees about the importance of environment contamination.
Hazardous waste	Contamination	Environment	Adequate measures have been adopted and it is disposed to government authorized agency for treatment and incineration.	6	1	1	8	Periodical visits being made to the treatment premises to ensure and awareness is given to maintenance employees about the importance of

								environment contamination.
Chemicals/Substances								
A. Inhalation of dust, gases, fumes, vapors and mist								
Spray Chemical Fumes	Breathing Problem	Employees working in department	Adequate safety measure has been adopted and avoided inhale of chemical fumes. In addition to this special PPE's are provided and educated to employees to use while entering in the department.	6	1	1	8	Periodical health checkup performed to employees working in particular department and preventive maintenance are being done. Awareness about the PPE usage being given.
Brushing and damage dust	Breathing Problem	Employees working in department	Adequate safety measure has been adopted and avoided inhale of dust particles. In addition to this special PPE's are provided and educated to employees to use while entering in the department.	6	1	1	8	Periodical health checkup performed to employees working in particular department and preventive maintenance are being done. Awareness about the PPE usage being given.
B. Ingestion of chemicals/Substances								
Chemicals	Vomiting and giddiness	Employees working in department	Adequate safety measure has been adopted and avoided ingestion of chemicals. In addition to this special PPE's are provided and educated to employees to use.	6	1	1	8	Periodical health checkup performed to employees working in particular department and preventive maintenance are being done. Awareness about the PPE usage being given.
C. Absorption of chemicals/Substances through Skin								
Chemicals	Skin irritation	Employees working in department	Adequate safety measure has been adopted and avoided absorption of chemicals. In addition to this special PPE's are provided and educated to employees to use.	6	1	1	8	Periodical health checkup performed to employees working in particular department and preventive maintenance are being done. Awareness about the PPE usage being given.
Radiation								
Exposure to non-ionising source (Laser, radio frequency)								
Laser Machines	Disease due to radiation	Employees working in department	Adequate safety measure has been adopted and avoided radiation and laser machines used are	6	1	1	8	Periodical health checkup performed to employees working in particular

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			environment friendly and certified by the manufacturers. In addition to this special PPE's are provided and educated to employees to use.					department and preventive maintenance are being done.
RFID Card reader	Disease due to radiation	Employees working in department	Adequate safety measure has been adopted and avoided radiation and laser machines used are environment friendly and certified by the manufacturers. In addition to this special PPE's are provided and educated to employees to use.	6	1	1	8	Periodical health checkup performed to employees working in particular department and preventive maintenance are being done.
Biological								
A. Exposure to algal, bacterial, fungal, viral or parasitic agents (Skin contact, ingestion, inhalation)								
Drinking Water	Infections	All Employees	Adequate safety measure has been adopted and avoided infections. Drinking water is being treated by UV and R.O. In addition to this special SOP are followed educated to employees.	6	1	1	8	Regular drinking water tests are being conducted. Periodical health checkup performed to employees working in particular department and preventive maintenance are being done.
B. Animal Insect and spider bites/Stings, Sharp/needle-stick exposure								
Rats, Insects & spider	Spreading of diseases	All employees.	Adequate pest control measure has been schedules. Doctor and nurse are given responsibility to inform management in case of more complaints.	6	1	1	8	Awareness is given to maintenance employees about the importance,
Cooking vessels	Infections	All Employees	Adequate safety measure has been adopted and avoided infections. In addition to this special SOP are followed educated to canteen employees.	6	1	1	8	Regular drinking water tests are being conducted. Periodical health checkup performed to employees working in particular department and preventive maintenance are being done.
Manual Handling								
A. Handling heavy, Unstable or awkward objects/loads repetitious movements								
Chemical Tanks Handling	Injury	Employees working in department	Proper equipments are provided and educated employees to use strictly.	6	1	1	8	Refresher awareness training have been given to the and also ergonomics training is given all

								employees.
Stone bag movement	Injury	Employees working in department	Proper equipments are provided and educated employees to use strictly.	6	1	1	8	Refresher awareness training have been given to the and also ergonomics training is given all employees.
Movement of trolley	Injury	Employees working in department	Proper equipments are provided and educated employees to use strictly.	6	1	1	8	Refresher awareness training have been given to the and also ergonomics training is given all employees.
Psychological/Mental, Social, Medical								
A. Working for excessive time of periods and/or fatigued								
Excessive time	Tiredness	All employees	Working hours are restricted and educated employees that incase of issues to contact occupational health centre.	6	1	1	8	HR department is instructed to monitor working Hours strictly.
Responsibility	Mental stress	All employees	Work pressure is distributed properly.	6	1	1	8	Relevant management is instructed to monitor & plan properly.
B. Exposure to workplace bullying, harassment, violence								
Bullying, harassment, violence	Mental stress	All employees	All these are strictly prohibited and frequent monitoring will be done.	6	1	2	9	CCTV is installed for monitoring.
Facility								
A. Inadequate Lighting								
Shop Floor lighting	Injury	All employees	Adequate lighting provided	6	1	2	9	Preventive maintenance will ensure safe working area.
Street and Yard Lighting	Injury	All employees	Adequate lighting provided	6	1	2	9	Preventive maintenance will ensure safe working area.
Work place lighting	Injury	All employees	Adequate lighting provided	6	1	2	9	Preventive maintenance will ensure safe working area.
B. Wet/Slippery/Uneven/Unstable work surface								

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Shop Floor	Injury	All Employees	Proper cleaning and proper floors are designed	6	1	2	9	Preventive maintenance will ensure safe working area.
Walk way	Injury	All Employees	Proper cleaning and proper floors are designed	6	1	2	9	Preventive maintenance will ensure safe working area.
Infrastructure								
A. Infrastructure								
Cracks in the wall of building	Major Injury	All Employees	This will be inspected on regular basis and immediate action will be taken for the reason.	6	1	2	9	Preventive maintenance will ensure safe working area
Corrosion in Metal structure / Fence / roof / Gate / window	Major Injury	All Employees	This will be inspected on regular basis and immediate action will be taken for the reason.	6	1	2	9	Preventive maintenance will ensure safe working area
Water Seepage/leakage in roof	Injury	All Employees	This will be inspected on regular basis and immediate action will be taken for the reason.	6	1	2	9	Preventive maintenance will ensure safe working area
Water Leakage in Pipeline	Injury	All Employees	This will be inspected on regular basis and immediate action will be taken for the reason.	6	1	2	9	Preventive maintenance will ensure safe working area
Drain Blockage	Injury	All Employees	This will be inspected on regular basis and immediate action will be taken for the reason.	6	1	2	9	Preventive maintenance will ensure safe working area
Insufficient vehicle parking place	Injury	All Employees	Sufficient parking place are provided.	6	1	2	9	Instruction are given to security to not to block parking place.
Rolling shutters for Emergency exit	Injury	All Employees	Rolling shutters are provided with stopper and exits opening kept out wards.	6	1	2	9	Preventive maintenance will ensure safe working area
Conditions of over head tanks and sumps	Injury	All Employees	This will be inspected on regular basis and immediate action will be taken for the reason.	6	1	2	9	Preventive maintenance will ensure safe working area
Canteen								
Utensils cleaning	Food poison	All Employees	Hygienic training	3	2	1	6	
Food preparation (rotten vegetables)	Food poison	All Employees	Hygienic training	3	2	1	6	
Cheap provisions (adulterant)	Food poison	All Employees	Following HACCP	3	2	1	6	

Food service	Contagious diseases	All Employees	6 months once medical check up	3	4	1	8	
Countertops improper cleaning	Food poison	All Employees	Hygienic training	3	2	1	6	
Flies and rodents	Food poison	All Employees	Installing pest-o-flash & insect net	3	2	1	6	
Unhygienic practices	Infectious diseases	All Employees	Personal hygiene training	1	2	1	4	
Wet surface	fall hazard	All Employees	Proper usage of PPE	3	2	1	6	
Slippery floor	fall hazard	All Employees	Floor tiles should be partly rough.	3	4	1	8	
Table surface clean	Infectious diseases	All Employees	Cleaning by disinfectant & hygienic training.	1	2	1	4	
Floor cleaned and disinfected daily	Infectious diseases	All Employees	Cleaning by disinfectant & hygienic training.	1	2	1	4	
Floor drains cleaned and disinfected daily	Infectious diseases	All Employees	Cleaning by disinfectant & hygienic training.	1	2	1	4	
Refrigerator 5 degree Celsius	Contamination	All Employees	Hygienic training	3	2	1	6	
Compressed gas safety	Suffocation Or explosion	All Employees	Following local legal regulations	6	2	1	9	
Vegetable storage	Cross contamination	All Employees	Hygienic training	3	4	1	8	
LPG Gas Cylinder	Gas leakage / explosion	All Employees	Following local legal regulations	10	4	1	15	
Drinking water	Infectious diseases	All Employees	Following local legal regulations	3	2	1	6	
Groceries storage (Free from Mouses& insects)	Infectious diseases	All Employees	Proper containers should be used	3	2	1	6	
Usage of used edible Oil	Digestive disorders, Intestinal problems	All Employees	Proper monitoring	3	2	2	7	
Food waste mixing into rain water drainage	Ground water pollution	All Employees	Proper disposal of food waste	3	2	1	6	
Worker without gum boot	Fall hazard	All Employees	Proper usage of PPE	3	2	1	6	

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Worker without hair net	Digestive disorders, Intestinal problems	All Employees	Proper usage of PPE	3	2	1	6	
Worker without mask	Spread of contagious diseases	All Employees	Proper usage of PPE	3	2	1	6	
Worker without plastic gloves	Spread of contagious diseases	All Employees	Proper usage of PPE	3	2	1	6	
Rotten vegetables	Food poison	All Employees	HACCP	3	2	1	6	
Spoiled food	Food poison	All Employees	Food sampling, HACCP	3	2	1	6	
Spoiled milk	Digestive disorders, Intestinal problems	All Employees	Proper monitoring	3	2	1	6	
Expired Groceries	Digestive disorders, Intestinal problems	All Employees	Proper monitoring	3	2	1	6	
Artificial colours	Digestive disorders, Intestinal problems	All Employees	Proper monitoring	3	2	1	6	
Spoiled curd	Digestive disorders, Intestinal problems	All Employees	Proper monitoring	3	2	1	6	
unclean plates	Digestive disorders, Intestinal problems	All Employees	Proper monitoring	3	2	1	6	
Fire alarm blockage	Inability to use during emergency	Any one	Red tape marking	6	1	1	8	
Fire extinguisher blockage	Inability to use during emergency	Any one	Red tape marking	6	1	1	8	
Drinking water bubble tops	Water borne diseases	Any one	Properly cleaned.	3	2	1	6	
Irregular replacement of first aid box inventory	inability to use during accident	Any one	Proper monitoring /Proper replacement	3	2	1	6	
Floor cleaning	Infectious diseases	Any one	Clean the floors with disinfectant.	3	2	1	6	
Improper segregation of wastes	Environmental pollution	Any one	Proper monitoring	6	1	1	8	

Emergency exit blockage	Inability to escape during emergency	Any one	Proper monitoring	6	1	1	8	
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IX. ENVIRONMENTAL

- A. Air/ground/water pollution (including spills, uncontrolled release, etc
- B. Discharge of unsafe solid, liquid or gas during transport on/off site
- C. Incorrect waste disposal
- D. Import of unauthorized soils, resources, plants apparatus

X. CHEMICALS / SUBSTANCES

- A. Breathing of dusts, gases, fumes, vapours and mists
 - 1. Brushing machines,
 - 2. Damage Machines,
 - 3. Laser Machines,
 - 4. Spray Mannequins,
 - 5. Washing Machines,
- B. Intake of chemicals/substances
 - 1. Chemicals
- C. assimilation of chemicals/substances through skin
 - 1. Printing inks and chemicals

XI. RADIATION

- A. Revelation to non-ionising emission source (laser, welding flash, infrared, radiofrequency)

XII. BIOLOGICAL

- A. Contact to algal, bacterial, fungal, viral or parasitic agents (skin contact, ingestion, inhalation)
- B. Animal, insect and spider bites/stings Sharps/needle-stick revelation

XIII. MANUAL HANDLING

- A. Managing heavy, unstable or awkward objects/loads Repetitious movements
 - 1. Handling of Fabric rolls
 - 2. Handling of Trims and accessories

XIV. PSYCHOLOGICAL / MENTAL, SOCIAL AND MEDICAL

- A. Functioning for excessive time periods and/or while fatigued
- B. Contact to workplace bullying, harassment, violence

XV. WORK ENVIRONMENT (FACILITIES, INFRASTRUCTURE AND CANTEEN)

- A. Inadequate lighting
- B. Wet/slippery/uneven/unstable occupation surface
- C. Climatic conditions (including flooding, lightning, wind)
- D. Working alone
- E. Unfavorable atmospheric conditions (dusty)
- F. Restricted access OR working space

XVI. RESULTS AND DISCUSSION

Risk analysis of different activities of a garment finishing unit has been performed on the basis of risk rating which is divided into low, medium and high risk activity.

A. Mechanical / kinetic:

Contact with moving plant/parts, contact with sharp objects/edges, contact with moving material handling equipment and mechanical damage to services, PPE or other items were investigated. Different activities in this area were assigned with a rating which varies from 3 – 7. This activity is categorized into low risk.

B. Gravitational:

Fall from height and falling object from height were studied. Risk rating in this category varies from 9 -12 which can be classified as medium risk.

C. Thermal / Explosive:

Fire due to diesel storage, chemical storage, paints & solvents, electrical short circuit and waste storage [chindi, paper, plastic bag] were analyzed. Risk rating of 9 has been assigned to such activities. This is treated as medium risk category.

D. Contact with hot/cold objects / parts:

Contact with hot pressing bed, boiler surface and steam pipe line has been studied. This activity is classified as low risk area due to a risk rating of 4.

E. Electrical:

Contact with live electrical parts, exposure to high fault currents, mechanical damage to power leads/ fixed electrical wiring and Ingress of water into electrical components was the areas of interest. Risk rating of such activities varies from 8-9 and registers under medium risk category.

F. Noise and Vibration:

Exposure to increased noise in washing machines area, diesel generator and contact with vibrating plant/vehicle/tools/objects were the areas of interest. Various operations in this category have been rated from 5-8 and falls under medium risk.

G. Environmental:

Risk due to air/ground/water contamination (Including Spills, Uncontrolled release, etc), release of harmful solid, liquid or gas during transport on/off site and incorrect waste disposal were investigated. Risk rating of 8 has been assigned to such activities which are classified as medium risk.

H. Chemicals / Substances:

Inhalation of dusts, gases, fumes, vapours and mists, ingestion of chemicals/substances and absorption of chemicals/substances through skin were studied. Activities are evaluated for risk and rated as 8 which is treated as medium risk.

I. Radiation:

Exposure to non-ionizing radiation source (laser, welding flash, infrared, radiofrequency) has been investigated and risk rating of 8 is assigned. Such activities are grouped under medium risk category.

J. Biological:

Exposure to algal, bacterial, fungal, viral or parasitic agents (skin contact, ingestion, inhalation) and animal, insect and spider bites / stings and sharps/needle-stick were analysed. They are classified as 8 and categorized into medium risk rating.

K. Manual handling

Handling heavy, Unstable or awkward objects/loads repetitious movements was observed. Those activities are rated as 8 and classified in medium risk category.

L. Psychological / Mental, Social and Medical

Working for excessive time periods and/or while fatigued and exposure to workplace bullying, harassment and, violence was analysed. Risk rating of 8 has been assigned to such activities and categorized as medium risk.

M. Work Environment

Different areas of facilities, infrastructure and canteen were observed and analysed. Except LPG gas cylinder used in canteen, risk rating varies from 4 – 9 and classified as medium rating. Due to accidental factor, risk rating for the LPG gas cylinder used in cooking in the canteen shall be 15.

XVII. CONCLUDING REMARKS:

Risk analysis in Garment Finishing Unit has been performed in this study. Different activities associated with mechanical / kinetic, gravitational, thermal / explosive, contact with hot/cold object/parts, electrical, noise and vibration, environmental, chemicals / substances, radiation, biological, manual handling, psychological/mental/social/medical, and work environment were investigated for possible hazards. Hazards in each activity were identified and rating has been assigned to understand the intensity of risk associated with each activity in a garment finishing unit. It has been observed that a risk rating of 8 has been obtained in majority of activities. Hence it can be concluded from this study that medium risk is associated in performing various activities in a garment finishing unit. Different control measures have also been suggested for each activity.

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