

JAIPUR ENGINEERING COLLEGE & RESEARCH CENTRE, JAIPUR

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

DISASTER MANAGEMENT

UNIT-IV Part-2

BY-

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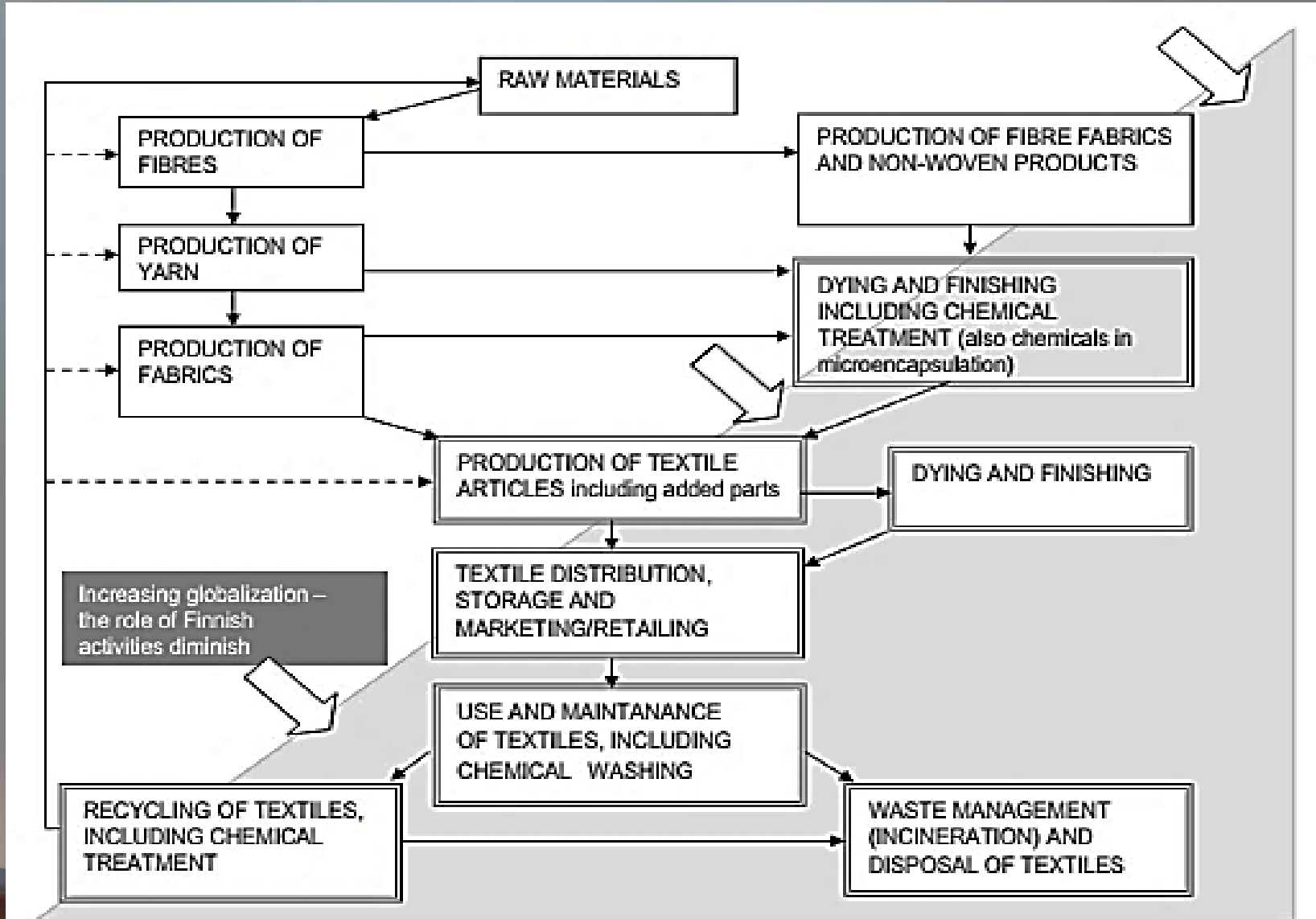
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PRODUCTION IN TEXTILE INDUSTRY

LIFE-CYCLE STAGES OF TEXTILE INDUSTRY



PRODUCTION IN TEXTILE INDUSTRY

TEXTILE RAW MATERIALS

A unique material which is related to the production of raw material in the Textile Industry. It plays a key role in the continuous production and high-quality fabric. Textile Raw Materials are selected as per the manufacturing policy of the company i.e. whether a Composite Mill or only a Spinning, Weaving or Dyeing /Finishing.

TYPES OF TEXTILE RAW MATERIALS

- Fibers
- Fabrics
- Dye Stuffs
- Chemical and Auxiliaries

PRODUCTION IN TEXTILE INDUSTRY

1. FIBERS

It is defined as one of the delicate, hair portions of the tissues of a plant or animal or other substances that are very small in diameter in relation to their length. A fiber is a material which is several hundred times as long as it's thick.

TYPES OF FIBERS

a) NATURAL FIBER

Examples: Silk Fiber, Wool Fiber, Cotton Fiber, Flax Fiber, Jute Fiber and Ramie Fiber.

b) MAN MADE FIBER

Examples: Polymers, Minerals, Rayon Fiber.

PRODUCTION IN TEXTILE INDUSTRY

2. TEXTILE FABRICS

A Textile Fabric is a cloth that has been woven, knitted, tufted, knotted, or bonded together using natural or synthetic threads, yarns, and other materials. Popular fabrics include cotton and leather, but even seaweed and gold have been used to make textiles.

3. TEXTILE DYES

Colour is obtained in textiles and other materials by the use of colorants (Dyes and Pigments). A Dye can be referred as water soluble coloured organic compound that has affinity for the substrate whereas Pigments are usually water insoluble.

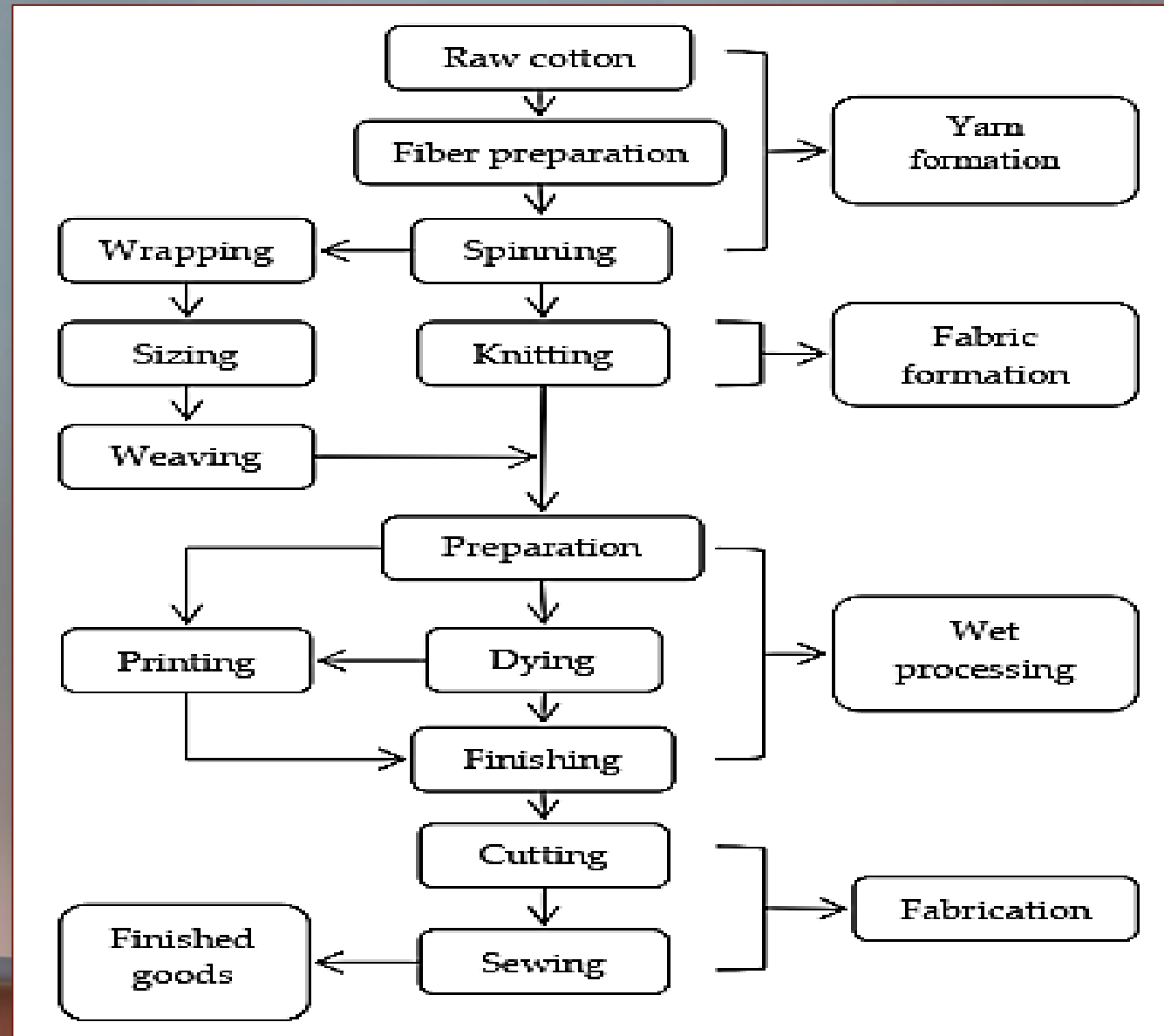
PRODUCTION IN TEXTILE INDUSTRY

4. AUXILIARIES & CHEMICALS

The various processing operations may be in the functions of preparation, dyeing, printing or finishing. Auxiliaries help by speeding up these processes or carry out the processes in a more efficient manner. This is necessary to obtain the desired effect.

TEXTILE MANUFACTURING

PROCESS FLOW CHART



TEXTILE MANUFACTURING

PROCESSES

1. *Spinning:* The manufacturing process for building polymer fibres is spinning. This is a specialized filter that uses a spinning to create multiple continuous filaments. There are four types of spinning: wet, dry, melt, and gel spinning.

2. *Weaving:* There are usually three types of fabric production processes: weaving, knitting and uncut.

Weave technology is widely used for fabrication. Woven fabric produced from weaving process.

3. *Knitting:* Knitting is a type of fabric manufacturing process, where cloth is produced by searching poles in the middle of the loops created by multiple threads. Knitting fabrics are formed by stitching.

TEXTILE MANUFACTURING

PROCESSES

4. *Finishing:* Textile finishing usually includes treatments such as scouring, bleaching, and dyeing and/or printing, the final mechanical or chemical finishing operations, which during this stage are carried out on textile products to enhance their basic characteristics like dye penetration, printability, wet ability, colour, hand, and appearance.

HAZARDS IN TEXTILE INDUSTRY

1. PHYSICAL HAZARDS

The Textile Industry consists of a number of units engaged in spinning, weaving, dyeing, printing, finishing and a number of other processes that are required to convert fibre into a finished fabric or garment.

Slippery surface:



Noise:



Dust:



Stress:



HAZARDS IN TEXTILE INDUSTRY

2. ELECTRICAL HAZARDS

Electrical Hazard can be defined as a dangerous condition where a worker could make electrical contact with energized equipment or a conductor, and from which the person may sustain an injury from shock, there is potential for the worker to receive an arc-flash burn, thermal burn, or blast injury.

Improper grounding



Exposed electrical parts



Inadequate wiring



Wet conditions



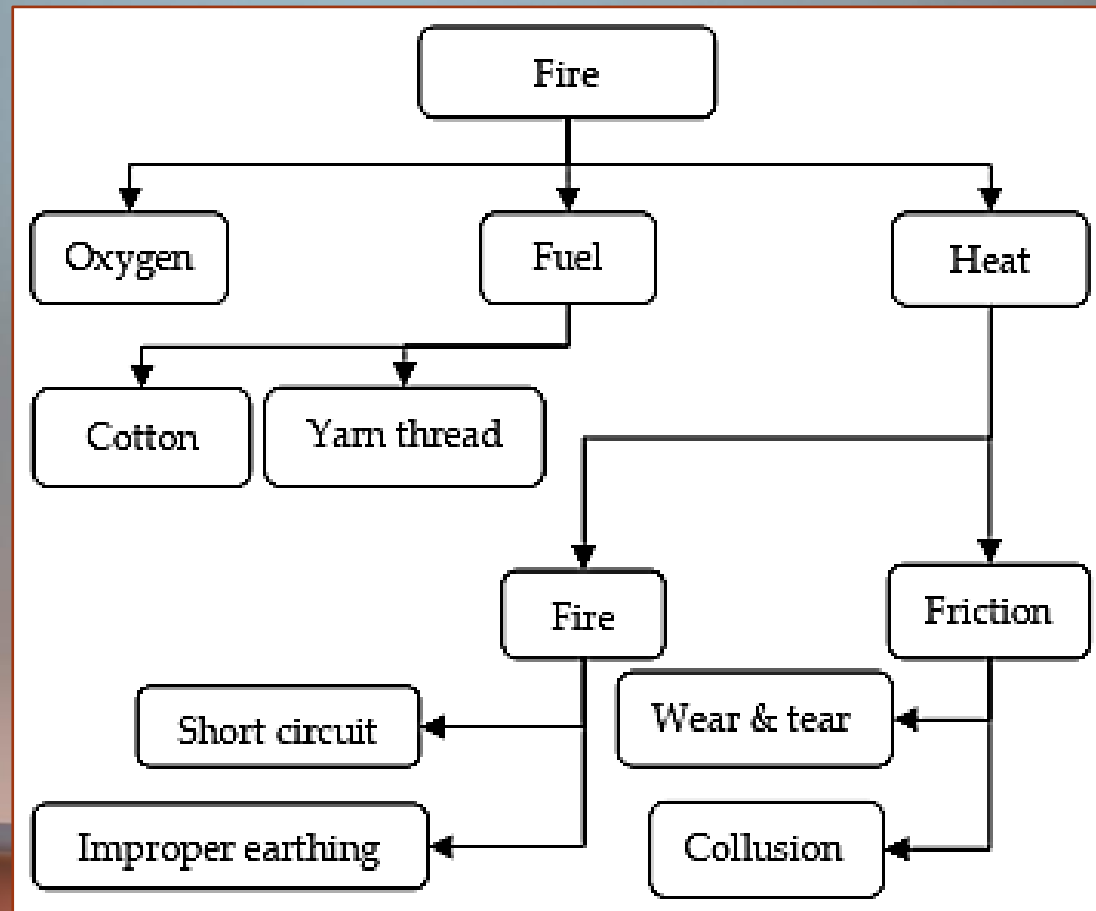
Damaged insulation



HAZARDS IN TEXTILE INDUSTRY

3. FIRE AND EXPLOSION HAZARDS

The textile industry produces various products out of different natural and artificial fibres. It does not only belong to the oldest, but also to the most important segments of industry. However, the production of cloth holds many risks of fire.



HAZARDS: CAUSES, EFFECT & REMEDY

S. No.	HAZARDS	CAUSE	EFFECT	REMEDIAL MEASURES
PHYSICAL HAZARDS				
1	Noise	<ul style="list-style-type: none"> · Simple Gear · Continuous Gear Train · Chain Drive · Bevel Drive · Worm and Worm wheel · Variable Drive 	<ul style="list-style-type: none"> · Sound levels cause Trauma to the cochlear structure in the inner ear. · It will cause high blood pressure. · It affects sleep and work performance 	<ul style="list-style-type: none"> · Isolation of the machine and Silencer must be kept. · Inverted drive control noise in ring frame. · Proper maintenance lubricating control noise.
2	Dust	<ul style="list-style-type: none"> · Cotton · Fiber particles 	<ul style="list-style-type: none"> · Causes Respiratory problems and causes Byssinosis 	<ul style="list-style-type: none"> · Dust collector · Proper Housekeeping · Necessary PPE should were by worker.
3	Lighting	<ul style="list-style-type: none"> · High beam and Low beam of light 	<ul style="list-style-type: none"> · Eye Strain · Glaring and Irritation of eye 	<ul style="list-style-type: none"> · Proper lightning condition · Provide safety goggles for reduce eye strain for improper lighting condition.

HAZARDS: CAUSES, EFFECT & REMEDY

S. No.	HAZARDS	CAUSE	EFFECT	REMEDIAL MEASURES
FIRE HAZARDS				
1	Welding operation	· Welding Sparks	· Spark ignition is very dangerous.	· Restrict unauthorized person to do welding
2	Electrical short circuit happens	· Improper Earthing and moisture · Insulations	· If no trip occurs its get sparks and get fire.	· ACB (Air Circuit Breaker), MCB (Motor Circuit Breaker).
3	Smoking	· Easily Ignitable materials	· Easily gets fire	· Safety signs & workers must aware of not using any ignition product
4	Flammable dyestuffs	· Dyes	· It may be easily ignited	· To store the dye stuffs in safe place. · To maintain properly.

HAZARDS: CAUSES, EFFECT & REMEDY

S. No.	HAZARDS	CAUSE	EFFECT	REMEDIAL MEASURES
ELECTRICAL HAZARDS				
1	Improper Earthing and Moisture	<ul style="list-style-type: none"> · Poor Housekeeping · Improper circuit connections 	<ul style="list-style-type: none"> · Trip occurs Electric Shock 	<ul style="list-style-type: none"> · Avoid improper Earthing and loose connections. · All circuits to be enclosed in a proper circuit. · Proper Housekeeping.
2	Input Power Cable exceeds More Output	<ul style="list-style-type: none"> · Using low quality cables. 	<ul style="list-style-type: none"> · Cable Melting & Switch becomes Heated 	<ul style="list-style-type: none"> · Input wire must be more power than Output wire.
3	Looping in the Running Line	<ul style="list-style-type: none"> · Improper Looping System 	<ul style="list-style-type: none"> · Electronics PCB 	<ul style="list-style-type: none"> · Avoid Looping · ECB Board Check the connection
4	Electrical Maintenance	<ul style="list-style-type: none"> · Improper Electrical Maintenance. 	<ul style="list-style-type: none"> · Easily get Fire with the Friction of Motors 	<ul style="list-style-type: none"> · Needs Preventive Maintenance · Grease the Motor Frequently.

HAZARDS: CAUSES, EFFECT & REMEDY

S. No.	HAZARDS	CAUSE	EFFECT	REMEDIAL MEASURES
CHEMICAL HAZARDS				
1	Bleaching	· Chlorine Powders	<ul style="list-style-type: none">· Exposed to dangerous levels of Chlorine skin and eye irritant· Dangerous Pulmonary Tissue irritant causing Delayed Lung Oedema.	<ul style="list-style-type: none">· Suitable PPE, including eye-protective equipment· Use personal protective equipment
2	Corrosion	· Alkalis and Acids	<ul style="list-style-type: none">· Expose the workers to the risk of Burns and Scalds	<ul style="list-style-type: none">· Protective clothing should be cleaned at regular intervals

HAZARDS: CAUSES, EFFECT & REMEDY

S. No.	HAZARDS	CAUSE	EFFECT	REMEDIAL MEASURES
ERGONOMICS HAZARDS				
1	Uncomfortable Work Station and Height.	· Improper Height	· Pain in Hands and Legs.	<ul style="list-style-type: none">· Importance to Ergonomics· Practicing Shifts· Provide Height-adjustable Chairs so individual operator can work at their preferred work height
2	Repetitive Strain Injuries	· Repeating of Work	· Wrist, Neck, Shoulder, Neck, Knee, Angle.	<ul style="list-style-type: none">· Proper working procedure· Raised Platforms to help operators reach badly located controls· Proper Orientation of Machine to prevent Squatting Posture

HAZARDS: CAUSES, EFFECT & REMEDY

S. No.	HAZARDS	CAUSE	EFFECT	REMEDIAL MEASURES
PSYCHOLOGICAL HAZARDS				
1	Not Interested to Work	· Physiological Problem	· Trauma · Anxiety Disorder · Bipolar and Related Disorder · Neuro-Development Disorder.	· Give Counselling.
2	Production Target	· Stress to the Worker	· High Blood Pressure · Nervousness and Tensions · Uncooperative Attitude · Digestive Problem	· Set Achievable Target.

RISK ANALYSIS

RISK ANALYSIS

Risk analysis of different activities of a Garment Finishing Unit is performed on the basis of risk rating which is divided into low, medium and high risk activity.

RISK PRIORITY NUMBER

The hazards are prioritized on the based of RPN number. The RPN number is calculated by the multiplication of Severity, Occurrence and Detectability.

$$***RPN = Severity \times Occurrence \times Detectability***$$

RPN is calculated for all the hazards involved which are involved in the Textile Industry. The Maximum Value of Risk Priority Number is 1000.

RISK ANALYSIS

RISK PRIORITY NUMBER

Rank	Severity	Occurrence	Detection
1	None	Almost Never	Almost Certain
2	Very Minor	Remote	Very High
3	Minor	Very Slight	High
4	Very Low	Slight	Moderately High
5	Low	Low	Moderate
6	Moderate	Medium	Low
7	High	Moderately High	Very Low
8	Very High	High	Remote
9	Serious	Very High	Very Remote
10	Hazardous	Almost Certain	Almost Impossible

RPNs IN TEXTILE INDUSTRY

S. No.	HAZARDS	RPN No. = Severity x Detectability x Occurrence.
Physical Hazards		
1	a) Noise	$7 \times 6 \times 8 = 336$
	b) Dust	$8 \times 8 \times 9 = 576$
	c) Light	$5 \times 5 \times 4 = 100$
Fire Hazards		
2	a) Electrical Short Circuit Happens	$7 \times 4 \times 6 = 168$
Electrical Hazards		
3	a) Improper Earthing	$6 \times 7 \times 7 = 294$
	b) Improper Isolation	$6 \times 6 \times 6 = 216$
	c) Motor High Speed Rotating Due to High Voltage	$6 \times 6 \times 7 = 252$
	d) Input Power Cable exceeds More Output	$6 \times 6 \times 7 = 252$
	e) Electrical Maintenance	$7 \times 6 \times 7 = 294$
Ergonomically Hazards		
4	a) Uncomfortable Work Station and Height	$7 \times 7 \times 6 = 294$
	b) Repetitive Strain Injuries	$8 \times 7 \times 6 = 336$
Physiological Hazards		
5	a) Not Interested to Work	$7 \times 7 \times 6 = 294$
	b) Production Target	$6 \times 6 \times 6 = 216$

RISK ANALYSIS in TEXTILE INDUSTRY

Major Activities and Sub-Categories are listed below:

1. 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

RISK ANALYSIS in TEXTILE INDUSTRY

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

RISK ANALYSIS in TEXTILE INDUSTRY

Risk Analysis

Different activities in mentioned category are evaluated to a Risk Rating which varies from **3 to 7**. Thus, the “Mechanical/Kinetic” category is classified as **Low Risk** Category.

RISK ANALYSIS in TEXTILE INDUSTRY

2. 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

Risk Analysis

Different activities in mentioned category are evaluated to a Risk Rating which varies from **9 to 12**. Thus, the “Gravitational” category can be classified as **Medium Risk** Category.

RISK ANALYSIS in TEXTILE INDUSTRY

3. 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]

Risk Analysis

Different activities in mentioned category are evaluated to a Risk Rating of **9**. Thus, the “Thermal and/or Explosive” category can be classified as **Medium Risk** Category.

RISK ANALYSIS in TEXTILE INDUSTRY

4. ENGAGED WITH HOT/COLD STUFF/PARTS

1. Pressing Machines
2. Boiler Surface
3. Steam Line

Risk Analysis

Different activities in mentioned category are evaluated to a Risk Rating of **4**. Thus, the “Hot/Cold Stuff/Parts” category can be classified as **Low Risk** Category.

RISK ANALYSIS in TEXTILE INDUSTRY

5. 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 Charger

RISK ANALYSIS in TEXTILE INDUSTRY

C. Mechanical Scratch to Power Leads/Permanent Electrical Wiring

1. Diesel Generator

D. Opening of water into electrical components

Risk Analysis

Different activities in mentioned category are evaluated to a Risk Rating which varies from **8 to 9**. Thus, the “Electrical” category can be classified as **Medium Risk** Category.

RISK ANALYSIS in TEXTILE INDUSTRY

6. 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

Risk Analysis

Different activities in mentioned category are evaluated to a Risk Rating which varies from **5 to 8**. Thus, the “Sound and/or Trembling” category can be classified as **Medium Risk** Category.

RISK ANALYSIS in TEXTILE INDUSTRY

7. 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

Risk Analysis

Different activities in mentioned category are evaluated to a Risk Rating of **8**. Thus, the “Environmental” category can be classified as **Medium Risk** Category.

RISK ANALYSIS in TEXTILE INDUSTRY

8. 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

C. Assimilation of Chemicals/Substances through Skin

1. Printing Inks and Chemicals

Risk Analysis

Different activities in mentioned category are evaluated to a Risk Rating of **8**. Thus, the “Chemicals/Substances” category can be classified as **Medium Risk** Category.

RISK ANALYSIS in TEXTILE INDUSTRY

9. RADIATION

A. Revelation to Non-Ionising Emission Source (Laser, Welding Flash, Infrared, Radiofrequency)

Risk Analysis

Different activities in mentioned category are evaluated to a Risk Rating of **8**. Thus, the “Radiation” category can be classified as **Medium Risk** Category.

RISK ANALYSIS in TEXTILE INDUSTRY

10. 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

Risk Analysis

Different activities in mentioned category are evaluated to a Risk Rating of **8**. Thus, the “Biological” category can be classified as **Medium Risk** Category.

RISK ANALYSIS in TEXTILE INDUSTRY

11. MANUAL HANDLING

A. Managing Heavy, Unstable or Awkward Objects/ Loads Repetitious Movements

1. Handling of Fabric Rolls
2. Handling of Trims and Accessories

Risk Analysis

Different activities in mentioned category are evaluated to a Risk Rating of **8**. Thus, the “Manual Handling” category can be classified as **Medium Risk** Category.

RISK ANALYSIS in TEXTILE INDUSTRY

12. PSYCHOLOGICAL/MENTAL, SOCIAL AND MEDICAL

A. Functioning for Excessive Time Periods and/or while Fatigued

B. Contact to workplace Bullying, Harassment, Violence

Risk Analysis

Different activities in mentioned category are evaluated to a Risk Rating of **8**. Thus, the “Psychological/Mental, Social and Medical” category can be classified as **Medium Risk** Category.

RISK ANALYSIS in TEXTILE INDUSTRY

13. WORK ENVIRONMENT (INFRASTRUCTURE, FACILITIES AND CANTEEN)

A. Inadequate Lighting

B. Wet/Slippery/Uneven/Unstable Occupation Surface

C. Climatic Conditions (including Flooding, Lightning, Wind)

D. Working alone

E. Unfavourable Atmospheric Conditions (Dusty)

F. Restricted Access or Working Space

Risk Analysis

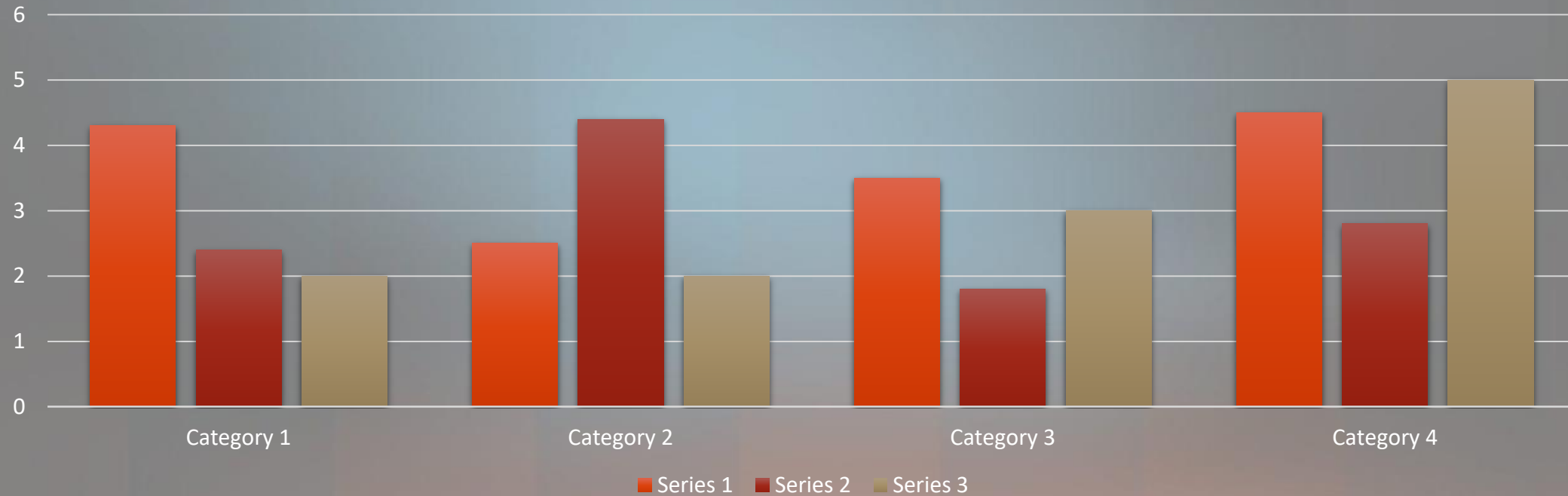
Different activities in mentioned category are evaluated to a Risk Rating which varies from **4 to 9**. Thus, the “Work Environment” category can be classified as **Medium Risk** Category.

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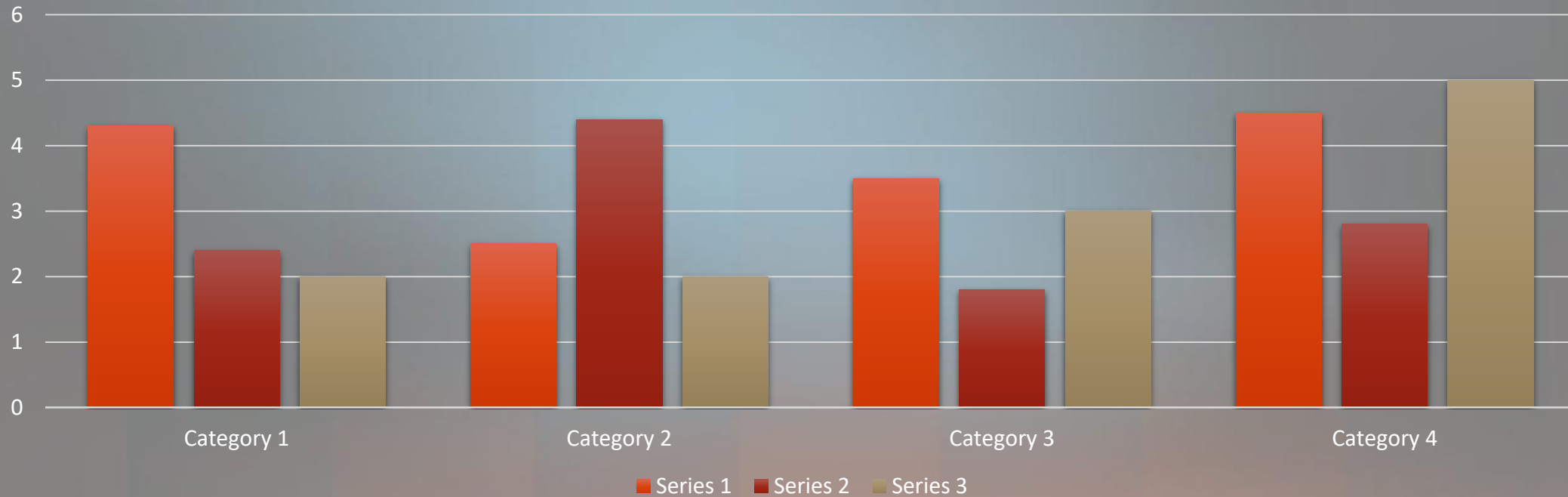
Title and Content Layout with Chart

Chart Title



Title and Content Layout with Chart

Chart Title



Two Content Layout with Table

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- Second bullet point here
- Third bullet point here

Class	Group A	Group B
Class 1	82	95
Class 2	76	88
Class 3	84	90

Two Content Layout with Table

- First bullet point here
- Second bullet point here
- Third bullet point here

Class	Group A	Group B
Class 1	82	95
Class 2	76	88
Class 3	84	90

Two Content Layout with SmartArt

Group A

- Task 1
- Task 2

Group B

- Task 1
- Task 2

Group C

- Task 1
- Task 2

- First bullet point here
- Second bullet point here
- Third bullet point here

Two Content Layout with SmartArt

Group A

- Task 1
- Task 2

Group B

- Task 1
- Task 2

Group C

- Task 1
- Task 2

- First bullet point here
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