Industrial-Safety-Series-1 Important Topics

Module 1

Safety organization

1. **Definition**: Safety organization involves dividing employees into sections or departments, each assigned specific safety functions to achieve organizational safety goals.
2. **Authority & Responsibility**: Clearly defined roles and interrelationships are essential for achieving safety objectives.
3. **Structure**:
    - **Large Units**: Have dedicated safety departments with specialized groups.
    - **Small Units**: May have limited personnel; safety duties are distributed among available staff, with departmental heads taking on safety responsibilities.
4. **Integration**: Safety is considered everyone's responsibility, with specific duties communicated in writing or displayed at workplaces.

Objectives of Safety Organization

1. **Accident Prevention**: Aim to prevent future accidents.
2. **Safe Work Environment**: Ensure a safe workplace.
3. **Safety Awareness**: Promote safety consciousness.
4. **Policy Integration**: Align safety policies with job processes.
5. **Compliance**: Follow rules as per the Factory Act.
6. **Risk Management**: Identify and modify risks.
7. **Training**: Provide safety training.
8. **Employee Involvement**: Invite cooperation and suggestions from employees.
9. **Post-Accident Measures**: Implement measures after accidents

Functions & Duties of Safety Organization

1. **Directive Implementation**: Monitor the implementation of safety directives from higher authorities.
2. **Super Checks**: Conduct super checks of operational and maintenance machinery.
3. **Train Inspections**: Perform checks on coaching and goods trains, including night inspections.
4. **Safety Drives**: Implement safety circulars and drives.
5. **Coordination**: Improve crew and guard facilities, and coordinate disaster management.
6. **Accident Inquiries**: Assist in inquiries for serious accidents.
7. **Staff Counseling**: Counsel and monitor maintenance and operations staff.

Safety officer

- **Role Importance**: A safety officer is vital in ensuring a safe working environment by recognizing potential risks, taking action during emergencies, and owning the situation.
- **Responsibilities**:
  - Prevent accidents.
  - Respond to emergencies.
  - Evaluate and improve safety programs.
  - Identify, investigate, and control safety hazards.
- **Position in Organization**:
  - Head of the safety department.
  - Typically reports to the Chief Operations Officer (COO).
- **Common Goal**: Regardless of the specific duties, the primary goal is to ensure the safety of everyone in the workplace.
- **Verification Role**: Ensures that all employees follow safe work practices and that safety programs are effective.

Theory of causation

1. Heinrich's Domino Theory

- **Concept**: Accidents are part of a chain reaction, like falling dominoes. One factor leads to the next, ultimately causing injury.
- **Key Findings**:
  - **Unsafe Acts**: 88% of industrial accidents are caused by unsafe actions of workers.
  - **Unsafe Conditions**: 10% are due to unsafe conditions.
  - **Unavoidable**: 2% are unavoidable.
- **Axioms of Industrial Safety**:
  1. Injuries result from a series of factors.
  2. Accidents arise from physical hazards or unsafe acts.
  3. Most accidents are due to unsafe behavior.
  4. Unsafe acts or hazards don't always cause immediate accidents.

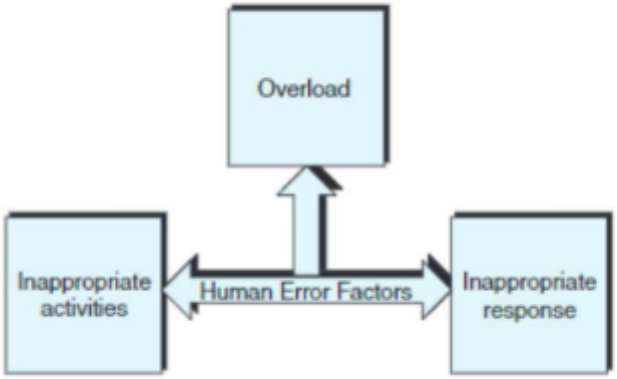
5. Understanding unsafe acts helps create corrective guidelines.
6. The severity of injury is often random; the accident is preventable.
7. Best safety practices are similar to best quality practices.
8. Management should take safety seriously.
9. Supervisors are crucial in preventing accidents.
10. Accidents have both direct and indirect costs.

- **Five Factors Leading to Accidents**:
  - **Ancestry and Social Environment**: Negative traits from heritage or environment can lead to unsafe behavior.
  - **Fault of Person**: Unsafe actions and conditions stem from these traits.
  - **Unsafe Act/Hazard**: Unsafe actions and physical hazards cause accidents.
  - **Accident**: Results in injury, like falls or being hit by objects.
  - **Injury**: Common injuries include cuts and fractures.
- **Central Points**:
  - Injuries result from a sequence of factors.
  - Removing unsafe acts or hazardous conditions prevents accidents.

2. Human Factors Theory

The Human Factors Theory explains that accidents are often caused by a chain of events related to human error. This theory identifies three main factors leading to such errors:

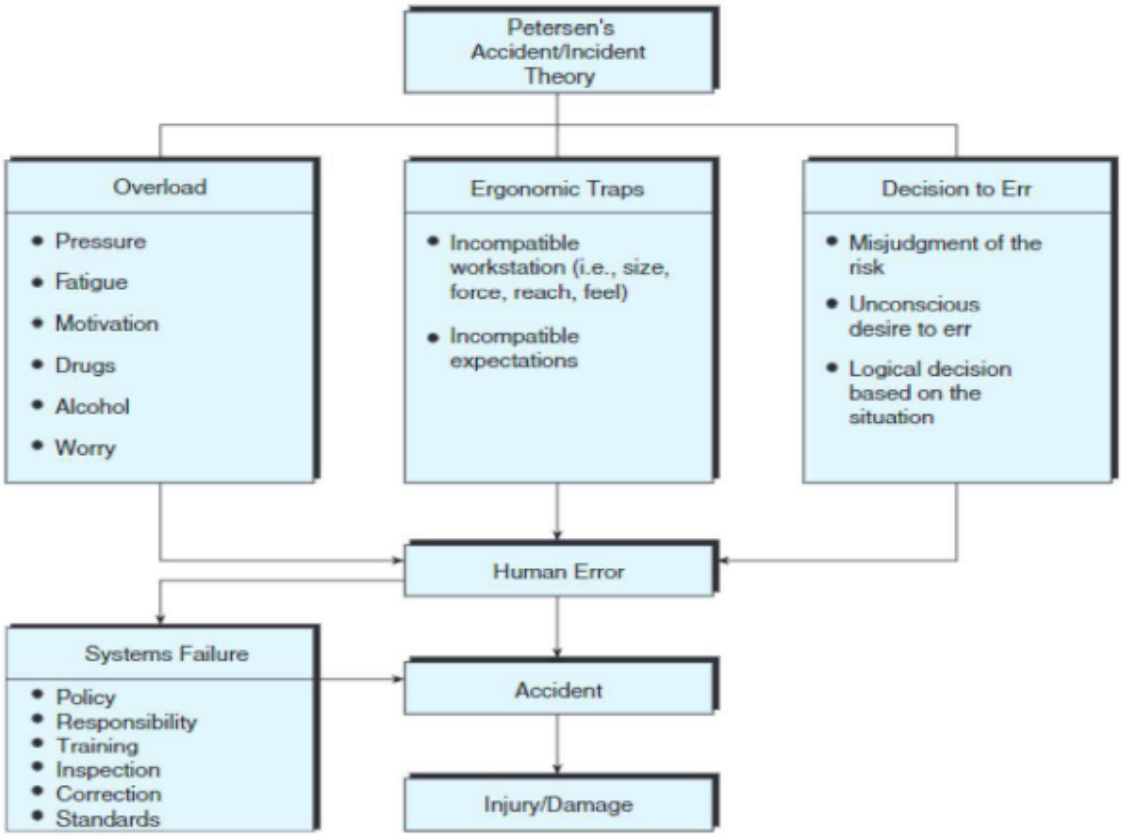
1. **Overload**: This occurs when there is a mismatch between a person’s capacity (affected by their skills, training, and current state) and the demands placed on them (tasks, environmental distractions, and situational risks).
2. **Inappropriate Response**: This includes failing to address or correct hazards, such as ignoring safety issues or removing safety features. It also covers workstation design issues that can contribute to accidents.
3. **Inappropriate Activities**: This involves performing tasks without proper knowledge or underestimating the risks involved, which can lead to errors and accidents.



3. Accident/Incident Theory

- The **Accident/Incident Theory** builds on the human factors theory by adding elements like ergonomic issues, decision-making, and systems failures.
- It highlights how human errors, whether conscious or unconscious, **are influenced by pressures like deadlines and peer pressure**.
- The theory also emphasizes how management decisions and systems failures can impact safety.
- **Key Elements**:
  - **Human Error**: Resulting from overload, ergonomic traps, or a decision to err.
    - **Decision to Err**: Can be conscious (deliberate) or unconscious.
    - **Influences**: Pressures such as deadlines, peer pressure, budget constraints, and the “It won’t happen to me” syndrome.
  - **Systems Failure**: A major contribution of Petersen’s theory.
    - **Management Decisions**: Links management actions to safety outcomes.
    - **Management’s Role**: Highlights the importance of management in accident prevention and overall workplace safety.
- **Examples of Systems Failures**:
  - Lack of comprehensive safety policy.
  - Unclear safety responsibilities and authority.
  - Inadequate attention to safety procedures (measurement, inspection, correction, investigation).
  - Insufficient employee orientation.

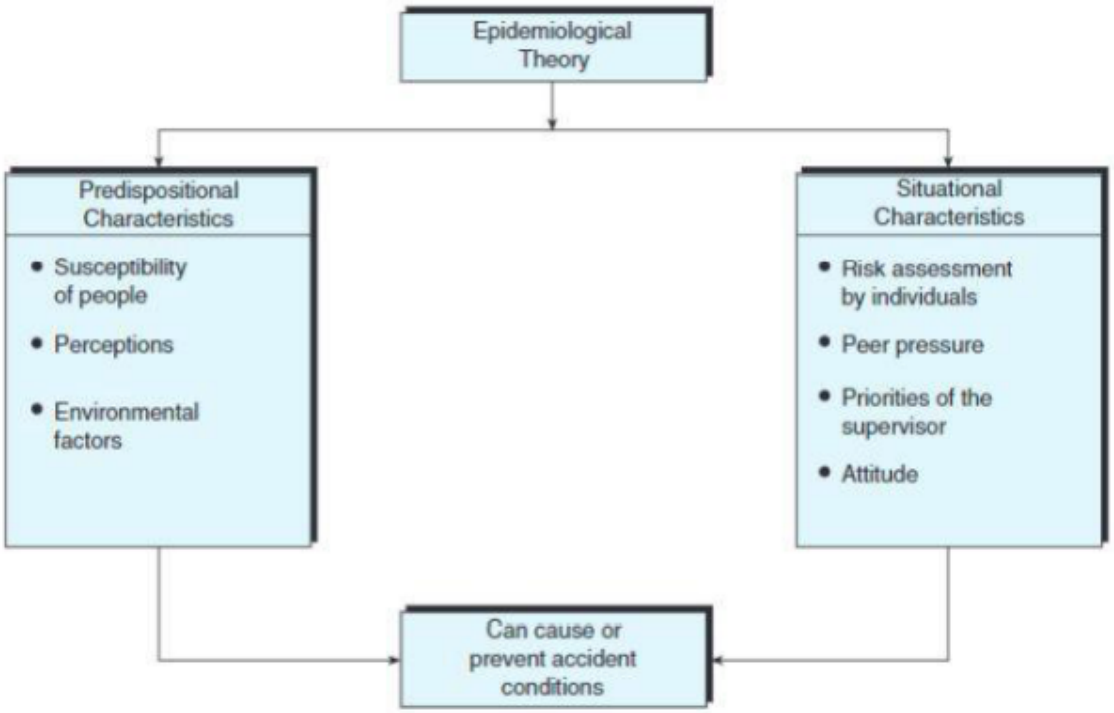
- Lack of proper safety training for employees.



4. EPIDEMIOLOGICAL THEORY OF ACCIDENT CAUSATION

- **The Epidemiological Theory of Accident Causation** broadens the traditional focus on accidents and injuries by incorporating industrial hygiene, which examines how environmental factors impact health.
- This theory studies the links between environmental conditions and health outcomes, aiming to understand how such factors can contribute to accidents and health problems in the workplace.
- By addressing these environmental influences, the theory helps to identify and mitigate risks that could lead to sickness, disease, or other health issues.
- **Traditional Focus**: Safety theories often concentrated on accidents and resulting injuries.
- **Broader Perspective**: Modern approaches include industrial hygiene, which addresses environmental factors affecting health.
- **Industrial Hygiene**: Concerns with factors leading to sickness, disease, or impaired health in the workplace.
- **Epidemiological Theory**:

- **Concept**: Studies the causal relationships between environmental factors and health outcomes.
- **Focus**: Looks at how environmental conditions contribute to accidents and health issues.



5. SYSTEMS THEORY OF ACCIDENT CAUSATION

- **The Systems Theory of Accident Causation** says that accidents happen because of how people, machines, and their surroundings interact.
- If any of these parts change, like a new worker or a broken machine, it can raise the risk of accidents.
- The theory highlights the need to gather information, assess risks, and make decisions carefully. Stressful conditions, like noise or tight deadlines, can make it harder to make good decisions.
- By understanding these factors and managing them well, organizations can reduce accidents and keep the workplace safer.

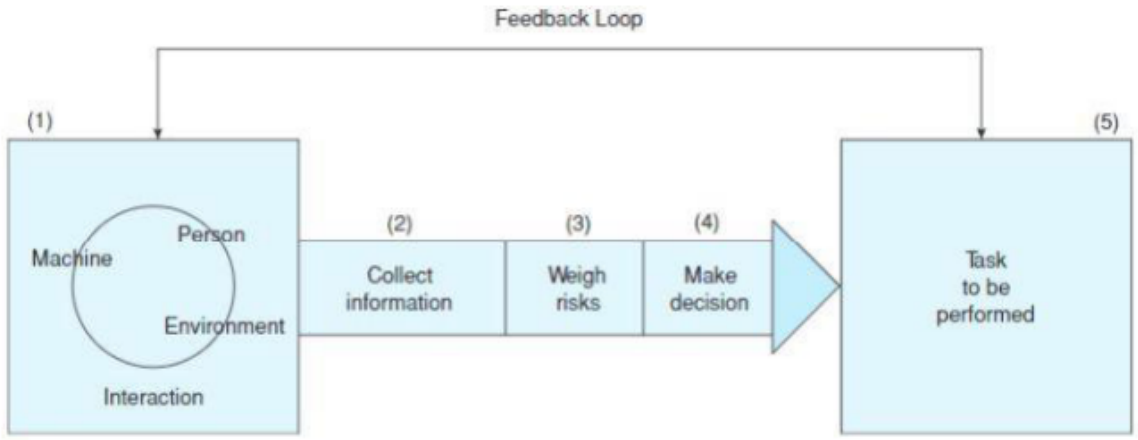


Figure 3–5
Systems theory model.

-

6. COMBINATION THEORY OF ACCIDENT CAUSATION

The Combination Theory of Accident Causation recognizes that no single theory can fully explain all accidents. Here's a summary:

- **Theory and Reality**: There can be a gap between theoretical models of accident causation and actual events.
- **Model Accuracy**: Some theories may be accurate for certain accidents, but not for others.
- **Combination of Models**: The actual cause of an accident often involves elements from multiple theories.
- **Practical Use**: Safety personnel should apply various theories as needed for both prevention and investigation, rather than relying on one model for all accidents.

7. BEHAVIORAL THEORY OF ACCIDENT CAUSATION

The Behavioral Theory of Accident Causation, also known as Behavior-Based Safety (BBS), focuses on applying psychological principles to improve safety through understanding and influencing employee behavior.

- **Overview**: BBS applies psychological theories to enhance workplace safety by focusing on employee behavior.
- **Key Proponent**: E. Scott Geller, a psychologist and senior partner at Safety Performance Solutions, is a major advocate of BBS.

- **Seven Basic Principles of BBS**:
  - **Focus on Behavior**: Aim to improve safety by changing how employees act.
  - **Understand Influences**: Look at what outside factors affect how employees behave and stay safe.
  - **Encourage Good Behavior**: Use events and rewards to promote safe actions.
  - **Reward Positively**: Highlight and reward good behavior to motivate employees.
  - **Use Science**: Apply scientific methods to make safety programs more effective.
  - **Integrate Theories**: Use different theories to better understand and address safety issues.
  - **Consider Feelings**: Keep in mind employees' feelings and attitudes when planning safety improvements.

Safety committee

A **safety committee** is a group of people from different parts of a workplace who come together to focus on keeping everyone safe. This group usually includes managers, regular workers, and office staff.

- **Meetings**: They hold regular meetings to discuss and solve safety problems.
- **Goals**: Their main goal is to reduce accidents and health issues at work.
- **Education**: They teach employees about safety and set realistic safety goals.
- **Culture**: They work to create a strong safety culture where everyone is aware of and follows safety practices.

Functions:

- **Create Safety Programs**: Develop written guidelines for safety.
- **Promote Safe Work**: Encourage safe working habits.
- **Train Employees**: Provide safety training.
- **Inspect Workplace**: Check the workplace for safety issues.
- **Investigate Accidents**: Look into accidents to prevent future ones.
- **Act as a Link**: Connect employees with management on safety issues.
- **Review Records**: Look at injury and illness records to spot trends.
- **Raise Awareness**: Increase understanding of safety issues.

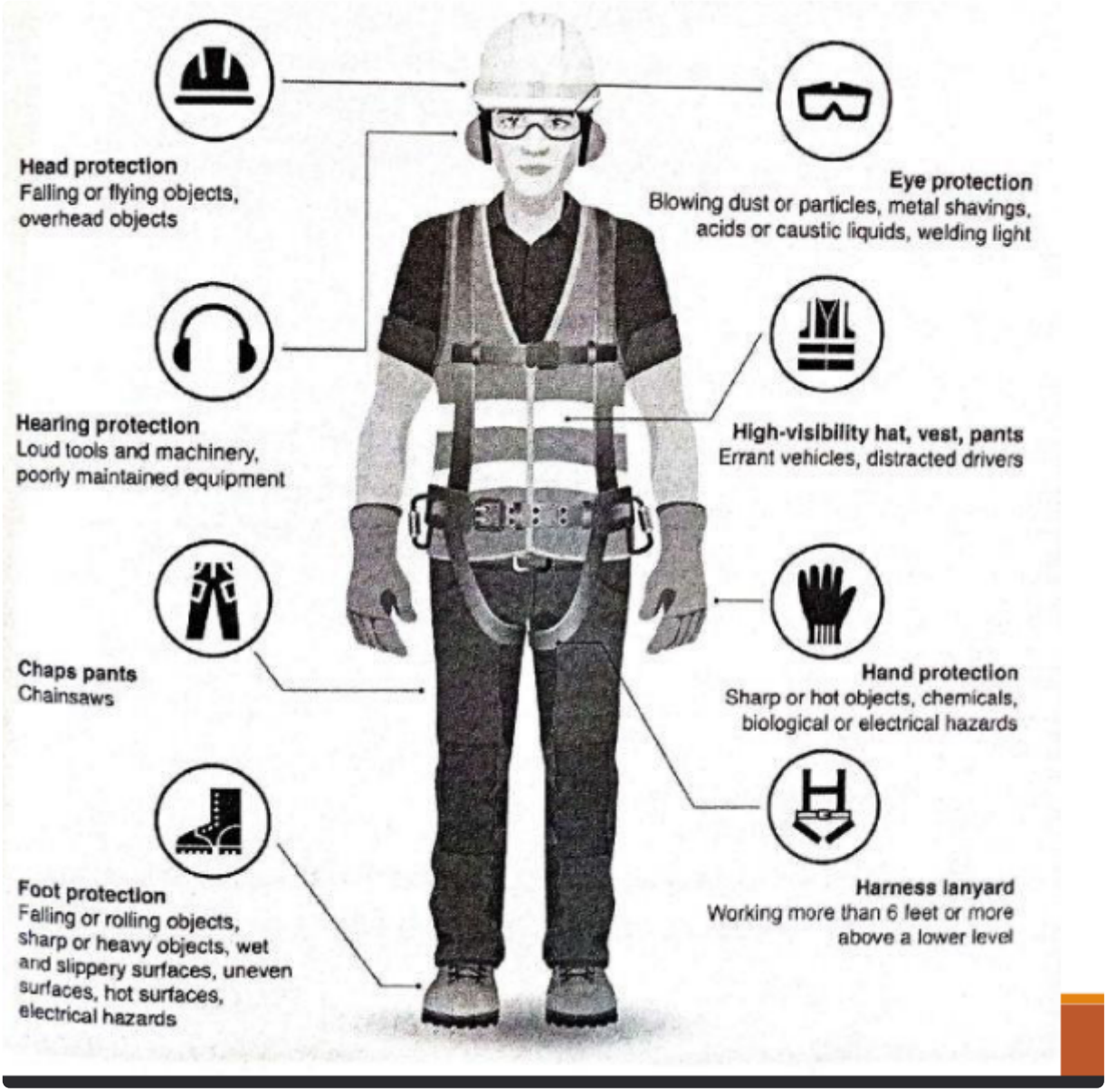
- **Identify Hazards**: Find dangers and suggest ways to fix them.

Module 2

Types of Personal protective equipments

- **Head Protection**:
  - **Purpose**: Protects against falling objects, intense heat, and chemical splashes.
  - **Types**: Industrial helmets, hair nets, and safety caps are used based on the specific risks.
- **Ear Protection**:
  - **Purpose**: Prevents hearing damage.
  - **Types**: Earplugs, earmuffs, and helmets with integrated ear protection and communication devices.
- **Eye Protection**:
  - **Purpose**: Shields eyes from glare, flying fragments, dust, chemical splashes, and molten metal.
  - **Types**: Eye-shields, goggles, and safety spectacles.

- **Body Protection**:
  - **Purpose**: Protects against minor injuries, chemical hazards, and fire.
  - **Types**: Aprons, boiler suits, asbestos suits, hot entry suits, and safety belts for fall protection.
- **Hand Protection**:
  - **Purpose**: Guards hands and arms against various hazards.
  - **Types**: Gloves, pads, arm shields, wristbands, and barrier creams.
- **Lung Protection (Respiratory PPE)**:
  - **Purpose**: Protects against dust, sprays, fumes, and contaminated air.
  - **Types**: Face masks for simple protection, respirators for purifying air, and breathing apparatus for contaminated environments.
- **Foot Protection**:
  - **Purpose**: Protects feet from injuries like molten metal burns or falling weights.
  - **Types**: Safety footwear and special safety shoes.



5S Concept of Housekeeping

5S is a system used to organize and maintain a clean, efficient workplace. It's based on five Japanese words that start with 'S,' and it's a foundational tool for improving workplace quality and fostering discipline. Here’s a simple breakdown of each step:

1. **Seiri (Sort)**: Remove unnecessary items from the workplace to keep only what’s needed.
2. **Seiton (Straighten/Streamline)**: Organize and arrange the necessary items for easy access and efficiency.
3. **Seiso (Shine)**: Clean the workspace and equipment regularly to keep everything in good condition.

4. **Seiketsu (Standardize)**: Create and follow standards for maintaining order and cleanliness.
5. **Shitsuke (Sustain)**: Develop habits and discipline to sustain the improvements and maintain the organized workspace.

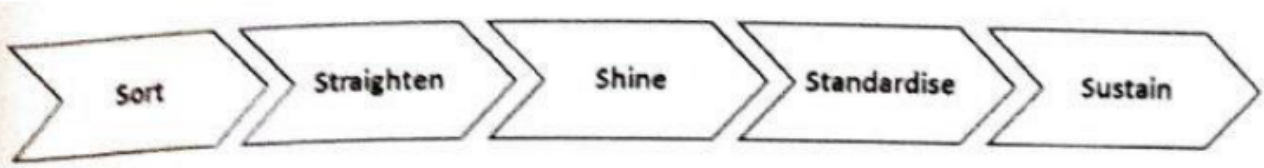


Fig 2.4: Recommended sequence for 5S implementation

Step Name	Japanese term	Explanation
1. Sort	Seiri (tidiness)	Remove unnecessary items from each area
2. Set In Order	Seiton (orderliness)	Organize and identify storage for efficient use
3. Shine	Seiso (cleanliness)	Clean and inspect each area regularly
4. Standardize	Seiketsu (standardization)	Incorporate 5S into standard operating procedures
5. Sustain	Shitsuke (discipline)	Assign responsibility, track progress, and continue the cycle

Work permit system

Work Permit System (PTS), also known as Permit-To-Work (PTW), is a formal written system designed to ensure the safe execution of potentially hazardous jobs. The system makes sure that all conditions are safe before work begins and that the job is carried out under controlled risk conditions.

Objectives of the Work Permit System:

- **Written Permission:** Provides formal authorization to start the work.
- **Planning:** Ensures thorough planning for every aspect of the job.
- **Checking:** Confirms that all safety measures are in place and functioning.

- **Risk Assessment:** Implements risk assessments and method statements.
- **Communication:** Shares health and safety information with all involved.
- **Control Maintenance:** Ensures essential safety controls are maintained.
- **Safe State:** Guarantees the area is safely returned to its original state after work.
- **Communication:** Facilitates communication between all parties involved.

Work Not Requiring a Permit:

- Routine tasks in established workshop areas.
- Material handling in warehouses and storage areas.
- General office work.
- Visual inspections without tools, with verbal permission.
- Daily startup and shutdown activities performed by operational employees.
- Work in designated areas declared as permit-free by the client.
- Special tasks approved by the client on a contractor's request.

Types of Work Permits:

- **Cold Work Permit (Green):** For jobs that do not involve sources of ignition, sparks, or fire.
- **Hot Work Permit (Red):** For tasks that involve sources of ignition, sparks, or fire.
- **Confined Space Entry Authorization (Yellow):** For entering confined spaces.
- **Excavation Authorization:** For excavation jobs, valid for 1 month and can be renewed for up to 3 months if requested at least 3 days before expiration.