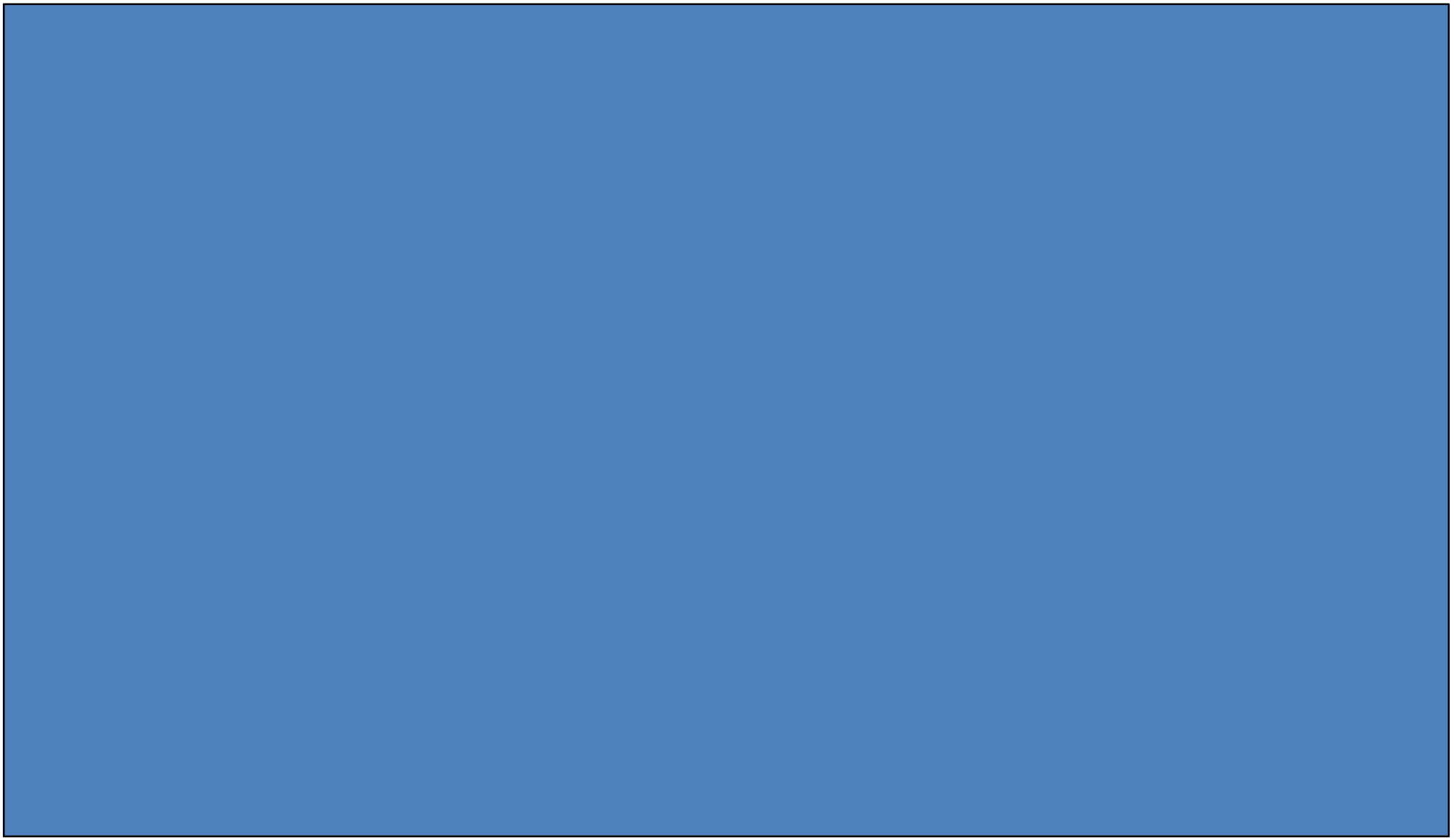
MAINTENANCE OF MACHINERY, GUARDS AND EQUIPMENT

Safety and Health Officer Certificate Programme

Session/LessonPlans



OBJECTIVES

- State the definition of maintenance
- List 3 maintenance requirements
- Explain 4 types of maintenance
- List 4 hazards during maintenance activities
- List 12 safety measures related to maintenance works
- List 6 factors that influence the frequency of maintenance

SCOPE

- Definition
- Necessity for maintenance
- Types of maintenance
- Selection and frequency
- Common accidents during maintenance works
- Safety measures
- Conclusion

DEFINITION

MAINTENANCE

"Work that is carried out to ensure plant* remains at acceptable standards"

** plant – as defined in the Occupational Safety and Health Act 1994*

NECESSITY FOR MAINTENANCE

- To ensure smooth-running of plant operations
- To ensure safety of plant operations
- To minimize the possibility of injury or harm
- To increase workplace cleanliness for safety purposes
- To demonstrate compliance with safety regulations

TYPES OF MAINTENANCE

- Preventive Maintenance
- Statutory Preventive Maintenance
- Breakdown Maintenance
- Online Maintenance

PREVENTIVE MAINTENANCE

- Conduct maintenance regularly according to already set schedules
- Replace and restore faulty equipment according to schedule
- Keep maintenance and repair records

PREVENTIVE MAINTENANCE

- Conducted to prevent faulty equipment or equipment failures that may result in:
  - Work disruption
  - Accidents

STATUTORY PREVENTIVE MAINTENANCE

- Conducted in compliance with provisions of the Factories and Machinery Act 1967 (required by the regulations)
- Machinery inspection as per FMA 1967 provisions

STATUTORY PREVENTIVE MAINTENANCE

Types of Machinery:

- Steam generating machinery
- Boilers, autoclaves, steam generators
- Pressure vessels
- Lifting machinery
- Lifts, cranes and machinery that requires certification of fitness
- Prime movers

METHODS OF STATUTORY PREVENTIVE MAINTENANCE

As per regulatory requirements, such as:

- Keeping maintenance records
- Appointing registered firms (lifts, boilers, cranes)

BREAKDOWN MAINTENANCE

Conducted when machinery encounters a problem or is damaged, and is unable to operate.

BREAKDOWN MAINTENANCE

Why?

- Fulfill / address company policy
- Reduces cost (rather than buy a new one)
- Machinery does not have to be regularly stopped (only when needed)
- Allows the option of repairing or disposing of the machinery

ONLINE MAINTENANCE

Conducted while machine is in operations

ONLINE MAINTENANCE

Why?

- Not practical to stop machine operations
- Some maintenance works/processes requires machine to be in operations for the purpose of:
  - Cleaning
  - Repair works
  - Coordination
  - Trouble shooting

SELECTION OF METHOD

The selection of which maintenance method to adopt is dependent on the:

- Type of process
- Type of machinery

FREQUENCY OF MAINTENANCE

Frequency is dependent on:

- Age of machinery
- Machinery damage records
- Conditions of the machine operations
- Manufacturer instruction/suggestion/ recommendation
- Statutory requirements
- Company policy

The frequency and nature of maintenance should be determined through risk assessment, taking full account of:

the manufacturer's recommendations

FREQUENCY OF MAINTENANCE

Also the frequency and nature of maintenance should be determined through risk assessment, taking full account of:

- the manufacturer's recommendations
- the intensity of use
- operating environment (eg the effect of temperature, corrosion, weathering)
- user knowledge and experience
- the risk to health and safety from any foreseeable failure or malfunction

COMMON ACCIDENTS DURING MAINTENANCE

- Exposure to hazardous materials including chemical substances
- Contact with moving elements/ materials/parts
- Falls
  - from same level
  - from higher level
- Crushed by falling object

MAINTENANCE SAFETY

Measures to be Taken

- Safety training for relevant workers and personnel
- Formulate safe work procedures
- Implement safe system of work
- Supervision of work to be undertaken
- Formulate rules and guidelines for maintenance works

MAINTENANCE SAFETY

Measures to be taken (Cont.)

- Implement permit to work system
- Implement proper worker selection
- Use of safety signages
- Provide uniforms and appropriate PPE
- Use of suitable tools/equipment

WHO CAN UNDERTAKE MAINTENANCE WORK

Maintenance work should only be undertaken by those who:

- are competent to do the work
- have been provided with sufficient information, instruction and training
- in some cases, may be best undertaken by the manufacturer or specialist contractors
- but, in many cases, maintenance can be done in-house by suitably trained, competent staff

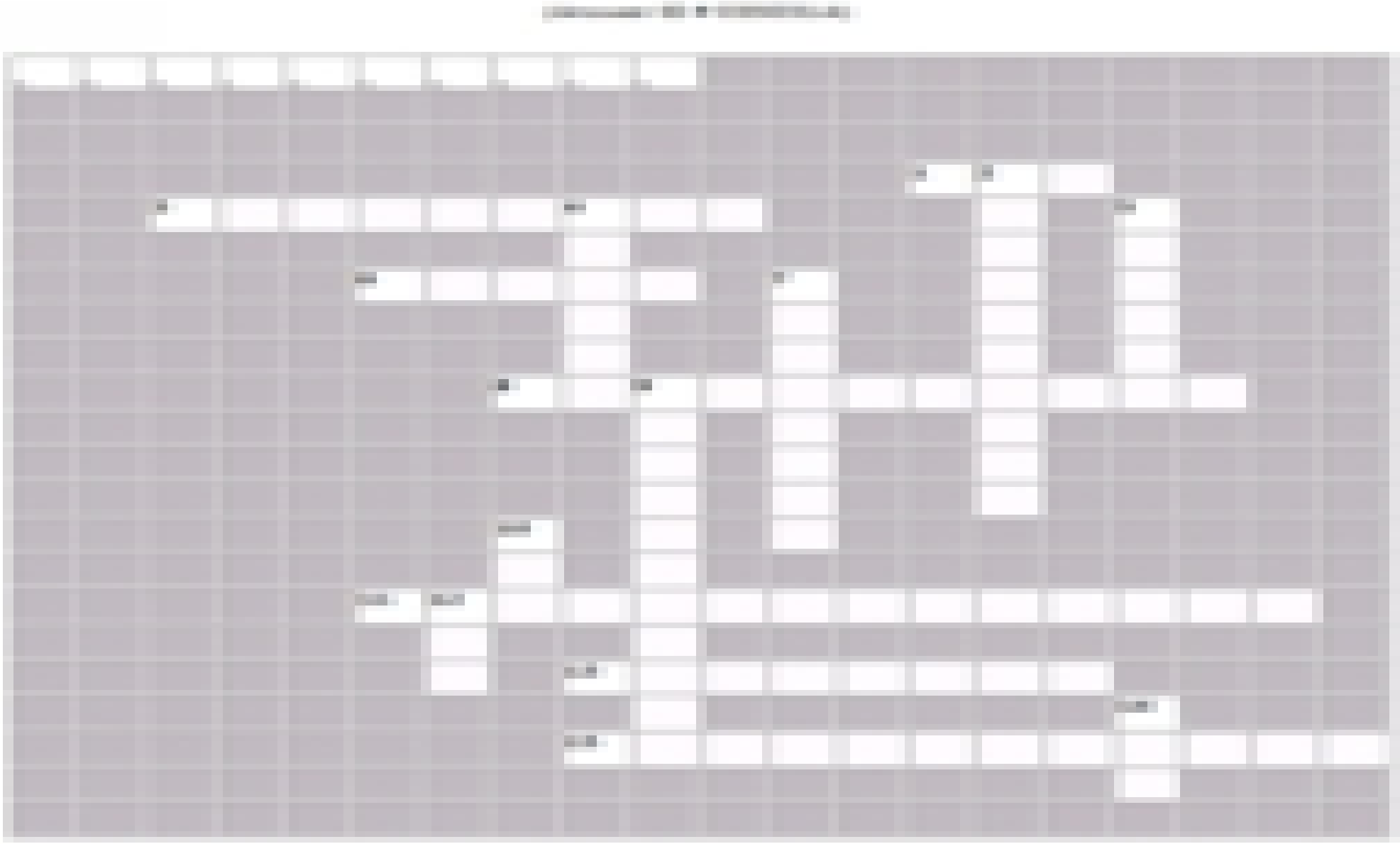
CONCLUSION

- The purpose of maintenance is to:
  - Ensure smooth-running and safety of plant, workplace and equipment operations
  - Prevent accidents with improved workplace cleanliness and housekeeping

- There are four types of maintenance methods that may be adopted.

- Selection of method is based on the machinery, equipment or process used in operations

Complete the puzzle



Down

2. uniform and scheduled maintenance

4. maintenance to a machine in operation

5. regulatory maintenance with certificate of fitness

7. required for maintenance staff

9. required during maintenance work

10. maintenance machine depends on its _____

12. certicate of fitness for unfired pressure vessels

14. CF for Boilers

Across

1. the last hierarchy of control measures

3. Is it a problem ? Fix it

6. right ____ for the job

8. PPE for dust

11. maintenance records

13. measures during maintenance

15. hazard during maintenance

REFERENCE

- http://ehs.research.uiowa.edu/machine-and-equipment-guarding-procedures
- https://www.osha.gov/SLTC/etools/machineguarding/additional_considerations.html