OBJECTIVE SYLLABUS FOR ENVIRONMENTAL, HEALTH & SAFETY MODULE

SECTION A - THE ENVIRONMENT

LESSON 1 An Introduction to the Environment

At the end of Lesson 1 you should be able to:

1.1 Understand how human activity affects the environment.
1.2 Understand the importance of environmental, health and safety controls.
1.3 Know how energy use affects the environment.
1.4 Appreciate the need for resource conservation.
1.5 Understand how waste and pollution affects the environment.
1.6 Know how carbon dioxide affects the environment and appreciate the need to reduce carbon dioxide emissions.

SECTION B - WHY SURFACE FINISHING?

LESSON 2 - Surface Finishing Techniques and Applications

At the end of Lesson 2 you should be able to:

2.1 Define surface finishing.
2.2 Describe the main processes used for Surface Finishing and their basic principles.
2.3 Describe the purposes for which these finishes are applied to substrates.
2.4 Describe the nature of the Surface Finishing Industry and its economic importance.

LESSON 3 - Properties of Different Surface Finishes

At the end of Lesson 3 you should be able to:

3.1 List the strengths and weaknesses of various surface finishes.
3.2 Decide which finish is appropriate for a particular function.

LESSON 4 - How Coatings Can Prevent Corrosion

At the end of lesson 4 you should be able to:

4.1 Define corrosion and understand its consequences.
4.2 Understand the chemistry of corrosion of iron.
4.3 Understand the electrochemical nature of the aqueous corrosion of metals.

4.4 Know how the electrochemical series can be used to select coatings for the prevention of corrosion.
4.5 Understand how coatings prevent corrosion.
4.6 Describe the need for accelerated corrosion tests for coated products and explain the main tests.

SECTION C - WASTE

LESSON 5 - Sources of Waste

At the end of Lesson 5 you should be able to:

5.1 Identify the sources of waste in cleaning and pretreatment operations.
5.2 Identify the sources of waste from inorganic coating operations.
5.3 Identify the sources of waste from organic coating operations.
5.4 Recognise that ancillary operations also produce waste.

LESSON 6 - Waste Avoidance

At the end of Lesson 6 you should be able to:

6.1 Understand the recycle hierarchy.
6.2 Develop a strategy to avoid spills and leaks.
6.3 Deal with spills and leaks and organise a spills team.
6.4 Reduce energy use in a surface finishing facility.
6.5 Manage quality to reduce waste.

LESSON 7 - Waste reduction and disposal

At the end of Lesson 7 you should be able to:

7.1 Understand the waste reduction hierarchy.
7.2 Discuss process substitution in surface finishing.
7.3 Discuss strategies for reducing the amount of waste going for disposal.
7.4 Reduce water usage in a finishing facility.
7.5 Develop strategies to reduce energy usage in surface finishing.

SECTION D - TREATMENT AND DISPOSAL OF WASTES

LESSON 8 - Waste Processing

At the end of Lesson 8 you should be able to:

8.1 Discuss techniques to reduce surface finishing wastes by elimination, substitution, reduction, recycling and recovering..
8.2 Appreciate that disposing of waste by landfill is an expensive option.
8.3 Describe some of the equipment used for waste processing.

8.4 Understand the importance of monitoring the pH value and oxygen redox potential of waste streams
8.5 Understand the importance of good mixing when carrying out chemical processes.
8.6 Discuss the options available for waste treatment.

LESSON 9 - Effluent Treatment

At the end of Lesson 9 you should be able to:

9.1 Discuss the principles of effluent treatment.
9.2 Safely treat cyanide.
9.3 Treat effluent containing hexavalent chromium.
9.4 Remove heavy metal ions from effluent by precipitation.
9.5 Remove phosphates and oils and greases from effluent.
9.6 Remove water from the sludge produced by effluent treatment.
9.7 Safely dispose of the solid waste from effluent treatment.

LESSON 10 - Treatment Systems for Waste Water

At the end of Lesson 10 you should be able to:

10.1 Explain how ion exchange works and the benefits it can give to a surface finishing facility.
10.2 Discuss the limitations of ion exchange technology.
10.3 Use vacuum evaporation techniques for some applications.
10.4 Discuss the use of membrane technologies for the treatment of waste water from a surface finishing facility.
10.5 Use electrowinning techniques to recover valuable metals from waste water.

LESSON 11 - Air Pollution Control Systems

At the end of Lesson 11 you should be able to:

11.1 Discuss the different methods for the abatement of particulates in waste air streams.
11.2 Use scrubbers to remove both particulates and gases from waste air streams.
11.3 Remove noxious gases from waste air streams.
11.4 Prevent paint overspray escaping into the environment.
11.5 Discuss designs of spray booths to trap and treat paint overspray.

SECTION E - LEGAL AND OTHER ASPECTS

LESSON 12 - General Legislation

At the end of Lesson 12 you should be able to:

12.1 Discuss the Environmental Protection Act (1990).
12.2 Discuss the Pollution Prevention and Control Act (1999) and Environment Damage and Liability Regulations (2009).
12.3 Comply with the COMAH regulations.

12.4 Comply with the RoHS and WEEE regulations.
12.5 Comply with CHiPS and End of Life Vehicle regulations.
12.6 Discuss the Solvent Emissions Directive.

LESSON 13 - Environmental and Health and Safety Legislation

At the end of Lesson 13 you should be able to:

13.1 Discuss the legislation relating to air pollution.
13.2 Discuss the legislation relating to water pollution.
13.3 Discuss the legislation relating to land pollution.
13.4 Understand the objectives of REACH.
13.5 Discuss the Health and Safety at Work Act.
13.6 Apply the CoSHH regulations.

SECTION F - PROTECTION FROM ENVIRONMENTAL, HEALTH AND SAFETY HAZARDS

LESSON 14 - Health and Safety Equipment

At the end of Lesson 14 you should be able to:

14.1 List safe working procedures.
14.2 List and identify the most important items of primary safety equipment in a hazardous workplace.
14.3 List and identify the most important items of secondary safety equipment in a hazardous workplace.
14.4 Discuss the first aid requirements in the work place.

LESSON 15 - Health and Safety Hazards in the Workplace

At the end of Lesson 15 you should be able to:

15.1 Identify physical hazards in the workplace.
15.2 Apply remedies to avoid physical hazards in the workplace.
15.3 Avoid long term health and safety hazards.
15.4 Identify chemical hazards in the work place.
15.5 Identify hazards associated with blast cleaning.
15.6 Discuss the causes of fire and develop strategies to avoid fires.
15.7 Know how to develop procedures to implement in the event of a fire.
15.8 List the 5 steps to fire safety.

LESSON 16 - Health and Safety Hazards in Surface Finishing

At the end of Lesson 16 you should be able to:

16.1 Identify hazards in the electroplating shop and know the precautions to take against these hazards.

16.2 Identify the hazards in the vacuum deposition shop.
16.3 Identify the hazards in the paint shop and know the precautions to take against these hazards.
16.4 Identify the hazards in the powder coating shop and know the precautions to take against these hazards.
16.5 Know how to safely access plant and equipment.

SECTION G - MANAGING HEALTH, SAFETY AND ENVIRONMENTAL IMPACTS

LESSON 17 - How to Assess and Manage Risks

At the end of Lesson 17 you should be able to:

17.1 Explain the difference between hazard and risk.
17.2 Use the hierarchy for minimising risks.
17.3 Carry out a risk assessment.
17.4 Identify hazards.
17.5 Identify risk and safety phrases.
17.6 Prioritise and reduce risks.

LESSON 18 - The Environmental Management System.

At the end of Lesson 18 you should be able to:

18.1 Discuss the need for management control of potential environmental impacts.
18.2 Explain what is an environmental management system.
18.3 Use an environmental management system.
18.4 Create an environmental objectives plan.
18.5 Implement an environmental management system.
18.6 Know how to maintain the environmental objectives plan and the environmental management system.

LESSON 19 - Other Environmental Impact Assessment Processes.

At the end of Lesson 19 you should be able to:

19.1 Carry out an Environmental Impact Analysis.
19.2 Prepare an Environmental Impact Statement.
19.3 Appreciate the need for a Cost Benefit Analysis of an environmental project.
19.4 Know the benefits of Life Cycle Analysis of products, processes or services.
19.5 Understand the importance of controlling energy use.
19.6 Discuss the Eco Management and Audit System.

SECTION H - SURFACE FINISHING AND THE ENVIRONMENT

LESSON 20 - The interplay between Surface Finishing and the Environment

At the end of Lesson 20 you should be able to:

20.1 Understand what is meant by sustainability.
20.2 Discuss the environmental impact of some surface finishing processes.
20.3 Understand the use of carbon equivalents for assessing environmental impact.
20.4 Discuss the economic importance of surface finishing for environmental protection.
20.5 Understand the environmental benefits of green chemistry in surface finishing.
20.6 How new technologies can help surface finishing to meet environmental challenges.