

Study Guide

Module 207 – Level 2

Powder Coatings – Overview

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Summary

The idea of a solvent-free system is very attractive, both to manufacturers and applicators. It suggests freedom from such problems as fire risks, pollution and wastage of raw materials. Thermoplastic and thermosetting coating powders offer one such answer.

This module describes the various stages in the development of these relative newcomers to the coatings market, comparing and contrasting them with liquid coatings. The study material covers the basic properties of powders, the methods used in their production and the techniques used to apply them. It also discusses particle size – one of the most important factors in the manufacture of powder coatings.

Thermosetting powder coatings are one of the major growth areas in the surface coatings industry, despite their relatively slow growth when they were first introduced. The Module gives details of the markets where they are currently used and of the recent developments which might lead to expansion into new areas.

It is expected that it will take approximately 10 hours to complete this module, including the Assignment work involved

Prerequisites

Before working through this module, you should first read through the “Student Guide” provided by the British Coatings Federation. This gives information on the back-up and support provided for persons studying this and other modules.

Structure of the Module

It is expected that it will take between 8 and 10 hours to complete this module, including the Assignment work involved.

Learning Objectives

For each topic in the module, there is a learning objective. These objectives are listed immediately before the Study material.

Marking Scheme

The marks are allocated to the different features of the module, as follows:

ASG	35%
CMA	20%
End Test	<u>45%</u>
TOTAL	<u>100%</u>

An overall mark of 50% or more is necessary for successful completion of the module, with students achieving at least 40% of the marks available in each element.

Self Assessment Questions (SAQ's)

The answers to SAQ's can be found in Appendix 1. If you have any difficulties, go over the text again to make sure that you understand the answer. Ask your Tutor or Counsellor to explain anything you do not understand.

Assignment Exercises (ASG's)

In Section 5 you will be asked to carry out a piece of experimental work. This ASG can be found in Appendix 2. Please note that these ASG's are optional, but final marks will be affected accordingly.

Computer Marked Assessments (CMA)

When you have finished the module, a note in the text will guide you to the Computer Marked Assessment (CMA) on the website. Send the completed CMA to your Tutor for marking. Receipt of the CMA to your Tutor will also tell them that you have completed the module and that, if necessary, they must arrange an End Test.

The Module Calendar

We expect that the amount of learning material in this module can be completed within a month of starting.

Note: *The subject of Powder Coatings is dealt with in detail in:*

- *Technology of Powder Coatings by S.T. Harris ISBN 9019 9 4936 Published (1976) by Portcullis Press.*
- *Electrostatic Powder Coatings by J.F. Hughes*
- *The Science of Powder Coatings, Volume 1. Chemistry, Formulation and Application (1990), Volume 2. Applications (including Manufacture) (1993) by D.A. Bates Published by SITA Technology*
- *Code of Safe Practice: Powder Coating Application of thermosetting coating powders by Electrostatic Spraying. Published by The British Coatings Federation (2004 Edition)*

MODULE OBJECTIVES

At the end of this module, you should be able to do the following:

Section 1 - Introduction and historical perspectives

- 1.1. Define powder coatings, comparing and contrasting them with solvent-based paints.
- 1.2. Compare and contrast thermosetting and thermoplastic powder coatings.
- 1.3. Describe the various key stages in the evolution of the equipment, materials and techniques used in powder manufacture and application today, listing the factors that made their development possible.

Section 2 - Why powders?

- 2.1. List the advantages and disadvantages of powder coatings compared with solvent-based paints.
- 2.2. Outline the end-uses to which powder coating have been put and suggest future market opportunities.

Section 3 - Powder coating resin systems

- 3.1. List the various types of thermoplastic resin and the basic properties that make them suitable for use as a powder coating.
- 3.2. List the basic properties that thermosetting resin/hardener systems must have for use as a powder coating, giving an example.

Section 4 - The manufacturing process

- 4.1. Describe the process of pigment dispersion and its importance in the manufacture of coatings.
- 4.2. Describe the various stages in the manufacture of powder coatings and the types of equipment used.

Section 5 - Particle technology of finished powders

- 5.1. Describe methods of measuring particle size distribution.
- 5.2. Explain the importance of particle size in the application of powder coatings.

5.3. Describe the effects of particle shape on application properties.

Section 6 - Principal methods of application

6.1. Describe preheat / immersion method of application.

6.2. Describe the electrostatic spray method of application