

Intermediate Module 316

Manufacture of Powder Coatings

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Summary

Module 316 begins by giving an overview of the processes used in the manufacture of thermosetting and thermoplastic powder coatings and then proceeds to describe the nature of the raw materials used.

Following this outline, a detailed description of each of the separate stages in the manufacturing process for thermosetting powders is provided.

The theory of the dispersion process is examined, and the mechanism explained together with a consideration of the extruders used. Grinding and classification are discussed, and a description of the plant and processes used provided.

In the final section, specific processes used for the manufacture of some thermoplastic powder coatings are explained.

A general consideration of the incorporation of pigments and metallic powders completes this study of powder coatings manufacture.

Structure of the module

The module consists of a theory block, 1 Computer Marked Assessment and 1 Practical Attendance Exercise. The theory block is split into four sections which are not of equal length but should take, on average, about 2.5 to 3 hours to go through.

The module is designed to take about 12 hours of study made up of:

- theory block
- practical work

This time excludes the time taken to write up your report for the practical attendance exercise.

The practical attendance exercise is explained in Appendix 2. You should discuss this with your tutor.

For full certification, the CMA and the PAX must be completed satisfactorily.

Marks for this module

CMA answers	20%
PAX	35%
End Test (TMA)*	45%

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.

*You may, if you wish, await the completion of three modules before sitting the TMA papers. By 'Stacking' tests in this way, you will only need to attend the test centre once instead of three times.

Module Pre-requisites

Persons taking modules at Intermediate Level should be employed or have recently been employed in the coatings or a related industry. They should have studied some science, including physics and chemistry.

Most intermediate students will have studied some modules at foundation level. However, students who have not studied modules at foundation level but have a scientific background and experience of the coatings industry in general and powder coatings, in particular, should be able to benefit from this module.

Module Objectives

Section 1. Review of manufacturing processes, techniques and terminology. Properties of raw materials; weighing and blending stages

- 1.1** Overview of manufacturing techniques, stages of the process and the terminology used in powder coatings manufacture.
- 1.2** Properties of raw materials used; master batching; weighing.
- 1.3** Pre-blending
- 1.4** Storage and Transfer of Pre-blend.

Section 2. Theory of Compounding and Dispersion- Thermosets

- 2.1** Objective of dispersion and overview of the dispersion process.
- 2.2** Mechanism of Dispersion
- 2.3** Use of single- and twin-screw extruders.
- 2.4** Compounding and Dispersion Plant – Thermosets.
- 2.5** Cooling, kibbling and cleaning.

Section 3. Grinding and Classification: Thermosets

- 3.1** Objectives of the grinding process.
- 3.2** Particle size range and temperature control.
- 3.3** Types of milling plant
- 3.4** Mill cooling, dust explosions, packaging and storage.

Section 4. Manufacturing of thermoplastics; Incorporation of pigments; metallic finish powders

- 4.1** Comparison with Thermosets
- 4.2** Manufacturing Processes - Thermoplastics.
- 4.3** Pigmentation.
- 4.4** Incorporation of Pigments; Masterbatching; Metallic finish powder coatings.