



Australian Government

Department of Education, Employment and Workplace Relations

PMAOPS550B Develop a colour formulation

Revision Number: 1

PMAOPS550B Develop a colour formulation

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit covers the development of a new formulation, suitable for production, of a colour to match a sample/customer requirements. It includes both computer and visual colour matching and the adjustment of a computer suggested formulation to suit company conditions and standard materials/colourants.
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Application of the Unit

Application of the unit	In a typical scenario, a technologist is given a colour sample, or colour description, and needs to develop a formulation. The formulation would be suitable for production by the company and produce a final product which meets the colour requirements of the customer. The development would include factory trials and modifications to the formulation. Typically the development will be of a new colour for an existing product of another colour. It may include the colour aspects (only) of developing a totally new product. This unit does not include the development of any aspect of the product other than its colour. The technologist would: • identify potential manufacturing problems associated with the colour formulation and propose/implement solutions • analyse the production trials from the standpoint of the desired colour and the impact of the colour requirements on the production process and make modifications to ensure a product of stable colour and suitable manufacturing process. Generally the technologist would be part of a team for the total development of a new product, but may develop the colour formulation for a new colour for an existing product independently. The technologist would liaise with relevant production and other personnel for production trials.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units	<i>PMAOPS350B</i>	<i>Match and adjust colour</i>
	<i>PMAOPS450B</i>	<i>Solve colour problems</i>

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Confirm design brief of new colour.	1.1. Communicate with customer and other key stakeholders and agree on: 1.1.1. colour/colour specification 1.1.2. surface finish/gloss 1.1.3. viewing conditions (lighting) 1.1.4. opacity 1.1.5. requirements for metamerism/non-metamerism match 1.1.6. other aesthetic requirements 1.2. Determine end use of product, eg interior, exterior, automotive 1.3. Develop and validate design brief to meet needs.
2. Determine initial colour formulation.	2.1. Analyse colour sample (where provided) using colour computer and/or eye and predict possible colour formulation 2.2. Compare predicted formulation with company/customer preferred colourants. 2.3. Adjust predicted formulation to use preferred colourants. 2.4. Check that the adjusted formulation complies with design brief.
3. Conduct small scale trials.	3.1. Make/arrange for small batch to adjusted formulation 3.2. Undertake trials to determine optimum processing conditions where relevant 3.3. Analyse colour of sample product and compare to design brief 3.4. Modify formulation and processing (where relevant) to have simplicity of manufacture and to meet brief.
4. Assess hazards.	4.1. Identify hazards arising from colour formulation and processing 4.2. Assess risks arising from those hazards 4.3. Determine appropriate action to control risks in accordance with hierarchy of control and duty of care 4.4. Take required action before proceeding to trial.
5. Trial new colour formulation through the process.	5.1. Design trial to procedure to deliver required information 5.2. Ensure OHS and environmental requirements are stringently observed 5.3. Coordinate the trialing of the new product 5.4. Interpret colour trial results and guide colour trial process 5.5. Adjust formulation, and if appropriate tune process, to optimise production of new colour.

ELEMENT	PERFORMANCE CRITERIA
6. Coordinate evaluation and testing.	6.1. Determine colour testing and evaluation regime required to meet end use requirements, including regulatory/industry code requirements 6.2. Arrange for testing and evaluation of trial colour 6.3. Interpret colour trial results 6.4. Modify formulation and conduct new trials as required 6.5. Determine final formulation and processing specifications.
7. Implement procedures for new colour.	7.1. Monitor initial production and adjust process, conditions and formulation to make the process a smooth operation 7.2. Ensure process specifications reflect the optimised operation developed 7.3. Ensure quality standards and procedures meet requirements of design brief 7.4. Ensure procedures are correct for the new colour 7.5. Ensure project records are complete and all required reports have been completed and submitted 7.6. Archive records according to procedure.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required skills

This competency requires skills of:

- communication
- interrogation
- observation
- analysis

Required knowledge

Competence includes an understanding of colour, the interaction of colourants and the impacts of processing variables on the final colour of then product. In particular it includes the ability where relevant to:

- interpret the 'flare path' on a tonal graph of tone vs time
- choose the optimum grind/particle size for the required colour
- balance gloss, opacity and tone
- substitute colourants recommended from a 'computer match' for other colourants
- make both metamerics and non-metameric matches
- determine the hazards arising from the colourants chosen
- interpret weathering and other test data relevant to colour and the use of colour
- describe the causes and remedies of common problems such as those selected in the Range Statement.

Competence also includes the ability to isolate the causes of problems to an item of equipment within the compressor system and to be able to distinguish between causes of problems such as:

- wrong colourant
- wrong colourant amount
- wrong grind time/particle size
- wrong wetting/dispersing.

Evidence Guide

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Assessment for this unit of competency will be by developing colour formulations in a plant, laboratory or other relevant context. Assessment will occur over a range of situations which will include different design briefs.

Simulation may be required for assessment of this unit of competency. Simulation should be based on actual colour formulation developments. Simulations may also include the use of case studies/scenarios and role plays.

This unit of competency requires a significant body of knowledge which will be assessed through questioning and the use of what-if scenarios.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Competence must be demonstrated in the ability to recognise and analyse potential situations requiring action and then in implementing appropriate corrective action. The emphasis should be on the predicting possible problems and determining actions required to avoid the difficulty.

Consistent performance should be demonstrated. In particular look to see that:

- predicted colour formulations are reasonable
- adjustments to formulations are made based on a rational interpretation of the results and an understanding of colour and the process

These aspects may be best assessed using a range of colour formulation development projects backed up by scenarios/case studies/what-ifs. These assessment activities should include a range of problems, including new, unusual and improbable situations which may have been generated from the past incident history of the plant, incidents on similar plants around the world, hazard analysis activities and similar sources.

Context of and specific resources for

Assessment will require a suitable method of

EVIDENCE GUIDE	
assessment	gathering evidence of colour formulation ability over a range of situations. A bank of scenarios/case studies/what-ifs will be required as will a bank of questions which will be used to probe the reasoning behind the observable actions.
Method of assessment	In all plants it may be appropriate to assess this unit concurrently with relevant teamwork and communication units.
Guidance information for assessment	Assessment processes and techniques must be culturally appropriate and appropriate to the oracy, language and literacy capacity of the assessee and the work being performed.

Range Statement

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the Performance Criteria, is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Codes of practice/ standards	Where reference is made to industry codes of practice, and/or Australian/international standards, the latest version must be used.
Context	This unit of competency covers the development of a new colour formulation 'from scratch', usually based on a provided colour sample. The formulation would normally use colourants already available within the company (preferred colourants), but does not preclude the use of colourants which are novel/new to the company. It may be applied to any industry sector requiring the development of a new colour formulation such as: • paint • ink • plastics • rubber • concrete products • glass products • clay/ceramic products.
Typical problems	Typical problems may include: • matching under different lighting conditions • variable surface finish/gloss level • non-metameric matching • process caused colour differences.
Health, safety and environment (HSE)	All operations to which this unit applies are subject to stringent health, safety and environment requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between Performance Criteria and HSE requirements, the HSE requirements take precedence.

Unit Sector(s)

Unit sector	Operational/technical
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Competency field

Competency field	
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Co-requisite units

Co-requisite units	
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