Assessment Requirements

Unit PO013K – Knowledge of Vehicle Colour Matching

Content:

The effects of the viewing environment on colour matching:

a. Artificial light
b. Natural light
c. Light box
d. Direct sunlight
e. Shaded light
f. Reflection

The purpose of paint materials:

a Anti-corrosion
b Protection
c Reflection
d Visual
e Body sound deadening (all list to go in content)

Types of undercoats and their function:

a Primer
b Primer surfacer
c Anticorrosion
d Etch primers
e Plastic primers
f Primer fillers
g Electrodepositing (E-coating)
h e-coat replacement products
i Sealers/isolators
j Anti chip/texture coatings

Types of paints and their function:

a. Single pack
b. Two pack
c. Acrylic
d. Alkyd
e. Epoxy
f. Polyurethane
g. Phenolic
h. Polyester

Types of pigments available and their function:

a Coloured
b Metallic
c Pearl
d Anti corrosion
e Extender
f Special effects

The purpose of testing paint materials:

a. Adhesion
b. Durability
c. Corrosion
d. Resistance to chemicals
e. Abrasion
f. Acid rain
g. Ultraviolet

Types of topcoat

a. solid colours
b. clear over base colours
c. metallic colours
d. pearl colours

Methods and importance of correctly identifying paint substrates prior to undertaking any refinishing work

a. Workshop tests to determine substrates to include:
   i. solvent wipe test (1k or 2k)
   ii. colour of flatting sludge (straight colour or C O B)
   iii. VIN plate
b. Substrates to determine selection of undercoat with reference to:
   i. condition of surface
   ii. type of substrate
   iii. process requirements
   iv. material requirements
c. The physical properties of a substrate to include:
   i. surface condition
   ii. adhesion
   iii. flexibility
   iv. porosity
d. The technical properties of a substrate to include:
   i. type of paint
   ii. steel
   iii. aluminium
   iv. plastic
   v. coated steels
   vi. repaired panels
   vii. OE finish

How to prepare existing paint substrates for colour matching

a. The required preparation for the listed substrates to include
   i. steel
   ii. aluminium alloys
   iii. GR plastics
   iv. thermo plastics
   v. cured 2k materials
   vi. synthetic enamels
b. The procedures for the preparation of paint finishes to include:
   i. thorough cleaning and drying
   ii. compounding to restore original colour
c. The procedures for the preparation of plastics to include:
   i. identification
   ii. tempering
   iii. porefilling

iv. release agent removal
v. cleaning
vi. adhesion promotion
vii. elastic primers

d. The preparation requirements for textured and special effect coatings to include:
i. spoilers
ii. bumpers
iii. exterior trim

How different light sources can affect the perception of colour for matching purposes

a. Colour in terms of light reflected from a surface to include:
i. light quality
ii. surface quality
iii. absorbed light
iv. reflected light

b. The effects of metamerism under:
i. sodium light
ii. mercury vapour
iii. explain how this phenomenon is created

Types of refinishing materials by their film forming characteristics

a. The different types of paints to include:
i. non convertible
ii. nitro cellulose
iii. 1k acrylic
iv. convertible
v. oil based synthetics
vi. 2 k acrylics
vii. 2k polyurethane
viii. polyesters
ix. isocyanate resins
x. waterborne basecoats
xi. microgel
xii. latex

b. The properties of binders to include:
i. convertible
ii. oxidise
iii. high temperature reactants
iv. chemical reactants

c. Non-convertible:
a. solvent evaporation

d. The forms of binder such as:
i. nitro-cellulose
ii. alkyds
iii. urethanes
iv. polyesters
v. isocyanates
vi. acrylics

e. The uses of binders in paints:
i. film forming
ii. binding the pigments
iii. adhesion
iv. cohesion
v. flexibility

f. The principles of operation of water based materials.

g. The materials used in water based paint technology.
h. The environmental advantages of using water based paints.

Distinguish between paint system classification, such as MS, HS, UHS, waterbased, etc.

a. The difference between paint systems to include:
    i. medium solids
    ii. high solids
    iii. ultra high solids
    iv. waterbased

The properties of different types of solvents, thinners and hardeners

a. The properties of different types of solvent, thinners and hardeners such as:
    i. evaporation rate
    ii. ability to dissolve the binder
    iii. ability to be tolerated by the binder
    iv. fade out properties
    v. drying rate
b. The forms of solvent/thinner such as:
    i. alcohols
    ii. ketones
    iii. glycol ethers
    iv. blends
c. The use of solvent/thinner
    i. to make the paint fluid in the tin
    ii. to reduce the paint to a spraying/ application viscosity
d. The properties of 2K hardeners to include:
    i. effectiveness at blocking out harmful ultra violet light
    ii. necessity for adding to 2k paints to effect curing
    iii. inclusion of isocyanates requires special H&S procedures

The properties of paint system additives

a. Listed additives and describe their properties to include:
    i. adhesion promoters
    ii. flexible additives
    iii. texture finishes
    iv. extenders
    v. UV absorbers
    vi. flow aids
b. The characteristics of additives to be added to textured paints such as those for:
        i. textured finish
        ii. leather look finishes
        iii. crackle finishes
        iv. metallic additives other than aluminium

The factors to be considered when choosing and using refinishing systems

a. The characteristics and properties of surface coatings to include:
    i. nitro-cellulose- non convertible-low build –fast surface dry
    ii. oil based synthetics-convertible-slow dry through uptake of oxygen
    iii. two packs- convertible- chemical reaction –high build
    iv. basecoats- solvent or water borne -non convertible-very low build-high opacity have to be overcoated with clearcoat
b. The listed paint materials in terms of their:
    i. preparation of substrates
    ii. mixing procedures
    iii. application

iv. drying processes
v. working techniques
vi. covering and hiding power
vii. rectification
viii. cleaning processes

Spraying equipment adjustments can alter the colour of refinishing materials

a. The spray gun adjustments that can be made to determine the surface finish of a colour coat to include:
   i. air pressure
   ii. fluid volume
   iii. fan width

Sources of information relevant to the mixing and matching of vehicle paint colours

a. The information that may be gained from the Vehicle Identification No. (VIN) plate with regard to paint codes.
b. Alternative areas of the vehicle where the paint code may be found.
c. The sources of information relevant to paint finishing to include:
   i. PC based material
   ii. paint manufacturers information
   iii. trade magazines
   iv. specialist magazines (customising periodicals)
   v. vehicle manufacturers information sheets
   vi. paint data sheets
   vii. microfiche
   viii. world wide web
   ix. Thatcham methods manuals
d. Types of information recoverable from the above sources to include:
   i. product and mixing information
   ii. health and safety information
   iii. first aid procedures
   iv. application techniques
   v. rectification procedures
   vi. colour information
e. The meaning of the symbols used on most microfiche such as:
   i. colour data
   ii. formula field
   iii. technical field
   iv. on line finish
   v. coding field
   vi. formula in development
   vii. special technical information
   viii. variants
   ix. respray
   x. poor opacity
   xi. 3-stage colour
   xii. colours for mouldings/bumpers
   xiii. revised formula
f. The extra colour information available such as:
   i. colour variants
   ii. colour ‘wheel’
   iii. on-line colour back up
g. The sources of tinting information available to the painter to aid colour matching of metallics.

The principles of colour, the colour wheel, and Munsell’s Notation

a. The theory of colour matching to include:
    i. primary and secondary colours
    ii. metamerism
    iii. quality of light source
    iv. colour circles
b. The terminology used to describe the matching of metallic colours with reference to:
    i. the munsell colour circle
    ii. the variant shade
    iii. hue
    iv. chroma
    v. value
c. What is meant by subtractive mixing.
d. What is meant by additive mixing.

The factors affecting colour and colour perception, including metamerism

a. Factors affecting colour variation such as:
    i. orientation of metallic particles
    ii. flip and face tones
    iii. coating thickness and viscosity
    iv. spraying temperatures
    v. spraying pressures
b. How each of the above has an effect on the colour match
c. How the above problems can be overcome
d. The process of light and pigment interaction with reference to:
    i. colour spectrum
    ii. colour effects
    iii. refraction
    iv. diffusion
    v. light wavelengths
    vi. thickness of pigment particles
    vii. type of pigment particles
e. The function of a light box testing unit as:
    i. testing under normal daylight conditions
    ii. testing for metamerism
    iii. comparison of colour standards
f. The operation of a light testing unit with reference to:
    i. operation
    ii. type of light used

How to obtain matching colours and how to compare them with the original finish in terms of colour, tone and effect, including the use of dried test cards or panels

a. The procedures and principles for using colour chips such as:
    i. cleaning the panel
    ii. matching in daylight conditions
    iii. matching adjacent panels
b. What is meant by subtractive mixing
c. What is meant by additive mixing
d. The mixing of basecoat materials to include:
    i. mixing tinters
    ii. thinners, solvents or water
    iii. additives
e. The preparation of a clearcoat material to include:
    i. hardeners
    ii. thinners/solvents
    iii. additives

f. The types of 'advanced pigments' used in modern paints:
    i. metallic (aluminium and titanium)
    ii. pearlescents (micas)
    iii. 'multi flip' pigments
g. The operation and characteristics of different pigments to include:
    i. acicular-noodle shaped-add strength and reinforcing
    ii. lamollar - flakes-increased durability
    iii. nodular- roughly spherical-most common
h. The function of spray out cards to determine:
    i. opacity of colour
    ii. hiding power
    iii. colour comparison
    iv. as a reference for future use
i. The functions of spray out cards with reference to a 'colour library':
    i. reference functions
    ii. colour tinting information
    iii. information required
    iv. recording of information

Different application techniques

a. The differences to applying a base coat material compared with one stage solid colours such as:
    i. gun distance
    ii. gun speed
    iii. air pressure
    iv. 'drop coats'
    v. flash off
b. The application of clear coat with reference to:
    i. gun speed
    ii. flash off
    iii. number of coats
    iv. MS, HS and UHS

The importance of using material application methods which assist in achieving colour match

a. The differences to applying a base coat material compared with one stage solid colours such as:
    i. gun distance
    ii. gun speed
    iii. air pressure
    iv. 'drop coats'
    v. flash off
b. The effects of applying metallic colours:
    i. wet
    ii. dry
c. The application of clear coat with reference to:
    i. gun speed
    ii. flash off
    iii. number of coats
    iv. MS, HS and UHS

The use of blending techniques as an aid to achieving an acceptable colour match

a. The procedure for carrying out paint blend to include:
    i. panel preparation
    ii. masking
    iii. gun technique
    iv. final thinning
    v. spraying onto adjacent areas and panels to assist in matching colours

The methods used to rectify mismatches caused by over tinting

a. The requirements of tinting colours to:
    i. lighten the colour
    ii. darken the colour
    iii. tint the colour
    iv. 'clean' the colour
b. The procedure of colour matching with reference to:
    i. identifying the mismatch
    ii. describing the hue and value
    iii. identifying the required tinter
    iv. regulating the tinter additions