Appendix L

ARTS, A/V TECHNOLOGY AND COMMUNICATIONS YOUTH APPRENTICESHIP

PRINTING TECHNOLOGY PATHWAY PRESS AND POST-PRESS OPERATIONS (UNIT 4)

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

1. Review job ticket

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Obtain job ticket
Read and interpret production information on a job ticket
Study the print operation requirements
Review job components
Identify the required job components

- Paper required- size and type
- Inks and colors required
- Imposition configuration
- Printing and post-press equipment to be used
- Other press and post-press requirements

Learning Objectives

Explain the purpose of the job ticket
Describe different parts of a printed product
Describe what happens in a press and post-press department
Describe how all print departments work together to complete a print job
Compare capabilities, productivity, and quality of high-end output versus low-end output
Explain the impact of design to press and post-press requirements
Discuss some the of the incompatibilities that arise between design files and press and post-press requirements

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

2. Select materials

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Obtain job ticket

Identify the required print job materials components

- Paper required- size and type
- Inks-colors

Calculate the amount of paper and ink required for the run

Choose the appropriate raw materials

Verify raw material(s) meet specifications

Arrange and ready the materials in the production area

Learning Objectives

Identify the raw materials included in a wide range of printed products

Explain how to calculate amounts of paper and ink required for a press run

Analyze and contrast the effect of using different papers and inks for differing products during the printing process

Identify basic paper sizes and weights

Compare types of paper (lightweight, carbon, card stock, envelopes)

Compare paper finishes (linen, laid, flat, coated stock, vellum)

Discuss types of paper coatings

Measure linear dimensions for printing materials in inches and fractions of inches

Identify effects of temperature and humidity on paper and storage requirements

Discuss paper issues that occur in the printing environment such as piling, linting, blistering, etc.

Discuss precautions for handling and loading paper rolls

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

3. Perform safety checks

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Review production procedure to be used

Review safety requirements of procedure

Verify safety equipment and any Personal Protective Equipment (PPE) needed for production process

Inspect tools and work area for safety considerations

Examine equipment labeling and safeguarding

Learning Objectives

Explain and analyze the rules for safety in the printing environments

List the types of labeling used on tools and equipment at your facility to indicate whether a tool or piece of equipment is functional and safe to use

List the situations which require you to obtain help to resolve problems with equipment or production

List the safety rules for the equipment you will be operating

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

4. Operate tools and equipment safely

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Wear the required Personal Protective Equipment (PPE) at all times as required for the operation of the equipment
Cycle equipment
Operate equipment safely in the manner required for the job task
Operate equipment according to machine requirements
Monitor equipment for safe operation while operating

Learning Objectives

Describe advantages and limitations of automated production
Identify and describe basic production equipment used in a commercial printing plant, including: platesetter, offset press, digital press, paper cutter, folder, saddle stitcher, perfect binder, paper padder, and, paper drill
List the situations which require you to obtain help to resolve problems with equipment or production

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

5. Monitor equipment for correct operation

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Monitor product produced for specification
Monitor the process and equipment for performance
Adjust the process for quality and/or productivity as needed
Take corrective actions to resolve problems as they occur
Replenish processing materials as needed
Check product for proper production requirements
Label pieces for compliance or non-compliance
Document quality control checks
Products are produced to specification

Learning Objectives

List the quality checks performed as part of the production process
List and describe quality control devices for press (color bars, densitometer, etc.)
List and describe quality control for post-press (sheets in order, stitch and fold placement)
Explain why products are checked for quality
List the situations which require you to obtain help to resolve problems with equipment or production
Identify common production problems encountered in the bindery area
Explain why labeling and documentation are part of the quality check

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

6. Clean up

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Select appropriate cleaning tools and equipment
Clean production tools/equipment as required
- Perform roller care and maintenance of inking and dampening systems

Clean work area as required
Store tools safely in proper location
Store materials in safe manner
Identify unsafe conditions and report them promptly
Take corrective action to correct unsafe conditions
Ensure that workstation is clean and clear of safety hazards
Ensure workstation is organized for efficiency
Dispose of waste appropriately as required by the facility
Complete cleaning documentation

Learning Objectives

Describe the cleaning procedures and materials used for the specific processes you perform
Explain procedures for daily, weekly, and monthly maintenance on press or post press equipment
Identify various conditions affecting the use of solvents for various parts of the press
Explain how to prevent print plates from oxidation
Discuss the reasoning for maintaining the dampening roller covering
Discuss any special disposal requirements for materials processed

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

7. Complete job tracking documentation

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Document processing data on items such as labor, quality, quantity, and time
Documentation is legible
Documentation is accurate

Learning Objectives

Describe the uses of production data
Describe the importance of documenting the production process

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

8. Register print job

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Ensure that the customer has reviewed and approved the proofs for the print run
Check the file type(s) is compatible for the commercial printer
Register the plate/screen/job image (side-to-side, up and down, tilt)
Register the color
Register crop marks and bleed allowances

Learning Objectives

Explain the purpose and function of automatic registering systems with single and multiple register marks and/or scanning heads
Explain the purpose of registration, crop, and bleed marks
Compare registering and proofing a PMS or Pantone color job to a typical CMYK color match
Identify problems common in color registration
Explain the concept of printer spread sheetwise, work and tumble, work and turn
Discuss the purpose of the color bar
Explain the major functions of a densitometer as a quality control device
Maintain accurate registration and monitor ink density
Compare digital printing registration to other commercial printer registration (e.g., offset)
Explain precautions for maintaining a good register system

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

9. Mount plat/screen (N/A for digital printing)

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Review job ticket for type of press run

Review set up and safety requirements for equipment

Prepare plates

- Verify bends
- Compare copy to plate
- Verify plate sequence

Mount each plate as required on the press equipment with respect to the color they represent

Adjust plates

- Tension, Lateral/Circumferential/Tangical Position

Apply substances to plates as needed (desensitizers, gum, etc.)

Mount screen on material as required for color alignment

Learning Objectives

Compare common methods of image transfer in the printing industry

Explain the purpose of the plate or screen

Discuss common materials used for plates or screens

Discuss how Computer To Plate (CTP) and Direct To Plate (DTP) technology have revolutionized pre-press

Explain how an offset lithographic and gravure plate work

Explain digital plate-making process

Compare digital printing methods: electrophotography (EP), ink-jet, ion or electron charge deposition, magnetography, thermal transfer, thermal dye sublimation and electro-coagulation

Discuss the purpose and types of substances used on plates

Explain the reasoning and preparation of plate bends

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency
10. Load paper and ink

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Review job ticket for type of press run

Review set up and safety requirements for equipment and inks

Select appropriate materials

Handle paper in manner to eliminate any damage

Paper

- Find grain direction with and without carton label
- Jog and air paper stock
- Set separators and detectors for weight and caliper (wire/felt, watermarks, and carbonless sequence)
- Set up web-to-sheet converter
- Load paper into equipment
- Set up grippers and guides as required
- Install flags to count sheets during a pressrun
- Correct any paper problems prior to running the press

Ink

- Obtain pre-mixed inks for color
- Mix ink
- Measure volume for mixing chemicals for pressroom operations
- Mix test ink for printing using color chart for mixing requirements
- Interpret color bars on press sheet to determine quality

Set up inking system

- Establish ink sequence
- Measure durometer
- Prepare system- rollers, roller pressures
- Assemble fountain and liners

Learning Objectives

Discuss proper paper handling and preparation techniques

Demonstrate basic paper jogging techniques

Explain how to find or determine grain direction of paper

Explain the importance of proper grain direction when running the press, including folds and scoring

Describe the importance of paper conditioning prior to running the press

Explain typical process for color addition in a print environment

Identify ink ingredients

Describe the differences between colorants used in digital printing versus offset lithography

Describe the differences in substrates intended for offset printing versus digital printing

Compare offset ink types and uses including oil-based, rubber-based, soy-based, and Ultraviolet (UV)
Discuss how to establish ink sequence depending on paper stock, coverage, dry time, waste elimination, marking prevention
Explain the purpose of using spray powder on an offset press
Explain the purpose of an infrared dryer on an offset press
Describe the procedure for mixing and testing custom colored inks
Explain the purpose and use of fountain solution and fountain solution additives
Explain how to mix fountain solutions using appropriate ratios

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

11. Set up press

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Review job ticket for type of press run

Review set up and safety requirements for equipment

Register print job

Assemble and adjust tools and production equipment as required

Verify production equipment is available for use and in working order

Verify production equipment is current for preventative maintenance and/or calibration

Calculate any control settings needed

Check equipment water, solutions and additives, ink, oil, air, pressure levels as required

Load paper and ink

Set production equipment parameters as required for the procedure

- Set up feeder/roller system- shafts, roll stand, braking mechanisms, rollers, web guides
- Set up sheet transfer and guiding system
- Set up delivery system- roll-to-roll, sheeter, signature, inline
- Set up plate and inking systems- install blanket, cylinder alignment and pressures
- Set up dampening system- solutions and additives, rollers
- Set up drying system

Document set up as required

Learning Objectives

Explain the function of the following components on a typical press: paper handlers, grippers, trimmers, inking, dampening, delivery

Identify methods of sheet transfer (chain, single-drum, three-drum, transverter, beaded blanket, air-cushion drum, etc.)

Identify characteristics of dampening solutions and additives- pH, Conductivity, water, alcohol, fountain solutions

Compare different delivery devices such as front gates, fans, infrared dryer, spray powder, air knives, suction wheels, back jogger, static eliminator

Identify types of folders associated with web press (combination, inline, sheeter, stackers and bundlers, etc.)

Discuss chute versus chain delivery systems

Explain the relationship between cylinder undercut and plate and blanket packing and thickness

Compare drying techniques and their associations with specific inks (quickset, heatset, UV, electron beam, laser, fluorescent, magnetic, oxidizing, hard dry, etc.)

Identify variables that affect drying temperature and impact to press operation (press speed, weight of web, amount of ink, length of dryer, temperature of dryer, etc.)

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

12. Verify press set up (make-ready)

Performance Standard Condition

Competence will be demonstrated

at the worksite

while assisting a worksite professional

Performance Standard Criteria

Performance will be successful when learners:

Verify set up meets process requirements and product specifications

- Paper stock
- Ink
- Plate/screen
- Proper web lead if applicable
- Feeder and delivery devices
- Dampening and inking systems
- Check blankets
- Registration

Examine first piece/product or production run for visual and/or dimensional specification

Adjust to ensure piece/product meets specification if needed

- Make necessary adjustments to register image position
- Adjust/set color (tint value, ink hue, density, dot gain)
- Adjust impression pressure
- Rule up sheet
- Appropriately sequence order of inks

Document makeready steps if required

Learning Objectives

List the types of labeling used on tools and equipment at your facility to indicate whether a tool or piece of equipment is functional and safe to use

Explain the purpose and importance of preventative maintenance and calibration

List the situations which require you to obtain help to resolve problems with equipment or production

Discuss causes of tension disturbances in feeder systems

Explain common issues associated with sheetfed delivery systems (ink setoff and blocking, anti-setoff spray, static electricity, failure to jog neatly)

Identify how splices affect the printing process

Identify common issues with web delivery (curling, poor folding, static electricity, smudging, wrinkling, etc.)

Identify causes of ink problems and suggest appropriate solutions (ghosting, piling, trapping, stripping, etc.)

Describe common drying system issues (dryer and chill roll, wet ink, uneven drying, setoff, hue change, blistering, etc.)

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

13. Perform press operation

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Wear the required Personal Protective Equipment (PPE) at all times as required for the operation of the equipment

Attach auxiliary equipment if needed (perforators, numberers, scorers, coaters, etc.)

Operate equipment safely in the manner required for the job task according to machine requirements

Monitor equipment for safe operation while operating

Operate printing press and monitor

- Register System
- Feeding System
- Delivery System
- Dampening System- dampening rollers
- Inking System
- Printing System (image transfer)
- Drying System

Print:

- Single color or multi-color job
- Single or multi-color, 2 sided job
- Color job on coated and/or uncoated paper

Complete job tracking documentation

Store and/or forward printed materials for post-press, packaging and/or distribution

Learning Objectives

Compare the fundamentals of typical printing process: offset/lithography, gravure, flexography, letterpress, screen, electrophotography, digital

Identify basic parts of the press(es) used in your facility

Describe the attributes of sheet-fed, web-fed, stream-fed, and perfecting presses

Describe sheetwise, work-and-turn, and work-and-tumble jobs, and how they differ for 2 sided jobs

Explain how to identify, interpret and monitor register marks

Identify primary causes for various issues during a press run (paper problems, ink problems, plate problems, blanket problems, positioning of side-guide marks, register and fit, excessive inking, color consistency, ink and water spots, trapping, doubling, plate wear or cracking, etc.)

Identify problems inherent in printing heavy solid work on a duplicator press

Identify causes of unintended screen patterns

Define variable data printing

Give specific examples of variable data printing products
Compare and contrast the production considerations of a variable data job compared to a static job
Describe the types of jobs that use one, two, four or more color printing

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency
14. Identify paper options for project

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Refer to customer requirements and job ticket to review the layout and job requirements including any special circumstances (shingling, bottling, binding method, crossovers)
Select appropriate paper option technique
Prepare pages or components for final imaging size
Impose digital files according to layout and job requirements using software
Add quality control guides to imposed pages
Create imposition proof
Create an accurate master cutting diagram for making cuts from the proof
Review master diagram with worksite professional
Ensure that the customer has reviewed and approved the proofs for the post-press process

Learning Objectives

Define the process of imposition in the printing industry
Discuss the factors that impact imposition choices
Compare imposition formats for different print job configurations
Discuss the cost implications of incorrect or inefficient imposition
List basic paper types, weights, grades and classifications commonly used in the printing industry
Identify grain direction of paper, and explain its importance
Demonstrate proper printed paper handling and storage procedures
Demonstrate knowledge of paper types related to their grain direction, cutting, folding and binding characteristics
Identify basic folds for printed products
Identify die cut products, embossing and foil stamping products, and procedures/equipment used for each
Identify and explain different binding methods and applications including: case binding, perfect binding, saddle stitching, and lay-flat

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

15. Calculate most efficient cuts/folds

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Refer to customer requirements and job ticket to review the layout and job requirements including any special circumstances (shingling, bottling, binding method, crossovers)
Select appropriate paper option technique
Calculate cuts/scores from a parent sheet
Calculate number of sheets for booklets
Calculate number of sheets to cut and load

Learning Objectives

Describe how to calculate basic paper cuts from a parent sheet, considering job requirements and grain direction
Demonstrate basic paper counting techniques: measure by ream marker, weight, caliper, or other methods

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

16. Set up post-press

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Review job ticket for type of post-press run
Review set up and safety requirements for equipment
Assemble and adjust tools and production equipment as required
Verify production equipment is available for use and in working order
Verify production equipment is current for preventative maintenance and/or calibration
Calculate any control settings needed
Check equipment, fluids, air, pressure levels as required
Set production equipment parameters as required for the procedure

- Paper stock (Correct grain direction, quantity of pads, sheets/pad, counted sheets, insert chip boards as full sheets)
- Chemistry
- Registration
- Mechanical (jog, stitch, folding, drill hole positions)

Document set up procedure if required

Learning Objectives

Describe how to set up programmable automatic cutters, stitchers, folders, drills
Identify padding equipment materials and hand tools
Identify stapling and stitching equipment materials and supplies
Identify punching/drilling equipment and tools
Identify folding equipment
Identify collating equipment
Explain the importance of proper grain direction when running the post-press, including folds and scoring

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

17. Verify post-press set up (make-ready)

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Verify set up meets process requirements and product specifications
- Paper stock
- Chemistry
- Registration
- Mechanical

Examine first piece/product or production run for visual and/or dimensional specification
Adjust to ensure piece/product meets specification if needed
Verify repeatability of set up if applicable
Document set up procedure for repeatability if applicable
Document set up procedure if required

Learning Objectives

List the types of labeling used on tools and equipment at your facility to indicate whether a tool or piece of equipment is functional and safe to use
Explain the purpose and importance of preventative maintenance and calibration
List the situations which require you to obtain help to resolve problems with equipment or production
Identify the major components of equipment used in your production process and their functions
Identify variables that impact equipment settings
Define repeatability
Describe the importance of repeatability in printing
Demonstrate basic paper jogging techniques
Demonstrate how to check the squareness of stock

Comments:

Unit 4: Printing Technology Pathway
Press and Post-Press

Competency

18. Perform post-press operation

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Wear the required Personal Protective Equipment (PPE) at all times as required for the operation of the equipment

Operate equipment safely in the manner required for the job task according to machine requirements

Monitor equipment for safe operation while operating

Operate post-press equipment

- Cutting (Correct direction)
- Folding
- Collating
- Numbering
- Perforating/scoring
- Binding
- Packaging and shrink wrapping
- Stitching
- Other Finishing (die cuts, laminating, embossing, foil stamping, flocking, etc.)

Watch operation for

- Sheets in order
- Edges jogged flush
- Edges free of white space or image/color bleed
- Wires closed
- Perforation/scoring positions

Adjust settings as needed:

- Feeder table for different sizes, consistent feed
- Roller gap settings and double sheet detector
- Open and close correct gates
- Adjust gates for accurate folds

Complete job tracking documentation

Store and/or forward printed materials for packaging and distribution

Learning Objectives

Describe different ways paper can be bound

Discuss common types of binding and finishing: pads of paper, side and saddle stitching, die cutting, laminating, embossing, foil stamping, flocking, etc.

Describe how to use programmable cutters, stitchers, folders, drills

Define folding terminology and list different folding techniques

Demonstrate the use of folding equipment to produce a single fold, an accordion fold, and a gate fold

Describe and identify the uses of right angle folding, knife folding, buckle folding, and combination folding
Describe tipping in procedures
Demonstrate the use of folding equipment to perforate and score
Describe and identify off-line finishing systems
Describe the fundamentals and applications of saddle stitching and perfect binding
Identify spiral binding and wire binding equipment and products
Describe the case binding process
Identify packaging and shrink wrap equipment and materials
Identify specialty bindery processes: foil stamping, embossing, die cutting, and thermography
Describe the differences between, and the advantages/disadvantages of: in-line; off-line; and, near-line finishing

Comments: