CON EJO VALLEY WOODWORKERS ASSOCIATION

BOX MAKING with DAVID BLACKBURN

May 1st, 2014

I. INTRODUCTION

II. GOALS

- A. Broad spectrum of possibilities
- B. Techniques, methods, sequences, shortcuts, etc.
- C. Encourage skill development and creativity

III. WHY BOXES?

- A. People are fascinated (with small treasures)
- B. Boxes are functional and build skills for furniture/cabinet making

IV. TYPES OF BOXES

- A. Traditional - from simple to historical period styles
- B. Contemporary
  1. Architectural/Industrial
  2. Sculpted
  3. Freeform
- C. Other Features
  1. Bandsaw
  2. Lift-off tops
  3. Pivot tops
  4. Hinged tops
  5. Slide Tops
  6. Embellishments Le. Mixed Media, Sizes and Shapes

V. DESIGN ELEMENTS

- A. Function/Purpose
- B. Style
- C. Contrasts

1. Colors
2. Textures - natural edge and surfaces, carved, etc.

D. Balance
1. Proportions (Technical: The Golden Mean, balanced as perceived by the eye
2. Contrasts - for interest, incorporated through the piece

E. Ballast (weight appropriate)

F. Design Ideas - where to get them
1.
2.

G. Draw to Scale - to test an idea and see proportions
1. Templates - for patterns, repeat cuts, symmetry, final edge finishes Le. flush cutter bits

VI. TYPES OF WOOD - SELECTION

A. Purpose of Box

B. Colors
1. Contrasts
2. How Many?

C. Grain Patterns
1. Sawn Methods
2. Distortion
3. Figure

D. Other Characteristics
1. Hardness - Applications
2. Ease of Use
3. Oil Content
4. Toxicity
5. Textures
6. Scent

E. Cost!Availability
1. Woodcraft/Lumber Stores/On-line

2. Hunt your own
3. Selective cutting

F. Veneer Considerations

VII. TOOL ESSENTIALS

A. Table Saw
B. Jointer
C. Plainer
D. Belt & Orbital Sanders
E. Drills, Drill Press
F. Routers
G. Bandsaw
H. Drum Sander
I. Scroll Saw
J. Spindle Sander
K. Biscuit or Plate Jointer
L. Other, including Jigs

VIII. BOX PREP AND ASSEMBLY

A. Design (of Functional or Aesthetic value only, or can be both)
   1. Features: Inlays, compartments, divisions, hidden features, hardware
   2. Construction methods and sequences
B. Dimensions (again, driven by function and visual balance)
   1. Width vs Length vs Height
   2. Consider vertically "stacked" proportions: lid & drawers, contrasting trims, legs, feet, skirts
C. Wood Selection
   1. Spectacular focal points, medallion, centerpiece
   2. Contrast consideration and "which side our
D. Material Lists
   1. Value: Organization, review the process
   2. Value: Count the costs, economize
E. Test Tools
   1. Square and Parallel (blade/trunion tune)
   2. Drift on bandsaws
   3. Bearing and blade wobble, etc.
   4. Trial/test cuts - get familiar with new tools and techniques
F. Glue-up Laminations (Le. multicolors, chevrons, herring-bone patterns)

G. Comer Joints / Reinforcements
   1. Butt
   2. Lap or Rabbeted
   3. Miter with biscuits, perpendicular or vertical splines
   4. Lock Miter
   5. Dovetail (standard or decorative)
   6. Box/Finger Joint
   7. Dowels - hidden or exposed
   8. Vertical corner blocks (opt: extend as legs)
   9. Other

H. Make Fixtures and Jigs
   1. Table saw sled for cross cuts, spline cutting, miters
   2. Comer splines slotting jig
   3. Mortise and Tenon or Recessed Panels

I. Tops and Bottoms Prep
   1. Kerf Slots/Rabbets (pros and cons)
   2. Show sides, add figured veneers (both sides or one)
   3. Recesses for inlays, false bottoms, structural features

J. Cut to Length
   1. Start with enough material "around the circle"
   2. Precisely match opposing sides - errors multiply
   3. Square or Exact Angles - errors multiply
   4. Cut too short? Match to the short cut ("inch-up" to your exact cut line)

K. Cut Biscuits or Splines . . . or "Dominos" - Festool
   1. Placement: Near interiors, away from edges
   2. Contrasts or concealment of vertical
   3. Sized thickness and glue considerations

L.. Dry Fit
   1. Save yourself "glue grief mess and start over"
   2. Saves material and promotes precision
   3. Structural integrity

M. Glue-ups

1. Finish sand interiors to 220 grit minimum
2. Masking tape interior corners for squeeze-out
3. Wet both surfaces for structural integrity
4. Only wood edge prep
5. Apply sparingly - experience will guide you

N. Types of Glues

1. CA
2. Alaphatic Resins (yellowlWoodworkers GluelThe Bond - different grades)
3. Epoxy - 5 minute, structural advantages
4. Resorsenal
5. Specialty/characteristic specific (bending, veneers)
6. Polyurethanes (expansive, moisture cured)
7. Hide (for removablilty and repairs

O. Clamping

1. Open to size/length before glue application
2. Use cauls for pressure and protection
3. Types of clamps

P. Cutting the Lid Off

1. Shallow cuts/thin kerfs
2. Two kerfs, add taped-in-place spacers, final cuts
3. Band Saw

IX. PREPPING SURFACES FOR FINISH

A. Type of Wood

1. Oily - solvent cleaning after finish sanding
2. Porous grained - fillers, sealers and wood hardeners
3. Stans, dyes, conditioners

B. Type of Applied Finish (pros and cons)

1. Shellac the universal sealer . . . French polish
2. Oils and waxes (sealer, visual depth especially with highly figured woods . . . multiple coats and steel wool

3. Lacquers: usually sprayed fast drying, forgiving, deceptive cure, irregular surface preference
4. Polyurethane: durable, sand between coats
5. Catalyzed finishes: epoxy, conversion varnishes, automotive/ industrial

C. Function of Piece
1. Exposed refinement/beauty
2. Utilitarian requiring only seal or protection

D. Smoothing Options
1. Planing/Jointing
   a. Read the grain/direction of feed
   b. Speed settings, number of bladed, sharpness
   c Remove small amounts.
   d. Chipping and snipe
2. Sanding (belt, random orbit, hand blocks)
   a. Drum sand figured woods and veneer making
   b. Course to fine grits (gradation rates)
   c. Hard or highly figured magnify with high number grits
   d. Steel wool
3. Wet Sanding (water, oil, or stain)

E. Sealers/First Coats
1. Types - Considerations - fillers/sanding sealers
2. Purpose: penetration, stain control, glazing
3. Fine Grits on wood and finish rub outs - hard and figured woods

F. Pre-finish Before Glue-ups vs. After
1. Advantages before
   a. Seal and pre-treat pristine surfaces
   b. Prevent glue "halo" blemishes (color variance)
   c. Avoid dificulty of reaching inside corners - sanding and refinish
2. Precautions
   a. Oily woods and "Rish-Eye" plus not drying
   b. Dust free environment

c. Scratches not fully sanded out or to fine grit

d. Excess glue not removed

3. Procedures

a. Sand, Dust, Mask

b. Cautions

1. Tape between glue-joints

2. Compressed air oil

3. Finish on glue surfaces and bleed

G. Finish Build-up

1. Sanding fillers - fUlly mix/shake

2. Sand with 220 to 400 grit or use steel wool 0000 between coats

3. Drying time/shrinkage/sanding

4. Multiple coats and rubout

H. Hardware

X. HARDWARE HINGING TECHNIQUES AND TIPS

A. Hinge Types

1. Conventional: two leaf with pin

2. Stop hinges

3. Quadrant hinges

4. Round

5. Barrel

6. Soss

7. Barbed

8. Drative, wood, strap, other

B. Function

1. The obvious: open and close

2. Duty: heavy or light

3. Exposure: minimal or maximum for decor

4. Hold open feature: stop hinge

5. Other

C. Application - Type and Install

1. Leaf Type/Box Hinge
    a. Decide on size, color, etc.
    b. Mark to cut
    c. Mortise
        1. Layout
        2. Jig cut with router
        3. Hand cut with chisels
        4. Depth: bind or gap outcome
2. Piano Hinge: continuous
    a. For long applications
    b. Strength
3. Quadrant Hinge
    a. Decorative
    b. Hold open feature
    c. Often used on finer boxes i.e. humidors
    d. Best done with jig and router
    e. Requires pockets for retractable arm
4. Barbed Hinge
    a. Requires slot cutter
    b. Material thickness (box sides)
    c. Sizes
    d. Tips
        1. Hardwood application
        2. Partial crush of barbs
        3. Number used
        4. Adjust depth and alignment/set with CA glue
5. Barrel Hinge
    a. Box wall thickness
    b. Boring Holes
        1. Matching drill bit (brad point)
        2. Perpendicular (drill press or jig)
        3. Layout

c. Beveled Edges Required

6. Single Pin Pivot
   a. Weight of box top/support
   b. Diameter of dowel/pin
   c. Bore through both pieces stacked
   d. Boring Holes
      1. Flatten mating surfaces/ finish sand
      2. Stack parts
      3. Use matched size quality drill bit
      4. Use drill press
7. Double Pin - Lift (Requires a Square Box)
   a. Parallel sides
   b. Clearances and glue-up
   c. Pins
      1. Size
      2. Brass, steel, wood dowel
      3. Precise layout
      4. Hole diameter
8. Round Flat Mortised Hinge (Brusso)
   a. Requires jig or forstner bit
   b. Depth
   c. Stop option
   d. Decorative

XI. OTHER HARDWARE
   A. Lid Stops: Mortised Arms, Articulating Arms, Chain
   B. Locks
   C. Pulls, Knobs, Handles
   D. Corner Protectors
   E. Hidden Mechanisms - Magnets, Slides
   F. Other

XII. INTERIOR LINERS

A. Types: leather. velvet. cloth

B. Application

1. Cardboard or . . .
2. Clearances/Measurement
3. Pre-cut
4. Clean support
5. Spray
6. Place. Fold
7. Trim

XIII. MIXED MEDIA

A. Material Possibilities

1. Stone
2. Fossil
3. Metal
4. Other: crystal, antler. glass . . .

B. Uses/Applications

1. Inlays / Overlays
2. Legs

C. Cautions