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# RESIN CASTING CLASS

# Introduction to Casting

- There are many materials that are called “resin” for art and craft casting applications.
- Specifically clear or water clear liquid resins are used for casting and encapsulating objects.
- “Laminating” resins are used with fiber reinforcements and should not be used to cast.
- There are many U-Tube and web based instructions on casting resins for the hobbyist.
- **Safety** is paramount when handling liquid resin components or solvents. Always use Personal Protection Equipment (PPE) for hands, eyes, breathing.

# Safety First

- Maintain adequate ventilation in the shop
- Use Nitrile gloves to protect you hands
- Use acetone to clean tools and surface spills
- Protect work surfaces with poly sheeting
- Wear safety glasses, goggles or face shield
- Wear a shop apron or smock over your cloths
- Use a organic vapor respirator to protect your lungs when measuring or mixing.

# Material Science 101

- Plastics come in two types
  - Thermoplastic vs. Thermoset
    - One softens with the application of heat the other is unaffected by heat other than post cure properties.
  - Liquid resin systems are “Thermosets”
    - They transition from liquid to solid by way of polymer reactions called “crosslinking” forming molecular chains that are strong and stiff. Higher crosslinking = harder polymer
    - These resin systems consist of two components (A/B)
      - Resin (A) and Hardener (B) are precisely weighed or measured by volume, then thoroughly mixed to distribute the resin components for optimum cure.

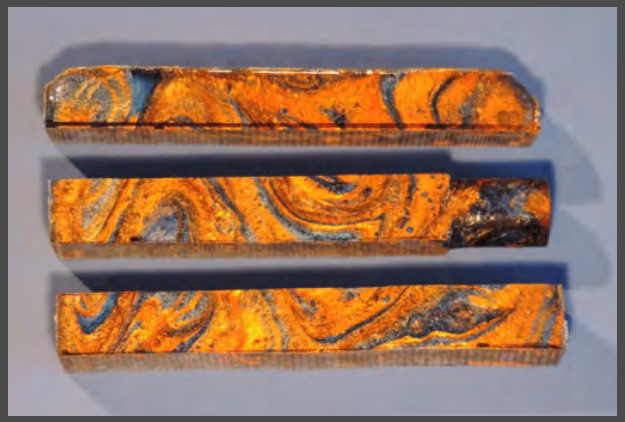
# Resin Comparison

| Resin Type | Working Time | Cure Time | Viscosity | Smell | Cost /Qt | Best used for | Sample |
|---|---|---|---|---|---|---|---|
| Polyester Casting Resin | 15-30 minutes | 24 hours | Thin | horrible | $32 | Stabilizing, small void filling | US-Composites Silmar 41 |
| Urethane | 5-10 minutes | 45-90 minutes | Medium | “None” | $40 | Multi-color Blanks, large void filling | Alumilite ~~Water~~ Clear |

# Materials Science 101

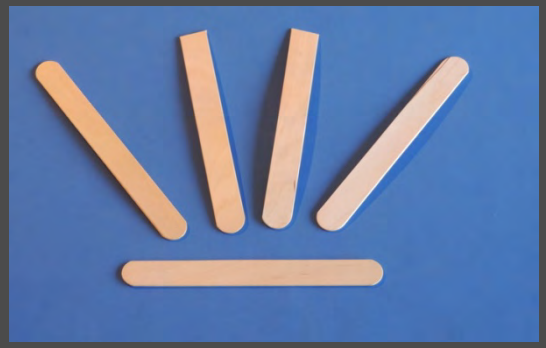
- Water Clear Liquid Casting Resins
- Compounds called Reaction polymers “polyfunctionals”
  - Epoxy
    - Hardeners include amines & acid anhydrides, may require heat to cure
    - Requires accurate measurements of both components (A/B)
    - Usually not optically clear, amber in color, poor UV resistance
  - Polyester
    - Styrene is used to lower the viscosity
    - Crosslinking is initiated by adding organic peroxide
      - Benzoyl peroxide or MEK Peroxide
    - Obnoxious odor, requires good shop ventilation
  - Polyurethane
    - Isocyanates react with water forming urea & $CO_2$
    - Metal complex catalysts are based on Mercury, use PPE for safety
    - Low moisture fillers required. Limited shelf life, poor long term storage.
    - Fast cure times, removal of air is a problem. Pressure cast equipment needed.

# Types or Styles of Castings
## Richard Greenwald Names



- Swirl: Intertwine 2 or more resin colors (marble)
- Splotch: Drop gelled resin blobs into base color
- Crackle: Broken chunks of resin in colored base
- Left Overs: Same as Crackle above in clear base
- Vein: Insert colored lines of resin prior to gel
- Ribbon: Continuous length of gelled resin or colored plastic sheet, looped into mold prior to color pour

# Shop Support Tools



- Gram scale for weighing components
- Bottles with sealable caps or dispensing tips
- Color pigments in powder or liquid
- Clean molds without cracks or cuts
- Disposable mixing cups
  - unwaxed paper or PETE (#1) plastic
- Tongue depressors or wooden stir sticks
- Measuring cups or graduated beakers
- Shop or paper towels for clean-ups
- Old Newspapers for “secondary” table top protection from spills

# Types of Casting Molds


- Store bought, size specific, polyethylene
- Old household containers, retired from use!
  - Tupperware, Rubbermaid, Ziploc, laundry caps
- Cast Silicone, size specific, pen blank (flexible)
  - Store bought or self cast from components
- Formica clad wood or metal clad wood
  - Must use release agent on surface
- PVC pipe
- HDPE/UHMW Plastic (cutting boards)

# Casting How To
## General





- Organize you work space with resin, molds, mold release, colorants, mixing cups, etc
- Select your colors and insure they are moisture free
- Keep a note book of your measurements, color combinations, and pouring-order so you can replicate your creations

# Casting How To
## Polyurethane

- Measure each part by weight per instructions
- Mix colors with part B.
  - When you like the look, double all your amounts.
- Stir slowly to prevent bubbles
- Combine both parts A / B stirring slowly
- Pour mixture slowly into your prepared molds
  - Strategically mix colors to create interesting designs
- Place molds inside Pressure Pot and apply 60 psi
- Release pressure after 30 minutes
- Allow to cure at least an hour before de-molding
- Cut slab into ¾” square lengths to match pen tube

# Casting How To
## Polyester

- Measure resin by volume
- Mix colors with base resin.  Stir slowly to prevent bubbles
- Add activator (MEKP) at 4-10 drops per ounce of resin
- Mix thoroughly
- Pour mixture slowly into your prepared molds
- Strategically mix colors to create interesting design
- Place molds inside Vacuum Pot for about an hour
- Optionally, place molds in a Pressure Pot and apply 60 psi
- Allow to cure overnight before removing from Pressure Pot and de-molding
- Cut slab into ¾” square lengths to match pen tube lengths

# Making your own blanks

- Matching a customer's bridesmaids dress

# Making your own blanks

- Favorite Colors

# Making your own blanks

- Utilizing pretty wood “scraps”

# Making your own blanks

- Getting “Creative”

# Sources of Supplies

- Casting Molds
  - PETE: TAP Plastics, Douglas & Sturgess
  - Silicone: CraftSupplies, IAP-vendors
  - Home Made
- Resin
  - Urethane:
    - Alumilite (Clear, NOT Water Clear) from Alumilite
    - Smooth-On (Crystal Clear 202) from Douglas & Sturgess
  - Polyester Resin (PR):
    - (Silmar 41) from USComposites,
    - (Apprentice Casting Kit) from CraftSupplies
- Colorants
  - PearlEx: Michael's
  - Luster Pigments: Douglas & Sturgess
  - Dyes: Alumilite, TAP plastic
- Mixing cups
  - Safeway, Starbucks, Smart & Final
- Stir Sticks
  - Michael's