

gūrū | **CRAFT TOOLS WISELY™**

PROCESS AND PROCEDURES

August 2017

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gūrū – COMPOSITE TOOLING MATERIAL AMBIENT USE

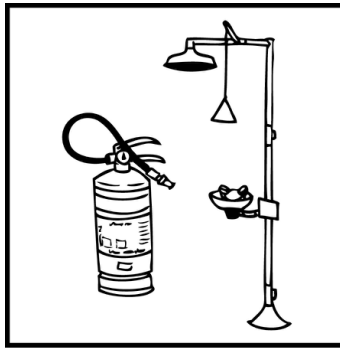
Procedure for Composite Tool Construction (Near Net Shape)

EQUIPMENT

1. High-shear mixer element for use with power drill
2. Power drill
3. Safety goggles (splash resistant)
4. Approved respirator for dust and airborne particulate
5. Safety gloves
6. Protective apron or suit (painter's protective gear)



Safety gear



Fire extinguisher,
eye wash and shower station

PROCESSING STEPS

1. Materials – Packaging

- I. Identify the Product: The Standard Kit is provided in two parts; Part A is in a 5 gallon bucket (40 lbs), Part B is in an additional 5 gallon bucket (14.4 lbs).

2. Mixing

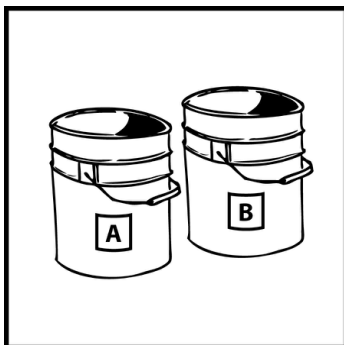
- I. Optimal mixing temperature is room temperature (77°F); ensure that the temperature is acceptable.
Note: Put on all required safety gear and protective clothing and locate all safety stations at the work site.

- II. Slowly add Part A (white powder) to Part B (blue liquid) while mixing with the mixer. Ensure proper mix ratio of 100:36 (by weight) of Part A to Part B. Mixing should be done at high speed to ensure both components are mixed fully.

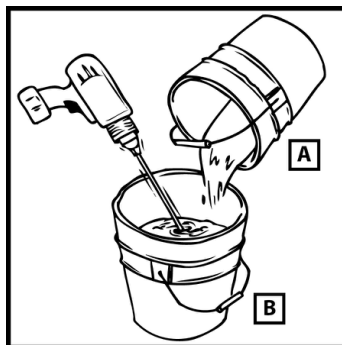
- III. Continue mixing until components are fully combined (approximately 1 minute); mixture will become a uniform gray color when mixed fully.

Note: In some cases the mixture may become a blue/green. This will not affect the quality or properties of the material.

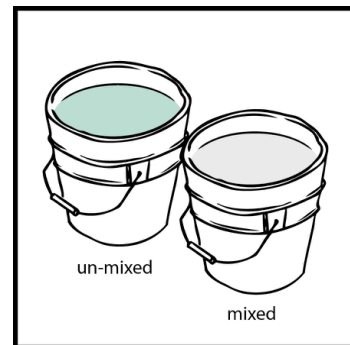
- IV. Working time (pot life) for the product at room temperature is between 45-75 minutes at the completion of the mixing step. Note time at completion of mixing.



Two 5 gallon buckets for mixing parts



Mixing of A and B



Mixed vs. un-mixed solutions

3. Tool Construction

I. Make sure the surface of the part from which the tool will be made is clean and free of foreign debris and chemicals. Apply mold release to the plug or pattern surface per manufacturer's recommendation. Soul Composites recommends Johnson's Paste Wax or Frekote NC-700.

II. Apply surface coat. Soul Composites recommends Axson Ad-Tech ES-215 epoxy surface coat to be applied per manufacturer's recommendations. Any natural bristle brush, foam brush or soft squeegee can be used to apply epoxy surface coat.

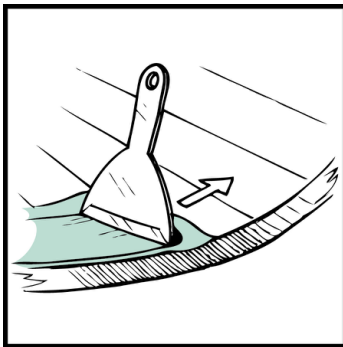
III. Apply gūrū tooling material to the surface coat in thin layers not letting the surface "skin up"; continue until a uniform target depth of 0.75" to 1" of tooling thickness is reached.

Note: gūrū tooling material will begin to transition to a paste form within 20-30 minutes, allowing for an ideal window to apply material to vertical surfaces. Use of gūrū Accelerant will speed up this process. (See gūrū Accelerant label for recommended use.)

Agitating the material can increase the working time of gūrū. Use of gūrū Decelerator will slow down the curing process. (See gūrū Decelerator label for recommended use.)

IV. After the final coat of gūrū is applied, mist with water and wipe surface until smooth. This will aid in secondary bonding of tool frame and handling of finished tool.

Note: Additional coating of gūrū is possible after room temperature cure by ensuring proper misting with water after application of gūrū. Further coating of gūrū can also be achieved through sanding and prepping gūrū tooling material prior to application. Soul Composites recommends roughing the surface with 80-grit sandpaper and removing debris with Acetone.



Spatula applying thin coat to surface



Mist water and wipe smooth

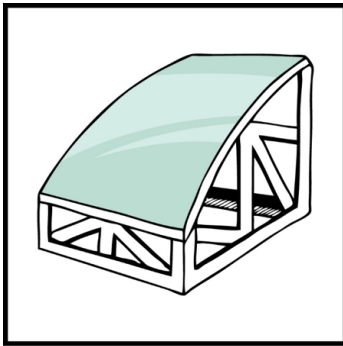
3. Tool Construction *continued...*

V. Allow the tool to cure at room temperature (77°F) for 4-6 hours for the 350°F product.

VI. When necessary, due to large tool size, a steel sub-structure will be needed. Fabrication and application of steel frame can be done either immediately after application or after room temperature cure cycle.

Note: 2"-4" wide fiberglass stripping may be used to adhere steel frame to tool using gūrū as an adhesive agent.

VII. Remove tool from plug or pattern. Tool will be "near net shape" and will not require final machining to achieve desired tolerance.



Tooling surface with support frame

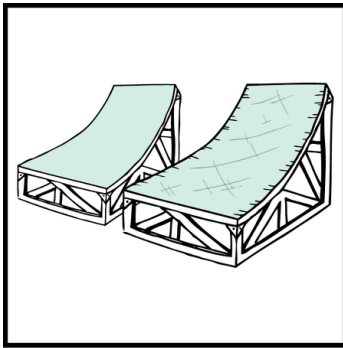
4. Tool Inspection

I. Visually inspect the tool for any sign of defects (cracks, roughness and indicators of incomplete mixing or product contamination) as these may negatively affect finished parts.

Note: gūrū tooling material will show slight discoloration over time with extended use.

5. Molding Operation

- I. Prepare surface of tool. If necessary, sand and buff to desired finish. Soul Composites recommends a minimum 600-grit surface finish.
- II. Apply tool sealer, then mold release. Soul Composites recommends MPP Chemlease 2180 as an ideal sealing agent.
- III. gūrū tool is now ready for use.



Smooth vs. rough tooling surface

6. Clean-up Operation

- I. Scrape up excess or spilled material with a squeegee or scraper and dispose in proper trash receptacle. Clean remaining materials with water.
Note: Do not use solvents on skin and avoid any contact.
Note: Wash exposed and contaminated skin.
Note: Ingestion or eye contact, use eye wash station following posted procedures; seek medical help.

7. Storage of gūrū Products

I. Store sealed containers at room temperature. Ensure storage environment does not reach below 40°F.

II. Shelf Life Part A (77°F) – 1 year

III. Shelf Life Part B (77°F) – 6 months un-opened

Note: Once Part B container has been opened, use immediately. Once opened, shelf life of Part B depends on seal quality, as air exposure will cause premature curing of Part B.

Note: Do not freeze.

8. Extended Use

I. For extended use of gūrū tooling material, determine tool condition by visually inspecting the tool and tool surface.

II. For tool surface, rework tool as required per surface coating manufactures' recommendation.

III. gūrū can be patched and repaired using newly mixed gūrū material. (See procedure for repair of composite tooling.)

gūrū – COMPOSITE TOOLING MATERIAL SURFACE FILLER/TOOL REPAIR

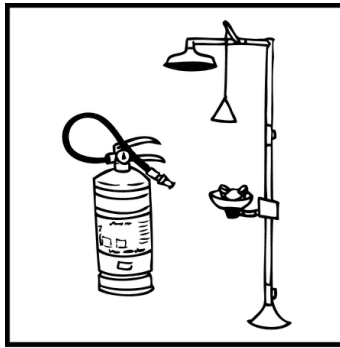
Procedure for the Repair of gūrū Composite Tooling

EQUIPMENT

1. High-shear mixer element for use with power drill
2. Power drill
3. Safety goggles (splash resistant)
4. Approved respirator for dust and airborne particulate
5. Safety gloves
6. Protective apron or suit (painter's protective gear)
7. Spatulas for applying mixture



Safety gear



Fire extinguisher,
eye wash and shower station

REPAIR STEPS

1. Inspection

- I. Inspect the composite tool to determine the extent of damage or defect that needs to be repaired.

Note: If large area of tool surface needs repaired, use gūrū tooling material to repair mold.

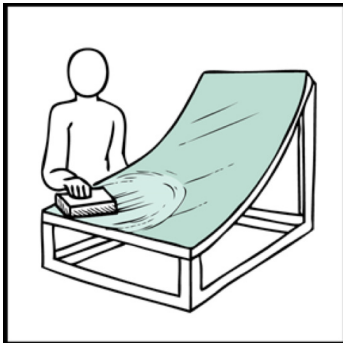
Note: For small dings, cracks or micro pitting from machining or air pits, use gūrū surface filler.

2. Surface Preparation

- I. Wipe the area to be patched with acetone.

- II. Sand with 80 grit sand paper to roughen the surface of the area to be patched.

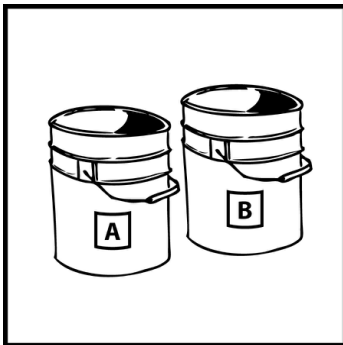
- III. Wipe the area again with acetone to remove particulates and allow the surface to dry.



Sand repair area

3. Materials – Packaging

- I. Identify the Product: The Standard Kit is provided in two parts.
- II. Note that both constituents are for the same product.
- III. Estimate the approximate quantity of repair material required for the repair in lbs.
- IV. Double the estimated quantity to accommodate for waste.
- V. Determine the quantities of Part A and Part B following a ratio of 100 Part A to 36 Part B, by weight, to make up the needed quantity of repair material.



Two 5 gallon buckets for mixing parts
(smaller containers may also be used
for smaller repair jobs)

4. Batch – Preparation

- I. Weigh out the required quantities of both Part A and Part B constituents.

5. Mixing

- I. Optimal mixing temperature is nominal room temperature (70°F); ensure that the temperature is acceptable.

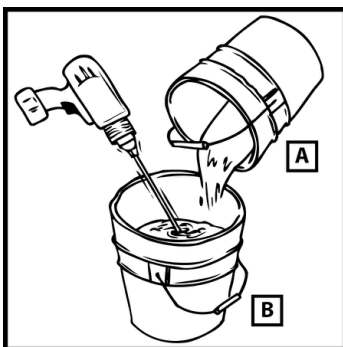
Note: Put on all required safety gear and protective clothing. Locate all safety stations at the work site.

- II. Slowly add Part A (white powder) to Part B (blue liquid) while mixing with the high-shear mixer, mix at high speed.

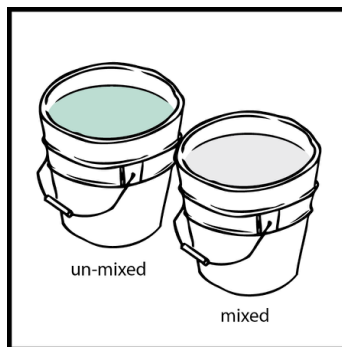
- III. If a small quantity is being mixed, a spatula or stir stick can be used to mix the material by hand.

- IV. Continue mixing until components are fully combined (approximately 1 minute); mixture becomes a uniform gray in color when completely mixed.

Note: In some cases the mixture may become a blue/green. This will not affect the quality or properties of the material.



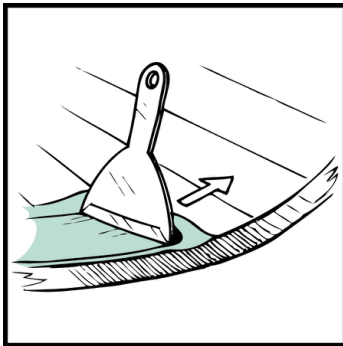
Mixing of A and B



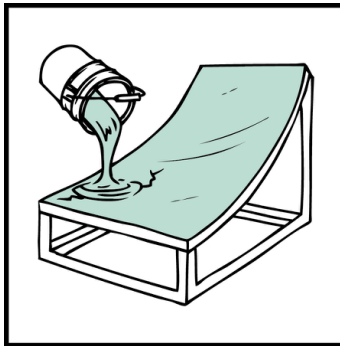
Mixed vs. un-mixed solutions

6. Repair Procedure

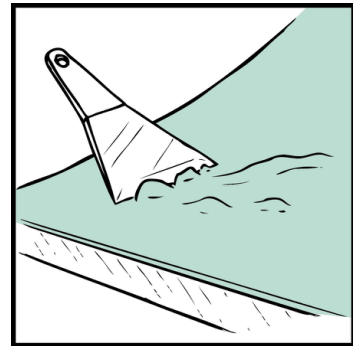
- I. Apply a thin coat on the area making sure it is fully covered.
- II. Fill, pour or spread additional gūrū into the area to be patched.
- III. Wait until material has just gelled.
- IV. Use a scraper or squeegee to take off excess repair material.
- V. Wipe with a sponge or clean rag with water and remove any excess material.
- VI. Cure at room temperature for 12 hours.
- VII. Sand with 80 grit to final shape.



Spatula applying thin coat to surface



Fill, pour or spread gūrū to patch area



Scrape off excess material

7. Clean-up Operation

- I. Scrape up excess or spilled reacted material with a squeegee and dispose in a flameproof container as hazardous waste. Clean remaining materials with lacquer thinner or acetone.

Note: Do not use solvents on skin and avoid any contact.

Note: Remove and dispose of any contaminated clothing.

Note: Wash exposed and contaminated skin.

Note: Ingestion or eye contact, use eye wash station following posted procedures; seek medical help.

8. Storage of gūrū Products

- I. Store sealed containers at room temperature. Ensure storage environment does not reach below 40°F.

II. Shelf Life Part A (70°F) - 1 year.

III. Shelf Life Part B (70°F) - 6 months un-opened.

Note: Once Part B container has been opened use immediately. Once opened, shelf life of Part B depends on seal quality, as air exposure will cause permanent curing of Part B.

Note: Do not freeze.