

FG-05: Heat and Form Material

SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- Gloves are required because you will be handling steel at temperatures in excess of 2000°F

EQUIPMENT

- tongs (to hold the stock)
- power hammer
- belt sander
- quenching oil
- heat treat forge or Acetylene torch
- stock (Solar steel or 4140 steel)
- metal file

RESOURCES

- Journeyman or Apprentice requesting the tool

Heat and Form Material

Warning: Wear safety gloves when handling material in the Blacksmith area. Material is formed at 2000°F.

1. Get the required stock.
 - Verify that you have the required type and width of material.

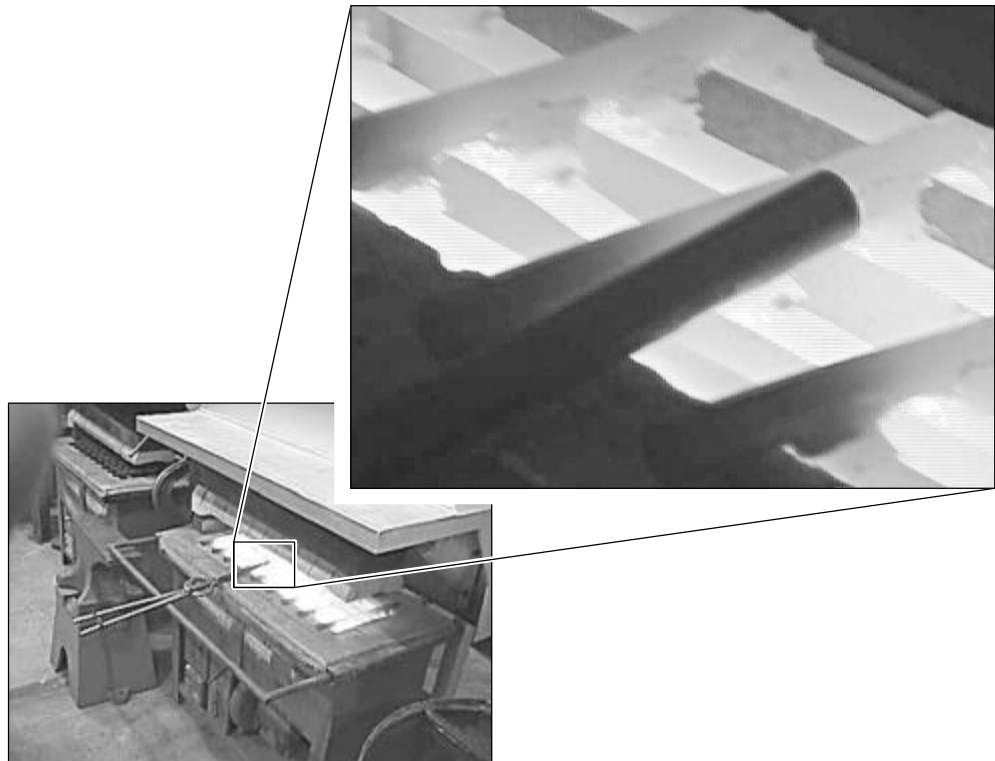


2. Secure the stock in tongs.



3. Heat the material.

- Place 1 1/2" of the material in the forge.



- Secure the material in a vise if you are using the acetylene torch to heat the stock.



- Heat until the material is white hot, which is approximately 2000°F.

4. Form the material into a chisel.

- Use the power hammer to form the face of the chisel until it is close to the desired angle.
- Make sure to use the drawing side of the die.

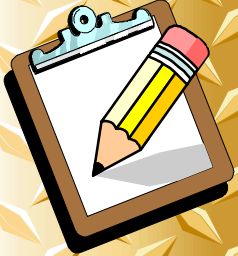


- Flip the stock over 180° to form the opposite face of the chisel.
- Turn the stock 90° to keep the side of the chisel within the width of the stock.

- Flip the stock over 180° to keep the other side of the chisel within the width of the stock.
- Heat the stock as necessary to keep the malleability of the stock.

5. File the stock.

- Use a metal file on the stock to de-burr and smooth the stock.



6. Set the stock to the side and allow it to cool.

7. Grind the chisel sides on the belt sander.

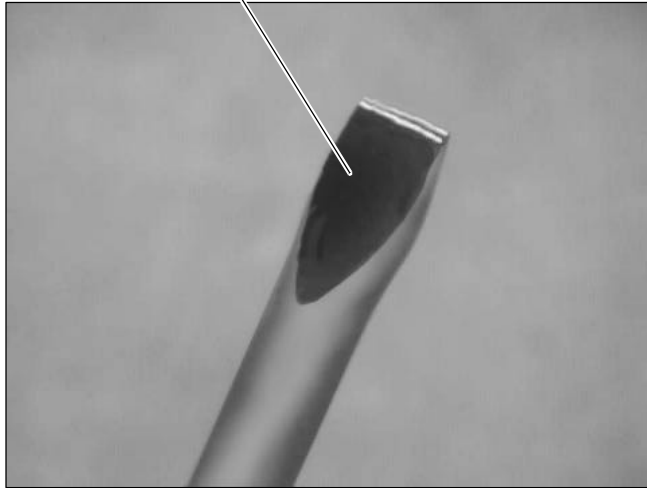
- Grind each chisel face and side to knock the slag off of the stock.
- Grind with the angle of each face or side.

Maintain Proper
Angle of the
Ground Surface



- Grind until the surfaces are smooth and glossy black.

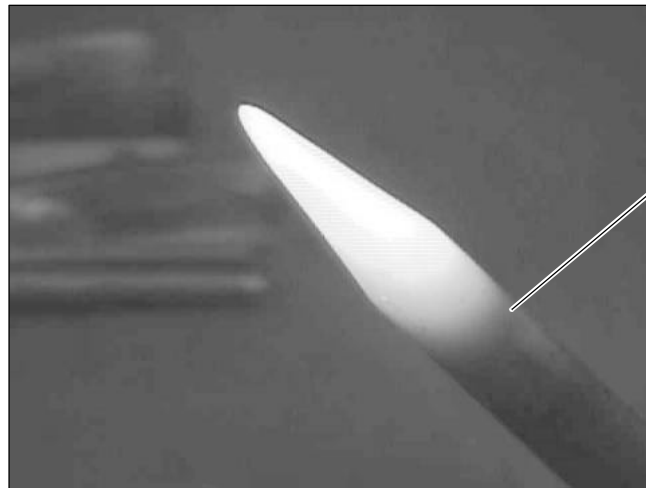
Smooth and Glossy Black



- Grind the end of the chisel angle to round off the tip, to prevent the chisel from cracking when struck with a hammer.

8. Heat treat the stock.

- Heat to a dull red (approximately 1800°F) using the forge or an acetylene torch.



Dull Red

9. Quench approximately 3/8" of the chisel end.
 - Always use quenching oil and hold the stock in the oil for at least 15 seconds.



- File while quenching, until the bluing returns.
 - Repeat step 9 on all sides of the chisel.
10. Quench the entire stock for 10 minutes.

