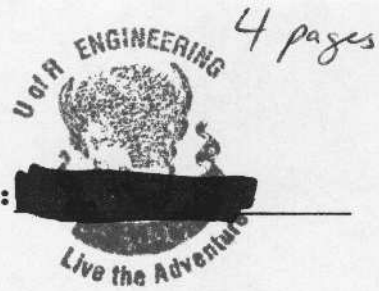


27/30



Name: [REDACTED]

Nov. 20, 1995

ENIN 343 (953)
TEST 3

1. Welding processes are categorized based on the source of energy used. Name three such categories, and for each, name one specific welding process.

ARC WELDING
-SOURCE: electricity
-EX: SPOT WELD

(3)

TORCH WELDING
-SOURCE: COMBUSTION OF CHEMICAL TO PRODUCE FLAME
-EX: oxyacetylene torch welding

3

MECHANICAL WELDING
-SOURCE: MECHANICAL WORK
-EX: friction welding or cold welding (pressure)

2. Outline briefly the principle of the electric resistance welding process. What are steps in the completion of a resistance weld?

IF 2R ED. RESISTORS
IN RESISTANCE WELDING A LOW VOLTAGE HIGH AMP CURRENT IS PASSED BETWEEN TWO PLATES BY TWO ELECTRODES. HEAT PRODUCED AND THE METAL MELTS TOGETHER.

STEPS:

(3)

① SQUEEZE TIME - ELECTRODES CONTACT PLATES UNDER PRESSURE BUT NO CURRENT IS SUPPLIED

② WELD TIME - CURRENT IS APPLIED HEATING METAL TO NEAR OR ABOVE MP PRESSURE IS STILL APPLIED

③ HOLD TIME - CURRENT STOPS BUT PRESSURE IS HELD TO MELT WELD WHILE COOLING

④ OFF TIME - WORK IS RELEASED OR THE ELECTRODES MOVE TO A NEW SPOT

3. In oxy-acetylene welding, the hottest part of the flame is in the outer envelope.

TRUE OR FALSE.

✓

2/6/00

4. Give three functions fulfilled by electrode coatings in arc welding.

1. FACILITATE OVERHEAD WELDING ✓

2. REDUCE SPATTER ✓

3. REDUCE OXIDATION BY PROVIDING INERT ATMOSPHERE AND SLAG COATING ✓

(3)
3

5. Compare and contrast MIG (GMA) and TIG (GTA) welding giving at least three different characteristics of each.

TIG (GTA)

MIG (GMA)

1. NON-CONSUMABLE ELECTRODE

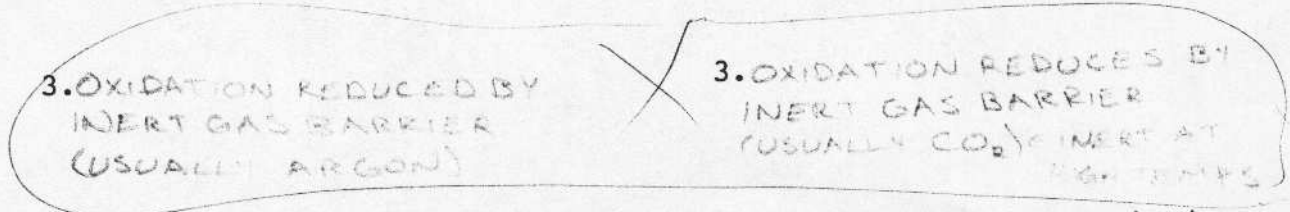
1. CONSUMABLE ELECTRODE

2. MAINLY MANUAL APPLICATION

2. AUTOMATIC OR MANUAL APPLICATION ✓

3. OXIDATION REDUCED BY INERT GAS BARRIER (USUALLY ARGON)

3. OXIDATION REDUCED BY INERT GAS BARRIER (USUALLY CO₂) INERT AT HIGH TEMPS



6. Name three methods of powder manufacture and the characteristics of the powder obtained from each.

1. MILLING - GRINDING AND SIMILAR PROCEDURES
CHAR - ROUGH NON-UNIFORM SHAPE ✓

2. SHOTTING - USE OF SHOT BLENDED WITH WATER
CHAR - FINE POWDER ✓

3. ATOMIZING - LIQUID METAL INTO WATER OR OTHER FLUID (GENERAL CONCEPT REQUIRES 2)

CHAR - FINE POWDER ✓

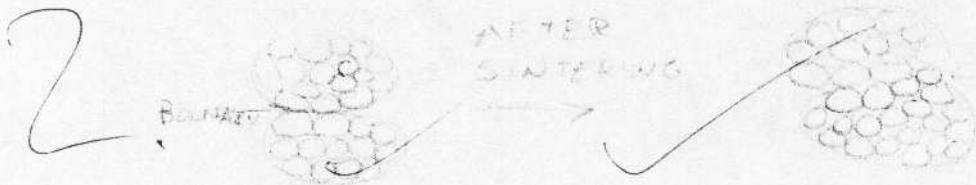
UNIFORM SHAPE
✓ regular

(3)
3

7. Describe the sintering process for metal powder compacts and explain how it leads to a strongly bonded product.

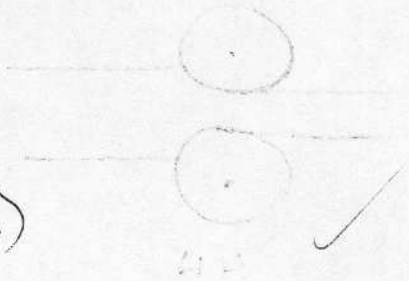
A POWDER PRODUCT IS SINTERED BY HEATING IT JUST ~~BEYOND~~ TO CRITICAL TEMP FOR A MINIMUM OF 20 TO 40 MINUTES (DEPENDING ON METAL USED AND CHARACTERISTICS OF THE POWDER COMPACT SIZE ETC). GRAINS ARE REFORMED AND BOUNDARIES BETWEEN POWDER PARTICLES NO LONGER EXIST.

(3)



8. Sketch 2-Hi and 4-Hi rolling mill configurations. Explain the advantages of 4-Hi over 2-Hi.

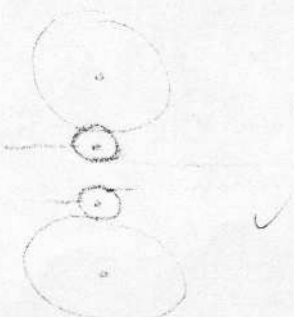
2 HI



(3)

ADVANTAGES OF 4-HI

- pressure applied mainly larger rolls which can take the load better (reduce wear)
- smaller rolls can be used in contact with metal sheet.
- less surface area in contact so more force is applied directly to the product. $P = F/A$



9. Hot working of lead is carried out at elevated temperatures where the workpiece is too hot to handle directly.

TRUE OR FALSE.

TRUE

(1)

10. Distinguish between hammer forging and drop forging.

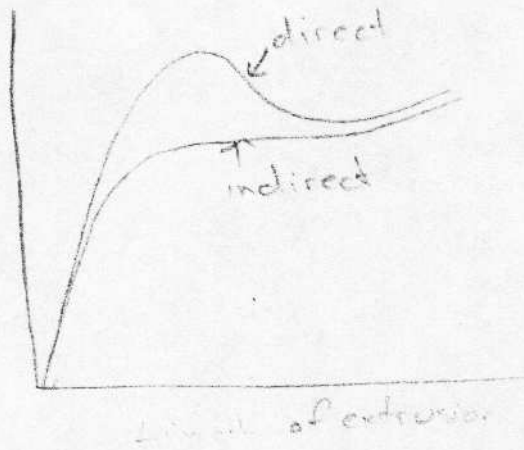
hammer forging - open die (flat die)
 - steam or manual hammers
 - little to no flashings
 controllable

(3)

drop forging - steam or ^{gravity} hammers
 - closed dies
 - flashings requiring removal

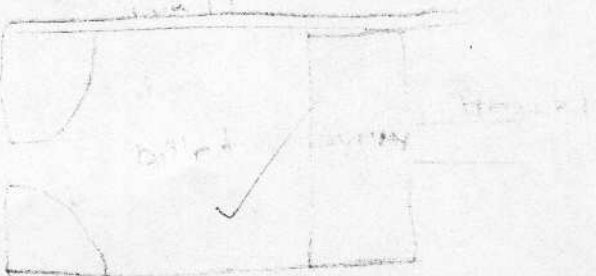
11. Sketch the processes of direct and indirect extrusion and label the relevant parts. Explain why the extrusion pressure achieves a higher peak for direct extrusion compared to indirect extrusion.

(3)

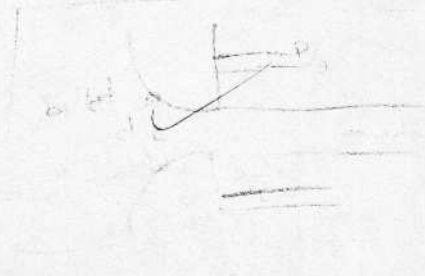


direct requires more force because the billet is forced to overcome friction with the cylinder wall

Direct extrusion



INDIRECT wall



12. In a lead-tin solder, the temperature range over which the solder changes from liquid to solid increases with increasing proportion of tin.

TRUE OR FALSE

(1)

(30)