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*"There is
nothing
impossible to
they who will
try."*

ISRO | BHEL | DRDO & OTHER PSUs



PRODUCTION

METAL FORMING

MOST EXPECTED QUESTIONS

Live@ 11:30Am

PART-2



Gaurav sir



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GATE 2023 RESULT



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AIR 03 ME KUSHAGRA DUTT	AIR 05 PI HARSHIT KUMAR	AIR 07 ME RUSHI PRADIPKUMAR KARIYA	AIR 11 CE VINEET JAIN	AIR 30 CE DITIK BANSAL	AIR 36 ECE SURIT KUMAR
AIR 64 CE UTKARSH MISHRA	AIR 71 EE SONESH SANJAY PAWAR	AIR 76 CE DIPANKAR DAS	AIR 87 EC SURAJIT RABI DAS	AIR 91 EE RISHABH GUPTA	AIR 111 ES ANIL GUPTA
AIR 130 EE SAURAV PATEL	AIR 136 CE RUPESH SACHDEVA	AIR 200 ECE WASIUZZAMA	AIR 212 IN WASIUZZAMA	AIR 217 ME VISHAL KUMAR	AIR 219 ME RITESH KUMAR
AIR 258 EE MANAV	AIR 348 EE AMAN NAMDEV	AIR 392 EE CAURAV MAHAJAN	AIR 403 EC MOHAN KUMAR SINGH	AIR 567 EE SHANKAR JHA	AIR 571 ME VIJENDER MEENA

You **Tube** Classes Schedule



MECHANICAL ENGINEERING

EXAM TARGET	SUBJECT	TIME	FACULTY
ALL PSUs	ENGINEERING MATHS	10:00 AM	ANANT SIR
ALL PSUs	PRODUCTION	11:30 AM	GAURAV SIR
ALL PSUs	THERMODYNAMICS	3:00 PM	KANISTH SIR
GATE 2024-25	HMT	4:30 PM	YOGESH SIR
GATE 2024-25	SOM	9:00 PM	MUKESH SIR

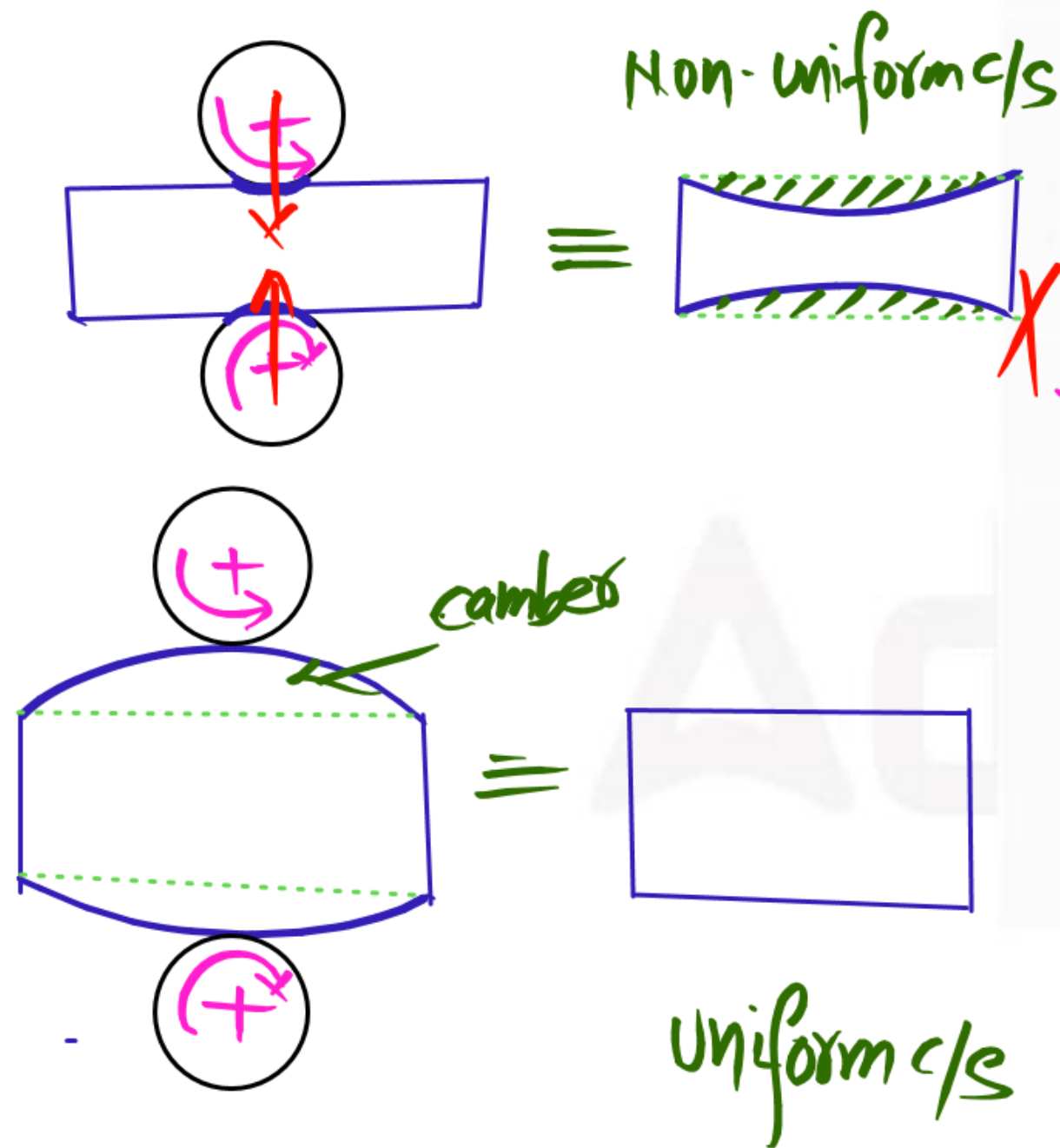
FREE APP CLASS SCHEDULE



MECHANICAL ENGINEERING



HMT	MONDAY Live @11AM	YOGESH SIR
PRODUCTION	TUESDAY Live @11AM	GAURAV SIR
SOM	WEDNESDAY Live @8PM	MUKESH SIR
THERMODYNAMICS	THURSDAY Live @11AM	KANISTH SIR
ENGINEERING MATHEMATICS	FRIDAY Live @11AM	ANANT SIR



In order to get uniform thickness of the plate by rolling process, one provides

- (a) ✓ Camber on the rolls
- (b) Offset on the rolls
- (c) Hardening of the rolls
- (d) Antifriction bearings

Given data \rightarrow

* $h_0 = 30\text{mm}$

* $h_f = 10\text{mm}$

* $D = 600\text{mm}$

* $\mu = 0.1$

* Min no of Pass Needed = ?

$\Delta h = 30 - 10 = 20\text{mm}$

The thickness of a plate is reduced from 30 mm to 10 mm by successive cold rolling passes using identical rolls of diameter 600 mm. Assume that there is no change in width. If the coefficient of friction between the rolls and the work piece is 0.1, the minimum number of passes required is

(a) 3

(b) 4

(c) 6

(d) 7

Solution \rightarrow

$$* \text{ No of Pass Needed } (n) = \frac{(\Delta h)_{\text{Required}}}{(\Delta h)_{\text{Max}}} = \frac{(\Delta h)_{\text{Required}}}{u^2 R}$$

$$* \eta = \frac{20}{(0.1)^2 \times 300} = 6.67$$

$$* \eta = 6.67 \approx 7$$





Forging



Hot Forging



Improved Mechanical Property



Due to Grain Distortion

Which one of the following is an advantage of forging?

(a) Good surface finish → D/s

(b) Low tooling cost → D/s

(c) Close tolerance → D/s

(d) Improved physical property.

In the forging process:

- ✓ 1. The metal structure is refined
- ✓ 2. Original unidirectional fibers are distorted.
- ✗ 3. Poor reliability, as flaws are always there due to intense working

✓ 4. Part are shaped by plastic deformation of material

(a) 1, 2 and 3

(b) 1, 3 and 4

✓ (c) 1, 2 and 4

(d) 2, 3 and 4

Consider the following statements about forging :

- ✓ 1. Forgings have high strength and ductility.
- 😊 *** 2. Forgings offer great resistance to impact and fatigue loads.
- X 3. Forging assures uniformity in density as well as dimensions of the forged parts.

Which of the above statements are correct?

- ✓ (a) 1 and 2 only (b) 1 and 3 only
- (c) 2 and 3 only (d) 1, 2 and 3



Which of the following processes induce more stress in the metal?

(a) Hot rolling

(b) Forging → Hot Forging

(c) Swaging

(d) Turning

Adda



forgeability



Ease of doing forging

* Temp ↑ ⇒ forgeability ↑

Which of the following statements is correct for forging?

- (a) Forgeability is property of forging tool, by which forging can be done easily.
- (b) Forgeability decreases with temperature upto lower critical temperature.
- (c) Certain mechanical properties of the material are influenced by forging.
- (d) Pure metals have good malleability, therefore, poor forging properties.



Forging

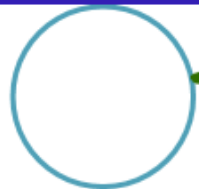


* open die forging

* closed Die forging



Upper die



Billet

Lower die

* Gutter

* Flash

Consider the following statements related to forging:

1. ✓ Flash is excess material added to stock which flows around parting line.
2. ✓ Flash helps in filling of thin ribs and bosses in upper die.
3. ✗ Amount of flash depends upon forging force.

Which of the above statements are correct?

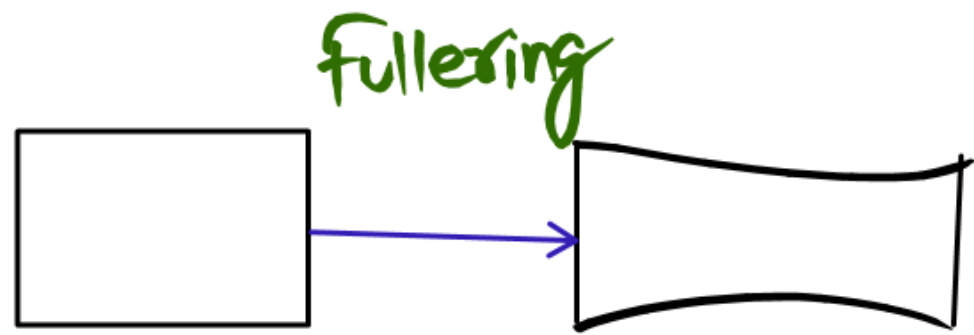
- (a) 1, 2 and 3 (b) ✓ 1 and 2
 (c) 1 and 3 (d) 2 and 3

Which one of the following manufacturing processes requires the provision of 'gutters'?

- (a) Closed die forging
- (b) Centrifugal casting
- (c) Investment casting
- (d) Impact extrusion

In the forging operation, fullering is done to

- (a) Draw out the material
- (b) Bend the material
- (c) Upset the material
- (d) Extruding the material



A forging method for reducing the diameter of a bar and in the process making it longer is termed as

- (a) Fullering
- (b) Punching
- (c) Upsetting
- (d) Extruding

Which of the following processes belong to forging operation ?

1. Fullering

2. Swaging

~~3. Welding~~

(a) 1 and 2 only

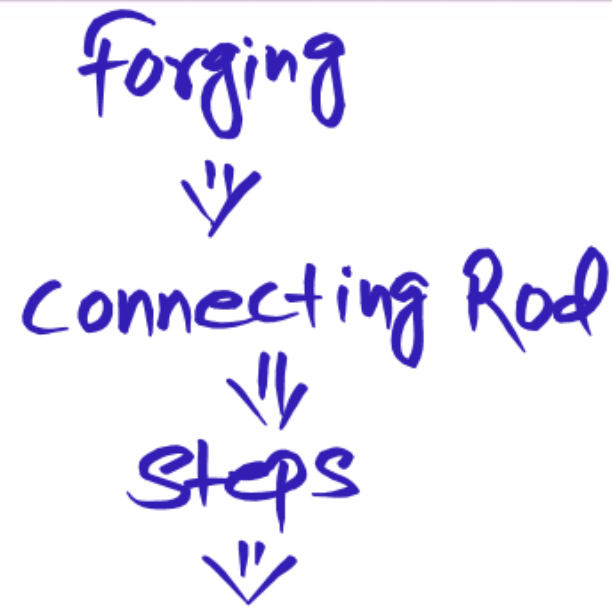
(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3 only

The process of removing the burrs or flash from a forged component in drop forging is called:

- (a) Swaging (b) Perforating
✓ (c) Trimming (d) Fettling



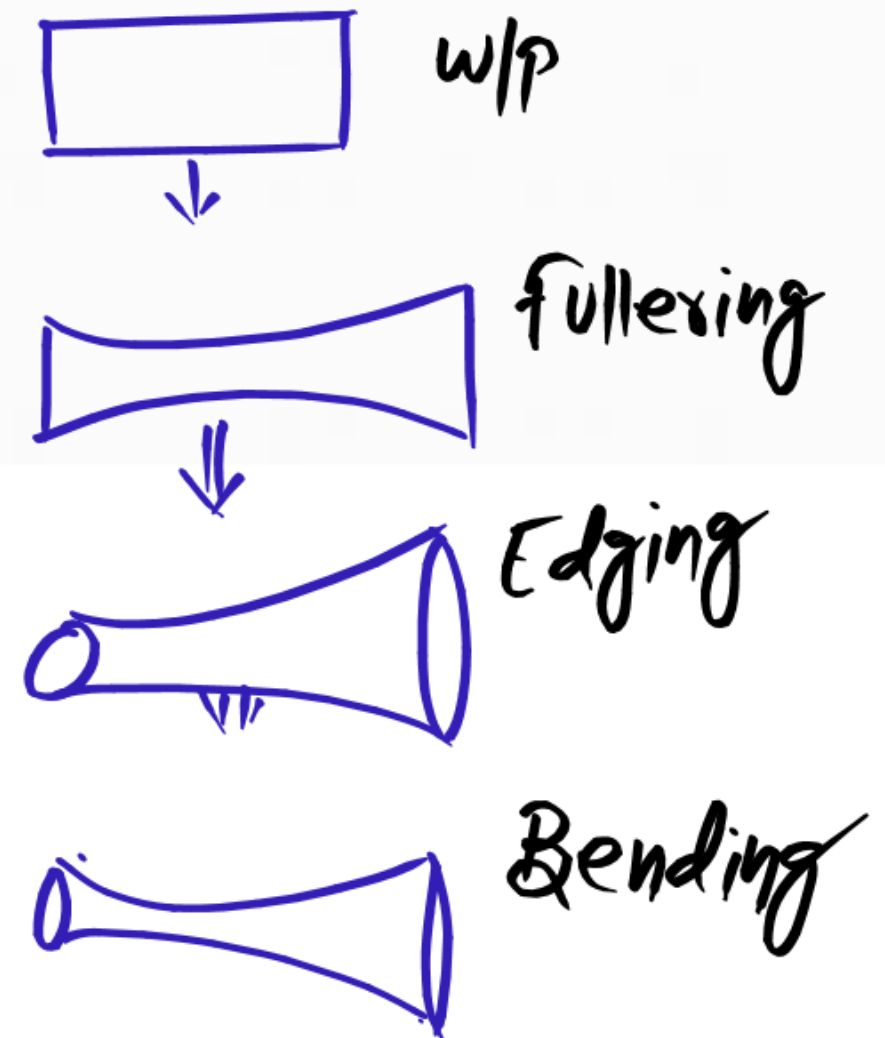
Consider the following steps involved in hammer forging a connecting rod from bar stock:

1. Blocking 2. Trimming
3. Finishing 4. Fullering 5. Edging

Which of the following is the correct sequence of operations?

- (a) 1, 4, 3, 2 and 5
- (b) 4, 5, 1, 3 and 2
- (c) 5, 4, 3, 2 and 1
- (d) 5, 1, 4, 2 and 3

- * Fullering
- * Edging
- * Blocking/Bending
- * Finishing
- * Trimming



In drop forging, forging is done by dropping

- (a) The work piece at high velocity
- (b) The hammer at high velocity.
- (c) The die with hammer at high velocity
- (d) a weight on hammer to produce the requisite impact.



$$* \epsilon_T = \ln(1 + \epsilon)$$



$$* \epsilon_T = \ln\left(\frac{L_f}{L_0}\right)$$

$$* \epsilon_T = \ln\left(\frac{A_0}{A_f}\right)$$

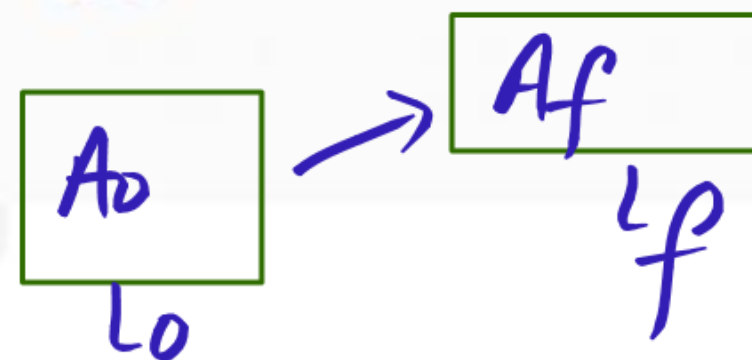
The relationship between true strain (ϵ_T) and engineering strain (ϵ_E) in a uniaxial tension test is

(a) $\epsilon_E = \ln(1 + \epsilon_T)$ (b) $\epsilon_E = \ln(1 - \epsilon_T)$

(c) $\epsilon_T = \ln(1 + \epsilon_E)$ (d) $\epsilon_T = \ln(1 - \epsilon_E)$

$$A_0 L_0 = A_f L_f$$

$$* \frac{L_f}{L_0} = \frac{A_0}{A_f}$$



😊 * $L_f = 2L_0$

$$\epsilon_T = \ln\left(\frac{L_f}{L_0}\right)$$

$$\epsilon_T = \ln\left(\frac{2L_0}{L_0}\right) = \ln 2$$

$$\epsilon_T = 0.693$$

The true strain for a low carbon steel bar which is doubled in length by forging is

- (a) 0.307
- (b) 0.5
- (c) 0.693
- (d) 1.0

Given data \rightarrow

$$* \quad \epsilon = 0.100\%$$

$$* \quad \epsilon_T = ?$$

Solution \rightarrow

$$* \quad \epsilon_T = \ln(1 + \epsilon)$$

$$* \quad \epsilon_T = \ln\left(1 + \frac{0.100}{100}\right) \times 100$$

$$* \quad \epsilon_T = 0.099\%$$

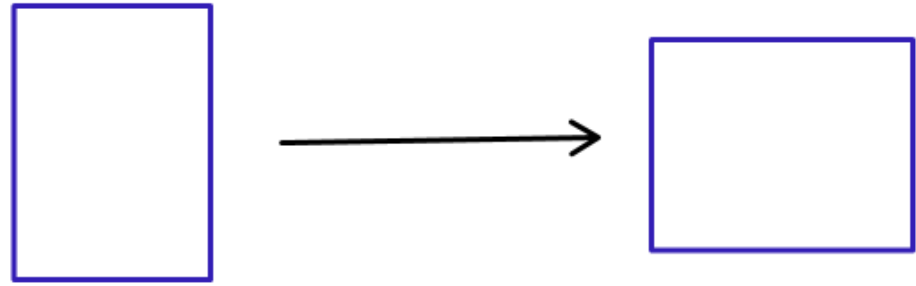
Engineering strain of a mild steel sample is recorded as 0.100%. The true strain is

(a) 0.010 %

(b) 0.055 %

(c) 0.099 %

(d) 0.101 %



$d_o = 200\text{mm}$ * $d_f = 400\text{mm}$
 $h_o = 60\text{mm}$ * $\epsilon_T = ?$

Solution: →

* $\epsilon_T = \ln\left(\frac{L_f}{L_o}\right) = \ln\left(\frac{A_o}{A_f}\right)$

* $\epsilon_T = \ln\left(\frac{A_o}{A_f}\right) = \ln\left(\frac{\frac{\pi}{4}d_o^2}{\frac{\pi}{4}d_f^2}\right)$

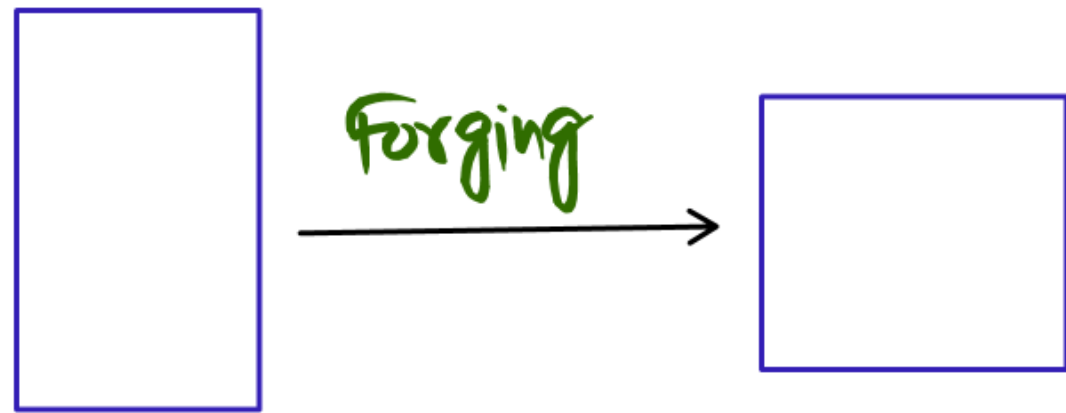
In open-die forging, a disc of diameter 200 mm and height 60 mm is compressed without any barreling effect. The final diameter of the disc is 400 mm. The true strain is

- (a) 1.986
- (b) 1.686
- (c) 1.386
- (d) 0.602

* $\epsilon_T = \ln\left(\frac{d_o}{d_f}\right)^2 = 2 \times \ln\left(\frac{d_o}{d_f}\right)$

* $\epsilon_T = 2 \times \ln\left(\frac{200}{400}\right)$

* $\epsilon_T = 1.386$



A solid cylinder of diameter 100 mm and height 50 mm is forged between two frictionless flat dies to a height of 25 mm. The percentage change in diameter is

* $d_o = 100\text{mm}$

* $h_o = 50\text{mm}$

* $d_f = 141.42\text{mm}$

* $h_f = 25\text{mm}$

* % change in dia = $\left(\frac{d_f - d_o}{d_o}\right) \times 100$
 $= \left(\frac{141.42 - 100}{100}\right) \times 100$
 $= 41.4\%$

(a) 0

(b) 2.07

(c) 20.7

(d) 41.4



$\frac{\pi}{4} d_o^2 \times h_o = \frac{\pi}{4} d_f^2 \times h_f$

* $(100)^2 \times 50 = d_f^2 \times 25$

* $d_f = 141.42\text{mm}$

Extrusion
⇓

- * Forward Extrusion
- * Backward Extrusion

😊 Ram → Solid

⇓
Extruded product → Hollow

😊 Ram → Hollow

⇓
Extruded product → Solid

Metal extrusion process is generally used for producing

- (a) Uniform solid sections
- (b) Uniform hollow sections
- ✓ (c) Uniform solid and hollow sections
- ✗ (d) Varying solid and hollow sections.

The process of hot extrusion is used to produce

- (a) ✓ Curtain rods made of aluminium
- (b) Steel pipes/or domestic water supply
- (c) Stainless steel tubes used in furniture
- (d) Large shape pipes used in city water mains



Which one of the following is the correct temperature range for hot extrusion of aluminium?

- (a) 300-340°C (b) 350-400°C
(c) 430-480°C (d) 550-650°C



What is the major problem in hot extrusion?

- (a) Design of punch ✓ (b) Design of die
(c) Wear and tear of die (d) Wear of punch



Assertion (A): Direct extrusion requires larger force than indirect extrusion.

Reason (R): In indirect extrusion of cold steel, zinc phosphate coating is used.

- (a) Both A and R are individually true and R is the correct explanation of A
- (b) Both A and R are individually true but R is **not** the correct explanation of A
- (c) A is true but R is false
- (d) A is false but R is true



Collapsible Tube



Extrusion



Impact Extrusion

Which one of the following methods is used for the manufacture of collapsible tooth-paste tubes?

(a) Impact extrusion

(b) Direct extrusion

(c) Deep drawing

(d) Piercing

The extrusion process (s) used for the production of toothpaste tube is/are

1. Tube extrusion
2. Forward extrusion
3. Impact extrusion

Select the correct answer using the codes given below:

Codes:

- | | |
|-------------|-------------|
| (a) 1 only | (b) 1 and 2 |
| (c) 2 and 3 | (d) 3 only |

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