PROBLEMS ON PRODUCTION COST

1. Calculate the total cost of CI (Cast Iron) cap shown in Fig. from the following Data:

Cost of molten iron at cupola spout = Rs. 30 per kg

Process scrap = 17 percent of net wt. of casting

Process scrap return value = Rs. 5 per kg

Administrative overhead charges = Rs. 2 per kg of metal poured.

Density of material used = 7.2 gm/cc

The other expenditure details are :

Process	*Time per piece*	*Labour charges per hr*	*Shop overheads per hr*
Moulding and pouring	10 min	Rs. 30	Rs. 30
Casting removal, gate cutting etc.	4 min	Rs. 10	Rs. 30
Fettling and inspection	6 min	Rs. 10	Rs. 30

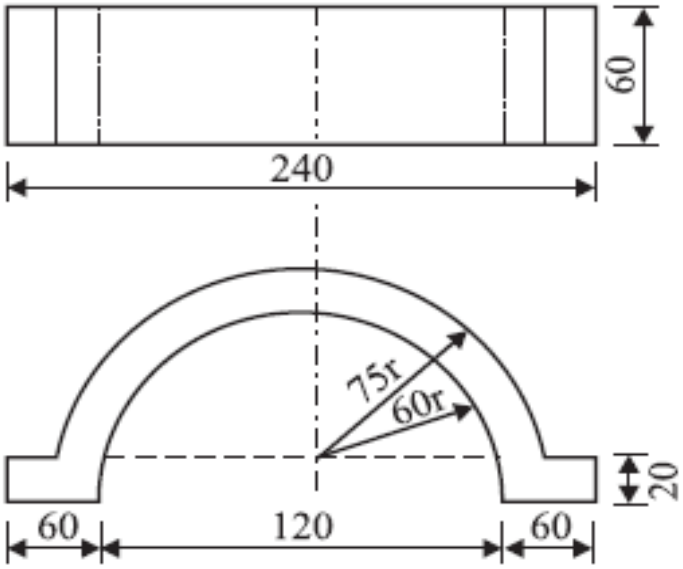


Fig. 5.1. All dimensions are in mm.

Solution:

$$\text{Volume of the component} = (2 \times 6 \times 2 \times 6) + \frac{1}{2} \times p\,[(7.5)^2 - (6)^2]\,6$$

$$= 335 \text{ cc}$$

$$\text{Net weight of the casting} = 335 \times 7.2$$

$$= 2{,}412 \text{ gms}$$

$$= 2.4 \text{ kgs}$$

$$\text{Process scrap} = 2.4 \times 0.17 = 0.4 \text{ kg}$$

$$\text{Metal required per piece} = 2.4 + 0.4 = 2.8 \text{ kgs}$$

$$\text{Material cost/piece} = 2.8 \times 30 = \text{Rs. } 84$$

$$\text{Process return} = 0.4 \times 5 = \text{Rs. } 2$$

$$\text{Net material cost per piece} = 84 - 2 = \text{Rs. } 82$$

(*ii*) Calculate Labour Cost and Overheads

Process	*Time per piece*	*Labour charges per piece (Rs.)*	*Shop overheads per piece (Rs.)*
Moulding and pouring	10 min	$\frac{10}{60} \times 30 = 5$	$\frac{30 \times 10}{60} = 5$
Casting removal, gate cutting etc.	4 min	$\frac{4}{60} \times 10 = 0.67$	$\frac{30 \times 4}{60} = 2$
Fettling and inspection	6 min	$\frac{6}{60} \times 10 = 1$	$\frac{30 \times 6}{60} = 3$
Total		**Rs. 6.67**	**Rs. 10**

$$\text{Labour charges} = \text{Rs. } 6.67 \text{ per piece}$$

$$\text{Shop overheads} = \text{Rs. } 10 \text{ per piece}$$

$$\text{Administrative overheads} = 2 \times 2.8 = \text{Rs. } 5.6$$

$$\text{Total cost per piece} = 82 + 6.67 + 10 + 5.6$$

$$= \text{Rs. } 104.27$$

2. A cast iron component is to be manufactured as per Fig. Estimate the selling price per piece from the following data :

Density of material = 7.2 gm/cc

Cost of molten metal at cupola spout = Rs. 20 per kg

Process scrap = 20 percent of net weight

Scrap return value = Rs. 6 per kg

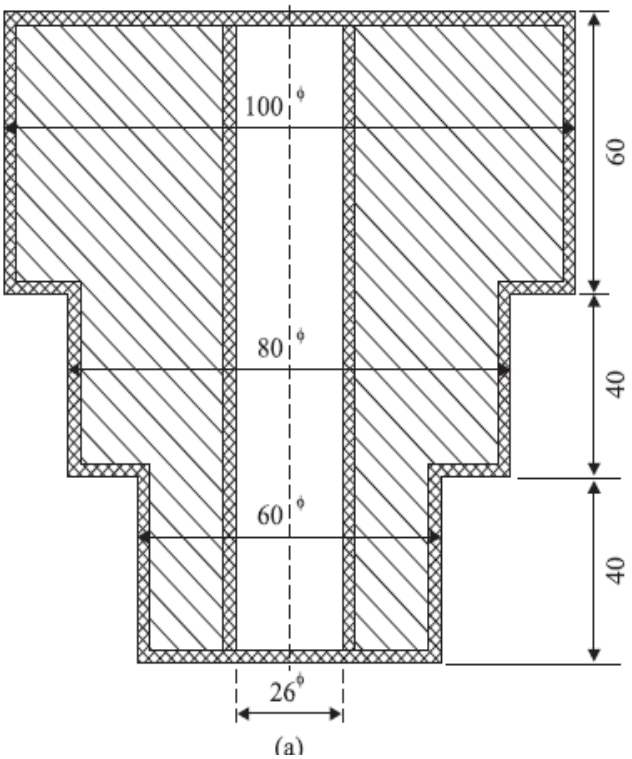
Administrative overheads = Rs. 30 per hour

Sales overheads = 20 percent of factory cost

Profit = 20 percent of factory cost

Other expenditures are :

Operation	*Time (min)*	*Labour cost/hr (Rs.)*	*Shop overheads/hr (Rs.)*
Moulding and pouring	15	20	60
Shot blasting	5	10	40
Fettling	6	10	40



(a)

Solution:

(*i*) *Material cost :*

$$\text{Net volume of cast component} = \frac{\pi}{4}(10^2 \times 6 + 8^2 \times 4 + 6^2 \times 4 - 2.6^2 \times 14)$$

$$= 711 \text{ cc}$$

$$\text{Net weight of cast component} = 711 \times 7.2 = 5117 \text{ gms}$$

$$= 5.117 \text{ kg}$$

$$\text{Process scrap} = 20 \text{ percent of } 5.117 \text{ kg}$$

$$= 0.2 \times 5.117 = 1.02 \text{ kg}$$

$$\text{Total metal required per component} = 5.12 + 1.02 = 6.14 \text{ kg}$$

$$\text{Cost of metal poured} = 6.14 \times 20 = \text{Rs. } 122.8$$

$$\text{Process return value} = 1.02 \times 6 = \text{Rs. } 6.12$$

$$\text{Material cost per component} = 122.8 - 6.1 = \text{Rs. } 116.7$$

(*ii*) *Labour cost and factory overheads :*

$$\text{Labour cost} = \text{Rs. } 6.83$$

$$\text{Shop overheads} = \text{Rs. } 22.33$$

Process	*Time per piece (Minutes)*	*Labour cost per piece (Rs.)*	*Shop overheads per piece (Rs.)*
Melting and pouring	15	5.00	15.00
Shot blast	5	0.83	3.33
Fettling	6	1.00	4.00
Total	**26 min**	**6.83**	**22.33**

(*iii*) Factory cost per component = 116.70 + 6.83 + 22.33 = Rs. 145.86

(*iv*) Administrative overheads = $\frac{30 \times 26}{60}$ = Rs. 13

(*v*) Sales overheads = 0.2 × 145.86 = Rs. 29.17

(*vi*) Profit = 0.2 × 145.86 = Rs. 29.17

Selling price per component = Factory cost + Administrative overheads + Sales overheads + profit

= 145.86 + 13 + 29.17 + 29.17

= Rs. 217.2

Example 15.5. *Estimating the total cost of 20 C.I. flanged pipe casting shown in Fig. 15.9. assuming the following data :*

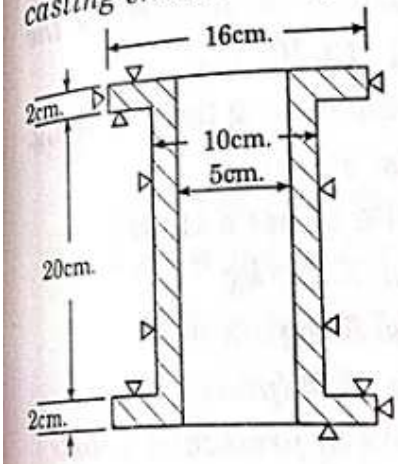


Fig. 15.9. Pipe casting.

(*i*) *Cost of C.I.= Rs. 5 per kg.*

(*ii*) *Cost of process scrap = Rs. 2 per kg*

(*iii*) *Process scrap = 2 % of net weight of casting*

(*iv*) *Moulding and pouring charges = Rs. 2.00/per piece*

(*v*) *Casting removal and cleaning = Re. 0.50/piece*

(*vi*) *Administrative overheads = 5% Factory cost*

(*vii*) *Selling overheads*

= 70% Administrative overheads.

Solution. Volume of C.I. pipe

$$= \frac{\pi}{4}(16)^2 \times 4 + \frac{\pi}{4}(10)^2 \times 20 - \frac{\pi}{4}(5)^2 \times 24$$

$$= 1902 \text{ cm}^3$$

Wt. of C.I. pipe $= 0.0072 \times 1902 = 13.7$ kg.

∴ Process scrap @ 2% net weight of casting

$$= \frac{2}{100} \times 13.7 = 0.274 \text{ kg.}$$

∴ Total C.I. required

$$= 13.7 + 0.274 = 13.974 \text{ kg}$$

∴ Cost of C.I. $= 5 \times 13.974 =$ Rs. 70 (nearly)

Amount recovered back by selling the process scrap

$= 0.274 \times 2 =$ Re. 0.548 say Re. 0.55

Costing/pipe

(*a*) Material cost $= 70 - 0.55 =$ Rs. 69.45

(*b*) Moulding and pouring charges = Rs. 2.00

(*c*) Casting removal and cleaning = Re. 0.50

(*d*) Factory cost $= 69.45 + 2 + 0.50 =$ Rs. 71.95

(*e*) Administrative overheads $= 0.05 \times 71.95 =$ Rs. 3.60

(*f*) Selling overheads $= 0.70 \times 3.60 =$ Rs. 2.52

∴ Total cost $= 71.95 + 3.60 + 2.52 =$ Rs. 78.07

∴ Total cost of 20 pipes $= 78.07 \times 20 =$ **Rs. 1561. Ans.**