

HW 5
(Due 2/18 Mon)

9-3

Suppose that liquid iron is undercooled until homogeneous nucleation occurs. Calculate
(a) the critical radius of the nucleus required; and
(b) the number of iron atoms in nucleus.

9-12

Find the constants B and n in Chvorinov's rule by plotting the following data on a log-log plot:

Casting Dimensions (in.)	Solidification Time (min)
$0.5 \times 8 \times 12$	3.48
$2 \times 3 \times 10$	15.78
2.5 cube	10.17
$1 \times 4 \times 9$	8.13

9-20

A cooling curve is shown in Figure 9-22. Determine

- the pouring temperature
- the solidification temperature
- the superheat
- the cooling rate, just before solidification begins
- the total solidification time
- the local solidification time
- undercooling
- the probable identity of the metal
- If the cooling curve was obtained at the center of the casting sketched in the figure, determine the mold constant, assuming that $n=2$.

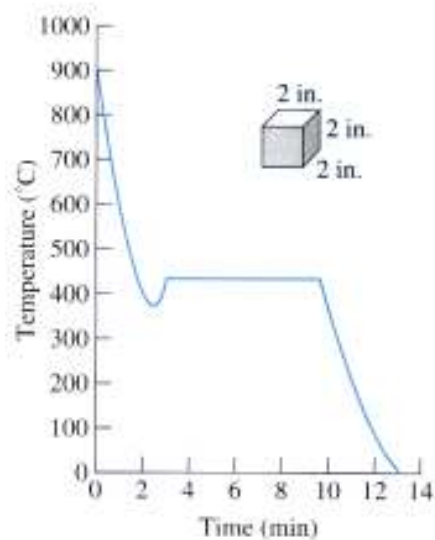


Figure 9-22 Cooling curve (for Problem 9-20).

9-27

Figure 9-25 shows a cylindrical riser attached to a casting. Compare the solidification times for each casting section and the riser and determine whether the riser will be effective.

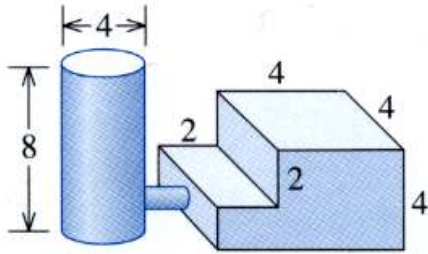


Figure 9-25 Step-block casting (for Problem 9-27).