OUTPUT = Volume per Cycle x Cycles per Hour x Efficiency

OUTPUT = $Q_l = (q_h\ k_d) * (n_c) * (k_e)$ m^3 or cu.yd/hour

Q_l = production of shovel in one hour in loose volume,

q_h = bucket (dipper) size = heaped capacity of bucket (loose),

k_d = dipper factor for shovel depending on the material handled,

n_c = number of cycles in one hour,

If c_t is the cycle time of shovel in seconds then,

$$n_c = \frac{3600}{c_t}$$

angle of swing $= \alpha$

$$Q_l = q_h k_d \frac{3600}{c_s} k_{\alpha d} k_e$$

EXAMPLE – OUTPUT

A subcontractor with an $1\frac{1}{4}$ cu.yd bucket capacity backhoe will excavate 11100 m^3 (bm) earth. Following data is given for the excavation. Determine how many work-days it will take to finish the excavation if backhoe works 10 hrs/day and 50 min/hr.

q_h = bucket capacity = $1\frac{1}{4}$ cu.yd

Soil type = Average (Earth)

$\alpha =$ angle of swing $= 75°$

$d =$ depth of cut $= 3.9$ m

<u>SOLUTION</u>

q_h = 1.25 cu.yd x 0.76 m^3/cu.yd = 0.95 m^3 (loose)

dipper factor = $k_d = \frac{0.85+1.10}{2} = 0.975$ (Table 8.7)

c_s = 23 seconds

$d_{max} = \frac{5.5+7.5}{2} = 6.5$ m

From Table 8.9 $\quad \frac{d}{d_{max}} = \frac{3.9}{6.5} x100 = 60\%$

$k_{\alpha d} = \frac{1.16+1.05}{2} = 1.105$ From Table 8.10 for depth ratio=60% and $\alpha = 75°$

Then, Q_l = (0.95 x 0.975) x $\frac{3600}{23}$ x 1.105 x $\frac{50}{60}$ = 133.42 m^3/hr (loose)

Output in a day = 133.42 x 10 = 1334.2 m^3/day (loose)

k_s = swelling factor = 1.25 (Table 8.8)

k_s = swelling factor in bm $= \frac{1334.2}{1.25} = 1067.4$ m^3/day (bm)

Number of workdays needed $= \frac{11100}{1067.4} = 10.4$ days **TAKE 11 WORK-DAYS**