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## Construction Management Formulas

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## List of 28 Construction Management Formulas

## Construction Management ©

## Construction Safety Management $₫$

1) Injury Frequency Rate

$$
\begin{aligned}
& f \times I_{r}=I_{n} \cdot \frac{100000}{N_{m h}} \\
& \text { ex } 800=20 \cdot \frac{100000}{2500}
\end{aligned}
$$

2) Injury Frequency Rate given Injury Index
$f \times I_{r}=I I \cdot \frac{1000}{I_{n} \cdot R_{i}}$
ex $800=288 \cdot \frac{1000}{20 \cdot 18}$
3) Injury Index
$f \mathrm{fx}=\mathrm{I}_{\mathrm{r}} \cdot \mathrm{R}_{\mathrm{i}} \cdot \frac{\mathrm{I}_{\mathrm{n}}}{1000}$
ex $288=800 \cdot 18 \cdot \frac{20}{1000}$
4) Injury Severity Rate
$f x \mathrm{R}_{\mathrm{i}}=\mathrm{D}_{\mathrm{l}} \cdot \frac{1000}{\mathrm{~N}_{\mathrm{mh}}}$
ex $18=45 \cdot \frac{1000}{2500}$
5) Number of Days Lost given Severity Rate
$f \times \mathrm{D}_{\mathrm{l}}=\mathrm{R}_{\mathrm{i}} \cdot \frac{\mathrm{N}_{\mathrm{mh}}}{1000}$
Open Calculator
ex $45=18 \cdot \frac{2500}{1000}$
6) Number of Disabling Injuries given Frequency Rate
fx $I_{n}=I_{r} \cdot \frac{N_{m h}}{100000}$
ex $20=800 \cdot \frac{2500}{100000}$
7) Number of Man-Hour Worked given Frequency Rate
$f \mathrm{fx} \mathrm{N}_{\mathrm{mh}}=\mathrm{I}_{\mathrm{n}} \cdot \frac{100000}{\mathrm{I}_{\mathrm{r}}}$
Open Calculator
ex $2500=20 \cdot \frac{100000}{800}$
8) Severity Rate given Injury Index
$f_{x} \mathrm{R}_{\mathrm{i}}=\mathrm{II} \cdot \frac{1000}{\mathrm{I}_{\mathrm{n}} \cdot \mathrm{I}_{\mathrm{r}}}$
ex $18=288 \cdot \frac{1000}{20 \cdot 800}$

## Economics of Project Management

9) Contribution per Unit
f. $\mathrm{CM}=\mathrm{SP}-\mathrm{V}$
ex $40=120-80$
10) Fixed Cost
fx FC $=\mathrm{T}_{\mathrm{c}}-\mathrm{TVC}$
ex $2000=3500-1500$
11) Profit for Total Expenses
fx $\mathrm{P}=\mathrm{TR}-(\mathrm{FC}+\mathrm{TVC})$
ex $500=4000-(2000+1500)$
12) Selling Price
$\mathrm{fx} \mathrm{SP}=\frac{\mathrm{FC}+\mathrm{V} \cdot \mathrm{V}_{\mathrm{o}}}{\mathrm{V}_{\mathrm{o}}}$
ex $120=\frac{2000+80 \cdot 50}{50}$
13) Total Cost
$f x T_{c}=F C+T V C$
ex $3500=2000+1500$
14) Total Cost given Profit
$f_{\mathrm{x}} \mathrm{T}_{\mathrm{c}}=\mathrm{TR}-\mathrm{P}$
ex $3500=4000-500$
15) Total Revenue $\sqrt{ }$
fx TR $=\mathrm{P}+(\mathrm{FC}+\mathrm{TVC})$
ex $4000=500+(2000+1500)$
16) Total Variable Cost
fx $\mathrm{TVC}=\mathrm{T}_{\mathrm{c}}-\mathrm{FC}$
ex $1500=3500-2000$
17) Volume of Output
$f_{x} V_{o}=\frac{F C}{S P-V}$

## Open Calculator

ex $50=\frac{2000}{120-80}$

## Management of Construction Equipment $₫$

18) Average Investment if Salvage Value is not 0
$f_{x} I_{a}=\frac{S_{s} \cdot(n-1)+P_{\text {Capital }} \cdot(n+1)}{2 \cdot n}$
$\operatorname{ex} 1381.8=\frac{456 \cdot(5 \mathrm{Year}-1)+1999 \cdot(5 \mathrm{Year}+1)}{2 \cdot 5 \mathrm{Year}}$
19) Average Investment when Salvage value is 0 L
$f \times I_{a}=\left(\frac{1+n}{2 \cdot n}\right) \cdot P_{\text {Capital }}$
ex $1199.4=\left(\frac{1+5 \text { Year }}{2 \cdot 5 \text { Year }}\right) \cdot 1999$
20) Book Value for New Machine
$f \mathrm{fx} \mathrm{C}_{\mathrm{bv}}=\frac{\mathrm{D}_{\mathrm{h}} \cdot \mathrm{L}_{\mathrm{s}}}{0.9}$
Open Calculator
ex $4002=\frac{20.01 \cdot 180 \mathrm{~h}}{0.9}$
21) Capacity of Crankcase when Quantity of Oil is Determined
$\mathrm{fx} \mathrm{C}=5 \cdot \mathrm{t} \cdot\left(\mathrm{Q}-\left(\mathrm{HP} \cdot \eta \cdot \frac{0.0027}{0.74}\right)\right)$
Open Calculator
ex $29.86486 \mathrm{~L}=5 \cdot 100 \mathrm{~h} \cdot\left(0.41 \mathrm{~L} / \mathrm{h}-\left(160 \mathrm{hp} \cdot 0.6 \cdot \frac{0.0027}{0.74}\right)\right)$
22) Capital Cost when Salvage Value is $0 \square$
$f \mathrm{f} \mathrm{P}_{\text {Capital }}=\frac{2 \cdot \mathrm{n} \cdot \mathrm{I}_{\mathrm{a}}}{1+\mathrm{n}}$
Open Calculator
ex $1999.954=\frac{2 \cdot 5 \mathrm{Year} \cdot 1000}{1+5 \mathrm{Year}}$
23) Depreciation Cost when Straight Line Method is Assumed
$\mathrm{fx}_{\mathrm{x}} \mathrm{D}=\frac{\mathrm{T}_{\mathrm{c}}-\mathrm{S}_{\mathrm{c}}}{\mathrm{n}}$
ex $630=\frac{3500-350}{5 \mathrm{Year}}$

## 24) Horsepower given Quantity of Oil

$f \mathrm{fx} \mathrm{HP}=\left(\mathrm{Q}-\left(\frac{\mathrm{C}}{5 \cdot \mathrm{t}}\right)\right) \cdot\left(\frac{0.74}{0.0027 \cdot \eta}\right)$
Open Calculator
ex $159.8765 \mathrm{hp}=\left(0.41 \mathrm{~L} / \mathrm{h}-\left(\frac{30 \mathrm{~L}}{5 \cdot 100 \mathrm{~h}}\right)\right) \cdot\left(\frac{0.74}{0.0027 \cdot 0.6}\right)$
25) Hourly Cost Worker
$f \mathrm{f} \mathrm{H}_{\mathrm{c}}=12 \cdot \frac{\mathrm{~S}_{\mathrm{m}}}{\mathrm{H}_{\mathrm{mh}}}$
Open Calculator
ex $96.00048=12 \cdot \frac{2000.01}{250 \mathrm{~h}}$
26) Hourly Depreciation
$f \times \mathrm{D}_{\mathrm{h}}=0.9 \cdot \frac{\mathrm{C}_{\mathrm{bv}}}{\mathrm{L}_{\mathrm{s}}}$
Open Calculator
ex $20.00005=0.9 \cdot \frac{4000.01}{180 \mathrm{~h}}$
27) Life Span of Machine
$f \mathrm{f} \mathrm{L}_{\mathrm{s}}=0.9 \cdot \frac{\mathrm{C}_{\mathrm{bv}}}{\mathrm{D}_{\mathrm{h}}}$
ex $179.9105 \mathrm{~h}=0.9 \cdot \frac{4000.01}{20.01}$

## 28) Quantity of Lubricating Oil

$f \mathrm{f}=\left(\mathrm{HP} \cdot \eta \cdot \frac{0.0027}{0.74}\right)+\left(\frac{\mathrm{C}}{5 \cdot \mathrm{t}}\right)$

## Open Calculator $\longleftarrow$

ex $0.41027 \mathrm{~L} / \mathrm{h}=\left(160 \mathrm{hp} \cdot 0.6 \cdot \frac{0.0027}{0.74}\right)+\left(\frac{30 \mathrm{~L}}{5 \cdot 100 \mathrm{~h}}\right)$

## Variables Used

- C Crankcase Capacity (Liter)
- Cbv $_{\text {br }}$ Book Value
- CM Contribution Margin per Unit
- D Depreciation
- $\mathbf{D}_{\mathrm{h}}$ Hourly Depreciation
- $\mathbf{D}_{\mathbf{I}}$ Lost Days
- FC Fixed Cost
- $\mathrm{H}_{\mathbf{c}}$ Hourly Cost
- $\mathrm{H}_{\mathrm{mh}}$ Machine Hours (Hour)
- HP Engine power (Horsepower)
- $I_{a}$ Average Investment
- $I_{\mathbf{n}}$ Number of Disabling Injuries
- Ir Injury Frequency Rate
- II Injury Index
- $\mathbf{L}_{\mathbf{s}}$ Life Span (Hour)
- $\mathbf{n}$ Useful Life (Year)
- $\mathbf{N}_{\text {mh }}$ Man Hour
- P Cost of Profit
- PCapital Capital Cost
- Q Quantity of Oil (Liter per hour)
- $\mathbf{R}_{\mathbf{i}}$ Injury Severity Rate
- $\mathbf{S}_{\mathbf{c}}$ Scrap Value
- $\mathrm{S}_{\mathrm{m}}$ Monthly Salary
- $\mathrm{S}_{\mathrm{s}}$ Salvage
- SP Selling Price
- t Time between Change of Oil (Hour)
- $\mathbf{T}_{\mathbf{c}}$ Total Cost
- TR Total Revenue
- TVC Total Variable Cost
- V Variable Cost per Unit
- $\mathbf{V}_{\mathbf{o}}$ Volume of Output
- $\boldsymbol{\eta}$ Operating Factor


## Constants, Functions, Measurements used

- Measurement: Time in Year (Year), Hour (h) Time Unit Conversion
- Measurement: Volume in Liter (L) Volume Unit Conversion
- Measurement: Power in Horsepower (hp)

Power Unit Conversion

- Measurement: Volumetric Flow Rate in Liter per hour (L/h) Volumetric Flow Rate Unit Conversion


## Check other formula lists

- Basic Formulas in Construction Planning and Management
- Construction Management Formulas

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