

# THE ARITHMETIC OF CONSULTING ENGINEERING

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## A. Assumptions

1. Total Salaries - 20 people @ \$50,000/yr = \$1,000,000
2. Client/project utilization = 70% x \$1,000,000 = \$700,000
3. Overheads:
  - a) Salaries = 30% x \$1,000,000 = \$300,000
  - b) Salary fringe benefits = 40% = \$400,000
  - c) Rent, travel telephone, computers, professional society, research, interest on borrowed capital, supplies, licenses, etc. = \$525,000

Total Overheads   \$1,225,000

## B. Arithmetic

1. Breakeven Multiplier   =  $\frac{\text{Total Costs}}{\text{Direct Salaries}}$   
   =  $\frac{\text{Direct Salaries} + \text{Overheads}}{\text{Direct Salaries}}$   
   =  $\frac{\$700,000 + 1,225,000}{\$700,000}$   
   = 2.75
2. Minimum Profit (Retain for growth and return to owners)  
   = 10%
3. Minimum Billing Multiplier   = 2.75 + 10% x 2.75  
   = 3.025
4. Total Required Revenue   = \$700,000 x 3.025 + Project Expenses  
   = \$2,117,500 + Project Expenses

## C. Key Business Indicators

1. Overhead rate =  $\frac{\$1,225,000}{\$700,000}$  = 175% x Direct Salaries
2. Billing Multiplier = 3.025 x Direct Salaries
3. Client/Project Utilization = 70% x Total Salaries

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## D. Typical Business Problems

1. Low Client/Project Utilization - say 60%  
Then overhead salaries increase to 40%

- a) Overheads become:  
40% x \$1,000,000 = \$ 400,000  
Plus other overhead = \$ 925,000  
Total = \$1,325,000
- b) Direct Salaries become = \$ 600,000
- c) Overhead rate becomes =  $\frac{\$1,325,000}{\$600,000} = 221\%$
- d) Breakeven Multiplier =  $\frac{\$1,925,000}{\$600,000} = 3.21$  vs. 2.75
- e) If contracted at 3.025  
Total revenues = \$600,000 x 3.025 = \$1,815,000
- f) Loss = \$1,925,000 - \$1,815,000 = (\$110,000)

2. Overrunning Project Fee (spending more time than planned)

Then: (say 15% overruns)

- a) Total Overheads (same) = \$1,225,000  
b) Original Direct Salaries = \$ 700,000  
c) 15% Overrun by Overtime = \$ 105,000  
d) Total Costs = \$2,030,000  
e) Total Revenues (same) = \$2,117,500  
f) Profit = \$ 87,500 = 4.5%