

COST ESTIMATION OF DRILL BIT AND BREAK EVEN ANALYSIS IN DRILLING

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Abstract: Eventual price drops in the international crude oil market and the new exploration activities have been stopped much. If the oil price rise that duration new finding of crude oil will come. for finding or exploration of new crude oil wells first step is to Estimate the Drilling Cost for the exploration activity. In this Article I have made several calculations on Drilling cost estimation with the assumed Data.

Keywords: Cost Estimation, Exploratory well cost determination, Drilling Cost , upstream operation

Introduction:

When the Exploration starts lot of wells have to be drilled to find out the crude from the subsurface for those money matters. so, the drilling cost estimation have to be done to minimize the risk and uncontrollable problems in that work like time delay, adequate supply of budget were determined by doing cost estimation before the work start.

Methodology:

Criterion for bit selection is based on cost/ft using the equation

$$C = (B + (T + t) * R) / F$$

For given bit (B) and hole section (F) cost/ft will be highly sensitive to changes in rig cost per hour (R), Trip time (T) and rotating time (t).

Selection of bit for next well by comparing the cost of two older wells

Data:

Well No	Bit type	Depth in(ft)	Depth Out(ft)	Footage Drilled	Rotating Time(hrs)	Trip time(hrs)
1	XXX	6468	9138	3670	244	8
2	YYY	5973	8795	3822	280	8

Assuming bit cost= \$20000 , Rig Cost= 1800\$/hr

Using

$$\text{cost/ft} = (B + (T + t) * R) / F$$

For Bit XXX

$$\text{cost/ft} = (20000 + (8 + 244) * 1800) / 3670$$

$$= 129.04 \$/\text{ft}$$

For Bit YYY

$$\text{cost/ft} = (20000 + (8 + 280) * 1800) / 3822$$

$$= 136.15 \$/\text{ft}$$

From above, the cost/ft of type XXX is more economical than bit YYY.so, the XXX type should be used in the next well

BREAK-EVEN ANALYSIS:

Break Even Analysis technique usually used for replacing a current cheap bit by a new and more expensive bit.

The comparison based on graph of footage vs rig hours

The graph is determined as follows

- 1) Calculating the number of rig hours equivalent to bit cost
 $A = \text{Cost of new bit } (\$) / \text{Rig cost } (\$)$
- 2) Adding trip time to A to obtain the total number of rig hours corresponding to the cost of the new bit before drilling commences.
 We say it as B
 Marking this on left handed side of the X-axis
- 3) Calculating the number of feet of hole at break-even cost using
 $F = (\text{cost of new bit} + \text{trip cost}) / (\text{offset cost}/\text{ft})$

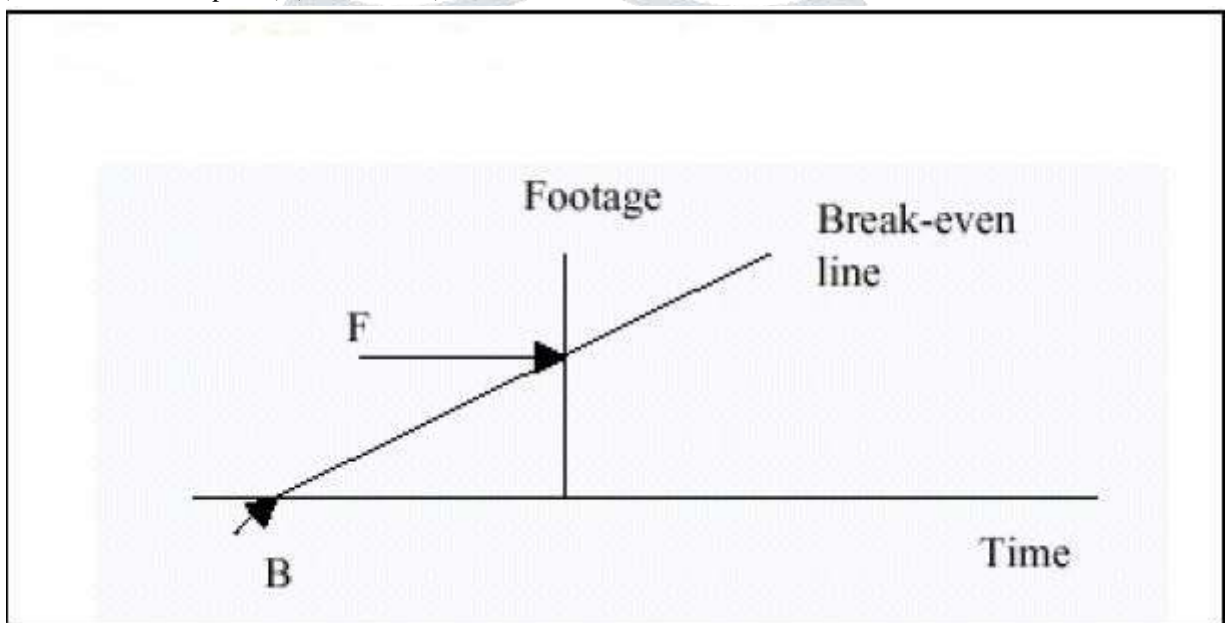


Fig: Break Even Analysis

Mark point F on the Y-axis (Footage axis)

- 4) Draw straight line through point B and F
 This line is the breakeven line. Any footage and hour combination on this line is a break-even point. Above this line, the new bit will produce lower cost/ft than the offset bit and below this line the new bit is more expensive to run.

Calculating break even analysis using assumed values

A milled tooth nit drilled 4922ft of limestone in 300 rotating hrs

Trip time(T)=8hrs, Bit cost(B)= \$6000, Rig cost=1800 \$/hr

It is proposed to replace this bit with an insert type bit costing 17000

- 1) $A = 17000 / 1800 = 9.4\text{hr}$
- 2) $B = \text{trip time} + A$
 $= 8 + 9.4 = 17.4\text{hrs}$
- 3) Calculating F
 $F = (\text{Cost of new bit} + \text{trip time cost}) / \text{offset cost } (\$/\text{ft})$
 $\text{Offset cost}/\text{ft} = (6000 + (8 + 300) * 1800) / 4922$
 $= 113.85 \text{ } \$/\text{ft}$
 $\text{Trip cost} = 8\text{hrs} * 1800 \text{ } \$/\text{hr} = 14400$
 $\text{Total cost} = 14400 + 17000$
 $= 31400\text{\$}$
 $F = 31400 / 113.85$
 $= 275.80\text{ft}$
 $B = 17.4\text{hr}$

F=275.80ft

C=113.85

Conclulsion:

- By doing the estimation the best bit in cheaper rate can be determined
- While drilling if the older bit have to be replaced then the cost estimationg the break even analysis have to be done for replacing the cheaper one with costlier one
- Estimating leads to a successful completion of project
- Innovation in technology, management and system is the only way to control drilling cost and improve benefit of oil companies.

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