William Rossell

CE 417

Homework 14

Due Date: 02-28-2018

Question:

A 75-fwhp gasoline-powered pump will be used to dewater an excavation. The work will be steady at an efficiency equal to a 60-min hour. The engine will work at 60% of full throttle. Calculate the theoretical fuel consumption.

\*\*\*Page 40, Lecture Notebook, Slide 1:

See table 2.2 for fuel consumption rate example.

Gasoline engines at approximately 0.06 gal of fuel per flywheel horsepower hour (fwhp-hr)

Solution:

* Fuel consumption rate equals 0.06 gal per fwhp-hr
* Throttle load factor (operating power): 60%
* Time factor (operating efficiency): 60-min hour: 60/60 = 1

**Final Solution:**

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Homework 15

Due Date: 02-28-2018

Question:

A 262-fwhp diesel-powered wheel loader will be used to load shot rock. This loader was purchased for $350,000. The estimated salvage value at the end of four years is $86,000. The company’s cost of capital is 7.2%. A set of tires costs $36,000. The work efficiency will be equal to a 45-min hour. The engine will work at full throttle while loading the bucket (33% of the time) and at three-quarter throttle to travel and dump. The crankcase capacity is 12 gal and the company has a policy to change oil every 100 hr on this job. The annual cost of repairs equals 65% of the straight-line machine depreciation. Fuel cost is $3.25/gal, and oil is $4.55/gal. The cost of other lubricants and filters is $0.45/hr. Tire repair is 18% of tire depreciation. The tires should give 3,400 hr of service. The loader will work, 1,600 hr/yr. In this usage, the estimated life for bucket teeth is 120 hr. The local price for a set of teeth is $700. What is the operating cost for the loader in this application? ($62.732/hr)

Solution:

Fuel:

* Fuel consumption diesel engine 0.04 gal per fwhp-hr

**Throttle Load Factor (Operating Power):**

Loading

Travel and Dump

Throttle Load Factor

**Time Factor (Operating Efficiency):** 45-min hour: 45/60 =

**Combined Operating Factor:**

**Consumption Rate:**

**Consumption Cost:**

Lubricants:

Where,

fwhp, rated horsepower of the engine

c, capacity of the crankcase in gallons

f, operating factor

t, number of hours between oil changes

**Consumption Cost:**

**Total Lubricant Operating Cost**

Repairs:

**Machine Repairs:**

**Tire Repair Costs:**

**Tire Use Cost (Time-Value of Money):**

Calculate the number of times the tires will have to be replaced.

Will have to purchase tires at time zero and the end of the second year, but not before salvage.

\*\*\*exponent “y” is present year

**First Set (Year 0):**

**Second Set (Year 2):**

High Wear Items:

**Total Operating Costs:**

Total Operating Cost is equal to $66.24 per hour.

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Homework 16

Due Date: 02-28-2018

Question:

A 196-fwhp diesel-powered wheel loader will be used to load shot rock. This loader was purchased for $295,000. The estimated salvage value at the end of five years is $70,000. The company’s cost of capital is 6.55%. A set of tires costs $26,000. The work efficiency will be equal to a 50-min hour. The engine will work at full throttle while loading the bucket (30% of the time) and at three-quarter throttle to travel and dump. The crankcase capacity is 9 gal and the company has a policy to change oil every 110 hr on this job. The annual cost of repairs equals 60% of the straight-line machine depreciation. Fuel cost is $3.05/gal, and oil is $4.35/gal. The cost of other lubricants and filters is $0.745/hr. Tire repairs is 19% of tire depreciation. The tires should give 4,000 hr of service. The loader will work 1,500 hr/yr. In this usage, the estimated life for the bucket teeth is 120 hr. The local price for a set of teeth is $670. What is the operating cost for the loader in this application?

Solution:

The following table follows the same process as outlined in HW15.



Total Operating Cost equals $51.85 per hour of operation.

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Homework 17

Due Date: 02-28-2018

Question:

Using the average-end-area method, calculate the cut-and-fill volumes for stations 55 + 00 through 61 + 00.





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Homework 18

Due Date: 02-28-2018

Question:

Complete the earthwork calculation sheet here and plot the resulting mass diagram. Divide ccy by 0.9 to convert to bcy.





