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SECTION 15

# OWNING & OPERATING COSTS

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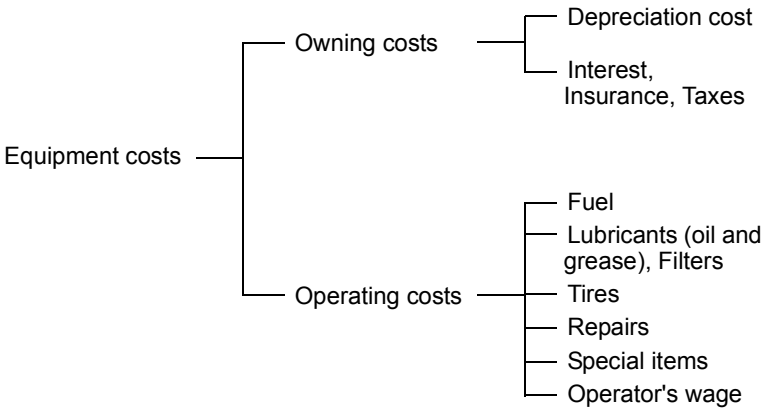
## ESTIMATION OF THE OWNING & OPERATING COSTS

Along with the trend for mechanization adopted for economical and satisfactory job accomplishment, equipment costs now occupy a large proportion of the overall construction cost. Therefore, the estimation of the equipment costs has become more important. Success or failure in a contract for a construction job is virtually dependent on the estimates of the equipment costs. In other words, careful consideration of the equipment costs is of prime importance, if a contractor is to fulfill the contract at a profit. Unless estimates are made properly, there will occur cases where a construction job cannot be accomplished at a profit.

There are two types of equipment costs: owning costs and operating costs. Owning costs refer to the costs incurred even if the machine is not working. They include depreciation, interest, taxes and insurance. Operating costs are the costs incurred in actually operating the machine. They include costs for repair, fuel, lubricants, tires, special items (consumable parts such as ground engaging tool) and operator's wages.




We would like to explain **one method** of estimating the owning and operating costs of construction equipment in this handbook.

**The owning and operating costs of construction equipment can vary widely because they are influenced by many factors: the type of work the machine does, local prices of material, labor, fuel and lubricants, interest rates, etc. Accordingly it is very dangerous to estimate the costs relying entirely on an established form of calculation method.**

In this Manual, however, we will make approximate estimates of general application of the equipment costs. Accordingly, if users want more accurate values of the costs, we hope that they will make estimates by taking into account their own reference data and territorial or environmental conditions.

**Depreciation period, and repair and periodic maintenance cost are especially affected by specific application and type of work. Therefore, if you need those data, we suggest that you contact the local Komatsu distributor with necessary information.**

The equipment owning and operating costs are calculated in units of $/m$^3$, $/m$^2$ or $/h, etc., depending on the type of construction work. The costs in $/m$^3$ or $/m$^2$ are obtained by dividing the cost in $/h by production (m$^3$/h) and thus, it is recommended that the owning and operating costs be calculated in the unit of $/h as generally accepted.

### 1. OWNING COST

The equipment owning cost is the expense required, as a matter of course, for the purchase and possession of the equipment as a property of its owner and consists of the following two items.

**(1) Depreciation**

**(2) Interest, insurance and taxes**

#### 1-1.DEPRECIATION

In general, depreciation is a tax term referring to the legally permitted decline in value from the original purchase price of equipment, and is an assessable property (expressed in units of years). Depreciation referred to herein is a business practice for conserving the investment in the form of purchased equipment, in other words, for making preparations in a systematic manner for the fund necessary for replacing the existing equipment with new or any other equipment.

$$\text{Depreciation} = \frac{\text{Net Depreciation Value}}{\text{Depreciation Period in Hours}}$$

Net depreciation value means Original purchase price minus Resale or Trade-in price.

The depreciation period varies considerably according to the equipment operating conditions. It is also affected by the speed of fund collection desired by the user, environmental and economic conditions in its applied territory. Furthermore, it goes without saying that maintenance of equipment is a significant

factor in determining the economical life of the equipment. Proper maintenance will extend the life of equipment. On the other hand, poor or improper maintenance will shorten the life. There is the legal depreciation period in each country for tax purpose. However, in the business, it is rather usual to employ the equipment owning period as the depreciation period. The equipment owning period is strongly affected by the economical life of the equipment (Years or hours for which the equipment can be used gainfully).
When you need to estimate the value of the economical life for a specific product, please consult your distributor or Komatsu representative. They can suggest you with the appropriate values from their experience and the data they have. (The former handbook contained the depreciation period, but they are removed because the straight numbers sometimes mislead the readers.)
The net depreciation value is the net amount to be considered in the depreciation of equipment.

In case of crawler-type tractors, their purchase prices are used to calculate the net depreciation value. In wheel type equipment, their tire values should be deducted from the purchase prices, because, unlike the undercarriages of crawler-type equipment, tires wear out earlier than the equipment chassis proper, and tires are not cheap. Further, there is a possibility of tires becoming unserviceable suddenly in unexpected accidents. Hence, it is necessary in tire depreciation to include their degrees of wear into the operating cost.

**RESALE OR TRADE-IN VALUES**

At the time of resale or trade-in, construction machines have a value.

Some users will hope that in terms of book value the machine will depreciate completely within the depreciation period. Other users will hope that the residual value expressed as resale value or trade-in value will be left. For these users the resale value or trade-in value is an important factor in reducing the capital invested. This value is also a factor when deciding to purchase a new machine.

The resale value or trade-in value changes greatly according to the territory. Therefore the conditions in that territory must be considered when determining these values. However, major factors in deciding resale value or trade-in value are the hours of operation, nature of work and working environment. The real resale value or trade-in value cannot be decided simply, but when a realistic value is decided it is subtracted from the purchase price to give the Net Depreciation value. It is then possible to obtain the depreciation from the Net Depreciation Value.

**1-2.INTEREST, INSURANCE AND TAXES**

Whether or not purchased equipment is actually in operation, its users must pay interest, insurance and taxes. Interest refers to the interest on the investment, when the investment is covered by the user's own fund or to the interest on the debt, when the investment is covered by a debt. In either case, the interest will be an equal amount.

Insurance and taxes are imposed on the annual residual values of the equipment, which requires knowledge of depreciation as prescribed by the tax law. The depreciation rate or the depreciation period (whether it is a fixed amount or a fixed rate) vary according to the country. For the correct values of insurance and taxes on the residual value in a country, the calculation formulas established in that country must be used.

Interest, insurance and taxes are imposed on the residual value that is the difference between the purchase price and the depreciated amount. This residual value decreases every year. However, when the user calculates owning & operating costs, it is convenient to consider interest, insurance and taxes as a constant amount paid out each year. For this reason, the machine will be considered here to depreciate by a constant annual amount. A calculation is made of the average value of the residual value at the beginning of each year within the depreciation period, and interest, insurance and taxes are imposed on this value. By dividing this value by the number of hours the user expects to operate the machine in one year, the hourly value can be calculated.

This can be calculated by using the following formula.

$$\textbf{Interest, insurance, tax} = \frac{\text{Factor} \times \text{Delivered price} \times \text{Annual rates}}{\text{Annual use in hours}}$$

The annual rates are the total of those of interest, insurance and tax.
The factor can be obtained by using Table 1 or can be calculated by the following formula.

$$\textbf{Factor} = 1 - \frac{(n-1)(1-r)}{2n}$$

where **n: Depreciation period**

**r: Trade-in value rate =** $\dfrac{\text{Machine worth at trade-in or resale time}}{\text{Delivered price}}$

(Example)

Delivered price: $100,000 Annual rates: 15% Annual use in hours: 2,000 hrs

Trade-in value: $25,000 Depreciation period (n) : 4 years

**Solution**

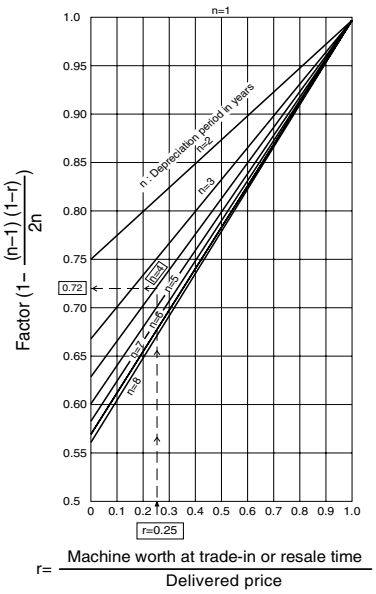
$\mathbf{r} = \dfrac{25{,}000}{100{,}000} = 0.25$

$\mathbf{Factor} = 1 - \dfrac{(4-1)(1-0.25)}{2 \times 4} = 0.72$

When obtaining the factor by using Table 1.
Enter r = 0.25 in Table 1
Move vertically to n = 4 line and horizontally to left axis.
Applicable factor is 0.72

**Interest, insurance, tax =** $\dfrac{0.72 \times \$100{,}000 \times 0.15}{2{,}000}$ **= $3.59**

**Table 1 Factor of Interest, Insurance, Taxes**




## 2. OPERATING COST

The equipment operating costs are proportional to the time that the equipment works. Items considered in this category are as follows:

(1) Fuel
(2) Lubricants (oil and grease), Filters and Periodic Maintenance Labor
(3) Tires
(4) Repair Cost
(5) Special items (Ground engaging tools)
(6) Operator's wage

### 2-1. FUEL

More definite fuel consumption data should be measured in the field.

It is possible, however, to anticipate the actual or approximate consumption values according to the actual operating conditions without measuring the consumption. **Table 3** gives the hourly fuel consumption values for KOMATSU construction machines. In this table, the average values are given, provided that the job conditions are classified into three different ranges of application. If a user has data on certain operating conditions, more correct or realistic values will be obtained by applying these data in similar operating conditions, provided that the equipment is limited to the same type as that used in the user's data.

To estimate hourly fuel cost, select the job condition based on application and find hourly fuel consumption.

Hourly fuel cost = Hourly fuel consumption $\times$ Local unit price of fuel

### 2-2. LUBRICANTS (OIL AND GREASE), FILTERS AND PERIODIC MAINTENANCE LABOR

It is possible to measure the consumption of lubricants and grease in the same manner as the fuel consumption. The consumption values of lubricants and grease are also obtained by calculation on the basis of lubrication intervals, but they are affected greatly by the type of machines and their operating conditions, which makes it difficult to specify the consumption suited for various machines and their operating conditions. **Table 4** gives the data based on the oil use per hour for your reference.

**Hourly Lubricant Consumption = Oil replacement amount (liter) ÷ Oil change interval (hour)**

Prices of lubricants vary in countries or areas and, therefore, the local price (price in that country or area) should be used.

In KOMATSU construction machines, filter replacement intervals are standardized for each machine model. Thus, the cost of filter can be calculated from the local price of filter and the replacement interval. The hourly filter cost is the total of the hourly costs for each type of filter.

**(Example)**

$$\text{Hourly cost of filter A} = \frac{\text{Number of filters A} \times \text{Local price of filter A}}{\text{A}}$$

The same method is used for calculating the hourly filter cost of other filters. For quick estimation, hourly filter costs are about 50% of hourly lubricant costs. If they are used in the dusty terrain, the calculated value should be multiplied by a proper factor.

**If necessary, we suggest you to contact the local Komatsu distributor with necessary information to get the assistance for estimating them.**

### 2-3. TIRES

As has been described in Depreciation, tires are in the category of consumable parts and tires are generally expensive. Therefore, it is better to include the tire cost as an individual item in the operating costs. Tire cost is calculated by the following formula.

$$\text{Hourly tire cost} = \frac{\text{Tire price}}{\text{Estimated life}}$$

As tire prices vary in each country or area, the price of tires actually bought by a user should be applied. It is difficult to indicate definitely the tire life, because the tire life is affected by many factors. However, the general measurements for the life expectancy of tires can be indicated on the basis of past experience and data obtained from the tire manufacturers. Refer to **Table 4**.

In this table, the approximate life values are given for three different types of conditions. The optimum value for a certain ground condition is one of those obtained by a user in experience on similar ground conditions. When recapped tires are to be used, their prices and life expectancy must be changed correspondingly.

### 2-4. REPAIR COST

Components or parts of a machine will in due course wear and sometimes fail. To keep a machine in a properly maintained condition, these components or parts must be replaced. It is natural for the repair cost of a machine to start from a small amount and gradually increase with time as the machine is operated. The repair cost of a machine can be estimated actually as described above with respect to the machine operating time. However, in general, repair cost is considered as an average of total repair costs throughout the service life of a machine. In other words, it is based on the concept that part of repair cost to be paid later should be laid aside in advance.

**Repair costs are more greatly affected by the machine operating conditions than by any other cost items. It depends greatly on the job, operating techniques or operator's skill, proper maintenance, etc. In a specific job application, calculation for repair cost should be made on the basis of the data accumulated in the past. If such data are not available, the calculation should be made with due consideration of experience.**

**Repair Cost are affected by specific application and type of work as well.**
**Therefore, we suggest that you contact the local Komatsu distributor with nesessary information for the repair cost estimation.**

### 2-5. SPECIAL ITEMS (GROUND ENGAGING TOOLS)

In the objects of repair, the repair costs include the machine and its attachments. Some parts of a machine wear faster than others. These parts are the ground engaging tools and not included in the category of repair but in a group of special items. Life expectancy of ripper points, ripper shanks and shank protector is given in **Table 5**.

### 2-6. OPERATOR WAGES

Operator hourly wages vary according to the country and area. Thus, the wages actually paid by users should be used.

### 3. EXAMPLE OF CALCULATION

**PC200 is delivered for $92,811 at a job site.**

**Applications:**

Mass excavation or trenching where machine digs all the time in natural bed clay soils. Some traveling and steady, full throttle operation.

**Net Depreciation Value**

Since the machine is a crawler-type, tires are not involved. This owner knows from experience that at trade-in time, the machine will be worth approximately 10% of its delivered price 4 years from now.

**Trade-in value is $9,281**

**Net depreciation value = $92,811 – $9,281 =$83,530**

## OWNING COST

**Depreciation:**

Putting 10,000 hours as the example depreciation period.

$$\textbf{Depreciation} = \frac{\$83{,}530}{10{,}000} = \$8.35$$

**Interest, Insurance, Taxes**

Owner plans to use machine during 4 years and about 2,500 hours per year.

$$\textbf{Trade-in value rate(r)} = \frac{\$9{,}281}{\$92{,}811} = 0.1$$

Calculate the Factor according to depreciation period and trade-in value rate, which is 0.66.

Enter the annual rates of interest, insurance and taxes and total them, which is 0.14 as an example.

$$\textbf{Interest, insurance, taxes cost} = \frac{0.66 \times \$92{,}811 \times 0.14}{2{,}500} = \$3.43$$

Add up the depreciation cost and interest, insurance, taxes cost for total owning.

## OPERATING COST

**Fuel:** See **Table 3**.

The intended application is in medium range. The estimated fuel consumption from table is 12.5 liter/hour.

Cost of fuel in this area is $0.2/liter.

Consumption × Unit cost = 12.5 liter/hr × $0.2/liter = $2.5

**Lubricants, Filters and Periodic Maintenance labor:**

Use local Komatsu distributor's estimation. (For calculation example: use $0.39)
Tires are not involved, since the machine is crawler type.

**Repair Cost**

Use local Komatsu distributor's estimation. (For calulation example: use $3.30)

**Repairs =** $3.30

Since the machine does not have fast wear parts like ripper points of bulldozer or cutting edge of motor grader, special item can be disregarded.

Operator hourly wage in this area is $16.00.

Add up the fuel cost, lubricant grease filter costs, repair cost and operator's hourly wage for operating cost.

## TOTAL HOURLY OWNING AND OPERATING COSTS

Add up the total owning cost and total operating cost.

## EXAMPLE

Estimated Owning and Operating Costs :

Machine & Model : Hydraulic Excavator PC200

Attachments : Standard bucket 0.8m$^3$ (SAE heaped)

Delivered Price (including attachments) : $92,811

Less Tire Price :

Front :

Rear :

Total Tire Price :

Delivered Price Less Tire :

Trade-in Value or Resale Value (optional) : $9,281

Net Depreciation Value : $83,530

### OWNING COSTS

Depreciation :

$$\frac{\text{Net Depreciation Value}}{\text{Depreciation Period in Hours}} = \frac{\$83{,}530}{10{,}000} = \$8.35$$

Interest, Insurance, Taxes :

Depreciation Period : 4 Years

$$\text{Trade-in value rate (r)} = \frac{\text{Trade-in Value or Resale Value}}{\text{Delivered Price}} = \frac{9{,}281}{92{,}811} = 0.1$$

$$\text{Factor} = 1 - \frac{(n-1)(1-r)}{2n} = 1 - \frac{(4-1)(1-0.1)}{2 \times 4} = 0.66$$

Annual Rates : (Int. % + Ins. % + Taxes % = %) ÷ 100 = 0.14

Approximate Annual Use : Hours

$$\frac{\text{Factor x Delivered Price x Annual Rates}}{\text{Annual Use in Hours}} = \frac{0.66 \times 92{,}811 \times 0.14}{2{,}500} = \$3.43$$

Total Owning Costs $11.78

### OPERATING COSTS

| | Consumption | | Unit cost | | |
|---|---|---|---|---|---|
| Fuel : | 12.5 liter / hr | x | $0.2 / liter | = | $2.50 |
| Lubricants, Filters and Periodic Maintenance Labor (Ask your local Komatsu distributor) | | | | example = | $0.39 |
| Tires $\frac{\text{Tire Price}}{\text{Estimated Life}}$ = | | = | | | |
| Repair Cost (Ask your local Komatsu distributor) | | | | = | $3.30 |
| Special items | | | | | |
| Operator's Hourly Wage | | | | | $16.00 |
| Total Operating Costs : | | | | | $22.19 |

**TOTAL HOURLY OWNING AND OPERATING COSTS** $33.97

## BLANK SHEET

Estimated Owning and Operating Costs :

Machine & Model : _____

Attachments : _____

Delivered Price (including attachments) : _____ _____

Less Tire Price :

Front : _____

Rear : _____

Total Tire Price : _____ _____

Delivered Price Less Tire : _____ _____

Trade-in Value or Resale Value (optional) : _____ _____

Net Depreciation Value : _____ _____

**OWNING COSTS**

Depreciation :

$$\frac{\text{Net Depreciation Value}}{\text{Depreciation Period in Hours}} = \_\_\_\_ = \_\_\_\_$$

Interest, Insurance, Taxes :

Depreciation Period : _____ Years

Trade-in value rate (r) $= \frac{\text{Trade-in Value or Resale Value}}{\text{Delivered Price}} = \_\_\_\_ =$

Factor $= 1 - \frac{(n - 1)(1 - r)}{2n} = - \_\_\_\_$

Annual Rates : (Int. _____ % + Ins. _____ % + Taxes _____ % = _____ %) ÷ 100 =

Approximate Annual Use : _____ Hours

$$\frac{\text{Factor x Delivered Price x Annual Rates}}{\text{Annual Use in Hours}} = \_\_\_\_ \text{ x } \_\_\_\_ \text{ x } \_\_\_\_ = \_\_\_\_$$

Total Owning Costs _____ [ ]

**OPERATING COSTS** Consumption Unit cost

Fuel : _____ _____ x _____ = _____

Lubricants, Filters and Periodic Maintenance Labor

(Ask your local Komatsu distributor)

Tires

$$\frac{\text{Tire Price}}{\text{Estimated Life}} = \_\_\_\_ = \_\_\_\_$$

Repair Cost

(Ask your local Komatsu distributor)

Special items _____

_____ _____

Operator's Hourly Wage _____ _____

Total Operating Costs : _____ [ ]

**TOTAL HOURLY OWNING AND OPERATING COSTS** _____ [ ]

The following tables show application and operating conditions in three categories.
Condition 1 is the light duty for machine, conditions 2 is the average and Condition 3 is the severe duty. It is the guide line and can be used with fuel and tire life tables to assist to select fuel and tire costs.

**Table 2-1 Application and Operating Conditions**

| | Condition 1 | Condition 2 | Condition 3 |
|---|---|---|---|
| Crawler type tractors | • Pulling scrapers, agricultural implements.<br>• Spreading work. | • Digging, dozing, ripping of soft rock, clay, most material.<br>• Scraper pushing<br>• Skidding<br>• Land clearing | • Digging, dozing, ripping of hard rock. |
| Dozer shovels | • Loading of light material from stock pile with substantial Idle time. | • Continuous loading from stock pile.<br>• Light excavation and loading. | • Bank excavation and loading.<br>• Loading of blasted material. |
| Pipelayers | • Operation on stable ground, a little incline of machine. | • Mainly pipe laying operation. | • Operation on poor ground, or on hard rock. |
| Hydraulic excavators | • Slope finishing, light material digging, and other light-duty operation. | • Mainly excavating and loading.<br>• Breaker operation. | • Excavation of hard bank. |

**Table 2-2 Application and Operating Conditions**

| | Condition 1 | Condition 2 | Condition 3 |
|---|---|---|---|
| Rigid dump trucks | • Level or favorable well-maintained haul road. | • Various operation at mine, quarry and construction site. | • Remarkable overloading<br>• Steep or rough (poor) haul roads.<br>• High load factor. (See Fuel Consumption in this section) |
| Articulated dump trucks | • Level or favorable well-maintained haul road. | • Steep, rough or muddy haul condition | • Remarkable overloading<br>• Remarkable steep, rough or muddy haul road |
| Motor graders | • Finishing and other light-duty operations. | • Mainly road maintenance, repair and construction.<br>• Snow removal | • Maintenance or repair of hard surface road, remarkable scarifying and or ripping operation. |
| Compactors | • Spreading and compaction of sandy soil. | • Spreading and compaction of various types of soil with some rocks.<br>• Break-down of comparatively small wooden items. | • Spreading and compaction of rocky material, high impact conditions.<br>• Break-down of lumber, electrical equipment, industrial products. |
| Wheel loaders | • Loading of light material from stock pile<br>• Operation with substantial truck waiting time. | • Continuous loading from stock pile<br>• Light-duty excavation and loading. | • Bank excavation and loading.<br>• Loading of blasted rock. |
| Wheel dozers | • Light surface finishing<br>• Spreading light material | • Average surface finishing<br>• Digging and dozing soft earth | • Digging and dozing hard earth |

**Table 3 Hourly Fuel Consumption**

**Construction**

**(1) Bulldozers**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr. | ltr./hr. | U.S. Gal/hr. | ltr./hr. | U.S. Gal/hr. | ltr./hr. |
| D21A, P-8E0 | 0.4 ~ 0.85 | 1.6 ~ 3.2 | 0.85 ~ 1.3 | 3.2 ~ 4.8 | 1.3 ~ 1.7 | 4.8 ~ 6.4 |
| D31EX, PX-22 | 0.9 ~ 1.8 | 3.3 ~ 6.7 | 1.8 ~ 2.6 | 6.7 ~ 10.0 | 2.6 ~ 3.5 | 10.0 ~ 13.3 |
| D37EX, PX-22 | 1.0 ~ 2.0 | 3.8 ~ 7.6 | 2.0 ~ 3.0 | 7.6 ~ 11.4 | 3.0 ~ 4.0 | 11.4 ~ 15.1 |
| D39EX, PX-22 | 1.2 ~ 2.4 | 4.5 ~ 8.9 | 2.4 ~ 3.5 | 8.9 ~ 13.4 | 3.5 ~ 4.7 | 13.4 ~ 17.9 |
| D51EX, PX-22 | 1.4 ~ 2.8 | 5.2 ~ 10.5 | 2.8 ~ 4.1 | 10.5 ~ 15.7 | 4.1 ~5.5 | 15.7 ~ 21.0 |
| D61EX, PX-15E0 | 1.7 ~ 3.4 | 6.4 ~12.9 | 3.4 ~ 5.1 | 12.9 ~19.3 | 5.1 ~ 6.8 | 19.3 ~ 25.7 |
| D65E, P-12 | 2.1 ~ 4.1 | 7.8 ~ 15.6 | 4.1 ~ 6.2 | 15.6 ~ 23.4 | 6.2 ~ 8.2 | 23.4 ~ 31.1 |
| D65EX, PX. WX-16 | 2.0 ~ 4.0 | 7.6 ~ 15.2 | 4.0 ~ 6.0 | 15.2 ~ 22.8 | 6.0 ~ 8.1 | 22.8 ~ 30.5 |
| D85ESS-2A | 2.2 ~ 4.4 | 8.4 ~ 16.8 | 4.4 ~ 6.7 | 16.8 ~ 25.2 | 6.7 ~ 8.9 | 25.2 ~ 33.6 |
| D85EX, PX-15E0 | 2.5 ~ 5.1 | 9.6 ~ 19.2 | 5.1 ~ 7.6 | 19.2 ~ 28.8 | 7.6 ~ 10.1 | 28.8 ~ 38.4 |
| D85EX, PX-15R | 2.5 ~ 4.9 | 9.4 ~ 18.7 | 4.9 ~ 7.4 | 18.7 ~28.1 | 7.4 ~ 9.9 | 28.1 ~ 37.5 |
| D155A-5 | 3.0 ~ 5.9 | 11.3 ~ 22.5 | 5.9 ~ 8.9 | 22.5 ~ 33.8 | 8.9 ~ 11.9 | 33.8 ~ 45.1 |
| D155A-6 | 3.3 ~ 6.6 | 12.5 ~ 25.0 | 6.6 ~ 9.9 | 25.0 ~ 37.5 | 9.9 ~ 13.2 | 37.5 ~ 50.0 |
| D155AX-6 | 3.0 ~ 6.0 | 11.4 ~ 22.8 | 6.0 ~ 9.0 | 22.8 ~ 34.2 | 9.0 ~ 12.0 | 34.2 ~ 45.6 |
| D275A-5 | 7.7 ~ 10.9 | 29.2 ~ 41.3 | 10.9 ~ 14.1 | 41.3 ~ 53.5 | 14.1 ~ 17.4 | 53.5 ~ 65.7 |
| D275A, AX-5E0 | 7.7 ~ 10.9 | 29.2 ~ 41.3 | 10.9 ~ 14.1 | 41.3 ~ 53.5 | 14.1 ~ 17.4 | 53.5 ~ 65.7 |
| D275A-5R | 7.6 ~ 10.8 | 28.8 ~ 40.8 | 10.8 ~ 13.9 | 40.8 ~ 52.8 | 13.9 ~ 17.1 | 52.8 ~ 64.8 |
| D375A-5 | 10.6 ~ 15.0 | 40.2 ~ 56.9 | 15.0 ~ 19.5 | 56.9 ~ 73.7 | 19.5 ~ 23.9 | 73.7 ~ 90.4 |
| D375A-6 | 11.3 ~ 16.0 | 42.8 ~ 60.6 | 16.0 ~ 20.7 | 60.6 ~ 78.5 | 20.7 ~ 25.4 | 78.5 ~ 96.3 |
| D375A-5R | 9.3 ~ 13.2 | 35.3 ~ 50.0 | 13.2 ~ 17.1 | 50.0 ~ 64.7 | 17.1 ~ 21.0 | 64.7 ~ 79.4 |
| D375A-6R | 10.9 ~ 15.4 | 41.3 ~ 58.4 | 15.4 ~ 20.0 | 58.4 ~ 75.6 | 20.0 ~ 24.5 | 75.0 ~ 92.8 |
| D475A-5E0, -5SDE0 | 15.5 ~ 21.9 | 58.5 ~ 82.9 | 21.9 ~ 28.3 | 82.9 ~ 107.3 | 28.3 ~ 34.8 | 107.3 ~ 131.7 |
| D575A-3 | 20.2 ~ 28.7 | 76.6 ~ 108.5 | 28.7 ~ 37.1 | 108.5 ~ 140.4 | 37.1 ~ 45.5 | 140.4 ~ 172.3 |
| D575A-3SD | 22.0 ~ 31.2 | 83.4 ~ 118.1 | 31.2 ~ 40.4 | 118.1 ~ 152.9 | 40.4 ~ 49.6 | 152.9 ~ 187.6 |

Low: Work where machine spend most of daily working hours idling or traveling with no load.

Medium: Average earth moving, scraper hauling, easy pushing
Object materials; Not hard to dig

High: Ripping, heavy pushing
Continuous use with engine at full throttle
Object materials; Blasted rock

**(2) Pipelayers**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr. | ltr./hr. | U.S. Gal/hr. | ltr./hr. | U.S. Gal/hr. | ltr./hr. |
| D85C-21 | 2.4 ~ 3.2 | 9 ~ 12 | 3.4 ~ 4.2 | 13 ~ 16 | 4.2 ~ 5.0 | 16 ~ 19 |
| D155C-1 | 3.4 ~ 4.5 | 13 ~ 17 | 5.3 ~ 6.3 | 20 ~ 24 | 6.9 ~ 7.9 | 26 ~ 30 |
| D355C-3 | 4.2 ~ 5.3 | 16 ~ 20 | 5.8 ~ 6.9 | 22 ~ 26 | 7.4 ~ 8.5 | 28 ~ 32 |

**Construction**

**(3) Hydraulic excavators**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr |
| PC20MR-3 | 0.21 ~ 0.29 | 1.1 ~ 1.6 | 0.29 ~ 0.45 | 1.6 ~ 2.3 | 0.45 ~ 0.77 | 2.3 ~ 3.9 |
| PC27MR-3 | 0.34 ~ 0.48 | 1.3 ~ 1.8 | 0.48 ~ 0.71 | 1.8 ~ 2.7 | 0.71 ~ 1.19 | 2.7 ~ 4.5 |
| PC30MR-3 | 0.34 ~ 0.50 | 1.3 ~ 1.9 | 0.50 ~ 0.74 | 1.9 ~ 2.8 | 0.74 ~ 1.24 | 2.8 ~ 4.7 |
| PC35MR-3 | 0.37 ~ 0.53 | 1.4 ~ 2.0 | 0.53 ~ 0.79 | 2.0 ~ 3.0 | 0.79 ~ 1.32 | 3.0 ~ 5.0 |
| PC45MR-3 | 0.50 ~ 0.71 | 1.9 ~ 2.7 | 0.71 ~ 1.06 | 2.7 ~ 4.0 | 1.06 ~ 1.74 | 4.0 ~ 6.6 |
| PC55MR-3 | 0.50 ~ 0.71 | 1.9 ~ 2.7 | 0.71 ~ 1.06 | 2.7 ~ 4.0 | 1.06 ~ 1.74 | 4.0 ~ 6.6 |
| PC78US-8, PC78UU-8 | 0.63 ~ 0.92 | 2.4 ~ 3.5 | 0.92 ~ 1.4 | 3.5 ~ 5.2 | 1.4 ~ 2.3 | 5.2 ~ 8.7 |
| PC88MR-8 | 0.77 ~ 1.1 | 2.9 ~ 4.1 | 1.1 ~ 1.6 | 4.1 ~ 6.1 | 1.6 ~ 2.7 | 6.1 ~ 10.2 |
| PC130-8 | 1.1 ~ 1.5 | 4.1 ~ 5.8 | 1.5 ~ 2.3 | 5.8 ~ 8.7 | 2.3 ~ 3.8 | 8.7 ~ 14.5 |
| PC138US-8 | 1.1 ~ 1.5 | 4.1 ~ 5.8 | 1.5 ~ 2.3 | 5.8 ~ 8.7 | 2.3 ~ 3.8 | 8.7 ~ 14.5 |
| PC160LC-7E0 | 1.4 ~ 1.9 | 5.1 ~ 7.3 | 1.9 ~ 2.9 | 7.3 ~ 11.0 | 2.9 ~ 4.8 | 11.0 ~ 18.3 |
| PC160LC-8 | 1.4 ~ 1.9 | 5.1 ~ 7.3 | 1.9 ~ 2.9 | 7.3 ~ 11.0 | 2.9 ~ 4.8 | 11.0 ~ 18.3 |
| PC200, LC-7 | 1.6 ~ 2.4 | 6.2 ~ 8.9 | 2.4 ~ 3.5 | 8.9 ~ 13.4 | 3.5 ~ 5.9 | 13.4 ~ 22.3 |
| PC200, LC-8 | 1.6 ~ 2.2 | 5.9 ~ 8.5 | 2.2 ~ 3.4 | 8.5 ~ 12.7 | 3.4 ~ 5.6 | 12.7 ~ 21.2 |
| PC220, LC-7 | 2.0 ~ 2.9 | 7.5 ~ 10.8 | 2.9 ~ 4.3 | 10.8 ~ 16.2 | 4.3 ~ 7.1 | 16.2 ~ 26.9 |
| PC220, LC-8 | 1.9 ~ 2.7 | 7.1 ~ 10.3 | 2.7 ~ 4.1 | 10.3 ~ 15.4 | 4.1 ~ 6.8 | 15.4 ~ 25.6 |
| PC228US, USLC-3E0 | 1.7 ~ 2.4 | 6.3 ~ 9.0 | 2.4 ~ 3.6 | 9.0 ~ 13.5 | 3.6 ~ 5.9 | 13.5 ~ 22.5 |
| PC270, LC-7 | 2.1 ~ 3.1 | 8.1 ~ 11.6 | 3.1 ~ 4.6 | 11.6 ~ 17.4 | 4.6 ~ 7.7 | 17.4 ~ 29.0 |
| PC270, LC-8 | 2.1 ~ 3.1 | 8.1 ~ 11.6 | 3.1 ~ 4.6 | 11.6 ~ 17.4 | 4.6 ~ 7.6 | 17.4 ~ 28.9 |
| PC300, LC-7, PC350, LC-7 | 2.9 ~ 4.1 | 10.8 ~ 15.4 | 4.1 ~ 6.1 | 15.4 ~ 23.1 | 6.1 ~ 10.2 | 23.1 ~ 38.5 |
| PC300, LC-8, PC350, LC-8 | 2.8 ~ 4.0 | 10.6 ~ 15.1 | 4.0 ~ 6.0 | 15.1 ~ 22.7 | 6.0 ~ 10.0 | 22.7 ~ 37.9 |
| PC400, LC-7, PC450LC-7 | 5.1 ~ 6.8 | 19.3 ~ 25.7 | 6.8 ~ 8.5 | 25.7 ~ 32.1 | 8.5 ~ 12.7 | 32.1 ~ 48.2 |
| PC400, LC-8, PC450, LC-8 | 5.1 ~ 6.8 | 19.3 ~ 25.7 | 6.8 ~ 8.5 | 25.7 ~ 32.1 | 8.5 ~ 12.7 | 32.1 ~ 48.2 |
| PC400, LC-8R, PC450, LC-8R | 5.1 ~ 6.8 | 19.3 ~ 25.7 | 6.8 ~ 8.5 | 25.7 ~ 32.1 | 8.5 ~ 12.7 | 32.1 ~ 48.2 |
| PC600, LC-7 | 6.2 ~ 8.2 | 23.4 ~ 31.2 | 8.2 ~ 10.3 | 31.2 ~ 39.0 | 10.3 ~ 16.5 | 39.0 ~ 62.4 |
| PC600, LC-8 | 6.5 ~ 8.6 | 24.5 ~ 32.7 | 8.6 ~ 10.8 | 32.7 ~ 40.8 | 10.8 ~ 17.3 | 40.8 ~ 65.3 |
| PC600, LC-8R | 6.5 ~ 8.6 | 24.5 ~ 32.7 | 8.6 ~ 10.8 | 32.7 ~ 40.8 | 10.8 ~ 17.3 | 40.8 ~ 65.3 |
| PC750, LC-7, PC800-7 | 6.7 ~ 9.0 | 25.6 ~ 34.1 | 9.0 ~ 11.3 | 34.1 ~ 42.6 | 11.3 ~ 18.0 | 42.6 ~ 68.2 |
| PC800, LC-8, PC850-8 | 6.7 ~ 8.9 | 25.2 ~ 33.7 | 8.9 ~ 11.1 | 33.7 ~ 42.1 | 11.1 ~ 17.8 | 42.1 ~ 67.3 |
| PC800, LC-8, PC850-8R | 6.7 ~ 8.9 | 25.2 ~ 33.7 | 8.9 ~ 11.1 | 33.7 ~ 42.1 | 11.1 ~ 17.8 | 42.1 ~ 67.3 |
| PC1250, LC, SP-7 | 9.5 ~ 12.7 | 36.0 ~ 48.0 | 12.7 ~ 15.8 | 48.0 ~ 59.9 | 15.8 ~ 25.3 | 59.9 ~ 95.9 |
| PC1250, LC, SP-8 | 9.4 ~ 12.6 | 35.7 ~ 47.6 | 12.6 ~ 15.7 | 47.6 ~ 59.6 | 15.7 ~ 25.2 | 59.6 ~ 95.3 |
| PC1250, SP, SP-8R | 9.0 ~ 12.1 | 34.2 ~ 45.7 | 12.1 ~ 15.1 | 45.7 ~ 57.1 | 15.1 ~ 24.1 | 57.1 ~ 91.3 |
| PC2000-8 | 12.6 ~ 16.8 | 47.7 ~ 63.6 | 16.8 ~ 21.0 | 63.6 ~ 79.5 | 21.0 ~ 33.6 | 79.5 ~ 127.1 |

Low: Intermittent work with job efficiency less than 65 %
Material; Easy to excavate

Medium: Digging and loading 65 - 80 % of machine operation hours
Material; Not easy to excavate

High: Work with job effficiency more than 80 %
Direct excavation needed sometimes.

| | Fuel consumption | | | ltr./hr (U.S. Gal/hr) |
|---|---|---|---|---|
| Model | Easy | Average | Rather difficult | Difficult |
| PC3000-6 | 161 (42.5) | 172 (45.4) | 184 (48.6) | 208 (55.0) |
| PC4000-6 | 228 (60.2) | 244 (64.5) | 260 (68.7) | 293 (77.4) |
| PC5000-6 | 306 (80.8) | 328 (86.7) | 350 (92.5) | 393 (103.8) |
| PC8000-6 | 515 (136.1) | 552 (145.8) | 589 (37.9) | 662 (174.9) |

**Construction**

**(4) Off-highway dump trucks**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr |
| HD255-5 | 3.4 ~ 5.0 | 12.7 ~ 19.0 | 5.0~ 6.7 | 19.0 ~ 25.4 | 6.7 ~ 9.2 | 25.4 ~ 34.9 |
| HD325-6 | 5.0 ~ 7.5 | 18.8 ~ 28.3 | 7.5 ~ 10.0 | 28.3 ~ 37.7 | 10.0 ~ 13.7 | 37.7 ~ 51.8 |
| HD325-7 | 4.8 ~ 7.2 | 18.0 ~ 27.1 | 7.2 ~ 9.9 | 27.1 ~ 37.4 | 9.9 ~ 13.6 | 37.4 ~ 51.5 |
| HD325-7R | 4.7 ~ 7.1 | 17.9 ~ 26.8 | 7.1 ~ 9.8 | 26.8 ~ 37.2 | 9.8 ~ 13.6 | 37.2 ~ 51.4 |
| HD405-6 | 5.0 ~ 7.5 | 18.8 ~ 28.3 | 7.5 ~ 10.0 | 28.3 ~ 37.7 | 10.0 ~ 13.7 | 37.7 ~ 51.8 |
| HD405-7 | 4.8 ~ 7.2 | 18.0 ~ 27.1 | 7.2 ~ 9.9 | 27.1 ~ 37.4 | 9.9 ~ 13.6 | 37.4 ~ 51.5 |
| HD405-7R | 4.7 ~ 7.1 | 17.9 ~ 26.8 | 7.1 ~ 9.8 | 26.8 ~ 37.2 | 9.8 ~ 13.6 | 37.2 ~ 51.4 |
| HD465-7 | 7.6 ~ 11.4 | 28.7 ~ 43.0 | 11.4 ~ 15.2 | 43.0 ~ 57.4 | 15.2 ~ 20.8 | 57.4 ~ 78.9 |
| HD465-7E0 | 7.0 ~ 10.5 | 26.4 ~ 39.8 | 10.5 ~ 14.2 | 39.8 ~ 53.7 | 14.2 ~ 20.6 | 53.7 ~ 78.1 |
| HD465-7R | 6.9 ~ 10.4 | 26.3 ~ 39.5 | 10.4 ~ 14.1 | 39.5 ~ 53.5 | 14.1 ~ 20.6 | 53.5 ~ 78.1 |
| HD605-7 | 7.6 ~ 11.4 | 28.7 ~ 43.0 | 11.4 ~ 15.2 | 43.0 ~ 57.4 | 15.2 ~ 20.8 | 57.4 ~ 78.9 |
| HD605-7E0 | 7.0 ~ 10.5 | 26.4 ~ 39.8 | 10.5 ~ 14.2 | 39.8 ~ 53.7 | 14.2 ~ 20.6 | 53.7 ~ 78.1 |
| HD605-7R | 6.9 ~ 10.4 | 26.3 ~ 39.5 | 10.4 ~ 14.1 | 39.5 ~ 53.5 | 14.1 ~ 20.6 | 53.5 ~ 78.1 |
| HD785-5 | 10.4 ~ 15.6 | 39.4 ~ 59.2 | 15.6 ~ 20.8 | 59.2 ~ 78.9 | 20.8 ~ 28.7 | 78.9 ~ 108.5 |
| HD785-7 | 10.2 ~ 15.2 | 38.5 ~ 57.7 | 15.2 ~ 20.4 | 57.7 ~ 77.3 | 20.4 ~ 28.6 | 77.3 ~ 108.2 |
| HD1500-7 | 13.7 ~ 17.1 | 51.8 ~ 64.8 | 17.1 ~ 24.0 | 64.8 ~ 90.7 | 24.0 ~ 32.8 | 90.7 ~ 124.4 |
| 730E | 19.3 ~ 24.2 | 73.2 ~ 91.5 | 24.2 ~ 33.8 | 91.5 ~ 128 | 33.8 ~ 46.4 | 128 ~ 175.6 |
| 830E-AC | 24.5 ~ 30.6 | 92.7 ~ 115.9 | 30.6 ~ 42.8 | 115.9 ~ 162.2 | 42.8 ~ 58.8 | 162.2 ~ 222.5 |
| 860E-1K | 27.0 ~ 33.7 | 102.1 ~ 127.6 | 33.7 ~ 47.2 | 127.6 ~ 178.7 | 47.2 ~ 64.8 | 178.7 ~ 245.1 |
| 930E-4 | 24.9 ~ 31.1 | 94.1 ~ 117.6 | 31.1 ~ 43.5 | 117.6 ~ 164.7 | 43.5 ~ 59.7 | 164.7 ~ 225.8 |
| 930E-4SE | 33.8 ~ 42.3 | 128.0 ~ 160.0 | 42.3 ~ 59.2 | 160.0 ~ 224.1 | 59.2 ~ 81.2 | 224.1 ~ 307.3 |
| 960E | 33.8 ~ 42.3 | 128.0 ~ 160.0 | 42.3 ~ 59.2 | 160.0 ~ 224.1 | 59.2 ~ 81.2 | 224.1 ~ 307.3 |

CONDITIONS:

Low : High ratio of loading time to cycle time, good haul road conditions
Low truck job efficiency

Medium : Medium raio of traveling time to cycle time, medium load factor of truck, and medium haul road conditions and grade
Total resistance; Over 2 % through 10 %

High : High raio of traveling time to cycle time, tough load factor of truck, severe haul road conditions and grade
Total resistance; 10 % and above

**(5) Articulated dump trucks**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr |
| HM250-2 | 3.2 ~ 4.9 | 12.3 ~ 18.4 | 4.9 ~ 6.5 | 18.4 ~ 24.6 | 6.5 ~ 8.9 | 24.6 ~ 33.8 |
| HM300-1 | 3.4 ~ 5.1 | 12.8 ~ 19.3 | 5.1 ~ 6.8 | 19.3 ~ 25.7 | 6.8 ~ 9.3 | 25.7 ~ 35.3 |
| HM300-2 | 3.0 ~ 4.8 | 11.5 ~ 18.3 | 4.8 ~ 6.1 | 18.3 ~ 23.2 | 6.1 ~ 9.5 | 23.2 ~ 35.9 |
| HM300-2R | 3.0 ~ 4.8 | 11.5 ~ 18.3 | 4.8 ~ 6.1 | 18.3 ~ 23.2 | 6.1 ~ 9.5 | 23.2 ~ 35.9 |
| HM350-1 | 4.3 ~ 6.4 | 16.1 ~ 24.1 | 6.4 ~ 8.5 | 24.1 ~ 32.2 | 8.5 ~ 11.7 | 32.2 ~ 44.2 |
| HM350-2 | 4.2 ~ 6.3 | 16.0 ~ 23.7 | 6.3 ~ 7.5 | 23.7 ~ 28.3 | 7.5 ~ 9.9 | 28.3 ~ 37.5 |
| HM350-2R | 4.2 ~ 6.3 | 16.0 ~ 23.7 | 6.3 ~ 7.5 | 23.7 ~ 28.3 | 7.5 ~ 9.9 | 28.3 ~ 37.5 |
| HM400-1 | 4.5 ~ 6.7 | 17.0 ~ 25.5 | 6.7 ~ 9.0 | 25.5 ~ 34.0 | 9.0 ~ 12.4 | 34.0 ~ 46.8 |
| HM400-2 | 5.2 ~ 6.5 | 19.5 ~ 24.5 | 6.5 ~ 8.9 | 24.5 ~ 33.6 | 8.9 ~ 12.9 | 33.6 ~ 48.8 |
| HM400-2R | 5.2 ~ 6.5 | 19.5 ~ 24.5 | 6.5 ~ 8.9 | 24.5 ~ 33.6 | 8.9 ~ 12.9 | 33.6 ~ 48.8 |

CONDITIONS:

Low : Long loading time, downhill travel with load, travel on well maintained road

Medium : Normal loading time , uphill travel with load (normal grade), travel on well maintained road

High : Short loading time, uphill travel with load (steep grade), travel on normally maintained road

**Construction**

**(6) Wheel loaders**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr |
| WA150-5 | 1.2 ~ 1.7 | 4.5 ~ 6.3 | 1.7 ~ 2.1 | 6.3 ~ 7.9 | 2.1 ~ 2.9 | 7.9 ~ 11.0 |
| WA150-6 | 1.2 ~ 1.7 | 4.7 ~ 6.5 | 1.7 ~ 2.2 | 6.5 ~ 8.2 | 2.2 ~ 3.0 | 8.2 ~ 11.4 |
| WA200, PT-5 | 1.6 ~ 2.2 | 5.9 ~ 8.3 | 2.2 ~ 2.7 | 8.3 ~ 10.4 | 2.7 ~ 3.8 | 10.4 ~ 14.5 |
| WA200, PZ-6 | 1.6 ~ 2.2 | 5.9 ~ 8.3 | 2.2 ~ 2.7 | 8.3 ~ 10.4 | 2.7 ~ 3.8 | 10.4 ~ 14.4 |
| WA250, PT-5 | 1.8 ~ 2.6 | 7.0 ~ 9.8 | 2.6 ~ 3.2 | 9.8 ~ 12.3 | 3.2 ~ 4.3 | 12.3 ~ 16.2 |
| WA250, PZ-6 | 1.8 ~ 2.5 | 6.9 ~ 9.6 | 2.5 ~ 3.2 | 9.6 ~ 12.1 | 3.2 ~ 4.2 | 12.1 ~ 15.9 |
| WA320-5 | 2.2 ~ 3.0 | 8.2 ~ 11.5 | 3.0 ~ 3.8 | 11.5 ~ 14.5 | 3.8 ~ 5.0 | 14.5 ~ 19.1 |
| WA320-3 | 2.6 ~ 3.7 | 10.0 ~ 13.9 | 3.7 ~ 4.6 | 13.9 ~ 17.5 | 4.6 ~ 6.1 | 17.5 ~ 23.1 |
| WA320 custom | 2.6 ~ 3.6 | 9.8 ~ 13.7 | 3.6 ~ 4.5 | 13.7 ~ 17.2 | 4.5 ~ 6.0 | 17.2 ~ 22.7 |
| WA320, PZ-6 | 2.2 ~ 3.0 | 8.2 ~ 11.5 | 3.0 ~ 3.8 | 11.5 ~ 14.4 | 3.8 ~ 5.0 | 14.4 ~ 19.0 |
| WA380-3 | 3.0 ~ 4.2 | 11.4 ~ 16.0 | 4.2 ~ 5.3 | 16.0 ~ 20.1 | 5.2 ~ 7.0 | 20.1 ~ 26.5 |
| WA380-5 | 2.9 ~ 4.0 | 10.8 ~ 15.2 | 4.0 ~ 5.0 | 15.2 ~ 19.1 | 5.0 ~ 6.6 | 19.1 ~ 25.1 |
| WA380-6 | 2.4 ~ 3.4 | 9.1 ~ 12.8 | 3.4 ~ 4.3 | 12.8 ~ 16.1 | 4.3 ~ 5.8 | 16.1 ~ 22.1 |
| WA430-5 | 3.3 ~ 4.6 | 12.5 ~ 17.6 | 4.6 ~ 5.8 | 17.6 ~ 22.1 | 5.8 ~ 7.7 | 22.1 ~ 29.1 |
| WA430-6 | 2.8 ~ 4.1 | 10.7 ~ 15.4 | 4.1 ~ 5.1 | 15.4 ~ 19.2 | 5.1 ~ 6.8 | 19.2 ~ 25.8 |
| WA470-3 | 4.0 ~ 5.5 | 15.0 ~ 21.0 | 5.5 ~ 6.9 | 21.0 ~ 26.3 | 6.9 ~ 9.2 | 26.3 ~ 34.7 |
| WA470-5 | 3.5 ~ 4.8 | 13.1 ~ 18.3 | 4.8 ~ 6.1 | 18.3 ~ 23.0 | 6.1 ~ 8.0 | 23.0 ~ 30.3 |
| WA470-6* | 2.9 ~ 4.1 | 11.0 ~ 15.5 | 4.1 ~ 5.1 | 15.5 ~ 19.3 | 5.1 ~ 7.1 | 19.3 ~ 27.0 |
| WA480-5 | 3.6 ~ 5.0 | 13.6 ~ 19.1 | 5.0 ~ 6.3 | 19.1 ~ 24.0 | 6.3 ~ 8.4 | 24.0 ~ 31.7 |
| WA480-6* | 3.1 ~ 4.3 | 11.6 ~ 16.2 | 4.3 ~ 5.4 | 16.2 ~ 20.4 | 5.4 ~ 7.8 | 20.4 ~ 29.6 |
| WA500-3 | 5.5 ~ 7.7 | 20.9 ~ 29.3 | 6.9 ~ 9.8 | 29.3 ~ 37.0 | 9.8 ~ 12.9 | 37.0 ~ 48.8 |
| WA500-6 | 4.9 ~ 6.9 | 18.7 ~ 26.2 | 6.9 ~ 8.7 | 26.2 ~ 33.1 | 8.7 ~ 12.0 | 33.1 ~ 45.6 |
| WA500-6R | 4.9 ~ 6.9 | 18.7 ~ 26.2 | 6.9 ~ 8.7 | 26.2 ~ 33.1 | 8.7 ~ 12.0 | 33.1 ~ 45.6 |
| WA600-3 | 8.2 ~ 11.5 | 31.1 ~ 43.5 | 11.5 ~ 14.5 | 43.5 ~ 54.9 | 14.5 ~ 19.2 | 54.9 ~ 72.5 |
| WA600-6 | 7.9 ~ 10.6 | 30.0 ~ 40.2 | 10.6 ~ 12.7 | 40.2 ~ 51.9 | 13.7 ~ 18.9 | 51.9 ~ 71.6 |
| WA600-6R | 7.9 ~ 10.6 | 30.0 ~ 40.2 | 10.6 ~ 13.7 | 40.2 ~ 51.9 | 13.7 ~ 18.9 | 51.9 ~ 71.6 |
| WA700-3 | 10.3 ~ 14.5 | 39.1 ~ 54.8 | 14.5 ~ 18.3 | 54.8 ~ 69.1 | 18.3 ~ 24.1 | 69.1 ~ 91.3 |
| WA800-3 | 11.8 ~ 16.5 | 44.6 ~ 62.5 | 16.5 ~ 20.8 | 62.5 ~ 78.9 | 20.8 ~ 31.4 | 78.9 ~ 119.0 |
| WA800-3E0 | 11.8 ~ 16.5 | 44.6 ~ 62.5 | 16.5 ~ 20.8 | 62.5 ~ 78.9 | 20.8 ~ 31.4 | 78.9 ~ 119.0 |
| WA900-3 | 12.3 ~ 17.2 | 46.5 ~ 65.1 | 17.2 ~ 21.7 | 65.1 ~ 82.1 | 21.7 ~ 28.7 | 82.1 ~ 124.0 |
| WA900-3E0 | 12.5 ~ 17.5 | 47.3 ~ 66.2 | 17.5 ~ 22.1 | 66.2 ~ 83.5 | 22.1 ~ 33.3 | 83.5 ~ 126.1 |
| WA1200-3 | 26.4 ~ 37.0 | 100.1 ~ 140.1 | 37.0 ~ 46.7 | 140.1 ~ 176.8 | 46.7 ~ 61.7 | 176.8 ~ 233.5 |

CONDITIONS:

Low : Light utility, work with considerable amount of idling

Medium : Non-stop operation over a long distance
Operation according to a basic loader cycle with frequent idling

High : Non-stop operation according to a basic loader cycle

* : With large-capacity torque convertor

**(7) Wheel dozers**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr |
| WD600-3 | 8.6 ~ 12.0 | 32.4 ~ 45.3 | 12.0 ~ 15.1 | 45.3 ~ 57.2 | 15.1 ~ 19.9 | 57.2 ~ 75.5 |
| WD600-6 | 8.6 ~ 12.1 | 32.6 ~ 45.7 | 12.1 ~ 15.2 | 45.7 ~ 57.6 | 15.2 ~ 20.1 | 57.6 ~ 76.1 |
| WD900-3 | 13.5 ~ 18.9 | 51.2 ~ 71.7 | 18.9 ~ 23.9 | 71.7 ~ 90.5 | 23.9 ~ 31.6 | 90.5 ~ 119.5 |

CONDITIONS:

Low : Work where machine spend most of operation hours idling or traveling with no load

Medium : Average earth moving, scraper hauling, easy pushing

High : Heavy pushing
Continuous operation

**Construction**

**(8) Motor graders**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr |
| GD511A-1 | 2.0 ~ 3.2 | 7.5 ~ 12.0 | 3.2 ~ 4.4 | 12.0 ~ 16.5 | 4.4 ~ 5.5 | 16.5 ~ 21.0 |
| GD555-3A, 3C | 2.3 ~ 3.7 | 8.8 ~ 14.0 | 3.7 ~ 5.1 | 14.0 ~ 19.3 | 5.1 ~ 6.5 | 19.3 ~ 24.6 |
| GD555-5 | 2.7 ~ 4.3 | 10.1 ~ 16.2 | 4.3 ~ 5.9 | 16.2 ~ 22.3 | 5.9 ~ 7.5 | 22.3 ~ 28.4 |
| GD611A-1 | 2.2 ~ 3.5 | 8.2 ~ 13.2 | 3.5 ~ 4.8 | 13.2 ~ 18.1 | 4.8 ~ 6.1 | 18.1 ~ 23.1 |
| GD655-3A | 2.6 ~ 4.3 | 10.0 ~ 16.1 | 4.3 ~ 5.8 | 16.1 ~ 22.1 | 5.8 ~ 7.4 | 22.1 ~ 28.1 |
| GD655-3E0 | 2.5 ~ 4.0 | 9.5 ~ 15.2 | 4.0 ~ 5.5 | 15.2 ~ 20.9 | 5.5 ~ 7.0 | 20.9 ~ 26.6 |
| GD655-5 | 3.0 ~ 4.8 | 11.5 ~ 18.3 | 4.8 ~ 6.7 | 18.3 ~ 25.2 | 6.7 ~ 8.5 | 25.2 ~ 32.1 |
| GD661A-1 | 2.7 ~ 4.3 | 10.1 ~ 16.2 | 4.3 ~ 5.9 | 16.2 ~ 22.3 | 5.9 ~ 7.5 | 22.3 ~ 28.3 |
| GD675-3A | 2.6 ~ 4.2 | 9.9 ~ 15.8 | 4.2 ~ 5.7 | 15.8 ~ 21.7 | 5.7 ~ 7.3 | 21.7 ~ 27.6 |
| GD675-3E0 | 2.5 ~ 4.0 | 9.5 ~ 15.2 | 4.0 ~ 5.5 | 15.2 ~ 20.9 | 5.5 ~ 7.0 | 20.9 ~ 26.6 |
| GD675-5 | 3.0 ~ 4.8 | 11.5 ~ 18.3 | 4.8 ~ 6.7 | 18.3 ~ 25.2 | 6.7 ~ 8.5 | 25.2 ~ 32.1 |
| GD705A-4 | 2.5 ~ 4.0 | 9.5 ~ 15.1 | 4.0 ~ 5.5 | 15.1 ~ 20.8 | 5.5 ~ 7.0 | 20.8 ~ 26.5 |
| GD825A-2 | 3.7 ~ 6.0 | 14.1 ~ 22.6 | 6.0 ~ 8.2 | 22.6 ~ 31.0 | 8.2 ~ 10.4 | 31.0 ~ 39.5 |

CONDITIONS:

Low: Minor road maintenance, leveling, traveling with no load

Medium: Average road maintenance, scarifying, light snow removal

High: Heavy pushing, continuous operation

**Table 3 Hourly Fuel Consumption**

**Mining**

**(1) Bulldozers**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr |
| D275A-5 | 9.3 ~ 12.8 | 35.3 ~ 48.5 | 12.8 ~ 17.5 | 48.5 ~ 66.1 | 17.5 ~ 21.0 | 66.1 ~ 79.4 |
| D275AX-5E0 | 9.5 ~ 12.8 | 35.8 ~ 48.3 | 12.8 ~ 17.5 | 48.3 ~ 66.1 | 17.5 ~ 20.8 | 66.2 ~ 78.7 |
| D275A-5R | 9.3 ~ 12.7 | 35.3 ~ 48.2 | 12.7 ~ 17.5 | 48.2 ~ 66.2 | 17.5 ~ 21.0 | 66.2 ~ 79.4 |
| D375A-5 | 12.9 ~ 17.5 | 48.7 ~ 66.2 | 17.5 ~ 24.1 | 66.2 ~ 91.2 | 24.1 ~ 29.0 | 91.2 ~ 109.9 |
| D375A-5R | 12.2 ~ 16.7 | 46.3 ~ 63.2 | 16.7 ~ 23.0 | 63.2 ~ 86.9 | 23.0 ~ 27.7 | 86.9 ~ 105.0 |
| D375A-6 | 13.1 ~ 18.0 | 49.6 ~ 68.2 | 18.0 ~ 24.6 | 68.2 ~ 93.0 | 24.6 ~ 29.5 | 93.0 ~ 111.6 |
| D375A-6R | 12.6 ~ 17.4 | 47.8 ~ 65.7 | 17.4 ~ 23.7 | 65.7 ~ 89.6 | 23.7 ~ 28.4 | 89.6 ~ 107.5 |
| D475A-5E0, ASD-5E0 | 18.0 ~ 24.7 | 68.0 ~ 93.5 | 24.7 ~ 33.7 | 93.5 ~ 127.5 | 33.7 ~ 40.4 | 127.5 ~ 153.0 |
| D575A-3 | 24.2 ~ 33.3 | 91.6 ~ 125.9 | 33.3 ~ 45.4 | 125.9 ~ 171.7 | 45.4 ~ 54.4 | 171.7 ~ 206.0 |
| D575A-3SD | 26.2 ~ 36.0 | 99.1 ~ 136.3 | 36.0 ~ 49.1 | 136.3 ~ 185.8 | 49.1 ~ 58.9 | 185.8 ~ 223.0 |

CONDITIONS:

Low : Machine movement is mainly consisting of idle running or traveling unloaded

Medium : Average earth moving, scraper hauling or easy pushing operation
Ripping ratio more than 50%

High : Ripping, heavy pushing, and operation continued without rest at full horspower

**(2) Hydraulic excavators**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr |
| PC1250, LC, SP-7 | 9.9 ~ 14.9 | 37.6 ~ 56.3 | 14.9 ~ 19.8 | 56.3 ~ 75.1 | 19.8 ~ 26.5 | 75.1 ~ 100.2 |
| PC1250, LC, SP-8 | 10.1 ~ 14.7 | 38.1 ~ 55.8 | 14.7 ~ 19.8 | 55.8 ~ 74.9 | 19.8 ~ 26.4 | 74.9 ~ 100.1 |
| PC1250, SP-8R | 9.5 ~ 13.8 | 35.8 ~ 52.4 | 13.8 ~ 18.5 | 52.4 ~ 70.2 | 18.5 ~ 24.8 | 70.2 ~ 93.9 |
| PC2000-8 | 12.5 ~ 18.7 | 47.2 ~ 70.8 | 18.7 ~ 29.4 | 70.8 ~ 94.4 | 29.4 ~ 33.2 | 94.4 ~ 125.8 |

CONDITIONS:

Low : Digging account for less than 50% in daily working hours
Loading of low density materials
Unnecessary for big digging force

Medium : Digging account for 60-85% in daily working hours
After blasting or after dozing
Small rock suitable for the bucket size

High : Digging account for more than 85% in daily work hours
Direct digging
Heavy duty digging after blasting

| | Fuel consumption | | | ltr./hr (U.S. Gal/hr) |
|---|---|---|---|---|
| Model | Easy | Average | Rather difficult | Difficult |
| PC3000-6 | 161 (42.5) | 172 (45.4) | 184 (48.6) | 208 (55.0) |
| PC4000-6 | 228 (60.2) | 244 (64.5) | 260 (68.7) | 293 (77.4) |
| PC5000-6 | 306 (80.8) | 328 (86.7) | 350 (92.5) | 393 (103.8) |
| PC8000-6 | 515 (136.1) | 552 (145.8) | 589 (37.9) | 662 (174.9) |

**Mining**

**(3) Off-highway dump trucks**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr |
| HD785-5 | 10.4 ~ 18.2 | 39.4 ~ 69.0 | 18.2 ~ 23.4 | 69.0 ~ 88.7 | 23.4 ~ 30.2 | 88.7 ~ 114.4 |
| HD785-7 | 9.9 ~ 17.3 | 37.3 ~ 65.5 | 17.3 ~ 22.1 | 65.5 ~ 83.6 | 22.1 ~ 26.8 | 83.6 ~ 101.6 |
| HD1500-7 | 13.7 ~ 17.1 | 51.8 ~ 64.8 | 17.1 ~ 24.0 | 64.8 ~ 90.7 | 24.0 ~ 32.9 | 90.7 ~ 124.4 |
| 730E | 19.3 ~ 24.2 | 73.2 ~ 91.5 | 24.2 ~ 33.8 | 91.5 ~ 128.0 | 33.8 ~ 46.4 | 128.0 ~ 175.6 |
| 830E-AC | 24.5 ~ 30.6 | 92.7 ~ 115.9 | 30.6 ~ 42.9 | 115.9 ~ 162.2 | 42.9 ~ 58.8 | 162.2 ~ 222.5 |
| 860E-1K | 27.0 ~ 33.7 | 102.1 ~ 127.6 | 33.7 ~ 47.2 | 127.6 ~ 178.7 | 47.2 ~ 64.8 | 187.6 ~ 245.1 |
| 930E-4 | 24.9 ~ 31.1 | 94.1 ~ 117.6 | 31.1 ~ 43.5 | 117.6 ~ 164.7 | 43.5 ~ 59.7 | 164.7 ~ 225.8 |
| 930E-4SE | 33.8 ~ 42.3 | 128.0 ~ 160.0 | 42.3 ~ 59.2 | 160.0 ~ 224.1 | 59.2 ~ 81.2 | 224.1 ~ 307.3 |
| 960E | 33.8 ~ 42.3 | 128.0 ~ 160.0 | 42.3 ~ 59.2 | 160.0 ~ 224.1 | 59.2 ~ 81.2 | 224.1 ~ 307.3 |

CONDITIONS:

Low : Variable travel times with the majority of the travel time attributed to segments with total resistance less than 4%
Abnormal operating efficiency with significant periods of wait time or delays

Medium : Average travel times with a balance between travel time along routes in excess of 10% total resistance and routes less than 4% in total resistance
Normal operating efficiency with occasional periods of wait time or delays

High : Long travel times with the majority of the travel time attributed to road segments in excess of 10% total resistance
Highly efficient applications with minimum delay or wait periods

**(4) Wheel loaders**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr |
| WA800-3 | 12.4 ~ 17.4 | 47.1 ~ 66.0 | 17.4 ~ 22.0 | 66.0 ~ 83.2 | 22.0 ~ 33.2 | 83.2 ~ 125.7 |
| WA800-3E0 | 12.2 ~ 17.0 | 46.3 ~ 64.4 | 17.0 ~ 21.6 | 64.4 ~ 81.7 | 21.6 ~ 32.8 | 81.7 ~ 124.1 |
| WA900-3 | 12.9 ~ 18.1 | 48.9 ~ 68.5 | 18.1 ~ 22.8 | 68.5 ~ 86.5 | 22.8 ~ 34.5 | 86.5 ~ 130.5 |
| WA900-3E0 | 12.5 ~ 17.4 | 47.4 ~ 65.9 | 17.4 ~ 22.3 | 65.9 ~ 84.4 | 22.3 ~ 33.9 | 84.4 ~ 128.3 |
| WA1200-3 | 29.1 ~ 48.4 | 110.0 ~ 183.3 | 48.4 ~ 63.0 | 183.3 ~ 238.3 | 63.0 ~ 82.4 | 238.3 ~ 311.7 |

CONDITIONS:

Low : Low production aggregate truck loading, large amount of idling time

Medium : Loading to stock-pile dump trucks
Short time waiting hours for dump trucks

High : Continuous loading
Short time waiting hours for dump trucks
Digging hard bank
Takes a lot of time for digging
Load and carry operation with high productivity

**Mining**

**(5) Wheel dozers**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr |
| WD600-3 | 9.2 ~ 12.9 | 34.8 ~ 48.8 | 12.9 ~ 16.2 | 48.8 ~ 61.5 | 16.2 ~ 21.5 | 61.5 ~ 81.3 |
| WD600-6 | 8.7 ~ 12.1 | 32.8 ~ 45.9 | 12.1 ~ 15.3 | 45.9 ~ 58.0 | 15.3 ~ 20.2 | 58.0 ~ 76.6 |
| WD900-3 | 12.5 ~ 17.5 | 47.2 ~ 66.1 | 17.5 ~ 22.0 | 66.1 ~ 83.4 | 22.0 ~ 29.1 | 83.4 ~ 110.1 |

CONDITIONS:

Low : Cleaning a surface of a hauling road, ground around large shovels and hoppers (collecting fallen stones).

Medium : Stock pilling
Dozing of crushing rock

High : Reclamation
Dozing after digging
Pusher using scraper

**(6) Motor graders**

| Range | Low | | Medium | | High | |
|---|---|---|---|---|---|---|
| Amount / Machine | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr | U.S. Gal/hr | ltr./hr |
| GD825A-2 | 4.0 ~ 6.5 | 15.3 ~ 24.5 | 6.5 ~ 8.9 | 24.5 ~ 33.7 | 8.9 ~ 11.3 | 33.7 ~ 42.9 |

CONDITIONS:

Low : Traveling Finishing
Grading of light materials

Medium : Light duty road maintenance
Scarifing

High : Ripping
Heavy duty road maintenance

**Table 4 Approx. Hourly Lubricants Consumption ***
**( * Oil replacement (liter) ÷ Oil change interval (hour))**

### (1) Bulldozers and Dozer shovels

| Application | *(1) Crank case | | *(2) Transmission | | *(3) Final Drives | | Hydraulic Control | | Grease | |
|---|---|---|---|---|---|---|---|---|---|---|
| Unit Q'TY / Machine Model | US Gal | Liter | US Gal | Liter | US Gal | Liter | US Gal | Liter | lb | kg |
| D21A, E, P-8E0 | 0.004 | 0.014 | 0.007 | 0.025 | 0.003 | 0.01 | 0.005 | 0.02 | 0.04 | 0.02 |
| D31EX, PX-22 | 0.007 | 0.025 | — | — | 0.003 | 0.01 | 0.008 | 0.03 | 0.04 | 0.02 |
| D37EX, PX-22 | 0.007 | 0.025 | — | — | 0.003 | 0.01 | 0.008 | 0.03 | 0.04 | 0.02 |
| D39EX, PX-22 | 0.008 | 0.25 | — | — | 0.003 | 0.01 | 0.008 | 0.03 | 0.04 | 0.02 |
| D51EX, PX-22 | 0.01 | 0.04 | — | — | 0.003 | 0.01 | 0.009 | 0.035 | 0.04 | 0.02 |
| D61EX, PX-15E0 | 0.016 | 0.06 | 0.019 | 0.07 | 0.016 | 0.06 | 0.008 | 0.03 | 0.04 | 0.02 |
| D65E, P-12 | 0.021 | 0.08 | 0.013 | 0.05 | 0.013 | 0.05 | 0.008 | 0.03 | 0.04 | 0.02 |
| D65EX, PX, WX-16 | 0.016 | 0.06 | 0.013 | 0.05 | 0.013 | 0.05 | 0.008 | 0.03 | 0.04 | 0.02 |
| D85ESS-2A | 0.021 | 0.08 | 0.013 | 0.05 | 0.016 | 0.06 | 0.008 | 0.03 | 0.04 | 0.02 |
| D85EX, PX-15E0 | 0.021 | 0.08 | 0.016 | 0.06 | 0.018 | 0.07 | 0.011 | 0.04 | 0.04 | 0.02 |
| D85EX, PX-15R | 0.021 | 0.08 | 0.016 | 0.06 | 0.018 | 0.07 | 0.011 | 0.04 | 0.04 | 0.02 |
| D155A-5 | 0.021 | 0.08 | 0.016 | 0.06 | 0.032 | 0.12 | 0.013 | 0.05 | 0.07 | 0.03 |
| D155AX-6 | 0.021 | 0.08 | 0.024 | 0.09 | 0.016 | 0.06 | 0.016 | 0.06 | 0.07 | 0.03 |
| D155A-6 | 0.021 | 0.08 | 0.019 | 0.07 | 0.016 | 0.06 | 0.016 | 0.06 | 0.07 | 0.03 |
| D155A-2 | 0.04 | 0.15 | 0.037 | 0.14 | 0.029 | 0.11 | 0.026 | 0.10 | 0.07 | 0.03 |
| D275A-5 | 0.029 | 0.11 | 0.024 | 0.09 | 0.021 | 0.08 | 0.021 | 0.08 | 0.09 | 0.04 |
| D275AX-5E0, D275A-5R | 0.029 | 0.11 | 0.024 | 0.09 | 0.021 | 0.08 | 0.021 | 0.08 | 0.09 | 0.04 |
| D375A-5 | 0.032 | 0.12 | 0.04 | 0.15 | 0.019 | 0.07 | 0.016 | 0.06 | 0.09 | 0.04 |
| D375A-5R | 0.045 | 0.17 | 0.04 | 0.15 | 0.032 | 0.12 | 0.023 | 0.10 | 0.09 | 0.04 |
| D375A-6, D375A-6R | 0.045 | 0.17 | 0.04 | 0.15 | 0.032 | 0.12 | 0.019 | 0.07 | 0.09 | 0.04 |
| D475A-5E0 | 0.066 | 0.25 | 0.055 | 0.21 | 0.04 | 0.15 | 0.042 | 0.16 | 0.11 | 0.05 |
| D575A-3 | 0.137 | 0.52 | 0.093 | 0.35 | 0.042 | 0.16 | 0.04 | 0.15 | 0.13 | 0.06 |

*(1) Includes lubricant oil of compressor for Portable Air Compressor
*(2) Includes oils in the torque converter, main clutch and steering cases, differential, etc.
*(3) Includes oils in the tandem case of Motor Grader.

### (2) Hydraulic excavators

| Application | *(1) Crank case | | Transmission or Swing Machinery | | *(2) Final Drives | | Hydraulic Control | | Grease | |
|---|---|---|---|---|---|---|---|---|---|---|
| Unit Q'TY / Machine Model | US Gal | Liter | US Gal | Liter | US Gal | Liter | US Gal | Liter | lb | kg |
| PC18MR-3, PC20MR-3 | 0.002 | 0.007 | — | — | 0.0003 | 0.001 | 0.003 | 0.01 | 0.04 | 0.02 |
| PC27MR-3 | 0.004 | 0.015 | — | — | 0.0003 | 0.001 | 0.003 | 0.01 | 0.04 | 0.02 |
| PC30MR-3, PC35MR-3 | 0.004 | 0.015 | — | — | 0.0003 | 0.001 | 0.003 | 0.01 | 0.04 | 0.02 |
| PC45MR-3, PC55MR-3 | 0.004 | 0.015 | — | — | 0.0006 | 0.002 | 0.003 | 0.01 | 0.04 | 0.02 |
| PC78US-8 | 0.006 | 0.022 | 0.0005 | 0.002 | 0.0006 | 0.002 | 0.003 | 0.012 | 0.09 | 0.04 |
| PC88MR-8 | 0.006 | 0.022 | 0.001 | 0.003 | 0.0006 | 0.002 | 0.003 | 0.012 | 0.09 | 0.04 |
| PC130-8 | 0.006 | 0.022 | 0.001 | 0.003 | 0.001 | 0.004 | 0.005 | 0.02 | 0.11 | 0.05 |
| PC138US-8 | 0.006 | 0.022 | 0.001 | 0.003 | 0.001 | 0.004 | 0.005 | 0.02 | 0.11 | 0.05 |
| PC160LC-7E0, PC160LC-8 | 0.008 | 0.032 | 0.0013 | 0.005 | 0.001 | 0.004 | 0.007 | 0.025 | 0.11 | 0.05 |
| PC200, LC-7, PC210, LC-7 | 0.013 | 0.05 | 0.002 | 0.007 | 0.0013 | 0.005 | 0.008 | 0.03 | 0.15 | 0.07 |
| PC200, LC-8, PC210, LC-8 | 0.013 | 0.05 | 0.002 | 0.007 | 0.0013 | 0.005 | 0.008 | 0.03 | 0.15 | 0.07 |
| PC228US, LC-3E0 | 0.013 | 0.05 | 0.002 | 0.007 | 0.0013 | 0.005 | 0.008 | 0.03 | 0.15 | 0.07 |
| PC220, LC-7, PC240LC-7 | 0.013 | 0.05 | 0.002 | 0.007 | 0.0013 | 0.005 | 0.008 | 0.03 | 0.15 | 0.07 |
| PC220, LC-8, PC240LC-8 | 0.013 | 0.05 | 0.002 | 0.008 | 0.0013 | 0.005 | 0.008 | 0.03 | 0.15 | 0.07 |
| PC220, LC-8 | 0.013 | 0.05 | 0.002 | 0.008 | 0.0013 | 0.005 | 0.008 | 0.03 | 0.15 | 0.07 |
| PC300, LC-7, PC350, LC-7 | 0.019 | 0.07 | 0.004 | 0.014 | 0.003 | 0.01 | 0.011 | 0.04 | 0.22 | 0.10 |
| PC300, LC-8, PC350, LC-8 | 0.018 | 0.07 | 0.005 | 0.017 | 0.003 | 0.01 | 0.01 | 0.04 | 0.22 | 0.10 |
| PC400, LC-7, PC450, LC-7 | 0.02 | 0.08 | 0.007 | 0.027 | 0.003 | 0.013 | 0.013 | 0.05 | 0.26 | 0.12 |
| PC400, LC-8, PC450, LC-8 | 0.021 | 0.08 | 0.005 | 0.02 | 0.003 | 0.011 | 0.013 | 0.05 | 0.26 | 0.12 |
| PC400-8R, PC450-8R | 0.021 | 0.08 | 0.005 | 0.02 | 0.003 | 0.011 | 0.013 | 0.05 | 0.26 | 0.12 |
| PC600, LC-7 | 0.021 | 0.08 | 0.007 | 0.026 | 0.003 | 0.01 | 0.019 | 0.07 | 0.35 | 0.16 |
| PC600, LC-8 | 0.021 | 0.09 | 0.007 | 0.026 | 0.003 | 0.01 | 0.019 | 0.07 | 0.35 | 0.16 |
| PC600, LC-8R | 0.021 | 0.09 | 0.007 | 0.026 | 0.003 | 0.01 | 0.019 | 0.07 | 0.35 | 0.16 |
| PC750-7, PC800-7 | 0.032 | 0.12 | 0.013 | 0.05 | 0.005 | 0.02 | 0.024 | 0.09 | 0.35 | 0.16 |
| PC800-8, PC850-8 | 0.032 | 0.12 | 0.013 | 0.05 | 0.005 | 0.02 | 0.026 | 0.1 | 0.35 | 0.16 |
| PC800-8R, PC850-8R | 0.032 | 0.12 | 0.013 | 0.05 | 0.005 | 0.02 | 0.026 | 0.1 | 0.35 | 0.16 |
| PC1250, SP-7 | 0.032 | 0.12 | 0.013 | 0.05 | 0.006 | 0.022 | 0.037 | 0.14 | 0.40 | 0.18 |
| PC1250, SP-8 | 0.048 | 0.18 | 0.013 | 0.05 | 0.006 | 0.021 | 0.037 | 0.14 | 0.40 | 0.20 |
| PC1250, SP-8R | 0.048 | 0.18 | 0.013 | 0.05 | 0.006 | 0.021 | 0.037 | 0.14 | 0.40 | 0.20 |
| PC2000-8 | 0.063 | 0.24 | 0.016 | 0.06 | 0.022 | 0.085 | 0.07 | 0.26 | 0.18 | 0.08 |

*(1) Includes lubricant of PTO case.
*(2) Includes lubricant of differential gear box.

| | Total Capacities Per Excavator | | | | | Total Consumption Per Excavator (Including oil change volume) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Engine ltr. (US Gal) | PTO ltr. (US Gal) | Hydraulic Reservoir ltr. (US Gal) | Slew gears ltr. (US Gal) | Travel gears ltr. (US Gal) | Engine Oil ltr/h (US Gal/h) | Hydraulic Oil ltr/h (US Gal/h)* | Gear Oil ltr/h (US Gal/h)** | Central Lubrication kg/h (lb/h) | Slew ring gear Lubrication kg/h (lb/h) |
| PC3000 SSA12V159 | 190 (50.2) | 90 (23.8) | 2900 (766) | 83 (21.9) | 135 (35.7) | 0.8 (0.21) | 0.53 (0.14) | 0.10 (0.026) | 0.14 (0.31) | 0.035 (0.08) |
| PC3000/E | — | 90 (23.8) | 2900 (766) | 83 (21.9) | 135 (35.7) | — | 0.53 (0.14) | 0.10 (0.026) | 0.14 (0.31) | 0.035 (0.08) |
| PC4000-6 SDA16V160 | 866*** (229) | 150 (39.6) | 3900 (1030) | 166 (43.9) | 310 (81.9) | 1.1 (0.29) | 0.72 (0.19) | 0.21 (0.055) | 0.16 (0.35) | 0.04 (0.09) |
| PC4000/E | — | 150 (39.6) | 3900 (1030) | 166 (43.9) | 310 (81.9) | — | 0.72 (0.19) | 0.21 (0.055) | 0.16 (0.35) | 0.04 (0.09) |
| PC5500 2 x SSA12V159 | 380*** (100) | 190 (50.2) | 3800 (1004) | 166 (43.9) | 237 (62.6) | 1.6 (0.42) 1.8*** (0.48) | 0.70 (0.21) | 0.20 (0.053) | 0.18 (0.40) | 0.05 (0.11) |
| PC5500/E | — | 153 (40.4) | 3800 (1004) | 166 (43.9) | 237 (62.6) | — | 0.70 (0.21) | 0.19 (0.05) | 0.18 (0.40) | 0.05 (0.11) |
| PC8000 2 x SDA16V160 | 2214*** (585) | 240 (63.4) | 8350 (2206) | 249 (65.8) | 780 (206) | 2.2*** (0.58) | 1.53 (0.40) | 0.43 (0.114) | 0.20 (0.44) | 0.06 (0.13) |
| PC8000/E | — | 240 (63.4) | 8350 (2206) | 100 (26.4) | 900 (238) | — | 1.53 (0.40) | 0.42 (0.11) | 0.20 (0.44) | 0.06 (0.13) |

* 10% of oil change volume between oil change intervals plus volume of oil change (latest every 6000 h)
** 2% of oil change volume between oil change interval (3000 h) plus volume of oil change
*** Including oil management system

### (3) Off-highway dump trucks

| Application | *(1) Crank case | | *(2) Transmission | | *(3) Final Drives | | *(4) Hydraulic Control | | Grease | |
|---|---|---|---|---|---|---|---|---|---|---|
| Unit Q'TY / Machine Model | US Gal | Liter | US Gal | Liter | US Gal | Liter | US Gal | Liter | lb | kg |
| HD255-5 | 0.02 | 0.08 | 0.018 | 0.07 | 0.003 | 0.01 | 0.011 | 0.04 | 0.04 | 0.02 |
| HD325-6 | 0.029 | 0.11 | 0.024 | 0.09 | 0.016 | 0.06 | 0.019 | 0.07 | 0.04 | 0.02 |
| HD325-7 | 0.029 | 0.11 | 0.023 | 0.09 | 0.011 | 0.04 | 0.009 | 0.035 | 0.04 | 0.02 |
| HD325-7R | 0.029 | 0.11 | 0.023 | 0.09 | 0.011 | 0.04 | 0.009 | 0.035 | 0.04 | 0.02 |
| HD405-6 | 0.029 | 0.11 | 0.024 | 0.09 | 0.016 | 0.06 | 0.019 | 0.07 | 0.04 | 0.02 |
| HD405-7 | 0.029 | 0.11 | 0.023 | 0.09 | 0.011 | 0.04 | 0.009 | 0.035 | 0.04 | 0.02 |
| HD405-7R | 0.029 | 0.11 | 0.023 | 0.09 | 0.011 | 0.04 | 0.009 | 0.035 | 0.04 | 0.02 |
| HD465-7 | 0.032 | 0.12 | 0.05 | 0.19 | 0.019 | 0.07 | 0.009 | 0.032 | 0.04 | 0.02 |
| HD465-7E0 | 0.042 | 0.16 | 0.06 | 0.22 | 0.019 | 0.07 | 0.009 | 0.032 | 0.04 | 0.02 |
| HD465-7R | 0.042 | 0.16 | 0.06 | 0.22 | 0.019 | 0.07 | 0.009 | 0.032 | 0.04 | 0.02 |
| HD605-7 | 0.032 | 0.12 | 0.05 | 0.19 | 0.019 | 0.07 | 0.008 | 0.03 | 0.04 | 0.02 |
| HD605-7E0 | 0.042 | 0.16 | 0.05 | 0.19 | 0.019 | 0.07 | 0.009 | 0.032 | 0.04 | 0.02 |
| HD605-7R | 0.042 | 0.16 | 0.06 | 0.22 | 0.019 | 0.07 | 0.009 | 0.032 | 0.04 | 0.02 |
| HD785-5 | 0.069 | 0.26 | 0.029 | 0.11 | 0.034 | 0.13 | 0.053 | 0.20 | 0.07 | 0.03 |
| HD785-7 | 0.069 | 0.26 | 0.055 | 0.21 | 0.034 | 0.13 | 0.021 | 0.08 | 0.07 | 0.03 |
| HM250-2 | 0.021 | 0.08 | 0.021 | 0.08 | 0.012 | 0.045 | 0.08 | 0.03 | 0.04 | 0.02 |
| HM300-1 | 0.019 | 0.07 | 0.021 | 0.08 | 0.013 | 0.05 | 0.008 | 0.03 | 0.04 | 0.02 |
| HM300-2, HM300-2R | 0.021 | 0.08 | 0.021 | 0.08 | 0.012 | 0.045 | 0.008 | 0.03 | 0.04 | 0.02 |
| HM350-1 | 0.029 | 0.11 | 0.032 | 0.12 | 0.019 | 0.07 | 0.013 | 0.05 | 0.04 | 0.02 |
| HM350-2, HM350-2R | 0.029 | 0.11 | 0.032 | 0.12 | 0.016 | 0.06 | 0.013 | 0.05 | 0.04 | 0.02 |
| HM400-1 | 0.029 | 0.11 | 0.032 | 0.12 | 0.021 | 0.08 | 0.013 | 0.05 | 0.04 | 0.02 |
| HM400-2, HM400-2R | 0.029 | 0.11 | 0.032 | 0.12 | 0.019 | 0.07 | 0.013 | 0.05 | 0.04 | 0.02 |

*(1) Includes lubricant oil of compressor for Portable Air Compressor
*(2) Includes oils in the torque converter, main clutch and steering cases, differential, etc.
*(3) Includes oils in the tandem case of Motor Grader
Includes oils in the differential case of Dump Truck
*(4) Includes oils in the brake cooling tank

### (4) Wheel loaders and Wheel dozers

| Application | *(1) Crank case | | *(2) Transmission | | *(3) Final Drives | | *(4) Hydraulic Control | | Grease | |
|---|---|---|---|---|---|---|---|---|---|---|
| Unit Q'TY / Machine Model | US Gal | Liter | US Gal | Liter | US Gal | Liter | US Gal | Liter | lb | kg |
| WA150-5 | 0.007 | 0.025 | 0.0013 | 0.005 | 0.004 | 0.015 | 0.006 | 0.024 | 0.02 | 0.01 |
| WA150-6 | 0.006 | 0.023 | 0.001 | 0.004 | 0.004 | 0.015 | 0.006 | 0.024 | 0.02 | 0.01 |
| WA200-5 | 0.01 | 0.04 | 0.0013 | 0.006 | 0.005 | 0.02 | 0.008 | 0.03 | 0.02 | 0.01 |
| WA200-6, WA200PZ-6 | 0.008 | 0.03 | 0.0013 | 0.005 | 0.005 | 0.02 | 0.008 | 0.03 | 0.02 | 0.01 |
| WA250-5 | 0.01 | 0.04 | 0.002 | 0.005 | 0.005 | 0.02 | 0.011 | 0.04 | 0.02 | 0.01 |
| WA250-6, WA250PZ-6 | 0.013 | 0.05 | 0.002 | 0.006 | 0.005 | 0.02 | 0.011 | 0.04 | 0.02 | 0.01 |
| WA320-5 | 0.01 | 0.04 | 0.002 | 0.007 | 0.013 | 0.03 | 0.013 | 0.05 | 0.02 | 0.01 |
| WA320-6, WA320PZ-6 | 0.013 | 0.05 | 0.002 | 0.007 | 0.013 | 0.03 | 0.013 | 0.05 | 0.02 | 0.01 |
| WA380-3 | 0.032 | 0.12 | 0.011 | 0.04 | 0.011 | 0.04 | 0.019 | 0.07 | 0.02 | 0.01 |
| WA380-6 | 0.013 | 0.05 | 0.01 | 0.04 | 0.005 | 0.02 | 0.018 | 0.07 | 0.02 | 0.01 |
| WA380-5 | 0.019 | 0.07 | 0.016 | 0.06 | 0.011 | 0.04 | 0.019 | 0.07 | 0.02 | 0.01 |
| WA420-3 | 0.032 | 0.12 | 0.016 | 0.06 | 0.016 | 0.06 | 0.019 | 0.07 | 0.02 | 0.01 |
| WA430-5 | 0.019 | 0.07 | 0.016 | 0.06 | 0.011 | 0.04 | 0.019 | 0.07 | 0.02 | 0.01 |
| WA430-6 | 0.019 | 0.07 | 0.016 | 0.06 | 0.013 | 0.05 | 0.019 | 0.07 | 0.02 | 0.01 |
| WA470-3 | 0.037 | 0.14 | 0.016 | 0.06 | 0.019 | 0.07 | 0.021 | 0.08 | 0.02 | 0.01 |
| WA470-5, WA480-5 | 0.021 | 0.08 | 0.016 | 0.06 | 0.016 | 0.06 | 0.026 | 0.10 | 0.02 | 0.01 |
| WA470-6, WA480-6 | 0.021 | 0.08 | 0.016 | 0.06 | 0.016 | 0.06 | 0.026 | 0.10 | 0.02 | 0.01 |
| WA470-6**, WA480-6** | 0.021 | 0.08 | 0.018 | 0.07 | 0.016 | 0.06 | 0.026 | 0.10 | 0.02 | 0.01 |
| WA500-3 | 0.04 | 0.15 | 0.032 | 0.12 | 0.021 | 0.08 | 0.024 | 0.09 | 0.04 | 0.02 |
| WA500-6, WA500-6R | 0.026 | 0.10 | 0.02 | 0.08 | 0.024 | 0.09 | 0.045 | 0.17 | 0.04 | 0.02 |
| WA600-3 | 0.045 | 0.17 | 0.029 | 0.11 | 0.034 | 0.13 | 0.048 | 0.18 | 0.04 | 0.02 |
| WA600-6, WA600-6R | 0.048 | 0.18 | 0.024 | 0.09 | 0.042 | 0.16 | 0.06 | 0.23 | 0.04 | 0.02 |
| WA700-3 | 0.058 | 0.22 | 0.029 | 0.11 | 0.066 | 0.25 | 0.066 | 0.25 | 0.06 | 0.03 |
| WA800-3, WA800-3E0 | 0.071 | 0.27 | 0.034 | 0.14 | 0.095 | 0.36 | 0.10 | 0.37 | 0.09 | 0.04 |
| WA900-3, WA900-3E0 | 0.071 | 0.27 | 0.034 | 0.14 | 0.095 | 0.36 | 0.10 | 0.37 | 0.09 | 0.04 |
| WA1200-3 | 0.275 | 1.04 | 0.092 | 0.35 | 0.22 | 0.83 | 0.16 | 0.60 | 0.18 | 0.08 |
| WD420-3 | 0.032 | 0.12 | 0.016 | 0.06 | 0.016 | 0.06 | 0.019 | 0.07 | 0.02 | 0.01 |
| WD500-3 | 0.04 | 0.15 | 0.032 | 0.12 | 0.021 | 0.08 | 0.024 | 0.09 | 0.04 | 0.02 |
| WD600-3 | 0.06 | 0.20 | 0.04 | 0.12 | 0.03 | 0.11 | 0.03 | 0.11 | 0.04 | 0.02 |
| WD600-6 | 0.048 | 0.18 | 0.024 | 0.09 | 0.042 | 0.16 | 0.06 | 0.23 | 0.04 | 0.02 |
| WD900-3 | 0.071 | 0.27 | 0.034 | 0.14 | 0.095 | 0.36 | 0.10 | 0.37 | 0.09 | 0.04 |

*(1) Includes lubricant oil of compressor for Portable Air Compressor
*(2) Includes oils in the torque converter, main clutch and steering cases, differential, etc.
*(3) Includes oils in the tandem case of Motor Grader
*(4) Includes oils in the brake cooling tank
** With large-capacity torque convertor

### (5) Motor graders

| Application | *(1) Crank case | | *(2) Transmission | | *(3) Final Drives | | Hydraulic Control | | Grease | |
|---|---|---|---|---|---|---|---|---|---|---|
| Unit Q'TY / Machine Model | US Gal | Liter | US Gal | Liter | US Gal | Liter | US Gal | Liter | lb | kg |
| GD500 series | 0.029 | 0.11 | 0.008 | 0.03 | 0.024 | 0.09 | 0.008 | 0.03 | 0.04 | 0.02 |
| GD555-3A/C | 0.021 | 0.08 | 0.013 | 0.05 | 0.024 | 0.09 | 0.008 | 0.03 | 0.04 | 0.02 |
| GD555-5 | 0.013 | 0.05 | 0.013 | 0.05 | 0.024 | 0.09 | 0.009 | 0.035 | 0.04 | 0.02 |
| GD600 series | 0.029 | 0.11 | 0.011 | 0.04 | 0.024 | 0.09 | 0.008 | 0.03 | 0.04 | 0.02 |
| GD655-3A | 0.021 | 0.08 | 0.013 | 0.05 | 0.016 | 0.06 | 0.008 | 0.03 | 0.04 | 0.02 |
| GD655-3E0 | 0.016 | 0.06 | 0.013 | 0.05 | 0.016 | 0.06 | 0.008 | 0.03 | 0.04 | 0.02 |
| GD655-5 | 0.013 | 0.05 | 0.013 | 0.05 | 0.024 | 0.09 | 0.009 | 0.035 | 0.04 | 0.02 |
| GD675-3A | 0.021 | 0.08 | 0.013 | 0.05 | 0.016 | 0.06 | 0.008 | 0.03 | 0.04 | 0.02 |
| GD675-3E0 | 0.016 | 0.06 | 0.013 | 0.05 | 0.016 | 0.06 | 0.008 | 0.03 | 0.04 | 0.02 |
| GD675-5 | 0.013 | 0.05 | 0.013 | 0.05 | 0.024 | 0.09 | 0.009 | 0.035 | 0.04 | 0.02 |
| GD705A-4 | 0.042 | 0.16 | 0.011 | 0.04 | 0.034 | 0.13 | 0.021 | 0.08 | 0.09 | 0.04 |
| GD825A-2 | 0.042 | 0.16 | 0.011 | 0.04 | 0.034 | 0.13 | 0.024 | 0.09 | 0.09 | 0.04 |

*(1) Includes lubricant oil of compressor for Portable Air Compressor
*(2) Includes oils in the torque converter, main clutch and steering cases, differential, etc.
*(3) Includes oils in the tandem case of Motor Grader

**Table 4 Approximate Tire Life**

| Machine | Easy Condition | Medium Condition | Severe Condition |
|---|---|---|---|
| Off-Highway Dump Trucks | 4,000 ~ 6,000 | 2,000 ~ 4,000 | 1,000 ~ 2,000 |
| Articulated Dump Trucks | 7,000 | 5,000 | 3,000 |
| Motor Graders | 3,000 | 2,000 | 1,000 |
| Wheel Loaders | 4,000 ~ 6,000 | 2,000 ~ 4,000 | 1,000 ~ 2,000 |
| Wheel Dozers | 3,000 | 2,000 | 1,000 |
| Hydraulic Excavators | 3,000 | 2,000 | 1,000 |
| | Traveling on well-maintained roads, or in silt or sand, tire wear is normal. | Traveling on gravelly surfaces, tire wear is normal but occasionally cut by rocks. | Tire wear mostly due to rock-cut, liable to puncture frequently. |

The life varies with brand and material. Tires may be used above or below the tire life expectancy given in this table.

**Table 5 Approximate Usable Hours of Special Items**

| Item | Easy Range | Medium Range | Severe Range |
|---|---|---|---|
| Ripper Point | 150 | 30 | 15 |
| Shank Protector | 1,500 | 450 | 150 |
| Shank | 7,000 | 3,500 | 2,000 |

Optimum Fleet Recommendation (OFR) software program is available for Komatsu distributors.
The OFR is able to simulate and recommend optimum fleet for the targeted production with followings.

1. Machine selection based on site conditions and target of production.
2. Estimation of each machine's production.
3. Estimation of owning and operating costs.
4. Estimation of production cost.

**Available machine type in the database**

1. Dump truck
2. Wheel loader
3. Hydraulic excavator
4. Bulldozer
5. Mobile crusher & recycler

**Computer processing**


**Report contents**

1. Production condition, object material, cost data
2. Optimum machine combination
3. Production
4. Number of units
5. Production cost

For Customer;
Please contact the nearest Komatsu distributor with your specific conditions, application and requirements.

**About Repair and Maintenance Cost Estimation**

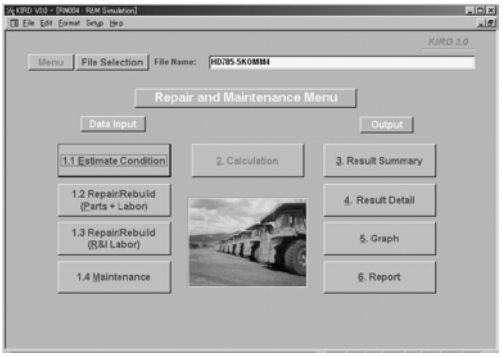
Repair and Maintenance cost is a part of the owning and operating cost.

Repair and Maintenance cost estimating software is available for Komatsu distributors.

The system is called KIRD (Komatsu Information on Reliability and Durability).

By using the KIRD, we can calculate Repair and Maintenance cost for Komatsu large sized equipment with local conditions such as followings.

1. Parts price (Each country has different import duty, transportation charge and etc.)
2. Hourly labor charges
3. Lubricants prices
4. Repairing methods (Repair option)
   - Rebuild
   - REMAN (Komatsu component exchange)
5. Man- hours
6. Component and system replacement intervals per operating conditions
   - Kind of job
   - Environments
   - Handling materials
   - Operating methods


For Customer;

Please contact the nearest Komatsu distributor with your specific model, application and requirements.