

# Machinery Cost Equations

Note: the values of the remaining farm value coefficients and the repair coefficients for each piece of equipment can be viewed by selecting "View Repair Factors" from the Help menu. These coefficients are constants which are published in the "Agricultural Engineers Yearbook" and cannot be changed by the user.

d1 - remaining farm value coefficient #1  
d2 - remaining farm value coefficient #2  
r1 - repair coefficient #1  
r2 - repair coefficient #2

L - labor multiplier = 1.1 for tractors  
= 1.2 for other power units

F - fuel multiplier = 1.0 for gasoline  
= 0.73 for diesel

years = ownership period + age when purchased

Tractors:

Costs/Hour

$$\text{salvage value} = d1 * \text{list price} * (d2^{\text{years}})$$

$$\text{depreciation} = (\text{purchase price} - \text{salvage value}) / (\text{ownership period} * \text{annual use})$$

$$\text{interest} = (\text{purchase price} + \text{salvage value}) * (\text{interest rate}/100) / (2 * \text{annual use})$$

$$\text{taxes, housing, insurance} = (\text{purchase price} + \text{salvage value}) * (\text{taxes, housing, insurance}\%/100) / (2 * \text{annual use})$$

$$\text{repairs \& maintenance} = \text{list price} * r1 * [(\text{annual use} * \text{years}/1000)^{r2}] / (\text{annual use} * \text{years})$$

$$\text{fuel cost} = F * 0.06 * \text{max pto HP} * \text{fuel price}$$

$$\text{lubricant cost} = 0.15 * \text{fuel cost}$$

$$\text{labor cost} = L * \text{wage}$$

Note: the equations for repair and maintenance, fuel costs, and salvage value are based upon studies performed by the American Society of Agricultural Engineers (ASAE Standards, 2000). The user may choose not to use the costs calculated by these equations by unchecking the box below the block in the input screen. In this case, the user must explicitly enter his own values for repair/maintenance, fuel costs, or salvage value.

If an implement is also selected:

$$\text{acres/hour} = \text{implement speed} * \text{implement width} * \text{implement field efficiency} / 825$$

$$\text{cost/acre} = (\text{cost/hour}) / (\text{acres/hour}) \text{ for all costs.}$$

### Self-propelled equipment:

The equations for self-propelled equipment are the same as those for tractors with two exceptions:

There is no equation to estimate fuel costs. Fuel usage must be entered into the input screen. This value is multiplied times fuel price to get fuel cost per hour.

Acres/hour is calculated based upon the power unit speed, width and field efficiency. Costs per acre are always calculated.

Note: The equations for repair and maintenance, and salvage value are based upon studies performed by the American Society of Agricultural Engineers (ASAE Standards, 2000). The user may choose to not use the costs calculated by these equations by unchecking the box below the block in the input screen. In this case, the user must explicitly enter his own values for repair and maintenance, or salvage value.

### Trucks:

The equations for depreciation, interest, taxes, housing, and insurance, and labor are the same as those for tractors. There are no equations to estimate fuel use and repair costs. The user must enter the values for these costs in the input screen for trucks.

$$\text{hours} = \text{annual miles driven} / \text{average speed}$$

$$\text{repair and maintenance costs} = \text{annual repair costs} / \text{hours}$$

$$\text{fuel cost} = (\text{annual miles} * \text{fuel price}) / (\text{fuel use} * \text{hours})$$

Costs/mile are calculated by dividing costs/hour by average speed in miles per hour. Costs per acre for trucks are calculated only if miles per acre are provided in the input screen.

Note: The equations for repair and maintenance, and salvage value are based upon studies performed by the American Society of Agricultural Engineers (ASAE Standards, 2000). The user may choose to not use the costs calculated by these equations by unchecking the box below the block in the input screen. In this case, the user must explicitly enter his own values for repair and maintenance, or salvage value.

### Implements:

The equations for implements are the same as those for tractors with the following exceptions:

$$\text{Fuel cost} = 0$$

$$\text{Lubricants} = 0$$

$$\text{Labor costs} = 0$$

In keeping with ASAE standards, these costs are always assigned to the power unit.

If the implement is a wagon, costs/acre are not calculated unless hours per acre are specified in the input screen.

Note: The equations for repair and maintenance, and salvage value are based upon studies performed by the American Society of

Agricultural Engineers (ASAE Standards, 2000). The user may choose to not use the costs calculated by these equations by unchecking the box below the block in the input screen. In this case, the user must explicitly enter his own values for repair and maintenance, or salvage value.

Reference:

American Society of Agricultural Engineers, "Agricultural Engineers Yearbook, 2000."