

Machinery Financing: Program Description

The Machinery Financing program is used to evaluate the financial implications of four types of financing alternatives: purchase, roll-over purchase, lease, and rent. For each alternative, a net present value and cash flows schedule are generated.

The information needed for this analysis can come from:

1. An individual's farm records
2. Loan records
3. Machinery information
4. Lease agreement
5. Rental agreement

The following information is needed for the analysis. To make use of this program, you must be able to provide estimates of the costs related to purchasing, leasing, and renting machinery, as well as farm characteristics and tax information.

A. Main Input:

Description of analysis; number of acres farmed; number of years for analysis; after-tax discount rate; user's federal, state, and social security tax rates; type of machinery.

B. Purchase:

Taxable basis of machinery, amount of section 179 to be expensed, amount of down payment plus equity, loan information (balance, interest rate, length in years), number of years machinery will stay in possession, value of machine at time of sale.

C. Roll-over Purchase:

Yearly repair costs, roll-over costs, increase in annual roll-over costs, remaining basis of machine that is traded in, amount of section 179 to be expensed, amount of down payment plus equity, loan information (balance, interest rate), # of months of interest expense, # of years roll-over will continue, value of machine at end of contract.

D. Lease:

Lease information (number of years, are there equal cash payments, cash lease payment per year), trade-in information (is there a trade in, adjusted basis of machine, is a value applied toward lease "equally each year"), security deposit, is there a purchase at end of lease, # of years of lease contract.

E. Rent:

Yearly repair costs, rental information (hours used per year, rate per hour, annual increase in rental costs), length of rental agreement.

Navigating the Machinery Financing Analysis program

The Machinery Financing Analysis program utilizes buttons to help the user move between input screens. The primary buttons are found on the Control Menu, which is described later.

Another useful tool is tabs, located at the bottom of the Excel spreadsheet screen. The tabs help navigate the user between input and output worksheets. Click on the name of the screen you wish to view. The tabs are described on the next page.

Input takes you to the input worksheet, as does the Input button described above.

Repairs salvage takes you to the screen where total hours used, repair costs, and remaining value of the machine are estimated based on: list price of machine, hours of use per year, beginning hours, and current age of machine.

Purchase takes you to the input and output screens for the purchase alternative.

Roll-over takes you to the input and output screens for the rollover alternative.

Lease takes you to the input and output screens for the lease alternative.

Rent takes you to the input and output screens for the rent alternative.

How to use the Input Sections

The Machinery Financing program has a main menu that collects information common to all financing alternatives, a control menu that helps the user move between input screens and reports, and a summary of alternatives that displays the financial information calculated for each alternative chosen for the analysis.

The inputs are entered in the main input screen as shown below where the text is blue. In addition to the common required input, each financing alternative has input specific to it. The required information needed for each of the four financing alternatives, as well as the output information, will be explained later in the documentation.

To explain the input required for this program, an example was developed for Terry and Kelly Maple's acquisition of a tractor. Terry and Kelly's information is entered throughout this documentation.

Example: Terry and Kelly Maple's Acquisition of a Tractor

Terry and Kelly Maple would like to get a new John Deere tractor (cost: \$55,000) for their 1500-acre farm. However, they are unsure about the many financing alternatives available, and which is the best for them. They'd like to do a 5-year analysis, at which time they plan to get another new tractor. Their tax rates are as follows: federal 15%, state 3%, and social security 15.3%. Their money market account currently earns a return of 5%. Terry and Kelly would like to analyze all of the alternatives.

The **main menu** is shown below.

Description	John Deere
Number of acres	1,500 acres
Years in analysis	5 range from 1 to 12
After-tax discount rate	5% per year
Marginal tax rates	
Federal	15%
State	3%
Social security	15.3%
Machine type	tractor

A **description** of the machinery being analyzed is entered here. The description can be a name, a color, or anything that will remind the user what is being analyzed. You only need to enter the description here, as it will appear on all of the inputs screens. Terry and Kelly described this analysis using "John Deere".

The **number of acres** the machinery will be used for is entered here. This is helpful in analyzing the cost per acre. Terry and Kelly farm 1500 acres.

The **number of years** you would like to analyze the machinery's financing options. Terry and Kelly would like to do the analysis for 5 years.

The **after-tax discount rate** is the rate you will earn or pay for an item after taxes are calculated. One method for estimating “after-tax” discount rate is described. The “before-tax” discount rate is the opportunity cost for money. For operations with debt, the discount rate may be a blend of debt costs and equity capital. For farms with no debt, the discount rate may be the return on off-farm investments (ie. CD rate). The “after-tax” rate may be found by 1) summing the marginal tax rates, 2) subtract answer to #1 from “1”, and 3) multiply answer #2 by the before-tax discount rate.

For example, Terry and Kelly Maple have their money in a money market account earning 7.5% (before-tax discount rate). Their **marginal tax rates** are: Federal 15%, State 3%, and Social Security 15.3% (Sum =33.3%). Their after-tax discount rate is: $(7.5\% \times (1-33.3\%)) = 3.33\%$

The **machine type** is entered here. This entry appears on all of the input screens in the program. In this scenario, the machine is a tractor.

The **control menu** is shown below.

Control Menu

Evaluate a

Purchase	Yes	<input type="button" value="Go to Purchase"/>
Roll-over purchase	Yes	<input type="button" value="Go to Roll-over"/>
Lease	Yes	<input type="button" value="Go to Lease"/>
Rent	Yes	<input type="button" value="Go to Rent"/>

The control menu assists the user in the initial stages of the analysis process as well as helps to navigate through the computer program. The user may choose which of the financing alternatives to include in the analysis by selecting “yes” or “no” from the drop down box located next to each method. The drop-down box will appear when the user clicks on the blue yes/no next to the financing alternative. Terry and Kelly want to analyze all of the financing alternatives.

In addition to the navigation buttons for each financing alternative, the Control Menu has a “**Go to Repairs and Salvage**” button. This button produces an estimated repair costs worksheet. In this section, the user estimates the repair costs and remaining values for the asset. This information is used in calculations for determining annualized cash flows, taxable cash flows, and tax savings. Required input may be entered where the text is blue followed by pressing Enter. The estimates per year will automatically adjust for this new value.

ESTIMATED REPAIR COSTS AND REMAINING VALUES
(for tractor)

List price when new	\$55,000		
Hours use per year	300 hrs		
Beginning hours	0 hrs		
Current age of machine	0 years		

	Estimated Total Hours	Estimated Repair Costs	Estimated Remaining Value
1	300	\$0	\$35,000
2	600	\$100	\$33,000
3	900	\$200	\$31,000
4	1,200	\$200	\$29,000
5	1,500	\$300	\$27,000
6	1,800	\$400	\$25,000
7	2,100	\$500	\$24,000
8	2,400	\$500	\$22,000
9	2,700	\$600	\$21,000
10	3,000	\$700	\$20,000
11	3,300	\$700	\$19,000
12	3,600	\$800	\$18,000

The **summary of alternatives** is shown below.

Summary of Alternatives

	Purchase	Roll-over Purchase	Lease	Rent
Net Present Value ¹	\$27,206	\$27,367	\$29,486	\$85,651
Annualized Cash Flow ¹	\$5,985	\$6,020	\$6,486	\$18,841
End of Horizon				
Value of Machine	\$27,000	\$50,000	\$0	\$0
Loan Balance	\$0	\$45,000	\$0	\$0
Net Value	\$27,000	\$5,000	\$0	\$0
Cash Flows In ² :				
Year 1	\$18,474	\$14,703	\$6,004	\$18,142
Year 2	\$7,256	\$4,684	\$6,071	\$18,503
Year 3	\$8,353	\$4,666	\$6,803	\$18,870
Year 4	\$9,156	\$4,651	\$6,803	\$19,245
Year 5	-\$15,606	-\$875	\$6,870	\$19,627

For each alternative, the yearly cash flows are calculated as well as the net present value of those cash flows. An annualized cash flow gives the average annual cash flow of the alternative, weighting yearly cash flows by the discount rate.

Positive Cash Flows represent outflows while negative cash flows represent inflows. The alternative with the lowest net present value and annualized cash flow is the least cost alternative. The last year's cash flow subtracts the value of the machine and adds to it the remaining loan balance.

In this example, the purchase alternative with a net present value of \$27,206 and an annualized cash flow of \$5,985 is the least cost alternative.

Section 1: Purchase Alternative

The input screen for the purchase alternative is found below. The input information can be entered where the text is [blue](#). Some of the information may already be entered from the main input screen. If you choose to change any information that may be common to other financing alternatives, be sure to click on the "[Link to Main Input](#)" button. This will update the information on the Main Input screen.

Example: Terry and Kelly Maple Purchase a Tractor

They have been approved for a \$55,000 loan that covers the cost of the tractor at a 10.4% interest rate for a term of 5 years. They have saved \$10,000 to use towards a down payment and will not expense any section 179 expenses. They'd like to keep the tractor at least 5 years.

Based on the "loan information" input, the principal and interest payments for 5 years using a constant amortization schedule are calculated. The taxable basis of the machine is \$55,000. Depreciation is calculated using a 5-year MACRS schedule. At the end of 5 years, the tractor is projected to be worth \$27,000.

PURCHASE		Go to Main	Print
INPUT			
Description	John Deere	Link to Main Input	
Number of acres	1,500 acres		
Taxable basis of new machine	\$55,000 \$		
Amt of section 179 expensing	\$0 \$		
Loan information			
Downpayment plus equity value of machine traded in	\$10,000 \$		
Loan balance	\$45,000 \$ of loan		
Interest rate	10.4% rate per year		
Years of loan	5 number of years		
Payment per year	\$11,992		
End of period information			
Years machine is held	5 number of years		
Remaining value of machine	\$27,000 \$	Link remaining value	
After-tax discount rate	5.0% rate per year		

In addition to the information required in the Main Input screen, the required inputs for the Purchase alternative are described below.

The **taxable basis of the new machine** is the amount paid for the asset minus section 179 expenses. If an item is traded in for a replacement, the basis of the old asset continues to depreciate as if it were still in possession. Do not combine the basis of the two items. Terry and Kelly enter \$55,000 as the taxable basis because that is the cost of the new tractor and they do not expense any section 179 expenses.

The **amount of section 179 expenses** is the amount of deduction allowed for a qualifying property's cost in its first year of service determined by the tax code. Terry and Kelly do not deduct any section 179 expenses.

Down payment plus equity value of machine traded in is the sum of the down payment you wish to use, as well as the value of the machine you traded in (if applicable). This amount is the collateral used to towards the purchase that reduces the amount of money borrowed. Terry and Kelly enter \$10,000, which represents the money they have saved for a down payment. They do not have a trade in.

The **loan balance** represents the amount of money borrowed for purchasing the machinery. Terry and Kelly enter \$45,000. This is the difference between the cost of the tractor (\$55,000) and the down payment (\$10,000).

The **interest rate** is the cost of borrowing money. Terry and Kelly have been approved for a loan with a 10.4% interest rate.

The **years of the loan** represent the number of years you have to repay the loan before penalties are incurred. Terry and Kelly have been approved for a 5-year loan.

While information is entered into the Purchase Input screen, the model automatically calculates "**Payments Per Year**". This represents the amount due each year as repayment of the loan. In this example, the payments are calculated to be \$11,992 per year.

The number of **years machine is held** refers to the number of years before you plan to sell the machine. Terry and Kelly plan to keep the tractor for 5 years.

The **remaining value of the machine** is the market value of the machine when the machine is sold. If the machine has a remaining value, different from that entered in the input screen, you may click on the "Link Remaining Value" button to have the calculated remaining value entered for you.

Reports for the Purchase Alternative:

The reports are: 1. **Yearly cash flows and net present value**, 2. **Annualized cash flows**, and 3. **Taxable cash flows and tax savings**.

Purchase Alternative Report 1:

Based on the input given for the purchase alternative, the yearly cash flows and net present value for the tractor are calculated as shown below. The net present value is \$27,206 and the annualized cash flows is \$5,985.

YEARLY CASH FLOWS AND NET PRESENT VALUE						
		Net present value		\$27,206	Change Repairs Costs	
		Annualized cash flows		\$5,985		
Year	Down-Payment	Loan Payment	Repair Costs	Salvage Value	Tax Saving	Net Cash Flow
1	\$10,000	\$11,992			\$3,518	\$18,474
2		\$11,992	\$100		\$4,837	\$7,256
3		\$11,992	\$200		\$3,839	\$8,353
4		\$11,992	\$200		\$3,036	\$9,156
5		\$11,992	\$300	\$27,000	\$898	-\$15,606

The report shows the annualized cash flows in the following categories: down payment, loan payments, repair costs, salvage value, and tax savings. Below is a description of each.

Down payment is the amount of equity financing used in acquiring the machine. In this example, Terry and Kelly used a \$10,000 down payment.

Loan payment is the amount of capital required per year to decrease debt. As calculated in the input screen, the amount required is \$11,992 per year for 5 years.

Repair costs are the estimated repair costs per year. Repair costs may be estimated using an engineering function or the user may specify an average yearly repair cost.

To specify the repair cost, the user must click on the Change Repair Costs button and the screen below is displayed. Enter the amount of repair costs for each year under the “Revised Entry” column. A revision to repair costs may cause changes in yearly cash flows and the net present value for the purchase. You may decide to either use the costs from the original repair input sheet or to use the revised inputs.

In this example, Terry and Kelly used the default repair costs: \$100 in year 2, \$200 in year 3, \$200 in year 4, and \$300 in year 5.

Year	Repair Sheet	Revised Entry
1	\$	500
2	\$100	100
3	\$200	0
4	\$200	0
5	\$300	0

Salvage value is the value of the machine when it is sold. This figure is the same as the “remaining value of machine” in the input screen. In this example, the salvage value is \$27,000.

Tax saving represents the tax savings resulting from depreciation, section 179 expensing, repairs, and interest. Also included are any gains when the machine is sold.

Net cash flow is the sum of the previous columns. Positive represents outflows, while negative represents inflows.

Purchase Alternative Report 2:

The annualized cash flows per year are representative of the cash you spend and save in a year. This report is separated into the categories as shown below. Each category is expressed in a "total per year" and "per acre" column. To figure the total cash flow, *sum* the loan payments, repair costs, and annualized down payment. From the summation, *subtract* the annualized remaining value and tax savings.

	Total	Per acre
Loan payments	\$11,421	\$7.61
Repair costs	\$153	\$0.10
Annualized downpayment	\$2,200	\$1.47
Annualized remaining value	-\$4,654	-\$3.10
Tax saving	-\$3,136	-\$2.09
Total cash flow	\$5,985	\$3.99

This report tells Terry and Kelly that if they purchase the tractor, they have the following cash flow implications to consider: yearly loan payments totaling \$11,421, yearly repair costs of \$153, and the down payment (based on one year's portion) being \$2,200. The annualized remaining value is \$4,654 and the tax savings is \$3,136. The total annualized cash flow is \$5,985.

Purchase Alternative Report 3:

The taxable cash flows are: interest expense, depreciation, repairs, and gain on sale. Each of these cash flows affect taxes differently and are described below.

Year	Interest	Depreciation	Repairs	Gain on sale	Tax Savings
1	\$4,680	\$5,885			\$3,518
2	\$3,920	\$10,505	\$100		\$4,837
3	\$3,080	\$8,250	\$200		\$3,839
4	\$2,153	\$6,765	\$200		\$3,036
5	\$1,130	\$6,765	\$300	\$10,170	\$898

Interest is the payment expense for borrowing money based on a percentage of the debt outstanding. Terry and Kelly will owe \$4,680 in year 1, \$3,920 in year 2, \$3,080 in year 3, \$2,153 in year 4, and \$1,130 in year 5. If they were to increase the payments per year, the interest expense would decrease.

Depreciation is calculated using double declining MACRS schedule over a 7-year time span.

Repairs refer to the estimated repair costs per year.

Gain on Sale is the amount of capital received above and beyond the original capital outlay.

Tax Savings is the amount of money saved by correctly reporting the taxable cash flows. The calculation for tax savings is: 1. summation of interest, depreciation, and repairs, 2. summation of all tax rates as entered in main input screen (federal, state, and social security), 3. gain on sale, 4. summation of federal and state tax rates. The equation, referring to the numbered descriptions, is as follows (#1 * #2 - #3 * #4). In this example, the maximum tax savings is in year 2, saving \$4,837, and the least tax savings is in year 5, saving \$898.

Section 2: Roll-over purchase

A roll-over purchase occurs when a new piece of machinery is purchased each year for a payment called a “roll-over cost”. As part of the roll-over purchase, the purchaser has a loan on which principal payments are not made. Interest is paid on the loan for a set number of months. The input screen for the roll-over purchase alternative is found below. The input information can be entered where the text is [blue](#). Some of the information may already be entered from the main input screen. If you choose to change any information that may be common to other alternatives, be sure to click on the “[Link to Main Input](#)” button. This will update the information on the Main Input screen.

Example: Terry and Kelly Maple Get a Roll-over Contract

Terry and Kelly have received an approved roll-over contract. It explains that they would pay \$6,000 each time they purchase a new tractor. This price will not increase over the next 5 years. They would still use the approved loan described in Section 1. Below is an excerpt from Section 1:

They have been approved for a \$55,000 loan that covers the cost of the tractor at a 10.4% interest rate for a term of 5 years. They have saved \$10,000 to use towards a down payment and will not expense any section 179 expenses. They'd like to keep the tractor at least 5 years.

In addition to the loan information above, the roll-over contract states that two months of interest are due on the loan. The estimated taxable basis of the machine that is traded in is \$45,000. The estimated market value of a one-year-old machine at the end of 5 years is \$50,000.

INPUT		Link to Main Input
Description	John Deere	
Number of acres	1,500 acres	
Yearly repair costs	\$0 \$ per year	
Roll-over costs	\$6,000 \$ per year	
Increase in annual rollover costs	0% % per year	
Remaining basis in machine that is traded in	\$45,000 \$ in first year	
Section 179 expense	\$0 \$ per year	
Loan information		
Downpayment plus equity value of machine traded in	\$10,000 \$	
Loan balance	\$45,000 \$ of loan	
Interest rate	10.4% rate per year	
Months interest expense	2 no. of months	
End of period information		
Years roll-over will continue	5 no. of years	
Value of machine at end	\$50,000 \$	
After-tax discount rate	5.0% % per year	
Ending position	\$5,000 (machine value - loan balance)	

In addition to the information required in the Main Input screen, the required inputs for the Roll-over purchase alternative are described below.

Yearly repair costs are the total repair costs incurred per year. Terry and Kelly enter \$0 because with a roll-over purchase, new machinery is acquired each year. Typically, if repairs are necessary on new machinery, they are covered by a warranty.

Roll-over costs refers to the payment made when in a roll-over purchase agreement. Terry and Kelly enter \$6,000. This is the amount of interest they will pay each year.

Increase in annual rollover costs is the percentage the rollover costs will increase each year. Terry and Kelly estimate that rollover costs will not increase in the five years of this analysis.

The **remaining basis in machine that is traded in** refers to the value of the machinery, that you originally traded in when you agreed on a roll-over contract, minus any write-offs or section 179 expenses. For example, if the machine is valued at \$55,000 and Terry and Kelly claim \$1,000 as a section 179 expense, the remaining basis is \$44,000.

The amount of **section 179 expenses** is the amount of deduction allowed for a qualifying property's cost in its first year of service determined by the tax code. Terry and Kelly do not deduct any section 179 expenses.

Down payment plus equity value of machine traded in is the sum of the down payment you wish to use, as well as the value of the machine you traded in (if applicable). This amount is the collateral used towards the purchase that reduces the amount of money borrowed. In a roll-over purchase, Terry and Kelly make "interest payments", thus by having a down payment, their interest payments are reduced. Terry and Kelly enter \$10,000, which represents the money they have saved for a down payment. They do not have a trade in.

The **loan balance** represents the amount of money that would be borrowed if you were to purchase the machinery. In a roll-over purchase, the yearly payment is the interest calculated based on a loan balance. Thus, the lower the loan balance, the value of the required payments is reduced. Terry and Kelly have a \$45,000 loan balance.

The **interest rate** is the cost of borrowing money. Terry and Kelly have been approved for a loan with a 10.4% interest rate.

The number of **months of interest expense** payments due for the roll-over contract is entered here.

The number of **years the roll-over contract will continue** is entered here. Terry and Kelly enter a 5 to represent the five year analysis.

Value of machine at end of roll-over contract refers to the market value of the machine when it is traded in. Terry and Kelly estimate the machine to be worth \$50,000 when traded in.

Reports for the Roll-Over Purchase Alternative:

The reports are: 1. **Yearly cash flows and net present value**, 2. **Annualized cash flows** and 3. **Taxable cash flows and tax savings**.

Roll-Over Purchase Alternative Report 1:

Based on the input given for the roll-over purchase alternative, the yearly cash flows and net present value for the tractor are calculated as shown below. The net present value is \$27,367 and the annualized cash flows is \$6,050.

CASH FLOW AND NET PRESENT VALUE

Net present value of cash flows		\$27,367				
Annualize cash flow		\$6,020				
Downpayment		Repair			Net	
Year	Rollover Costs	Interest	Costs	Ending Position	Tax Saving	Cash Flow
1	\$16,000	\$780			\$2,077	\$14,703
2	\$6,000	\$780			\$2,096	\$4,684
3	\$6,000	\$780			\$2,114	\$4,666
4	\$6,000	\$780			\$2,129	\$4,651
5	\$6,000	\$780		\$5,000	\$2,655	-\$875

The report shows the annualized cash flows in the following categories: downpayment rollover costs, interest, repair costs, ending position, and tax savings. Below is a description of each.

Down payment rollover costs are the amount of equity financing used in acquiring the machine. This is also referred to as the "rollover costs". In this example, Terry and Kelly pay a \$6,000 rollover cost. In year one, they paid a \$10,000 down payment.

Interest is the payment for borrowing money based on a percentage of debt outstanding. Terry and Kelly have \$780 in interest each year.

Repair costs are the estimated repair costs per year. Since a roll-over purchase gives the user a new machine each year, the user does not have any repair costs. Terry and Kelly have no repair costs.

Ending position is the value of the machine minus the remaining loan balance. This represents the value of the machine if the user had maintained ownership the entire period. In this example, at the end of the 5-year period, the ending value of the machinery is \$5,000.

Tax saving represents the tax savings resulting from depreciation, section 179 expensing, repairs, and interest. Also included are any gains when the machine is sold.

Net cash flow is the sum of previous columns. A positive number represents outflows, while a negative number represents inflows.

Roll-Over Purchase Alternative Report 2:

The annualized cash flows per year are representative of the cash you spend and save in a year. This report is separated into the categories as shown below. Each category is expressed in a "total per year" and "per acre" basis. To figure the total cash flow, *sum* the rollover costs, interest costs, repair costs, and annualized down payment. From the summation, *subtract* the annualized ending value and annualized tax savings.

ANNUALIZED CASH FLOWS

	Total	Per acre
Rollover costs	\$6,000	\$4.00
Interest costs	\$780	\$0.52
Repair costs	\$0	\$0.00
Annualized downpayment	\$2,200	\$1.47
Annualized ending value	-\$862	-\$0.57
Annualized tax saving	-\$2,098	-\$1.40
Total cash flow	\$6,020	\$4.01

This report tells Terry and Kelly that if they enter into a rollover purchase contract, they have the following cash flow implications to consider: yearly roll-over costs totaling \$6,000, yearly interest costs of \$780, no repair costs, and the down payment (based on one year's portion) being \$2,200. The annualized ending value is \$862 and the tax savings is \$2,098. The total cash flow is \$6,020.

Roll-Over Purchase Alternative Report 3:

The taxable cash flows are: tax basis, depreciation, interest, repairs, and gain on sale. Each of these cash flows affect taxes differently and are described below.

TAXABLE CASH FLOWS AND TAX SAVINGS

Year	Tax Basis	----- Taxable items -----				Tax Savings
		Depreciation	Interest	Repairs	Gain on sale	
1	\$51,000	\$5,457	\$780			\$2,077
2	\$51,543	\$5,515	\$780			\$2,096
3	\$52,028	\$5,567	\$780			\$2,114
4	\$52,461	\$5,613	\$780			\$2,129
5	\$52,848	\$5,655	\$780		-\$2,848	\$2,655

Tax Basis is the tax basis in the previous year, plus the rollover cost for that year, minus depreciation for that year. In year 1, the tax basis is simply the trade-in-value plus the rollover costs for year 1.

Depreciation is calculated using double declining MACRS schedule over a 7-year time span

Interest is the payment expense for borrowing money based on a percentage of the debt outstanding. Terry and Kelly pay \$780 each year.

Repairs refer to the estimated repair costs per year. Since a roll-over purchase gives the user a new machine each year, the user does not have any repair costs. Terry and Kelly have no repair costs.

Gain on Sale is the amount of capital received above and beyond the original capital outlay. If Terry and Kelly would have purchased the machinery, they would have received \$2848

Tax Savings is the amount of money saved by correctly reporting the taxable cash flows. The calculation for tax savings is: 1. summation of interest, depreciation, and repairs, 2. summation of all tax rates as entered in main input screen (federal, state, and social security), 3. gain on sale, 4. summation of federal and state tax rates. The equation, referring to the numbered descriptions, is as follows (#1 * #2 - #3 * #4). In this example, the maximum tax savings is in year 2, saving \$4,837, and the least tax savings is in year 5, saving \$898.

Section 3: Lease Alternative

The lease alternative represents a contract that has a cost for borrowing an item for a set length of time. The input screen for the lease alternative is found below. The input information can be entered where the text is blue. Some of the information may already be entered from the main input screen. If you choose to change any information that may be common to other alternatives, be sure to click on the "Link to Main Input" button. This will update the information on the Main Input screen.

Example: Terry and Kelly Maple Lease a Tractor

Terry and Kelly Maple wish to trade in their old tractor and lease a new tractor for 5 years. The old tractor has been fully depreciated. The lease payments are \$10,000 per year. Terry and Kelly do not pay a security deposit and do not plan on purchasing the leased tractor at the end of the lease agreement.

INPUT		Link to Main Input
Description	John Deere	
Number of acres	1,500 acres	
Lease information		
Years of lease	5 number of years	
Are cash payment on the lease the same in each year?	yes "yes" or "no"	
Cash lease payment per year	\$10,000 \$ per year	
Trade-in information		
Is there a machine trade-in?	no "yes" or "no"	
Security deposit		
Is there a security deposit?	no "yes" or "no"	
Purchase at end of lease		
Purchase at end of lease?	no "yes" or "no"	
End of period information		
Years machine is held	5 number of years	
After-tax discount rate	5.0% rate per year	

In addition to the information collected in the Main Input screen, the required inputs for the Lease alternative includes several yes/no questions. Dependent upon how the question is answered, the user may be prompted for more information. The above input screen displays Terry and Kelly's information.

Reports for the Lease Alternative:

The reports are: 1. **Yearly cash flows and net present value**, 2. **Annualized cash flows** and 3. **Taxable cash flows and tax savings**.

Lease Alternative Report 1:

Based on the input given for the lease alternative, the yearly cash flows and net present value for the tractor are calculated as shown below. The net present value is \$29,486 and the annualized cash flows is \$6,486.

YEARLY CASH FLOWS AND NET PRESENT VALUE

		Net present value	\$29,486	Change Repair Costs		
		Annualized cash flows	\$6,486			
Year	Deposits Trade-in	Cash Lease Payment	Repair & Salvage Costs	Purchase Values	Tax Saving	Net Cash Flow
1		\$10,000			\$3,996	\$6,004
2		\$10,000	\$100		\$4,029	\$6,071
3		\$10,000	\$200		\$3,397	\$6,803
4		\$10,000	\$200		\$3,397	\$6,803
5		\$10,000	\$300		\$3,430	\$6,870

The report shows the annualized cash flows in the following categories: deposits/trade-in, cash lease payment, repair costs, purchase and salvage values, and tax savings. Below is a description of each.

Deposits or Trade-in refers to the amount of equity financing used in acquiring the machine. Terry and Kelly do not pay a security deposit.

Cash lease payment refers to the amount of capital paid per period for leasing an item. Terry and Kelly pay \$10,000 each year.

Repair costs are the estimated repair costs per year. Repair costs may be estimated using an engineering function or the user may specify an average yearly repair cost.

To specify the repair costs, the user must click on the Change Repair Costs button and the screen shown below is displayed. Enter the amount of repair costs for each year under the "Revised Entry" column. A revision to repair costs may cause changes in yearly cash flows and the net present value for this financing alternative. You may decide to either use the costs from the original repair input sheet or to use the revised inputs.

In this example, Terry and Kelly used the default repair costs: \$100 in year 2, \$200 in year 3, \$200 in year 4, and \$300 in year 5.

Year	Repair Sheet	Revised Entry	
1	\$	500	Use Costs from Repair Sheet
2	\$100	100	
3	\$200	0	Use Costs from Revised Entries
4	\$200	0	
5	\$300	0	
			Exit

Purchase and salvage values refer to the value of the machine when it is sold. However, in a lease agreement, the user does not sell the machine at the end because the user never owned it. There is no purchase or salvage value.

Tax Savings represents the tax savings resulting from deposits/trade-in, cash lease payments, and repair costs. Also included in this value are any gains earned when the machine is sold.

Net cash flow is the sum of previous columns. A positive number represents outflows, while a negative number represents inflows.

Lease Alternative Report 2:

The annualized cash flows per year are representative of the cash you spend and save in a year. This report is separated into the categories as seen below. Each category is expressed in a “total per year” and “per acre” basis. To figure the total cash flow, *sum* the deposits/trade-ins, lease payment, and repair costs. From the summation, *subtract* the annualized purchase (sale) and tax savings.

	Total	Per acre
Deposits/Trade-ins	\$0	\$0.00
Lease payments	\$45,460	\$30.31
Repair costs	\$696	\$0.46
Annualized purchase (sale)	\$0	\$0.00
Tax saving	-\$16,670	-\$11.11
Total cash flow	\$29,486	\$30.77

This report tells Terry and Kelly that if they enter into a lease agreement, they have the following cash flow implications to consider: yearly lease payments equaling \$45,460 and yearly repair costs of \$696. The tax savings is \$16,670. Their total cash flow is \$29,486.

Lease Alternative Report 3:

The taxable cash flows are: lease payments, repairs, depreciation, and gain on sale. Each of these cash flows affect taxes differently and are described below.

Year	Taxable Lease Payment	Repairs	Depreciation	Gain on Sale	Tax Saving
1	\$12,000				\$3,996
2	\$12,000	\$100			\$4,029
3	\$10,000	\$200			\$3,397
4	\$10,000	\$200			\$3,397
5	\$10,000	\$300			\$3,430

Taxable Lease Payment is the capital paid for use of machinery. Terry and Kelly pay \$10,000 yearly payments.

Repairs refer to the estimated repair costs per year. Terry and Kelly use the default repair costs.

Depreciation is calculated using a double declining MACRS schedule over a 7-year time span for a tractor. However, in a lease agreement, no depreciation is claimed.

Gain on Sale is the amount of capital received above and beyond the original capital outlay. In a lease agreement, the asset is not owned by Terry and Kelly, so they can not sell it.

Section 4: Rent Alternative

The rent alternative is similar to the lease alternative in that you pay a fee for a borrowed item. However, the rent alternative represents a short amount of time. The input screen for the rent alternative is found below. The input information can be entered where the text is blue. Some of the information may already be entered from the main input screen. If you choose to change any information that may be common to other alternatives, be sure to click on the "[Link to Main Input](#)" button. This will update the information on the Main Input screen.

Example: Terry and Kelly Maple Rent a Tractor

Terry and Kelly found a tractor to rent. The rental rate is \$90 per hour with an expected annual increase of 2% per year. The estimated need is 300 hours per year for 5 years. The yearly repair costs are estimated at \$200 per year.

INPUT		Link to Main Input
Description	John Deere	
Number of acres	1,500 acres	
Yearly repair costs	\$200 \$ per year	
Rental information		
Hours used per year	300 hrs per year	
Rate per hour	\$90 \$ per hour	
Rental costs per in year 1	\$27,000	
Annual increase in rental costs	2% % per year	
End of period information		
Years of rental arrangement	5 number of years	
After-tax discount rate	5.0% rate per year	

In addition to the information collected in the Main Input Menu, the required inputs for the Rent alternative are described below.

Yearly repair costs are the total repair costs incurred per year. Terry and Kelly enter \$200.00.

The **hours used per year** refers to the number of hours the machine is used per year. The machine is rented on a "per hour basis". Terry and Kelly estimate their use of the tractor at 300 hours per year.

Rate per hour is the rental cost paid for each hour of machinery use. The current rate is \$90.00 per hour.

Rental costs in year 1 are automatically calculated while inputs are entered. The rental fees are \$27,000 the first year.

Annual increase in rental costs is the percentage that rental costs will increase each year. Terry and Kelly anticipate a 2% increase each year.

The number of **years of the rental arrangement** should be consistent with the financing alternatives, so to have a more accurate comparison. In this example, Terry and Kelly were approved for financing for a 5-year loan.

Reports Generated for the Rent Alternative:

The reports are: 1. **Yearly cash flows and net present value**, 2. **Annualized cash flows** 3. **Taxable cash flows and tax savings**.

Rent Alternative Report 1:

Based on the input given for the rent alternative, the program calculates yearly cash flows and net present value for the tractor are calculated as shown below. The Net Present Value is \$85,651 and the annualized cash flows is \$18,841.

YEARLY CASH FLOWS AND NET PRESENT VALUE

	Net present value				\$85,651
	Annualized cash flows				\$18,841
	<hr/>				
					Net
	Year	Rental Payment	Repair Costs	Tax Savings	Cash Flow
	1	\$27,000	\$200	\$9,058	\$18,142
	2	\$27,540	\$200	\$9,237	\$18,503
	3	\$28,091	\$200	\$9,421	\$18,870
	4	\$28,653	\$200	\$9,608	\$19,245
	5	\$29,226	\$200	\$9,799	\$19,627

The report shows the annualized cash flows in the following categories: rental payment, repair costs, and tax savings. Below is a description of each.

Rental payment refers to the cost incurred by renting the machinery.

Repair costs are the total repair costs incurred per year. Terry and Kelly have \$200 in repairs each year.

Tax savings represents the tax savings resulting from rental payments and repair costs.

Net cash flow is the sum of the previous columns. A positive number represents outflows, while a negative number represents inflows.

Rent Alternative Report 2:

The annualized cash flows per year are representative of the cash you spend and save in a year. This report is separated into the categories as seen below. Each category is expressed in a "total per year" and "per acre" basis. To figure the total cash flow, *sum* the rental costs and repair costs. From the summation, *subtract* the tax savings.

ANNUALIZED CASH FLOWS

		Total	Per acre
	Rental costs	\$28,048	\$18.70
	Repair costs	\$200	\$0.13
	Tax saving	-\$9,406	-\$6.27
	Total cash flow	\$18,841	\$12.56

This report tells Terry and Kelly that if they rent the tractor, they have the following yearly cash flow implications to consider: rental costs totaling \$28,048 and repair costs equaling \$200. The total cash flow is \$18,841 per year.

Conclusions

Now that Terry and Kelly have entered all of the required inputs into the four financing alternative input sheets, what does it all mean?

To easily compare the four alternatives, click on the “Go to Main” button. This returns you to the Main Input Menu. Scroll down to the third screen “Summary of Alternative”. The Summary of Alternatives is shown below:

	Purchase	Roll-over Purchase	Lease	Rent
Net Present Value ¹	\$27,206	\$27,367	\$29,486	\$85,651
Annualized Cash Flow ¹	\$5,985	\$6,020	\$6,486	\$18,841
End of Horizon				
Value of Machine	\$27,000	\$50,000	\$0	\$0
Loan Balance	\$0	\$45,000	\$0	\$0
Net Value	\$27,000	\$5,000	\$0	\$0
Cash Flows In ² :				
Year 1	\$18,474	\$14,703	\$6,004	\$18,142
Year 2	\$7,256	\$4,684	\$6,071	\$18,503
Year 3	\$8,353	\$4,666	\$6,803	\$18,870
Year 4	\$9,156	\$4,651	\$6,803	\$19,245
Year 5	-\$15,606	-\$875	\$6,870	\$19,627

From this summary, we see the net present value, annualized cash flows, the end of horizon value of the machine and loan balance (when applicable), as well as the cash flows for each year of the analysis.

The financing alternative that is the least cost alternative is the one with the lowest net present value and the lowest annualized cash flows

In this example, the least cost alternative is the “purchase alternative”. Thus, it is recommended that Terry and Kelly purchase a new tractor.