**Question 32- (Fundamentals of Corporate Finance 10th edition) (page340): Agilera Acoustic, Inc. (AAI)-Project Evaluation**

This is an in-depth capital budgeting problem. Probably the easiest OCF calculation for this problem is the bottom up approach, so we will construct an income statement for each year. Beginning with the initial cash flow at time zero, the project will require an investment in equipment. The project will also require an investment in NWC. The initial NWC investment is given, and the subsequent NWC investment will be 15 percent of the increase in the following year’s sales. So, the cash flow required for the project today will be:

|  |  |  |
| --- | --- | --- |
|  | Capital spending | –$21,000,000 |
|  | Initial NWC | –1,600,000 |
|  | Total cash flow | –$22,600,000 |
|  |  |  |

Now we can begin the remaining calculations. Sales figures are given for each year, along with the price per unit. The variable costs per unit are used to calculate total variable costs, and fixed costs are given at $1,500,000 per year. To calculate depreciation each year, we use the initial equipment cost of $21 million, times the appropriate MACRS depreciation each year. The remainder of each income statement is calculated below. Notice at the bottom of the income statement we added back depreciation to get the OCF for each year. The section labeled “Net cash flows” will be discussed below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Year | 1 | 2 | 3 | 4 | 5 |
|  | Ending book value | $17,999,100 | $12,856,200 | $9,183,300 | $6,560,400 | $4,685,100 |
|  |  |  |  |  |  |  |
|  | Sales | $30,780,000 | $35,720,000 | $41,040,000 | $39,140,000 | $31,920,000 |
|  | Variable costs | 21,465,000 | 24,910,000 | 28,620,000 | 27,295,000 | 22,260,000 |
|  | Fixed costs | 1,500,000 | 1,500,000 | 1,500,000 | 1,500,000 | 1,500,000 |
|  | Depreciation | 3,000,900 | 5,142,900 | 3,672,900 | 2,622,900 | 1,875,300 |
|  | EBIT | $4,814,100 | $4,167,100 | $7,247,100 | $7,722,100 | $6,284,700 |
|  | Taxes | 1,684,935 | 1,458,485 | 2,536,485 | 2,702,735 | 2,199,645 |
|  | Net income | $3,129,165 | $2,708,615 | $4,710,615 | $5,019,365 | $4,085,055 |
|  | Depreciation | 3,000,900 | 5,142,900 | 3,672,900 | 2,622,900 | 1,875,300 |
|  | Operating cash flow | $6,130,065 | $7,851,515 | $8,383,515 | $7,642,265 | $5,960,355 |
|  |  |  |  |  |  |  |
|  | *Net cash flows* |  |  |  |  |  |
|  | Operating CF | $6,130,065 | $7,851,515 | $8,383,515 | $7,642,265 | $5,960,355 |
|  | Change in NWC | –741,000 | –798,000 | 285,000 | 1,083,000 | 1,771,000 |
|  | Capital spending | 0 | 0 | 0 | 0 | 4,369,785 |
|  | Total cash flow | $5,389,065 | $7,053,515 | $8,668,515 | $8,725,265 | $12,101,140 |

After we calculate the OCF for each year, we need to account for any other cash flows. The other cash flows in this case are NWC cash flows and capital spending, which is the aftertax salvage of the equipment. The required NWC capital is 15 percent of the increase in sales in the next year. We will work through the NWC cash flow for Year 1. The total NWC in Year 1 will be 15 percent of the sales increase from Year 1 to Year 2, or:

Increase in NWC for Year 1 = .15($35,720,000 – 30,780,000)

Increase in NWC for Year 1 = $741,000

Notice that the NWC cash flow is negative. Since the sales are increasing, we will have to spend more money to increase NWC. In Year 4, the NWC cash flow is positive since sales are declining. And, in Year 5, the NWC cash flow is the recovery of all NWC the company still has in the project.

To calculate the aftertax salvage value, we first need the book value of the equipment. The book value at the end of the five years will be the purchase price, minus the total depreciation. So, the ending book value is:

Ending book value = $21,000,000 – ($3,000,900 + 5,142,900 + 3,672,900 + 2,622,900

+ 1,875,300)

Ending book value = $4,685,100

The market value of the used equipment is 20 percent of the purchase price, or $4.2 million, so the aftertax salvage value will be:

Aftertax salvage value = $4,200,000 + ($4,685,100 – 4,200,000)(.35)

Aftertax salvage value = $4,369,785

The aftertax salvage value is included in the total cash flows are capital spending. Now we have all of the cash flows for the project. The NPV of the project is:

NPV = –$22,600,000 + $5,389,065/1.18 + $7,053,515/1.182 + $8,668,515/1.183

+ $8,725,265/1.184 + $12,101,140/1.185

NPV = $2,098,569.18

And the IRR is:

NPV = 0 = –$22,600,000 + $5,389,065/(1 + IRR) + $7,053,515/(1 + IRR)2

+ $8,668,515/(1 + IRR)3 + $8,725,265/(1 + IRR)4 + $12,101,140/(1 + IRR)5

IRR = 21.54%

We should accept the project.

**Question 36- (Fundamentals of Corporate Finance 10th edition) (page340): Replacement Decision**

*a.* Since the two computers have unequal lives, the correct method to analyze the decision is the EAC. We will begin with the EAC of the new computer. Using the depreciation tax shield approach, the OCF for the new computer system is:

OCF = ($290,000)(1 – .38) + ($1,560,000 / 5)(.38) = $298,360

Notice that the costs are positive, which represents a cash inflow. The costs are positive in this case since the new computer will generate a cost savings. The only initial cash flow for the new computer is its cost of $780,000. We next need to calculate the aftertax salvage value, which is:

Aftertax salvage value = $300,000(1 – .38) = $186,000

Now we can calculate the NPV of the new computer as:

NPV = –$1,560,000 + $298,360(PVIFA12%,5) + $186,000 / 1.125

NPV = –$378,937.58

And the EAC of the new computer is:

EAC = –$378,937.58 / (PVIFA12%,5) = –$105,120.97

Analyzing the old computer, the only OCF is the depreciation tax shield, so:

OCF = $260,000(.38) = $98,800

The initial cost of the old computer is a little trickier. You might assume that since we already own the old computer there is no initial cost, but we can sell the old computer, so there is an opportunity cost. We need to account for this opportunity cost. To do so, we will calculate the aftertax salvage value of the old computer today. We need the book value of the old computer to do so. The book value is not given directly, but we are told that the old computer has depreciation of $260,000 per year for the next three years, so we can assume the book value is the total amount of depreciation over the remaining life of the system, or $780,000. So, the aftertax salvage value of the old computer is:

Aftertax salvage value = $420,000 + ($780,000 – 420,000)(.38) = $556,800

This is the initial cost of the old computer system today because we are forgoing the opportunity to sell it today. We next need to calculate the aftertax salvage value of the computer system in two years since we are “buying” it today. The aftertax salvage value in two years is:

Aftertax salvage value = $120,000 + ($260,000 – 120,000)(.38) = $173,200

Now we can calculate the NPV of the old computer as:

NPV = –$556,800 + $98,800 / 1.12 + ($98,800 + 173,200) / 1.122

NPV = –$251,748.98

And the EAC of the old computer is:

EAC = –$251,748.98 / (PVIFA12%,2) = –$148,959.40

Even if we are going to replace the system in two years no matter what our decision today, we should replace it today since the EAC is more positive.

*b.*  If we are only concerned with whether or not to replace the machine now, and are not worrying about what will happen in two years, the correct analysis is NPV. To calculate the NPV of the decision on the computer system now, we need the difference in the total cash flows of the old computer system and the new computer system. From our previous calculations, we can say the cash flows for each computer system are:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *t* | New computer | Old computer | Difference |
|  | 0 | –$1,560,000 | –$556,800 | –$1,003,200 |
|  | 1 | 298,360 | 98,800 | 199,560 |
|  | 2 | 298,360 | 272,000 | 26,360 |
|  | 3 | 298,360 | 0 | 298,360 |
|  | 4 | 298,360 | 0 | 298,360 |
|  | 5 | 484,360 | 0 | 484,360 |

Since we are only concerned with marginal cash flows, the cash flows of the decision to replace the old computer system with the new computer system are the differential cash flows. The NPV of the decision to replace, ignoring what will happen in two years is:

NPV = –$1,003,200 + $199,560/1.12 + $26,360/1.122 + $298,360/1.143 + $298,360/1.144

+ $484,360/1.145

NPV = –$127,188.60

If we are not concerned with what will happen in two years, we should not replace the old computer system.