OK, class, welcome back. We are going to do our tutorial on the capital budgeting module. And we've got two worksheets that we're going to look at today. We have a capital budgeting worksheet. And then we have capital budgeting with the same projects, only we're going to be using the MACRS depreciation. And we can compare the two and see what kind of difference that the accelerated depreciation of MACRS has on our projects.

So some things to think about as we get started here. We're going to need the weighted average cost of capital, which is provided to us when we do a project like this. This would come from either your CFO's office, or your general accounting, or possibly the budgeting office. In the case of the projects that we're working on, we're using 9% cost of capital.

And again, this is the weighted average cost of capital. So this is what it cost this organization to borrow money on average between the debt that they have, the equity that they have, any bank loans that they have taken out. All the average of that, this is what it costs them for a project.

We're going to look at sunk cost. And what we need to do is determine if any of these construction costs or related expenses are sunk cost. And if they were, then they would not belong in here. Which means that we would have taken those costs on before this project, and we would have incurred those costs regardless if we did this project or not. So that's something we have to look at.

There's this thing called the cannibalization effect. And you'll see in the case that you have-- that's coming up, that's due during this section-- there is a part of that where you need to look at and determine if there is this cannibalization. And what that means is that that is-- if we take on one of these projects, how does it affect the other business units. And that is, will other units lose business based upon us taking on this project? And if that's the case, then it needs to get worked into our cash flow estimations here.

And then, ultimately, we're going to decide if we're going to accept or reject these projects. That's what we're doing here. We're lining all of these projects up, and we're trying to determine if they're providing positive cash flows. And based upon the way that we're going to assess these, should these projects be accepted, or should we reject them.

It's a big decision within the financial management of an organization to determine what capital projects are taken on, and which ones are set aside. So this is kind of an exciting methodology that we use here for doing the assessments. And it's an important part that is part of the financial managements team.

We talked about it accelerated depreciation. When we get into this on the second page here, I'll show you how

that's calculated. We're starting off with straight line depreciation here. So you can see that each year is the same. In this case, it's $399,000 is what we're depreciating.

And then we need to know the reinvestment rate. And again that's something that our CFOs office would be able to tell us. And when we get down here to this modified internal rate of return, I'll explain to you how that reinvestment rate works, and how we go about interpreting that as well.

So to start with, one of the bigger tasks that we have are determining what these cash flows are going to be related to that a project. So we'll use this as an example. So we're looking at this orthopedic surgery unit here. In year zero, these negative cash outflows that you see here are the cost of the project.

This is what we're estimating as the cost of this project between the construction cost and any related cost that's related to starting this project should be incorporated in here, OK? This is the cost of it. And it comes through as a negative cash outflow. This is what it's costing us to get started.

And then what we need to do is we need to determine what are these positive cash flows from each of these years that are going to be produced from this project. And that's what we're doing here, OK? We need we need good, solid projections and estimations on what these are going to be.

And this could come from historical data, from projects that we've done that were similar in the past. It's going to come from a marketing analysis. It could come from the supplier of the piece of equipment that we're getting. They may be able to give us an idea of what kind of cash revenue flows that we're going to receive.

But again, there's revenues associated with those. Expenses as well. And then our operating income, and any taxes, and all of that.

There is one kind of unique thing that's related to working with capital budgeting problems, and that is we don't use what we call net income to determine our cash flows. We use a net cash flow approach. And this is more of a financial function than it is accounting. Accounting uses net income for most assessments. In finance, we use cash flows.

And the difference is, is these non-cash expenses that get added back in. And the primary one as depreciation. So if you see here, depreciation comes through as an expense. And effectively it reduces our tax rate, is what it does.

We add it in as an expense. And then we turn around in and get the tax benefit of reducing our taxes because of that expense, and then adding that depreciation non-cash expense back into our cash flow. So you see that same entry that's here as an expense, we add that back as a positive cash flow to force our bottom net cash flow entry

here. So it's our net income plus this depreciation equals this net cash flow for this.

We've already learned in our time value of money analysis that it's important to move these positive cash flows to the front. Any of these that can be moved to the front help the cause of our project, because we're going to be using time value of money analysis to determine whether or not these projects are going to be accepted or not. So, effectively, that's what the MACRS depreciation does, is it increases our depreciation in the early years. We're able to add that back in and get the tax benefit, which loads these positive cash flows up front for us.

There's a terminal cash flow at the end, which we normally call net salvage value. In this case here, in this problem, it's $510,000. And that's what we believe we're going to be able to sell this equipment and sell land or whatever associated with this project off at the end of the project, OK? That's an important number, because we need that to calculate our depreciation, too.

So if you look at our depreciation formula, we're taking the cash outflow, or the cost of the project, and we're subtracting the estimated net salvage value. And then we're dividing that difference by the number of years in the project. And effectively, that's what's happening through this calculation here.

So if you think of this when we do the calculation, we convert this over to a positive number. So we take this $2,500,000, we subtract $510,000, we get approximately $2 million. And then we divide that by 5. That's how we ended up with this 3, and that's how we calculate our straight line depreciation.

If our salvage value stays, if that's a good estimation, and that's what we're able to sell this equipment at the end, then there's no tax consequences. But if our book value differentiates from our net salvage value, then potentially there is going to be a tax consequence on the salvaged equipment. And this is the formula that we use to calculate that.

And that will become more apparent. And I'll go over that a little bit more when we get over here to the MACRS. Because it actually does come into play, because our salvage value normally never equals what our book value is at the end when we're using the MACRS depreciation.

So the idea here is we've got-- in this case, we're evaluating three different projects. And when companies evaluate capital budgeting projects, they have limited resources. So what they're looking for is they're looking for the projects that are going to return the most positive either NPV, Net Present Value, internal rate of return, which is the return on investment, or the modified internal rate of return, which I'm going to show you how to go ahead and calculate that as well.

But they're looking for the investments that they're going to have the most positive return. And we have a systematic way of going in and evaluating these projects. And we're going to start that now.

For this first one, let's take a look at this. So we're going to calculate the net present value, the internal rate of return, and the modified internal rate of return for this information right here, this orthopedic surgery unit. And it's easy to do these calculations. It's just knowing what information you need to capture to go ahead and do your analysis.

So again, we're going back to our formula bar, and we're going back to the financial functions. And for the first one, we're going to use net present value. And we've done this. We did this calculation in our time value of money analysis. We're going to look at it again here.

So the rate, in this case, is this 9% cost of capital. And the cash flows that we're going to capture are year 1, year 2, 3, 4, and 5. And there's one additional step to this project.

So right now, we're seeing the net present value is $2,611,250. That's not correct. We still have to take into account this cash outflow that took place in year 0. So we need to add that negative entry back into this.

So for this case here, we're saying that the net present value is $106,250. Now, the way that we interpret this is, for the net present value, any positive entry above 0 is a project that we would accept, OK? Because we've taken into account our cost of capital, this 9%.

And we've taken into account all of the additional expenses that are associated with taking this project on. The startup of the project, and then all of the expenses to run this. And coupled those with the revenues that are being provided. So the expenses are taken care of on this. And any positive entry, any entry that comes through as positive, is one that we would consider to accept.

Now, we're going to compare these projects against other ones. And since an organization only has a limited amount of capital, they're going to want to take on the ones that meet their mission, and they're going to want to take on the ones that produce the highest return for them. So that's one way of assessing this project.

There's another way, too. And I think these next two are more beneficial and have more impact. And I'll tell you why in just a second.

So the next method that we're going to use is called the internal rate of return, or the IRR. And we got that under the Function key as well. And this one is as easy as just taking and covering all of these cash flows, the negative and the positive ones. And when you hit OK, takes into account when these come in, and how many of these cash flows as well. And when we do that calculation, we get an output of 10.66%.

And the way that we interpret this is, any entry above the cost of capital is a project that we would consider. So

this is 10.66% return on our investment for this capital investment here. Because it's about the 9%, this is a project that we would consider accepting.

There's an assumption, though, that happens in and in these capital budgeting under the internal rate of return. And that is that each one of these cash flows, as we receive them, we're able to turn around and reinvest those dollars that we received at the same 10.66%. That may not be a good assumption.

So this particular investment's returning 10.66%. As we receive these cash flows, the question is, can we turn around and reinvest those at that same 10.66%. That may not be the case, and this modified internal rate of return takes that into account.

In this case here, we're saying, OK, we're going to receive this 10.66%, but we're only going to be able to reinvest these at 6%. Because once we get those cash flows, we're going to be potentially more conservative with those, more frugal. they're going to maybe go into a bank account. They're not going to be able to be reinvested at that same rate. We think we can only get 6% for those. So that's what this modified internal rate of return takes into account.

And this one also is under the financial functions. We cover the values in this one again. It asks for the financing rate, which is 9%. And it asks for the reinvestment rate, which is 6%.

Now, in this case, we get a modified internal rate of return of 8.56%. And our interpretation is the same. It has to exceed the cost of capital before we would consider taking on this project. This one doesn't, and it was kind of a giveaway on this project how close the net present value is.

We have an investment that's costing us $2.5 million and has a return of only $106,000, and an internal rate of return of 10.66%. It's above the cost of capital. But when we factor in the reinvestment rate, it doesn't meet that threshold.

In my estimation, this is the best assessment tool that we have, is this modified internal rate of return. If this is something that can be factored by our organization, then we should use that. And we should use the modified interest rate of return to value our projects. So in this case here, this would be a project that we would consider not taking on, based upon that 8.56% modified internal rate of return.

So let's take a look at the next project. And we're going to work through this one as well. And this one is-- interestingly, it's a lot smaller project. It's only $863,000 cash outlay, and then this stream of cash flows that come behind it. But let's see how we do on this one as we work our way through the tools that we have.

So let's use our net present value, and against this 9%. And we're going to capture each of these cash flows. And

we get a return of 934. But remember, we have one more step in this calculation, and that is to add in this negative cash outflow that we started with. We find that our net present value is $71,000.

But remember, we're kind of comparing this also to what it cost us to do this project. So up here in this one, we had a net present value of $106,000. But the project was $2.5 million. This one's a much smaller project and a little bit smaller net present value. So let's see what our internal rate of return tells us on this. And again, it's just covering those.

Now, this one has a 12% internal rate of return on it, which is good. It's positive. It's well above the 9% threshold that we need. And let's take a look at our modified internal rate of return.

So again, it's these same cash flows with a finance rate of 9%, and a reinvestment rate of 6%. And we get an entry now that is up above the 9% threshold. So definitely a capital investment that we would we would consider taking on.

And this last capital project that we're going to look at is the rehabilitation center. And this project is a $1.5 million project with these cash flows that are following. And we'll go through these same steps again with the net present value.

And we're going to add back in our cash outflow. And we get a pretty positive net present value on this one of $349,000 in net present value, and an internal rate of return on this project of 16.47%. So that is a really positive internal rate of return that well exceeds this cost of capital here.

Our modified internal rate of return for this project is 12.45%, which is well up to 9%. Even with this relatively low reinvestment rate, this looks like a really good project. If we were to rate these projects, so we're going to rate this rehab center our first or our best opportunity. The new laser center would be our second. And then the orthopedic unit would be our third and most likely rejected, because it didn't meet the threshold on the MIRR.

OK, so each of these projects, again, though, we're using the straight line depreciation. 148 on this project. This project here, the depreciation was 246 for each year. So we're going to evaluate these same projects, but we're going to use the accelerated method of depreciation. We can see if it makes an impact. And it may be that this project that we rejected more than meets that threshold under the accelerated method, but we'll have to see when we do that.

So in this these same projects now, same cash flows, or same cost of the project, and the cash flows are going to change. They're going to change the sequence of them, although in total, they're going to be the same. So what you're going to see is you're going to see these positive cash flows move up to the front to the early years, which is what happens.

Now the MACRS, for a five-year project, uses these parameters here. 20% in the first year is depreciated. 32% the second year. 19.2% the third. 11.52% in fourth and fifth. And then, if there is a sixth year, it's 5.76%.

But you can see that the amounts here are much higher in these early years. And because we add those back in, this depreciation back into our cash flow, and we get the tax benefit early on in these projects, and these are already done I see. So we've already calculated these. Let's compare what we had on the first one to what we had on the second.

So for this first project under the MACRS, it's 149. And under the first project, it was 160,000. And our internal rate of return was better on this one as well. Still not enough to get us over the hump, though. We bumped it to 8.81 over 8.56%, but not quite enough.

These calculations, by the way, are exactly the same as what we did on this. The difference here are the changes that we made in our depreciation. And there's also a tax consequence here. So I want to talk a little bit about how this works.

So when we sum all the depreciation for this, we get a depreciation number or amount of $2,360,000. The way that we figure or our current book value the cost of the project less what it's been depreciated, OK? So $2,505,000 less this $2,360,000 is the book value.

Well, that book value is less than the salvage value. So what we're looking at here is about $140,000. $145,000, approximately. That $145,000 is less than what the current salvage value. The difference between the salvage value and that-- let's just calculate it here. We have to multiply this times negative 1.

The difference between this salvage value and this book value is taxable income. And that's what this calculation here does. OK? In other words, we can do the same thing. Let's do it out here.

If we said the salvage value minus the current book value, and then multiply times the corporate tax rate is 146, 284 for the same entry that we got right here. That's what this calculation is doing. We're subject to that tax because our current book value is less than what we're selling this equipment off at the end of this project. So we have to pay that tax.

This is what balances out our equation. This sum here of these net cash flows equal exactly what it is on our straight line depreciation method as well. It's just what's happened is we've moved all of these more positive cash flows to the front end of this project so that they have more time to work with our project here.

In each of the cases here, you go through these entries, they're going to be better than they were on the straight

line depreciation. Each of these entries are slightly better than what they were using the straight line method. And the federal government is interested in giving us this opportunity to use this so that additional projects are accepted. And it enhances the economy.

They give this tax benefit because they know that if companies use this type of methodology to calculate their depreciation, that more projects will be accepted under this MACRS depreciation than what they would be under the straight line depreciation methodology. And that's why they allow for that.

So again, our assessment for each one of these projects is to determine if they should be accepted or rejected. And we have these three tools to do that, with this last one being the best of the three. If you have the information for the reinvestment rate, this is the best tool. This provides us with our return on investment.

The net present value gives us our output in dollars, but it doesn't take into account the overall size of the project. We could have a really large project that produced a positive net present value. But we could have another project that is much smaller, that doesn't take nearly as much capital, that may produce something that is very close to that.

The internal rate of return and the modified internal rate of return takes those into account, the difference in the size of projects. And that's why they're a superior methodology to evaluating projects.

This concludes our capital budgeting tutorial. You're going to have a similar exercise within your case study. So you want to be sure that you know how to make these calculations and interpret these cash flows, and the cash outflows, and these various subjects that are related to capital budgeting here in both the sunk cost and cannibalization cost and opportunity cost, and the accelerated depreciation method as well.

So that concludes this tutorial on capital budgeting. And we'll have one more for module 7 and the financial ratio analysis.