

The power of SAP Production Planning

- [Instructor] SAP production planning is a robust logistics module that can look into the future to predict customer demand. Then, working backwards, this module makes sure we have the materials and the capacity needed to manufacture and meet that demand. Production planning's tight integration with other SAP modules lets data flow smoothly from one area to another. Because of this capability, we can look at real time information about our materials, our orders, and our manufacturing capacity. And we can adjust on the fly. Hello there, I'm Justin Valley. I have over 14 years experience training SAP at manufacturing companies all over the world. I created this course specifically for people who use SAP, ERP at work, or anyone who wants to better understand how production planning, transactions, and reports work across the software. We'll start with an overview and cover the different production types that companies use. Then, we'll dive into the master data components and create routings, work centers, and bill of materials directly in the system. Next, we'll explore the planning phase to cover concepts like material requirements planning and capacity planning. And finally, we'll look at the processes and transactions necessary for production execution. Now, join me to level up your knowledge of SAP production planning.

What you should know

- [Instructor] If you want to better understand the processes and transactions in the SAP production planning module this course is for you. Because we will look at production planning processes, transactions and reports in this course. It's important to understand the fundamentals covered in my previous course, SAP ERP Essential Training. Generally understanding how SAP ERP works will help you get the most from this course. Basic SAP navigation and reporting skills will ensure you know what's happening on the screen and ensure you get the most out of your time spent. The transactions and reports demonstrated in this course are done in the GUI of SAP S/4HANA 1709.

SAP Production Planning module overview

- [Narrator] The SAP production planning module is crucial to manufacturing businesses. Known as SAP PP, this module quite literally enables effective planning and the execution of production. In what was once a seldom heard about business area, the supply chain is becoming sexy. Consumers want their products faster and faster. In production planning in SAP is a module that helps meet those demands. So why is SAP production planning so useful and important to manufacturing companies? First, PP is the SAP module that's responsible for lining up the demand for a product with a

company's manufacturing capacity. PP also synchronizes demand with procurement schedules to make sure we have all the materials necessary so production can take place. Production planning is the backend that powers these crucial logistics processes. Major examples of these processes are : material requirements planning, or MRP, which ensures we have the right materials at the right place at the right time for production. And capacity planning, which ensures that our work centers, where the manufacturing gets done, are producing at optimal levels. Next, production planning integrates or talks with other SAP modules, extremely effectively. Production planning integrates with sales and distribution, materials management, human capital management, and financial accounting, and controlling, to name only a few. These integrations ensure the data stays consistent across departments and the production planning process can be as efficient as possible. Because of these integrations, employees across many departments benefit from production planning. Specifically, the material requirements planning controllers, the capacity planners and the production schedulers work directly in this module to ensure each planning cycle aligns to meet the forecasted demand. SAP PP has the ability to handle businesses that have different production types. First, production planning can handle repetitive manufacturing models. This is where the manufactured products are less complex and they tend to stay the same over a long period of time. Next, production planning supports discrete production models. Businesses using discrete production models tend to use order based production where the product is customized or changed frequently. Finally, PP can support process-based manufacturing. Process Manufacturing is a recipe oriented form of production. Process Manufacturing is often used for chemicals or pharmaceuticals. Now, let's take a look at the production planning process flow. It's important to note that the process flow can vary greatly depending on a company's production type. But in general, the production planning process starts with forecasting demand. Demand can be determined using historical data in our system. Maybe we need to produce more for an upcoming holiday season. The demand forecast could also come from sales orders in the system with delivery dates that need to be met. The forecast is used to create a sales plan. Then, the sales plan is analyzed and takes into account factors like manufacturing capacity and lead time to buy our needed materials. Next, a production plan is created and reworked. Once this schedule is finalized, the necessary materials are bought from suppliers. Then all the planning pays off and production is actually executed. During production execution, checks for quality will be done to make sure our products are up to snuff and we won't have to deal with many customer complaints or returns. Finally, our finished products are sold to our customers and the products are delivered. All of this new sales data goes back to feed our demand forecasts, so they can be even more accurate in the future. As in most processes in SAP, we have robust reporting available to us at each step of the way. SAP production planning processes can be simple and straightforward or they can be quite complex. In the end though, the PP module is implemented to enable streamlined planning and production for any manufacturing businesses using SAP.

Production types in SAP Production Planning

- [Instructor] There are so many different products in our world today. The way these products are manufactured is also unique. The SAP production planning module is generally configured to support three production types, repetitive manufacturing, discrete manufacturing, and process manufacturing. Let's take a deeper look at these production types and when companies would choose to use them. We'll start with repetitive manufacturing. Repetitive manufacturing is the production type used by businesses making large quantities of relatively simple products. We're talking high volume production runs. The products being manufactured are also quite stable, meaning they won't be changed for long periods of time. With repetitive manufacturing, production also tends to be stable with quantities being made at fairly uniform levels over the longterm. Some examples of products include hardware, like nails or screws or office supplies, like pens or paper. Again, simple goods that aren't changing. Repetitive manufacturing and SAP can support make to order products. Meaning that a company can produce when a customer actually makes an order and a sales order is created in the system. The products are manufactured to fill that order. Typically though, repetitive manufacturing will be used for make to stock products, where production doesn't depend on orders from customers. Make to stock products, rely on SAP's demand management, which uses historical data to help companies forecast how much of something should be produced to meet anticipated demand. Next, let's look deeper at the discrete manufacturing production type in SAP. Discrete manufacturing, like its name implies, is where the goods that are being produced are separate and distinct. In discrete manufacturing, the products are more complex and they can change frequently. Because of this fewer products are manufactured at a time. Like what is being built, demand for these products also tends to be less regular. Examples of goods that are created using discrete manufacturing include high-tech goods like computer chips. It's also used by automobile and aerospace companies to satisfy the complex demands of those industries. Discrete manufacturing uses semi-finished goods effectively. This means that oftentimes smaller pieces of finished products will be created and then put in storage for future use. The discrete manufacturing process is triggered by production orders in SAP. A production order tells the manufacturing department that we need a certain quantity of a product made in a specific timeframe. Finally, we'll talk about process manufacturing as a production type. Process manufacturing is unique because it requires following a recipe or a formula that utilizes raw materials. And these products are created in batches. A good way to recognize products that have been made using process manufacturing is that once it's been produced, it cannot easily be disassembled into the materials used to make it. Often they'll be in a liquid form. Examples of goods produced using process manufacturing include foods or beverages, plastics, oil, pharmaceuticals, or cosmetics. Process manufacturing can be continuous, which means the production line runs consistently. It can be discontinuous, which means that the process is broken up and components are measured for each step. Or it can be regulated. Regulated production is often used with

pharmaceuticals when quantities need to be exact to meet strict requirements. Process manufacturing is initiated by process orders in SAP. Process orders are similar to production orders in that they specify quantity required and the date which production should meet, but they also have more functionality that allows production to be accomplished in more phases. For manufacturing companies implementing SAP production planning, one of the first decisions they need to make is which production type they're going to choose. The production type dictates how the manufacturing planning and execution are going to be accomplished.

SAP Production Planning module integration

- [Salesman] One of the biggest reasons companies spend the time and money to implement SAP is how well the modules integrate with one another. The flow of data between modules ensures data consistency. It cuts down on work, and most importantly, it prevents separate silos from forming within a company. Production planning has many beneficial integrations. Let's take a look at some of the most impactful. First we'll look at how production planning integrates with SAP materials management, or SAPMM. This integration is crucial at manufacturing organizations, because these two modules work in tandem to ensure the right materials are available for production. This integration leans heavily on the material requirements planning process. Once the product has been manufactured and is classified as a finished product, it is then entered in an inventory, which is again handled by the materials management module, and made available for sales. The next integration we want to look at is with another logistics module, SAP sales and distribution, or SAPSD. SD integrates with production planning to allow for availability checks, which make sure your product will be manufactured in time to meet the requirements of an order. In SAP, this is often referred to as MTO, or made to order production. That means that we don't produce anything until our customer actually makes that order. The next integration we'll cover is production planning and quality management, or QM. QM works with PP by handling quality checks for both procurement and production. We can inspect raw materials that have been purchased from outside suppliers, and conduct inspections on our work in progress materials, as well as on our finished goods. The more complex the good being manufactured, the more robust our quality checks will be. Next. Production planning integrates with plant maintenance, or PM. Plant maintenance ensures we keep our plants, and our equipment, in optimum condition. This integration point coordinates the maintenance schedules with production schedules to accomplish required maintenance without hurting a manufacturing capacity at our work centers. Finally, production planning, like most SAP modules, integrates tightly with the financial accounting and controlling modules, commonly referred to as FICO. This integration facilitates pricing updates for materials, and recording posting account activities for things like goods' movements. It also enables a key feature we'll dive into next called product costing. Product costing, in simple terms, is how much does it cost for us to manufacture a product? Product costing works in SAP because of the tight integration of

production planning with the controlling module and the materials management module. It measures our total cost of goods manufactured, and total cost of goods sold. Product costing shows managers the details on how much it takes to actually create a unit of a product. It allows insights to possibly cut expenses from direct costs. Maybe there's an opportunity to find a cheaper raw material. It can also help us minimize indirect costs. Maybe we can negotiate cheaper rent for a factory. These findings also indirectly help companies increase profitability. This costing information helps decision makers set prices, and build in profit margins for the products a company sells. All these robust module integrations are what make SAP ERP, and specifically the production planning module, a crucial tool at manufacturing companies.

SAP Production Planning organizational structure

- [Instructor] Like all SAP Modules, production planning depends on a solid organizational structure. The organizational structure ensures that all legal requirements are satisfied. It's also the basis for reporting in SAP. So it's really important that this is thoughtfully configured when companies begin using the system. The production planning organizational structure has three crucial components. The first organizational unit we'll look at is adopted from the financial accounting module. And it's called Company code. Company code is an independent legal entity. Profit and loss statements, as well as balance sheets are maintained at the Company code level. Company codes link SAP financial accounting with the other modules. Next up we have Plants, a Plant handles planning, purchasing, production, and the distribution of goods to customers. Organizations have some flexibility on how they use Plants. And depending on a company's needs, a Plant can be used as a manufacturing facility, an office, or a distribution center. A Plant can only be part of one Company code, but a Company code may have multiple plants. Next, we have storage locations. Storage locations quite literally are the physical storage locations where stock is kept within a plant. Storage locations may be used to store many things, including raw materials, semi-finished goods, finished products, or returns. Again, each Plant may have multiple Storage locations, but a Storage location can only be assigned to one plant. Let's take a look at how these organizational units all fit together in an example. This is an example of an organizational structure that enables production planning and other logistics processes. At the top level, we have Company code, which is defined in the financial accounting module. The Company code we're working in is 1710. From the Company code, we have two Plants, 1700 and 1710, and within each Plant, we have multiple storage locations. At Plant 1700, we have storage location 170A, which may be for raw materials, 170B, which may be for finished goods. And 170C, which could be for returns. At Plant 1710, we have storage location, 171A and 171B, which may be for raw materials and finished goods respectively. The organizational structure can be set up to suit an organization's needs. Once the structure is defined, the base is set for all production planning transactions to be executed and then reported on.

Production Planning master data overview

- [Instructor] In SAP, transactions just don't work without accurate master data. SAP's production planning is no exception. Let's examine the different master data elements used in the production planning module. The first component of PP master data we'll examine is the material master record. The material master is created in the materials management module, but it's incredibly important to all our business processes executed in production planning. Material masters are the sole information source about materials that are procured, produced, stored, or sold. There are different material types in SAP, which are denoted in our material master. We use finished goods or semi-finished goods for the materials we're manufacturing. Another important material type is our raw materials. Raw materials will be used in the manufacturing planning and execution phases to create our finished and semi-finished goods. If we were manufacturing number two pencils, some of our raw materials would be cedarwood, graphite and yellow paint. And our finished goods could be a pack of 10 yellow number two pencils. The material master in SAP has many views. Each of these views groups fields of information that are important to different parts of the business. In production planning, we're very interested in the views that house information, like the material requirements planning, or MRP views, and the work scheduling views. Next, let's talk about the bill of materials, or BOM. The bill of materials is the list of all the components and the quantity of those components necessary to produce the good. Going back to our pencil example, the bill of materials for a pack of 10 pencils could include 10 six-inch wood cylinders and 10 four-inch graphite pieces, plus a half an ounce of yellow paint. It would also include anything else that may be used to produce the pencils, like packaging materials. Next, we'll talk about routings. The routing is the sequence of operations or instructions that will take our raw materials and produce our finished goods. Routings for material can contain a number of operations. In our simplistic pencil example, our routings would be to cut the wood, cut the graphite, fill the wood with the graphite and then paint the pencils yellow. If the bill of materials is our ingredients list, the routings are the instruction steps to make the recipe, or in this case, manufacture the product. Next up, let's look at work centers. Work centers are very literally where the production work gets accomplished. A work center is flexible in that it can be a person physically performing the work, or it can be machines, or it can even be a production facility. We want to think of work centers as a place where we add value to something being produced. In our pencil example, we can have a work center that cuts the wood to size, a different work center that cuts the graphite, a different work center that paints the pencils, and so on. Finally, let's look at production versions. Production versions determined the specific way that a good is to be produced. In more complex industries, there can be multiple bill of materials and multiple routings. The production version marries a bill of materials with a specific routing or routings to denote that product version. In our pencil example, if we wanted to paint the wood before filling it with graphite, this would have a different production version than if we wanted to fill the wood

with graphite first and then paint it. Each of these master data components are the building blocks to effectively transact in production planning. Having accurate master data is critical to an effective and cost efficient supply chain.

Create a material master: MM01

- [Instructor] Manufacturing in SAP relies on well-defined master data. Now, let's take a look at the importance of material master records for production planning. Material masters are created for any products the company will want to keep in inventory. For example, they can be created for raw materials, packaging materials, semi-finished goods, or the finished products that will be sold to our customers. Material masters are typically set up by the departments that focus on the materials management module in SAP, but there are certain views in certain fields that are critical for the production planning processes to take place. We're going to create a material master for a finished product, and we'll look specifically at the important views in the fields from a production planning perspective. To create a material in our system we'll use transaction code MM01 and press enter. The first field we have available is material. We're going to leave this blank and allow the system to assign a material number for us. Next, under material type we'll select finished product. Our material type is going to dictate the views we have available to edit. We'll press enter and now we can select our views. We'll choose basic data one, sales org data two, MRP one, MRP two, MRP three, MRP four, and finally work scheduling. Next we'll click organizational levels. We want to extend this material to a plant as we create it. So we'll enter Plant 1710, and press continue. We can see that our material has been assigned a number by the system. It's material number two, three, four. Next, we need to enter our descriptions. We're creating a pack of pencils so we'll call this pack of pencils. Next, we need to enter our basic unit of measure. We'll sell these packages as eaches so we'll enter EA in this field. Now we'll press enter to move to the next view. This brings us to sales organization two view. Here, we need to enter our general item category group. Let's look at our options by clicking the match code button. We're creating a standard item so we want to select norm, we'll press enter again to move to MRP one view. MRP stands for material requirements planning. In this view, the first field we want to look at is MRP type. This field is crucial because here we're telling the system generally how we want to plan for this material. Let's look at our options. We'll choose option PD forecast consumption, no planning time fence. We're choosing PD because it takes into account all incoming sales orders and any stock transfer requirements, and then plans based on that information. Basically, this setting is telling the system, look at all of our upcoming needs and to plan to meet the requirements. As we can see, there are many options here. Alternatively, we could set this up based on our historical sales data. We'll scroll down and next we'll look at the MRP controller field. The MRP controller is responsible for ensuring we have all the right materials at the right time to meet the needs of the business. We'll choose MRP controller 001. Next we'll look at lot sizing procedure field. Lot sizing helps specify the quantity that should be proposed by the system when it

sees a shortage. Let's look at our lot sizing procedure options. We'll use EX, which is an exact match lot for lot order quantity. That means if this system sees we'll be 10 units short, it'll propose exactly 10 more to meet that demand. Now we'll press enter. This takes us to the MRP two view. Here, we'll look at the procurement type field. This is how our material is procured. We'll look at our options by clicking the match code button. We can see that we could choose that our material can be produced in-house, bought externally, or both. We'll change this to E for in-house production. Now we'll scroll down to the scheduling area. In scheduling, we'll look at the in-house production field. This is the number of days required to produce the material. This is based on workdays specified in the factory calendar. We're going to say, once we initiate the process, it's going to take one Workday to produce our pack of pencils. Now we'll press enter to advance the MRP three screen. In the MRP three screen, we will look at the strategy group field. To do this, we'll click the magical button and look at our options. The planning strategy is a really important field for the demand management side of our production planning because it denotes whether we have a make to stock, a make to order or a different kind of material. Again, we'll click the magical button in our strategy group field, and we'll choose make to stock. Make to stock is when we're making a product so we can put it in inventory and then sell it to customers as needed. Make to order is when we manufacturer specifically to meet our sales orders. Now we'll click the check mark to adopt this. We'll again press enter and we advanced to the MRP four screen. An important field on our MRP four view is the component scrap percentage field. When producing some products, some of the components may become scrap. In that case, we have to order more material. This is the field where we tell the system that percentage. We're going to keep it simple, and we're not going to enter any scrap here. We'll scroll down and look at the repetitive manufacturing area. If this was a product using repetitive manufacturing, we would click the check box and enter a profile here. Now we'll press enter and that brings us to our work scheduling view. This view controls production orders and how they're executed. We can designate our storage location after we produced the finished goods. We'll do that in a production storage location field. We'll choose storage location 171A. The serial number profile field allows us to let the system know this material should have a serial number associated. We're now ready to save our material. To do this, we'll click save in the bottom right corner. We can see that our material 234 has been created in the system. This material master is available across many modules of SAP, and we're now able to use this finished product in our production planning business processes.

Create a bill of materials: CS01

- [Instructor] An integral master data element to production planning is the bill of materials, often referred to as the BOM. The bill of materials is the list of every component and the quantity of those components necessary to produce a good. If we were looking at a recipe to cook something, the bill of materials would be equivalent to the ingredients list of the recipe. The bill of materials is used in SAP for material requirements

planning. It helps the system make proposals for ordering the right components for production. Once a finished good is produced, the BOM is also used by the system to measure consumption. Finally, the bill of materials holds key information for product costing to help determine how much it costs to produce each good. Let's create a bill of materials in the system now using transaction code CS01, and pressing Enter. We're going to create the BOM for our pack of pencils, which is a finished product. First, we need to enter the material number. Our material master must already be present in the system. We'll enter material 234. Next, in our plant field, we'll enter plant 1710. Now we'll click into our BOM usage field and click the match code button to see our options. Because we want to actually produce a finished good, we'll choose one for production. The valid from shows us our date from which we can start using this bill of materials. We'll leave this defaulted as today, but we could set this date in the future if needed. Now we'll press Enter. The system takes us to our general item overview screen. This is where we add the list of components and how much of each component to add to our bill of materials. Our first field is item category. We'll click the match code button to see our options here. We'll choose L for stock item, meaning that the component is a material we keep in stock. Next, we enter our first component. We'll enter material 216, which is for graphite. Now we enter the quantity of graphite. We'll enter 100 grams. Press Enter. In our second material, again, we'll choose item category L, and for our component, we'll enter material 217, which is California Cedar. We'll enter 200 for 200 cubic centimeters and press Enter. Next, we'll enter our third component. In item category, again, this is a stock item, So we'll choose item category L and our component number is material 224 for pink rubber. Here in the quantity, we'll enter 50 for 50 grams and press Enter. We've now entered all the required materials for our bill of materials. We can press save. We get a success message from the system, notifying us that our bill of materials is being created. We'll now be able to use this bill of materials for MRP, product costing, and to measure consumption of the three listed components during manufacturing of this finished product.

Create a work center: CR01

- [Instructor] Work centers are the master data element. They represent where the production of goods is actually carried out. Work centers are quite flexible. They can be configured to represent a person physically doing the work, or it can be a machine or group of machines. It can even be a production facility. Work centers are where value is added to a product. Let's create a work center in SAP. We'll do this by entering transaction code CR01 and pressing enter. Work centers are plant dependent so we need to enter the plant where this work center is located. We'll enter plant 1710. Next is the work center name field. This can be up to eight characters. We'll call this work center PLABLY short for pencil assembly. Next is our work center category field. Let's look at our options. We'll choose works in our category 0001 for machine as a machine is going to be doing the work of assembling our pencils. Now we'll press next screen. That brings us to our create

work center basic data screen. Here we get a long text field to better describe what this work center is doing. We'll name it pencil assemblies. Looking in the general data area, we'll go first to the person responsible for this work center field. We'll click the match code to see our options and we'll choose 001 for the work center supervisor. Next we'll look at our usage field. In our usage field will choose 009 for all task lists types. We'll now scroll down. In our standard value key field, we'll look at our options and we'll choose SAP1 for normal production. We've now filled out all the required fields for the basic data for this work center. Work centers can be configured in a very complex way. The capacities tab has fields where we can configure things like start and end times of shifts, the factory calendar, an overload percentage that is allowed. On the scheduling tab, we can enter formulas for setting up, processing, and tear downs at this work center. And on our costing tab, we have fields where we can configure this work center for product costing. Here we can define the cost center and the activity types that will feed product costing. We're now ready to save our work center. We'll press save and we get a success message from the system that our work center PLABLY in plant 1710 was created successfully. In our example, we can now use this work center to assemble pencils. This work center is now available for us to add value to the product we're manufacturing.

Create a routing: CA01

- [Instructor] Let's get into creating a routing in SAP. Routings are the operational steps undertaken to make our finished product. To do this, we'll enter transaction code CA01 and press enter. First, we need to enter the material number for which we want to create a routing. We'll enter material 233. Next we need to enter the plant where the operations will be taking place. We'll enter Plant 1710. The other required field on this screen is our key date. This is the date that our routing becomes available in our production process. We'll leave this as today and press continue. That brings us to our create routing header detail screen. In the general data field, we'll look at the usage field. We'll see all our usage options by pressing the match code button. Here, we want to choose one for production. This makes the routing available for the production of our material. Next we'll look at the overall status field. Again, we'll look at our options. In here, we'll choose status four for released general. This ensures the routing is available for later production activities. Now we'll scroll down and look at our lot size from field and our lot size from field we'll enter one. That means we want to use this routing when we're manufacturing a minimum lot size of one all the way up to a lot size of 100 million. Our header data is complete and now we'll click the operation button In our first line item, we'll enter our first operation. First, we need to choose the work center where we want this operation to be done. We'll enter work center PABLY. Next we have to enter our control key. The control key helps determine if the activity can be performed at the work center. Well choose control key PP01 for in-house production. Next we entered the description of what actually happens in this operation. We'll say the pencils are assembled. Next, we'll double click this line to get into our operation detail screen. We'll scroll down to our standard values. From

here, we enter our time to set up for this operation. We'll say five minutes. So we'll enter five. And then in unit we'll enter min for minutes. If in reality, it takes a longer amount of time. This will be reflected in the cost of goods manufactured. Then in the machine time, we'll say ten minutes to accomplish this assembly operation. And in labor, we'll say eight minutes. This is the time it will take to tear down this operation. We're now content with this operation, and we'll click the back button to go back to our operation overview screen. From here, we could add as many more operations as necessary. For example, we could add a painting operation and then a packaging operation. We'll click to save our routing now. We now receive a success message from the system saying that our routing was created and saved. Again, we've got our bill of materials, which is our list of ingredients to create a finished product. The routing is the specific instructions or the steps involved to get the work done, to manufacture our products at a work center.

Create a production version: C223

- [Instructor] Now, let's dive deeper into production versions in SAP. Production versions are used when there are multiple bill of materials or there are multiple routings and there's more than one way to manufacture a material. A production version tells the system to link a specific bill of materials, with a specific routing. This could be done for multiple reasons. Production versions can be configured by dates. For example, we could say, use one production version this month and then switch next month to another version. Production can also be configured by lot size. Perhaps it's more cost efficient to use one production version for smaller lot sizes. We can set it up like this, in the system. Now, let's create a production version using transaction code C223, and pressing enter. First, we need to enter our plant, we'll enter plant 1710. Next, we need our material, we'll enter material 234. Our key date is the date that this will take effect and we'll leave it set as today. Now, we'll press enter down, in the production versions line items area, we'll enter our material again, material 234, in the next column we need to enter our production number, we'll enter production version number 0001, in the production version text field, we'll enter small lot production and we'll press enter. We receive a warning message that tells us that the validity dates are being set from today, until the end of year 99', 99'. We're fine with this, so we'll press enter. Now, we want to go into our production version, detailed view, to do this, we'll click our line item and click the detail view icon. We want this production version to be for our small lot production. So, we'll enter a minimum lot size of one and a maximum lot size of 2,500 units. Now, in the task list area, in the detailed planning field, we'll click the dropdown and choose routing. We're now able to search for our routing by clicking in the group field and pressing the match code button. We're going to search by material 234. We see we have two routings for this material. We'll choose the group counter one routing. Now, we'll scroll down to the bill of material area, in the alternative BOM field. We'll search for our bill of materials. We only have one available for this material, so we'll choose it and we'll scroll down again. If the production type being used here was repetitive manufacturing, We would need to

activate the REM allowed checkbox and add details as needed. We'll scroll back up and we can now run a consistency check, to make sure all this information is correct, to do this, we'll press the check button. The system is confirming that yes, the task list or the routing and the bill of materials, both exist, so we're good to go. We'll press back. And we're now ready to save changes and close this screen. The green spotlight shows us that this production version has been created and has been checked. Let's create our second production version. Again, we'll enter material 234. This production version will be number 0002. And this one, we're going to call large lot production. Again, we'll press enter for the system to read this information and we'll press enter again. Now, our dates are populated. We'll click to go into detailed view, by selecting the line item and clicking detailed view, this time in our minimum lot size, we want minimum lot size to be 2501 units, all the way up to our maximum lot size of 4999 units. In our task list area, again, we'll choose routing. Again, we'll search, search by material and this time we'll choose the second routing. Again, we need to enter our bill of material. So, we'll search and choose the only bill of material available. Again, we'll check this information, both our task list and bill of materials exist. We'll click back and we'll save changes and close our screen again. We're now ready to save our production version. We don't receive a success message, but we can see the production version is set and ready to be used, now, because of the production versions we've just created, the system complaint to use the first bill of materials and routing combination for lot size is 2500 or less, in the second line item for any lots between 2501 and 4999. The production version tells the system to link a specific bill of materials, with a specific routing, depending on criteria like date or lot size. And that's exactly what we've done here.

SAP planning overview

- [Instructor] Planning ensures that we can manufacture to meet our demand on time and cost effectively. To do this, we must accurately measure and predict our demand. Then we must schedule to produce or procure the materials required. Let's take a high-level look at planning strategies and the planning process in SAP. Demand management specifically, and production planning in general, rely on assigning a planning strategy to each product that's being manufactured. Planning strategies are defined for a product in the material master. While there are multiple strategies available in SAP, the two major concepts we want to become familiar with are: make to stock and make to order. Make to stock products are produced independently of orders. The amount of make to stock products plan for and produced relies on sales forecasts from historical data and predicted trends. Make to stock products are usually manufactured evenly across given time periods. And because of this, the production process can be optimized for efficiency. Alternatively, make to order products are planned and produced to meet the requirements of items from sales orders. Make to order production can be more erratic because it's so dependent on customer demand. Generally speaking, make to stock products are less complicated and higher volume, while make to order products tend to be

more expensive and customized to suit customer needs. Let's see how these planning strategies impact the production planning process. The planning process varies greatly depending on production types and planning strategies. We want to be aware that this process is extremely flexible depending on what inputs are available to our planning. That said, let's walk through a high-level process to get an idea of how production plans are created and then executed upon. As we're planning production, the first thing we need to decide on is our demand, or how much of a product needs to be made. For make to stock products, we usually rely upon a tool in SAP called sales and operations planning. Sales and operations planning can be split into sales planning and operations planning. Our sales planning is based on what we think the demand for a specific product might be. Planners will look at the historical sales data and create forecasts. Often, they come up with multiple forecasts and then the planning team will work to determine the most likely scenario for our business. Once our forecast is in place, we can move forward with our operations planning. Operations planning takes our sales forecast results, then considers the amount of the product we already have in stock. It also looks at our operations capacity needed to meet this forecasted demand. These inputs are then sent to demand management. Alternatively, if we're dealing with make to order products, our sales orders directly feed our requirements into demand management. These requirements include which products need to be made, in what quantity and by when they need to be shipped to our customers. Now that we've got our requirements from sales and operation planning, or from our sales orders, we can create our production plan in demand management. Demand management enables us to estimate our delivery dates for finished products and estimate when production execution can take place. In demand management, we can also determine our active planned independent requirements for production. These active planned independent requirements feed into material requirements planning, or MRP. In MRP, the system checks these requirements and compares them with the materials already on-hand. Then MRP makes procurement proposals for internal production or external purchase requisitions. The proposals then feed our capacity requirements planning. Then we can ensure our work centers are optimized to do the work. All this is done so we can manufacture on time and meet our demand. This process can be extremely complex depending on what is being manufactured. But in the simplest terms, SAP production planning will be set up to determine how much we need to produce, then effectively create a production plan that accounts for our manufacturing capacity, and finally, order the materials necessary and manufacture the goods to meet our demand.

Create planned independent requirements: MD61

- [Instructor] Planned independent requirements or PIRs feed material requirements planning. And when material requirements planning is run, SAP will look at active PIRs to determine our procurement proposals. PIRs are the result of sales and operations planning. They can be created independently to respond to forecasted demand. Let's

create a planned independent requirement in the system now. To do this, we'll enter transaction code MD61 and press enter. First, we need to enter the material we'll enter material 233. We can create a PIR based on a product group or requirements plan. In our example, we're only creating it for this material. Next we'll enter our plant, Plant 1710. In our defined version area, we see the version zero zero requirements plan. We can have different versions of our planned independent requirements. Version zero zero is an active version. Meaning these requirements will be picked up when we run material requirements planning. Next is the planning horizon area, in our from date. We'll leave it set as today. In our to date, we'll change it to 930, 2021. Our planning period is set to month. This could be set to different timeframes. We're now ready to continue. In our line item, we have material 233 MRP Area 1710 in version zero, zero. We're now ready to enter our PIRs for August and September, 2021. We'll enter 2000 for August and 2000 for September, we're now ready to save. This system confirms that our PIRs have been saved. Now, when we run material requirements planning, we'll be able to create procurement proposals for each of the components required to build 2000 of this finished product. The planned independent requirements we created have taken our forecasted demand and ensure we have all the materials available to make our finished products.

SAP material requirements planning overview

- [Instructor] The importance of material requirements planning, or MRP, in SAP cannot be overstated. It makes sure materials are available when and where we need them. It also keeps supply chains efficient by avoiding too much inventory. Let's take a deeper dive and see how MRP supports production planning in SAP. Let's begin by taking a look at why MRP is so critical to keeping manufacturing businesses running well. MRP is the computer that takes all our inputs about forecasted or real demand. It then runs this demand through different formulas that look at things like lead times, lot sizes and scrap quantities. Then as an output, MRP generates procurement proposals for both in-house production and external purchases so we can meet our demand as efficiently as possible. Because MRP takes so many different variables into account, it's crucial that our master data, like our material masters, routings and bill of materials are accurate and complete with data like lead times. Next, the more times MRP is run and the better the quality data it has to work with, the more accurate MRP will get to ensure we have the right amount of materials at the right time. MRP is also flexible. When material demand changes, MRP can adjust quickly and nimbly. Finally, because MRP is good at ordering only what is required to meet demand, it helps us keep our inventory levels as low as possible. Inventory is expensive, and on our balance sheets, it's a liability. So keeping our inventory levels at a minimum can benefit many parts of our business. Now let's look at the MRP process from a high level. The process starts as MRP receives demand in the form of planned independent requirements and customer requirements that come from SAP's demand management. When we run MRP, the system will take into account our planning strategies, planning types, and any lot sizing procedures. The system checks will look at

our component requirements and compare them with materials already on-hand to determine material shortages or surpluses. During this process, MRP looks at all of our master data. For example, it looks at our bill of materials. If we're trying to produce packages of pencils, then it checks all the materials that make up the bill of materials. Do we have enough wood, graphite, paint and packaging materials so we can meet our production requirements? This is called exploding our bill of materials. As a result of all these calculations, MRP makes procurement proposals and creates planned orders so we can manufacture on time and meet our demand. These procurement proposals turn into purchase requisitions when we need materials from outside suppliers. And once they're approved, they're converted into purchase orders, which lead to goods receipt of materials once we receive them into inventory. Then in the production step, we convert planned orders into production orders. Then we move to actual production where the work is done. Next, we issue goods to an order, and then we can settle our orders after a goods receipt is performed. As we can see from this flow, MRP is the keystone tool that ties our demand with our procurement and then production so we can fulfill real and forecasted orders effectively. Material requirements planning, when set up with all the variables of a business in mind, can keep even the most complex supply chains running smoothly and keep costs low.

Run material requirements planning for a material: MD02

- [Instructor] Materials requirements planning, or MRP, ensures we'll be able to produce finished goods to meet forecasted demand. It also ensures we'll have the needed components that make up our finished goods at the right place at the right time, so we can produce. MRP also ensures that we don't have too much costly inventory on hand. We can run MRP for all materials at one plant using transaction code md01. To keep things simple, let's run MRP for only one material at one plant. And to do this, we'll enter a transaction code md02 and press Enter. This brings up our single-item, multi-level screen. First, we need to enter our material. We'll enter Material 234. In the MRP Area we'll enter area 1710, and for Plant we'll also enter 1710. We'll scroll down and we'll start looking at our MRP Control Parameters. In the Processing Key field, we'll leave it as defaulted to Net Change in Total Horizon. In our Create Purchase Requisition field, we'll click the match code button and choose 1 Purchase requisitions. By changing this, the system will create purchase requisitions for any materials that are procured externally. In the sales agreement, Schedule Lines field, we'll leave it set to 3 to schedule the lines. This means that MRP will generate schedule lines for raw materials having active scheduling agreements in the system. We'll leave the default in the MRP List field, as we'll want to reference the MRP List after it's been run. Next, we'll look in the Planning mode area. We'll click the match code button and we'll choose 3 to Delete and recreate our planning data. In the Scheduling field we'll leave this defaulted as 1 for the Determination of Basic Dates for Planned Orders. In our Process Control Parameters, we do want to check Display Results Prior to Saving. We're now ready to run MRP for a single item. To do this,

we'll go to More, Planning, Save and continue. The system warns us to check our input parameters. We know that they're checked, so we'll press Enter. This brings us to our Planning Result, Individual Lines. This is a very basic run, but we can see in the first line item that we have zero available stock as of today's date. In the second line, we can see our planned independent requirements are telling the system we need 2000 units to be made. Our third line item shows us that the system has created a planned order with a quantity of 2000 to address the shortfall. Our last two line items show us that the independent requirements for 2000 and to plan orders to compensate for this 2000 needed, have also been planned. If we wanted to view our planning results at any time, we can could back to these results using transaction code md04 to see more details about our stock requirements list. We'll now press Save and continue. This brings us to our MRP Summary page. We can see that this MRP run plan for 3 materials only. The three materials make up the bill of materials for our finished good. If MRP was run for the entire plant, instead of just one material, this would show a much higher number of materials planned. By running MRP for one material, the system has searched for demand and found it in the form of planned independent requirements. Based on this demand, the system has created procurement proposals in the form of purchase requisitions and planned orders so we can meet this demand on time.

SAP capacity planning overview

- [Instructor] When thinking about production planning, materials aren't the only variable that can impact our manufacturing schedule. Capacity in our plants must be available so we can produce to meet the demands of our customers. Having work centers, either sitting idle or being overbooked can be extremely costly. Capacity planning, ensures we can have our production running at an optimum level. Let's look at the biggest aspects of capacity planning in SAP. Capacity planning allows us to analyze our production schedule and predict where any bottlenecks may occur. Capacity planning takes our capacity requirements, which are generated from material requirements, planning or MRP, Unless the advanced planning and optimizer tool is being used, MRP assumes we have infinite capacity at our work centers. Of course, in the real world, we don't have infinite capacity. So these requirements are evaluated. Capacity evaluation answers a few key questions for planners like do our work centers have capacity available? And with this current availability, will we be able to produce in time to meet our forecasted demands. From our capacity evaluation, we can then focus on taking action with capacity leveling. Capacity leveling will let us spread the required production across work centers. This promotes efficiency, keeps our costs lower, and our manufacturing on schedule. Let's look more at how capacity leveling works. This is an oversimplified example, but we'll assume our manufacturing plant has two work centers that can handle the same type of job. The way production is scheduled right now, Work Center 1 is overbooked while Work Center 2 still has room for more work to be done. By performing capacity leveling, we stopped bottlenecks from occurring at Work

Center 1, and we even out our production across the two work centers, this helps us keep our costs standard. Capacity planning ensures we can efficiently complete the manufacturing that needs to be done to meet the demand for our products.

Perform capacity planning at work centers: CM01

- [Instructor] Even if we have all our materials in place to manufacture, we need to ensure we have capacity available in our work centers. So we can actually produce on time. Capacity planning helps us prevent any bottlenecks that may occur. When we run material requirements planning. This system can think that we have unlimited capacity at our work centers. Of course, this isn't realistic. Let's look at available capacity in our test system now. To do this, we'll enter transaction code CM01 and press enter. This brings us to our capacity planning selection screen. Here, we want to look at a work center called assembly. In Plant 1710 we'll press continue. Our test system is not configured to show capacity at our work centers, but we can go through the columns and understand what they're showing. Our capacity is broken down on a weekly basis. Our requirements column shows all the requirements at this work center that are coming from our production orders. Right now we see there are zero hours of requirements. Our available capacity is showing how many hours are available in total each week at this work center. Because we have no requirements, our capacity load is at 0%, and our remaining available capacity is 32 hours for this week, and 40 hours for next week. If our capacity at this work center was overbooked, we could use transaction code CM21 to perform capacity leveling. Capacity evaluation is a planner's best friend. By using these tools, we can get accurate data and ensure our work centers have the capacity to manufacture, to meet our forecasted demands.

SAP production execution overview

- [Instructor] All of our meticulous production planning is for nothing if we can't successfully manufacture our goods. Let's walk through a typical setup for production execution at a company using SAP Production Planning. The trigger for the production process is production order creation. Production orders can be created from planned orders already in the system, or they can be created from scratch. Production orders can hold many requirements. They specify what material is being produced, how much of it needs to be made, where it's being produced, and which resources will be used. Once our production order is created, the next step is to release it. Production orders can be released automatically by triggers set up in the system, or they can be released manually. Production orders can also be released from the header level, meaning the whole order, and all operations are released at once, or they can be released from the operation level when we only want to release one operation at a time. During this step, our

material and capacity availability checks are run to ensure we can move forward with production. It's important to note that production can not physically begin until the order has been released. And once an order has been released, we can begin many activities like printing shop floor documents and executing goods movements. The next step in the production process is the goods issue for the production order. When the production order is created, it looks at our master data, including our bill of materials and makes reservations on the materials we'll need to manufacture our finished goods. Often called material withdrawal, when the order is released, the goods are issued against the production order, and both our reservations and inventory gets updated. Next up, we have confirmations. Confirmations are used to give visibility about the progression of an order through its production cycle. There are many types of confirmations that can be set up like quantities, how long it actually took for production, which work centers were used, and this is where the actual cost of production can be updated with real figures. Because these confirmations record our actual data, they are essential for future production planning efforts. Finally, once production is complete, our finished goods is placed in the physical inventory, via goods receipt. This updates our stock quantity and the value of our stock, and it can make the product available for sales and distribution. Our production process utilizes all the information from the planning phases so we can effectively produce our finished goods to meet demand. This process also includes steps so we can record what happened during the production process and dial in our future planning efforts.

Create a production order manually: CO01

- [Instructor] Production orders are crucial to our production execution in SAP. Production orders trigger our work processes to be executed. Production orders can hold many requirements. They specify what material is being produced, how much of it needs to be made, where and when it's being produced, and which resources will be used. Production orders can be created in a few ways. We can convert planned orders into production orders. And this is done via transaction code MD16. In our example, we want to create a production order manually without referencing a planned order. To do this, we'll use transaction code CO01 and press enter. That brings us to our production order create initial screen. First, we need to enter our material. We'll enter material 233. Next we enter our production plant. We want this material to be produced at plant 1710. Next, we have our order type field. We'll press our magical button to see our different options for order type. We want to choose order type YBM1, which is associated with a make to stock production order. Now we'll press continue. That brings us to our production order create header screen. From here, we must first enter the total quantity that we want to produce. We'll say that we want to produce 2000 each of this material. So enter 2000 in the total quantity field. We'll now scroll down and in the scheduling area, we'll choose the scheduling type. We'll choose current date. Now we'll click our master data tab. We can see that our production order pulled in the production version for this material in

quantity. It's version 0001. We could also see that all our routing information has been pulled in for this material and lot size. We'll scroll down. Finally, we can see that the bill of material information has been pulled in for this material all from our master data. To ensure that our bill of material has been exploded, we'll click on the components button. Here we can see that each of the components needed to manufacture our finished product are listed here. Graphite, California Cedar and pink rubber. Each of them also has the associated requirement quantity listed. We're good with all this data and we can now save this production order. We'll click save. Our success message shows that our order has been created and saved and assigned a number. We're now able to perform checks, release our order, and then the work execution can begin for this production order.

Perform material and capacity availability checks: CO02

- [Instructor] Before we can move forward to release our production order and trigger the work to be done, it's important we perform availability checks. We can check to ensure we have the materials on hand to perform production. We can also check our capacity to ensure we have availability at our work centers to do the work on time. Let's perform our availability checks now by entering transaction code CO-02, and pressing Enter. First we must enter our production order number. We'll enter order number 1000107 and press Continue. That brings us to our production order change header screen. First, we'll perform a material availability check. To do this, we'll click the check material availability button. Our success message shows that we have checked all materials in this order, and they are available for production. The system has looked at the materials and quantities listed in this order, and the bill of materials for this material to ensure we have what we need to proceed. Now let's check our capacity availability. To do this, we'll click the check capacity availability button here. Here, we will receive a pop-up that capacity is available at all our work centers needed for this production order. The system checks and the capacity on the designated to work centers based on the routings in our production order. We'll now click Continue. Both our capacity and material availability checks have passed, so we'll save our production order. Because we have availability to complete this production order, we can now go back and release the order, so production work can actually begin.

Individually release a production order: CO02

- [Instructor] We can't create and save our production order without providing all the details as to what we want to produce, where we want to produce it and how much of it we want to produce. Once all that information is in our production order, we run our capacity and material availability checks to ensure that we can move forward. Once all the information and availability checks have been verified, we can release our production

order. By releasing the production order, we signal to proceed with actual production. Production orders can be configured to be released automatically. We can also manually release production orders collectively or one at a time. Now let's manually release one production order in our system. To do this, we'll enter a transaction code CO 02 and press enter. That brings us to our production order change initial screen. We need to enter the production order number we want to release. We'll enter order number 1000107 and press continue. First, we'll check our item status by clicking the status button. We can see our status is currently set to created. We'll click the back button to go back to the production order header screen. To release this order, we only have to press the release order flag. Our success message shows that their release has been carried out. Let's go back and press our status button again. Now we can see that our status is currently set to released. We'll go back and press save. Because we have released this production order from the header level, any operations included in this order are also released. By releasing this order, we can now print papers for the shop floor, use materials from stock, confirm operations in the order, and record goods receipt for the order. And as stated earlier, we can begin with actual production of our finished goods.

Enter confirmation for a production order: CO15

- [Instructor] Confirmations aren't important aspect of the production cycle because they give visibility to the actual details of production. They show us in the system, what really occurred on the shop floors of our plants. Confirmations can be set up to record quantities produced, the scrap quantities, how long it actually took for production and which work centers were used. Confirmations drive the actual costs of production as well. Let's enter a confirmation for a production order in the system. We'll enter transaction code CO 15 and press enter. First, we must enter our order number. We'll enter order number 1000108 and press continue. Under confirmation type, we can enter a partial confirmation or a final confirmation. We'll assume that all the work on this order has been completed and choose final confirmation. In the actual data area, we need to enter our yield quantity. This is the number of products that have been manufactured. This field has been auto-populated with 2000, because that was the quantity in the production order. Under our plan to be confirmed area, we see that this matches up with the number of products that we plan to confirm. We could also enter the number of products that needed scrapped and the number that needed reworked. We will assume we don't have any so we can leave these fields blank. Now we'll scroll down. In the, to be confirmed area, we can update these dates of execution and posting if needed. These are correct, so we can save our confirmation. We have successfully confirmed the quantities from our production order. Now anyone using the system can see how production went with this order. Because these confirmations record our actual data, they are essential for future production planning efforts.

Perform a goods receipt against a production order: MIGO

- [Instructor] After all our efforts to plan for, and then manufacture our goods, we need to perform a goods receipt. This step will place the goods into stock so that they can be sold. When we perform a goods receipt, we increase the physical inventory of the material. Let's perform a goods receipt against a production order in our system now. To do this, we'll enter transaction code MIGO and press enter. In our first field, we have a dropdown. This transaction is used for many goods movements, and we need to select the type of movement here. We'll choose goods receipt. In the next field we want to select the type of document we want to reference. We want to reference a production order, so we'll choose order. Next, we want to enter the order number we're referencing. We'll enter order number 1000108. On the right side of the screen, we see that this is a movement type 101 for goods receipt. We are receiving goods against an order into our warehouse. We'll now press enter so the system can read all our information and we'll scroll down to our detailed data view. In our first tab, we have material. We would ensure that this is the correct material, which is a pack of pencils material number 234. It is so we'll click quantity. Our quantity shows 2000 units of this product. This is correct. So we can click the next tab where we see that this product is going to be stored at storage location 171A, at plant 1710. And we also see that this is going to be placed into unrestricted stock. This means that we can use this item in sales. Finally, we'll click on our order data tab. In our delivery completed indicator field, we have it as set automatically. That means no further goods receipts are expected for this item. We've confirmed all the information in all of our tabs and we're okay with it. So we'll click item Okay. We're now ready to post our goods receipt. So we'll click post. We receive confirmation that our document has been posted successfully. By performing this goods receipt, these 2000 units have been placed into stock and our physical inventory has increased by 2000. These units are now available to be sold to our customers.

Continuing your SAP learning

- [Justin] You made it, well done, and thank you so much for joining me in deepening your SAP production planning skills. SAP ERP has many modules and this course is only the beginning. You've made it this far, so I know you're serious about learning SAP. Check out my other courses here on LinkedIn Learning. First, to step back and get an overview of the key pieces of SAP, check out SAP ERP Essential Training. Next, dive even deeper into SAP logistics modules like this one with Learning SAP Materials Management and Learning SAP Sales and Distribution. Then, learn all about financial transactions and reporting in SAP Financials Essential Training. Finally, if you're ready to give your SAP navigation and reporting skills a boost, I encourage you to check out SAP ERP Beyond the Basics. And for my advice on all things SAP learning, click over to my website at justin.training. Please don't hesitate to contact me through my LinkedIn profile. I'd love to hear about your learning journey and thank you for taking this journey with me.

