

The Project Management eBook for Manufacturers

by  ProjectManager



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Why manufacturers should care about project management

This eBook explores various manufacturing topics through a project management lens, helping manufacturers plan, coordinate and execute projects and production processes with the help of proven techniques. The insights from this eBook can positively impact day-to-day work and help optimize processes to become more successful.

This eBook will help you:

- ✓ Improve operational efficiency without sacrificing quality
- ✓ Make more nuanced production schedules that account for constraints
- ✓ Understand how project dependencies impact delivery timelines
- ✓ Manage and balance resources so you're operating at capacity
- ✓ Maximize profitability and competitiveness through advanced manufacturing
- ✓ Leverage project management software and tools to simplify workflows

To immediately start implementing improvements, take advantage of our free project management templates for manufacturing on the next page.

Free templates

Using pre-built templates is an easy way to jumpstart manufacturing initiatives while maintaining quality. ProjectManager offers dynamic templates to use in Excel, Word and directly within our software. We've compiled relevant templates for manufacturing teams below. [See all of our free templates.](#)



**Production
schedule template**



**Product development
template**



**Inventory
template**



**Project plan
template**



**Resource plan
template**



**Project status
report template**



**Product launch
template**



**Bill of materials
template**



**Standard operating
procedure template**



Production planning

Operations continue to become more complex. This means manufacturing companies need more thorough production planning. A production plan is the best way to deliver high-quality products/services as efficiently as possible.

Production planning overview

Production planning decides how a product or service will be made before manufacturing begins. In other words, it outlines how to manage supply chains, raw materials, employees and the physical space where manufacturing takes place.

A production plan is the outcome: it's a document that describes how production processes will be executed. It identifies the needed human resources, raw materials and equipment as well as the production schedule.

How to make a production plan

Follow these five steps to make your production plan as robust as possible.



Estimate/forecast product demand

Understanding product demand is the best way to decide which method is ideal. From here, estimate which resources are required and how they'll be used.



Access inventory

Accessing inventory is about more than simply taking stock, and having a plan can avoid shortages or waste. For this step, focus on inventory control and management techniques.



Resource planning

A successful plan requires familiarity with the resource planning details of manufacturing. Note the minimum number of people and raw material requirements to create a product or execute a service. Also, consider what machines and systems are essential for executing the plan.



Monitor production

During production, monitor how the results compare to the production schedule and resource management projections. This process should continually take place and be documented. [Monitoring production](#) is especially important as it enables intelligent changes.



Adjust the plan to make production more efficient in the future

Finally, reflect on the information gained in step four and strategize how to make the plan run more smoothly in the future. This process is about manufacturing a product or service, but it also helps create better plans for next time.

The importance of production planning

Production planning is foundational for manufacturers as it affects other key business areas such as:

- ✓ Supply chain management
- ✓ Production scheduling
- ✓ Material requirements planning
- ✓ Production lead time
- ✓ Capacity planning

If a manufacturing operation wants to expand, that evolution requires careful planning and scheduling. Someone must take on the responsibility of managing resources and deciding how they'll be allocated. This is a big part of capacity planning—how much can be made in a certain period with the available resources?

It's easy to use too much of a resource for one product and not leave enough for another. Without understanding how resources will be used, there may be delays that impact production or resources may go to waste, all resulting in a lack of efficiency. Having a plan is the best way to ensure resources are used appropriately, products and services are high-quality and nothing goes over budget.

PM Tip

Gantt charts are the quintessential scheduling tool. Use them to map phases, dependencies and track your fulfillment cycles for on-time delivery.

[Learn more](#) →

Types of production planning

The same plan isn't right for everyone. To get the most from production planning, decide which method is best. Here's a quick intro to the different types.



Job method

The job method is often used when manufacturing a single product where a unique production plan is created. This method is generally used in smaller-scale productions although it can be applied to larger manufacturing facilities. The job method is especially advantageous when a product or service needs specific customizations.



Batch production method

Batch production consists of manufacturing goods in groups, instead of being produced individually or through continuous production. This method is useful when manufacturing products on a large scale.



Flow method

The flow method is a demand-based model that minimizes production lead time by speeding up production. The process starts based on work orders, and once it starts, it doesn't stop until all finished goods are produced. This is called continuous production. Using machinery and little intervention helps minimize waiting time.



Process method

The process method is more or less what most people picture when they think about production—an assembly line. This method usually includes different types of machinery completing separate tasks to put together the finished goods.



Mass production method

The mass production method primarily focuses on creating a [continuous flow](#) of identical products. It's similar to the flow method, but at a much bigger scale, which cuts production costs. When uniformity is just as critical as efficiency, use standardized processes to guarantee all products look the same.

Common production planning mistakes

Stay vigilant of common missteps. Here are three preventable yet common mistakes.



Not expecting the unexpected

Have risk management strategies in place if things go awry. The goal is to never have to employ them, but it's better to be prepared. Production planning isn't complete if it doesn't anticipate risks, issues and changes. The right plan allows for problem-solving if needed.



Getting stuck behind the desk

Work with intelligent production planning tools, but don't rely solely on software. When production planning is only done from behind a screen, the result won't be as informed as it could be. The best planning is active and collaborative.



Neglecting equipment

Highly functional equipment requires proper care. This means tracking usage and keeping up with maintenance. This looks different depending on the industry and product or service, but the principle is the same; continually take care of equipment before it becomes a problem that slows production.

PM Tip

Capacity planning and resource planning work together to maintain transparency across sites, helping your product reach the market even faster.

[Learn more](#) →

Production planning best practices

Many tried-and-true best practices can set operations up for success.



Make accurate forecasts

It's not possible to create a detailed production plan without proper estimations, and demand planning is never static. Consider buying trends from previous years, changes in demographics, fluctuations in resource availability and other factors. These demand planning forecasts are the foundation of skillful production planning.



Understand capacity

[Capacity planning](#) means knowing the maximum capacity the company can manage—the absolute most of a product or service it can offer during a period. This is the only way to anticipate how much of each resource is needed to create X amount of products. Without this knowledge, the process is solely a guess.

The more efficient production is, the faster customers can receive products. Cycle time is one of the key performance indicators (KPIs) that manufacturers use to measure the time they spend working on an item.

What is cycle time in manufacturing and why is it important?

Manufacturing cycle time, also referred to as throughput time, is the amount of time spent working on an item from raw materials to finished product. Cycle time includes processing, moving, inspection and queue time for the item. That is, cycle time covers the entire process, even inactive time when a product is being moved from one part of the facility to another.

This engineering metric is critical to measuring and improving production. It can help manufacturers innovate faster, become more competitive in the marketplace and even retain employees. While it's technically a [metric for manufacturers](#), it's also a way to gauge business success.

It can help limit work in progress, eliminate wait time and streamline code review. Meanwhile, quality assurance keeps employees productive. It increases profitability and helps with more consistent production rates and customer satisfaction. Let's determine how to calculate cycle time in manufacturing.

How to calculate cycle time

The first step is to find the net production time. That's the amount of time workers are available to finish a project, which is usually measured in hours. Next, count the number of units that were produced in the project. Then, divide the net production time by the number of goods produced.

This results in the net production time. Divide that by the total number of goods produced to determine the team's cycle time value. Then, convert that value into time to know the time it takes to complete the project. To do this, multiply the decimal portion of the number by 60.

Net Production Time (Per Product) = **Cycle Time**

Nonproductive Hours + Productive Hours (Per Product) = **Cycle Time**

Process Time + Inspection Time + Movement Time + Queue Time (Per Product) = **Cycle Time**

With a better understanding of production details, begin to assemble a master production schedule.

Tip

Without a cost management plan, you risk going over budget, or worse, not finishing the project.

[Learn more](#) →



Master production schedule

Creating a master production schedule ensures supplies match demand. A robust master production schedule also supports the company's sales force and strengthens the capacity to meet customer needs.

What is a master production schedule?

This outlines which products will be manufactured and when they will be made, including data from the bill of material, which is a list of the raw materials required. This list integrates with the current inventory to determine the need for any procurement of further materials to begin manufacturing.

This schedule outlines the [various processes and resources](#) to make production move forward smoothly while identifying potential bottlenecks and creating plans to avoid them. It can be the difference between an organization making a profit or experiencing a loss.

A master production schedule also serves as a communication channel between the sales and the manufacturing teams. The schedule is flexible and open to change as needed as it's a continuous dialogue.

Function of a master production schedule

Having a plan that can forecast the demand for a product over time is the primary purpose of a master production schedule. It also saves time managing the different processes involved.

The main functions include:

- ✓ **Planning:** Balancing market demand to materials, labor and the capacity of your equipment to deliver the goods.
- ✓ **Make adjustments to schedule:** Schedules need to have a contingency for unexpected delays or mistakes that stop the flow of product.
- ✓ **Prevent stockouts:** Planning for capacity requirements to maintain output of production.
- ✓ **Improve efficiency and control costs:** The better the plan, the more likely you'll stay on schedule and identify potential efficiencies.

Another function is to keep your commitments to your customer base. Manufacturing only works when it serves its customers on time and within budget.

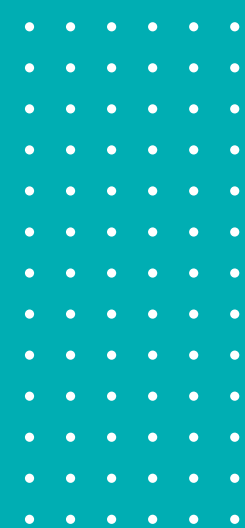
With the right master production schedule process, demand flows smoother, lead times improve, communication standardizes and production stabilizes.

Master production schedule process

The best way to make a master production schedule is to follow steps to fulfill the function of the schedule.

- 1 Start with a demand plan, which maps the demands to which the master production schedule will respond.
- 2 Identify the needed raw materials and secure a supply chain to deliver those materials to production.
- 3 Develop a proposal of the master production schedule to make sure the schedule can meet its requirements.
- 4 Make any calculations necessary to see if it can meet the demands of the master production schedule draft. Continue these calculations throughout the process to ensure demand is met.
- 5 Once the draft has been tested and it meets the requirements, confirm that it aligns with customer service initiatives, resources and the inventory investment.
- 6 Communicate the production schedule to everyone involved to align the team.
- 7 Return to the schedule to see if the supply and demand are balanced and increase or decrease production accordingly.

With the master production schedule in place, manufacturers can then begin to plan and allocate their capacity.



Capacity planning



Production capacity planning is an issue of supply and demand: one that can decide the fate of the project or production line. We've outlined the strategies and best practices to help plan resources and make sure team members are working on the right task at the right time.

Capacity planning overview

Capacity planning balances the available resources to meet customer demand or the project capacity requirements. In project management and manufacturing terms, capacity is the most work that can be done over a certain timeframe.

In project management, this process is key because it relates to critical project management knowledge areas such as:

- ✓ Resource management
- ✓ Time management
- ✓ Team management
- ✓ Work management

Production capacity, strategic planning and project planning work together. Planning is how to schedule the team's hours so that the work gets done on time. Capacity management isn't rigid. All companies are different and demand can be volatile, so project managers can use different strategies to adapt accordingly.

Capacity planning strategies

Three strategies can help meet demand, cover resource requirements and increase team productivity.

Lag strategy

The lag strategy consists of having enough resources to meet actual demand, not projected demand estimates. This is beneficial for smaller organizations with low capacity requirements.

Lead strategy

The lead strategy consists of having enough resources to meet demand planning forecasts. This strategy is beneficial when demand increases, as excess capacity can cover the increased demand.

Match strategy

This strategy is a mix of the lead and lag capacity planning strategies. In this case, project managers need to monitor actual demand, demand planning forecasts and market trends to adjust capacity accordingly.

Capacity planning benefits

Here are some of the main benefits of effective capacity planning.

- ✓ Reduces costs
- ✓ Prevents stock-outs
- ✓ Reduces production lead time
- ✓ Eliminates excess capacity
- ✓ Helps with supply chain and resource management

Capacity planning best practices

Here are some of the main benefits of effective capacity planning.

- ✓ **Establish cross-functional teams:** This improves collaboration and communication about production capacity and resource management.
- ✓ **Calculate resource capacity:** Get an idea of the current capacity and available resources before creating a production capacity plan.
- ✓ **Determine resource requirements:** Look at the scope and required resources to complete project tasks.
- ✓ **Prioritize projects:** Which projects are most important, and which can be put aside for the time being?
- ✓ **Allocate resources based on project priority:** Now allocate those prioritized projects and ensure they align with the organization's goals.
- ✓ **Keep lines of communications open:** Communicate between executives, project management leaders and stakeholders.
- ✓ **Document known risks:** Monitor risks such as union strikes, weather and government regulations that stop a project or create new ones unexpectedly.

- ✓ **Plan for how to handle too much capacity:** Understand where it is and how to resolve it (such as reassigning), or not enough capacity.

Capacity planning vs. resource planning

While “capacity planning” and “resource planning” are often used interchangeably, they aren’t the same. We’ve outlined the differences below.

Capacity planning

- ✓ Strategic planning process designed to help determine if the organization has the production capacity required to meet demand
- ✓ Looks at resource availability at the skill set/team level
- ✓ Facilitates the decision-making process to hire resources or defer/approve/cancel projects
- ✓ Focuses on supply and demand

Resource planning

- ✓ Strategic planning process that coordinates and allocates actual resources to project tasks
- ✓ Looks at resource requirements
- ✓ Provides project managers with a plan and outlines the resources they can use
- ✓ Focuses on resource allocation

The constant push and pull of supply and demand can be difficult to navigate. This is where demand planning comes into play.

PM Tip

Risk management can help recognize potential issues that threaten your production cycle’s efficiency.

[Learn more](#) →

Demand planning



Is it possible to meet demand and not overstock inventory? That's where demand planning can boost profits and minimize overhead costs.

What is demand planning and why is it important?

Demand planning is a cross-functional process to meet customer demand while avoiding supply chain or inventory management disruptions. This isn't a one-time initiative but rather is practiced continuously to respond to the market. Accomplish this by analyzing company sales, customer trends, historical sales and seasonal data.

Use both internal and external research to determine the product's demand forecast. Labor force changes, economic shifts, severe weather, natural disasters and global crises can all impact demand. It's not easy to make these estimates, but the more factors considered, the more accurate demand forecasting will be.

Once that's done, adjust sales and production planning to manufacture just the amount needed. Ideally, the inventory will be sufficient to meet customer needs without a surplus. That benefits supply chain management and inventory management.

Demand planning can increase profitability, boost customer satisfaction and build efficiency in production planning, inventory management and supply chain operations. While striking a balance between supply and demand isn't easy, the rewards are substantial.

On one hand, there are inventory costs. Stocking excess inventory is expensive, and this money could be used elsewhere in the business. There's also warehouse costs, as well as the fact that there's no guarantee the product will remain valuable. That's a lot of loss to deal with.

The other side of the coin is poor production planning, which can leave teams unable to respond to demand—all because there's no adequate demand forecasting to analyze sales and customer needs. This will get expensive as teams struggle to fill orders. Either way, money is lost due to poor demand management, and demand planning can help mitigate those risks.

Key elements of demand planning

Demand planning is complex, but not impossible. Here are some of the elements that work together to help balance demand with supply:

- ✓ **Data collection:** Gather data from both internal and external sources to put demand in context.
- ✓ **Statistical forecasting:** Look over sales, inventory levels and other operational data to get a full picture of capacity.
- ✓ **Modeling:** Feed collected data into models such as algorithms and artificial intelligence that can predict the product's future demand.
- ✓ **Collaboration:** Work with suppliers, manufacturers, salesforce and other stakeholders in the supply chain to collect information that can impact demand.

Use the above considerations to make a demand forecast or an informed prediction of expected demand. From there, create a demand plan.



The demand planning process

The demand plan outlines the amount, type and location of inventory needed to meet customer demand. All demand plans roughly follow these seven steps:

- 1 **Assemble your team:** Put together a coordinated cross-functional team with clearly defined roles and responsibilities.
- 2 **Define internal data:** Find agreement on which sales data, inventory turnover, lead times, etc., are relevant for forecasting future demand.
- 3 **Add external data:** Use the information gathered on recent performance, delivery timelines, purchasing habits, etc., to round out the plan.
- 4 **Make a statistical demand forecast:** Collaborate to decide what type of forecasting model fits the company's needs and develop it.
- 5 **Review and refine:** Take the demand forecast to stakeholders and have them review and analyze the work, adding new data to see if the predictions still hold. Then, refine data as needed.
- 6 **Check your inventory:** Determine the needed inventory levels to meet the demand forecast, including extra as a buffer. Identify vendors who will help meet this demand and ensure they can deliver on the ideal timeline.
- 7 **Track results:** Use key performance indicators (KPIs) to measure the demand plan's effectiveness and make adjustments as needed.

An important part of demand planning is understanding resources. At this stage, consider resource planning.

PM Tip

Reports help you understand the details of your operation, including hours spent, expenses and overall progress. This information is vital for reliable demand planning.

[Learn more](#) →



Resource planning

One of the most important factors to balance is inventory management—the materials and components needed for manufacturing. The more efficiently a company handles its material requirements, the more profitable it will be.

Manufacturing resource planning & materials requirements planning

Everything needed for manufacturing is a resource—people, materials, equipment, software, facilities, etc. Regardless of the product, resources must be managed.

That process is called [manufacturing resource planning \(MRP II\)](#), and it's a method that's used to work more effectively. Create an MRP system to precisely coordinate resources to get work done on time and within budget.

Why is it called MRP II? The name evolved from materials requirements planning (MRP I), an earlier resource planning system. Let's look at both to learn the differences and how to apply them.

Material requirements planning (MRP I)

This process is a digitally-operated method of managing inventory. When used properly, an MRP system improves production efficiency through accurate estimation of required materials and just-in-time delivery.

Material requirements planning helps manufacturers keep low production inventory levels because they're controlling the manufacturing, purchasing and delivery activities. Before the advent of computers, [production planning](#) was all done by hand, using calculations for reorder quantity and reorder point.

Manufacturing resource planning (MRP II)

Manufacturing resource planning (MRP II) is the process of creating an MRP system that allows manufacturers to account for the raw materials and human resources needed for manufacturing. MRP II touches on operational and financial planning but also explores contingency planning that creates additional paths forward when issues arise.

There's no proprietary software associated with manufacturing resource planning, but almost all manufacturers use some kind of software to create an MRP system.

MRP software is usually modular and has components that include:

- ✓ A master production schedule
- ✓ Technical data
- ✓ Bill of materials
- ✓ Production resource data
- ✓ Inventories and orders
- ✓ Purchasing management
- ✓ Materials requirement planning
- ✓ Shop floor control
- ✓ Capacity planning
- ✓ Cost control
- ✓ Reporting

That's only the beginning. There are other tools for business planning, tool management, sales analysis and project management. MRP II integrates many manufacturing processes so teams can organize and manage them.

MRP systems and how to create them

An MRP system collects all the data from MRP I and MRP II and combines it in one place. This helps managers with production planning, inventory planning, raw materials purchasing and purchase scheduling.

The goal of an MRP system is to avoid issues like over-or-understocking. It also helps plan all the manufacturing activities, including procurement, production and delivery.

When creating an MRP system, three key resource management and manufacturing process inputs are necessary:

- 1 **The master production schedule (MPS):** The number of end goods and the time needed to produce them. Estimate this by looking at customer orders and demand forecasts.
- 2 **The inventory status file (ISF):** Real-time inventory data. This information shows what's in stock and where it's warehoused.
- 3 **The bill of materials (BOM):** The BOM is a list of all the raw materials, components and anything else necessary to manufacture or repair the product or service.

These three inputs show the raw materials that are available for production and when they're needed. Then, the manufacturing resource plan can help keep the lowest number of materials on hand while planning and scheduling manufacturing activities.

The importance of manufacturing resource planning

This allows for a more productive and tight production schedule that keeps costs low. It also provides valuable data from the production floor that can address issues that slowed down manufacturing in the past—so it's not repeated in the future.

With resource planning, the workload is also reduced. The collected data helps teams plan and make more accurate estimates that lead to greater company profitability.

In the past, stock control and management were the only tools manufacturers had to run efficiently. Manufacturing resource planning is far more effective in managing resources and making more effective plans. Its use saves the company money, time and labor.

How to make a manufacturing resource plan

Ask three questions when creating a manufacturing resource plan. What is needed? How much is needed? And when is it needed? Working backward from the finished product can help assemble the needed materials for a manufacturing resource plan.

Break down the process of manufacturing resource plans into four basic steps:

- ✓ **Make estimates of product demand:** From there, determine the resources necessary so supply meets that demand. A bill of materials breaks down those resources, which is the list of raw materials, assemblies and other components necessary to manufacture the product. Don't forget to include personnel in this estimate.
- ✓ **Compare demand to current inventory:** This informs how many resources are needed to meet demand, on top of what's already in stock. Manufacturing resource planning allocates the inventory where it's needed.
- ✓ **Create a production schedule:** That means figuring out how much time each step in the process will take. Again, work backward from a deadline.
- ✓ **Monitor the process:** Make sure to meet milestones and not go over budget. If plans are derailed, have a contingency plan in place.

PM Tip

Project risks are around every corner. Without a contingency plan to navigate issues such as supply chain shortages or malfunctioning machinery, production could halt.

[Learn more](#) →

Manufacturing isn't free. The ability to make accurate estimates of manufacturing costs is critical to profitability and a competitive edge. This is where manufacturing costs are important.



Total manufacturing cost



It's essential to know how to calculate manufacturing costs before work hits the production line.

Manufacturing cost overview

Manufacturing costs are the prices incurred during manufacturing. They're made up of direct materials costs, direct labor costs and manufacturing overhead. Each of these costs is usually listed as separate line items on an income statement, which is the financial results of the business for a stated period.

Also included is the cost of turning materials into products. The manufacturing cost is a factor in the total delivery cost or the money a manufacturer spends to make and deliver the product. We'll get to how to calculate the manufacturing cost of production and delivery, but just as important is the ability to track those costs throughout the life cycle of the production to stay within budget.

Types of manufacturing costs

Determining manufacturing costs is important; it helps manufacturers price their products competitively but also ensures [high net profits](#). Knowing this information helps manufacturers meet goals and ensure their production is at the right productivity level.

The first step toward achieving these benefits is to know the different types of manufacturing costs. We've already identified them as direct material costs, direct labor costs and manufacturing overhead. Below, we've defined each cost in more detail.

Direct material costs

Direct material costs are the raw materials used to make the finished product. The value of these materials increases over the production of the product. Raw materials go through any number of types of operations in the course of manufacturing, such as welding, cutting, etc. When determining direct material costs, distinguish between direct and indirect. Indirect costs are subsidiary material costs, such as shop supply costs, perishable tools and equipment costs. Manufacturing overhead costs include these costs.

Direct labor costs

Direct labor costs are related to the workers who are physically involved in producing the finished product including the wages and benefits that the workers earn. These workers are responsible for converting the raw materials into the finished goods.

Manufacturing overhead

Manufacturing overhead costs include costs related to the manufacturing of a product that isn't direct materials costs or labor costs. These can include indirect labor costs, such as wages for supervisors and the material handling team.

Manufacturing overhead is referred to as indirect costs because it's hard to trace them to the product. A final product's cost is based on a predetermined overhead absorption rate. That overhead absorption rate is the manufacturing overhead costs per unit, called the cost driver, which is labor costs, labor hours and machine hours.

Five basic types of costs are included in manufacturing overhead, which are:

- ✓ **Indirect costs:** Costs that the business takes on for employees that aren't directly involved in product production.
- ✓ **Indirect materials:** Incurred material costs that are used in manufacturing but aren't assigned to a specific product.
- ✓ **Utilities:** Costs such as natural gas, electricity and water, but these can be difficult to calculate as they fluctuate with the number of materials being produced.
- ✓ **Physical costs:** These costs are calculated either by the declining balance method or a straight line method.
- ✓ **Financial costs:** Financial overhead costs that are unavoidable such as property taxes, legal fees, insurance, etc.

Tip

Timesheets are an effective way to track employee hours and overages. Use time management tools to manage time-sensitive initiatives across job sites.

[Learn more](#) →

How to calculate manufacturing overhead costs

Unlike the other costs, this is a broad category that includes many different items, such as utilities, equipment, etc. First identify these costs, such as the indirect labor and materials costs, add depreciation costs and all other manufacturing overhead costs to get this figure.

Manufacturing overhead = Indirect materials + Indirect labor +
Depreciation costs + Utilities + Insurance

Total manufacturing cost formula

Add the direct materials cost with the direct labor costs and the manufacturing overhead costs to determine the total manufacturing cost.

Total manufacturing cost = direct materials + direct labor + manufacturing overhead

Knowing production costs is critical for a manufacturer that wants to stay in business. It also informs supply chain management.



Supply chain planning

It's impossible to predict the future, but research and analyzing data help make accurate forecasts about supply and demand. This is called supply chain planning. Let's explore supply chain planning and what it means for business planning.

Supply chain planning overview

Supply chain planning is optimizing the procurement, manufacturing and distribution of goods and services from manufacturers and suppliers to customers. This includes adjusting the plan according to demand planning forecasts while factoring in production capacity constraints and material availability.

The goal of supply chain planning is to meet customer demand while avoiding product overstock and other inventory management inefficiencies that reduce profits. This requires a supply management structure that meets demand effectively through maintenance, policy regarding stock, production and sourcing parameters.

Supply chain planning also seeks to build strategic partnerships with suppliers and third-party manufacturers to create visibility and flexibility in vendor-managed inventory. This reduces the effects of demand volatility.

The supply chain planning process

These are some of the needed facets to achieve optimal manufacturing efficiency:

- ✓ **Supply management:** Start with managing the supply of goods or services. Find a balance between the supply of goods and the demand for these products, while also keeping in mind production planning and the financial objectives of the business. Determine how to best meet these requirements.
- ✓ **Demand management:** Next, forecast the future demand for goods and services. This requires accurate demand forecasting, matching inventory based on demand trends and improving the bottom line for the product or service. Demand planning is key to creating a successful supply chain plan.
- ✓ **Production planning:** Next, consider production planning and manufacturing processes. The critical aspect of production capacity planning is to determine factory operations. Part of this is figuring out the number of resources and how they'll be allocated across a schedule.

- ✓ **Operation planning:** What are the operational steps needed to maintain an effective supply chain? This requires scheduling to figure out a timeline and resources that meet operational goals. Conduct a gap analysis on performance reporting, identification, cost and benefit analysis.
- ✓ **Sales planning:** Sales must integrate with operations and warehouse management. Businesses must respond to actual sales, marketing, demand coordination, production planning, inventory control and more. The goal is to meet customer demand through production, distribution and purchasing processes.

Supply chain management goes hand-in-hand with production ordering, a topic that we outline below.



Production ordering



The supply and demand of raw materials will determine how much product a manufacturer makes.

What is a production order?

A production order is a document a manufacturing company's control department generates. It's sent to its production department to authorize the number of a particular product that will be produced over time. Typically, once a sales order has been made, the production order is issued.

What should be included in a production order?

Typically, the parts of a production order are the following.

- ✓ **Bill of materials (BOM):** The [bill of materials](#) ensures the product is built correctly. It is a high-level list that includes each part or assembly and a number where it fits in the hierarchy. Each part is numbered and named, including which stage each part is at in its life cycle. There's a description of the part, including a unit of measurement for each part in inches, feet, ounces, etc. Note also the procurement type and any reference designators.
- ✓ **Quantity of units to be produced:** Record the number of parts that will be used in each assembly or subassembly. This helps with the purchasing and manufacturing decisions and activities.
- ✓ **Production planning:** The routing number or production routing is the route that's followed during each of the steps in manufacturing, from raw material to finished product. This shows the production flow that needs to be followed.
- ✓ **Routing information:** What operational processes can assist in maintaining an effective supply chain? This step requires scheduling to determine a timeline and resources that meet operational goals. A gap analysis on performance reporting, identification, cost and benefit analysis is also beneficial.
- ✓ **Planned costs:** This is the base cost for the order and helps estimate the per-unit cost of manufactured goods and services.
- ✓ **Due date:** This is the factory-side delivery date for finished products.

- ✓ **Production order status:** The status of the production order can be in preparation, released, started, finished, closed or canceled.
- ✓ **Material consumption:** This refers to the raw material used during the production cycle. Manufacturers need to track material management and waste management.

These seven facets of a production order are foundational for success and enable teams to accurately create production orders.

The importance of production orders

Production orders are important because they ensure a manufacturer has the amount of product that the market demands. But more than that, it helps production planning by defining what's needed to produce based on demand, how much to make based on minimum order quantities and when to begin manufacturing based on weeks of supply.

Using a production order also helps optimize expenses and improve budgeting. By planning and knowing their inventory, manufacturers can improve order accuracy and reduce production costs. Using production orders, and archiving old ones, allows teams to reference previous inventory costs to see what they previously spent and ensure future orders are within budget.

This helps manufacturers increase their revenue and drive growth. With more revenue comes more working capital that allows manufacturers to invest in new machinery, software or expansion of their production lines with new products. This extra capital can also inform promotional campaigns and improve customer experience.

To take projects to the next level, consider implementing advanced manufacturing.

Tip

Kanban boards, which were invented in the manufacturing industry, are great for tracking production orders. If you don't track them closely, you risk missing inventory and losing profit.

[Learn more →](#)



Advanced manufacturing

Faster and better production leads to greater profits and competitiveness. Using technology to achieve efficiency is called advanced manufacturing.

What is advanced manufacturing?

Advanced manufacturing is the practice of using innovative technologies and methods to improve a company's ability to be competitive in the manufacturing sector. It optimizes all aspects of the value chain, from concept to end-of-life considerations.

Advanced manufacturing accomplishes this through advanced manufacturing technology, which integrates manufacturing and business activities to create a more efficient operation. It employs [automation](#), computation, software, sensing and networking to create greater efficiencies.

The purpose of advanced manufacturing is to use technology to allow companies to produce goods or services of better quality, faster and at lower costs than their competitors, which allows them to position themselves in the market.

Advanced manufacturing technology

The term advanced manufacturing technology refers to all the different technologies and techniques that can be used to improve an existing manufacturing process.

This technology takes many shapes. From inventory management software that allows manufacturers to better understand what's in their warehouse to using robots in the production line to cut down labor costs, to any other application of technologies in the manufacturing cycle. Here are the most common types of advanced manufacturing technologies.

Types of advanced manufacturing technology

First, let's divide advanced manufacturing into three main groups.

- ✓ **Efficient production:** This emphasizes simultaneous rather than sequential engineering and involves design, simulation, physical and computer modeling, advanced production technologies and control techniques. This is used in rapid prototyping and precision casting.
- ✓ **Intelligent production:** Uses ICT and related logistic systems to implement systems for the extended life and optimal use of production facilities. It does this through efficient monitoring, regular maintenance and repair.
- ✓ **Effective organization:** The process of coordinating and exploiting manufacturing resources, both physical and knowledge-based. This is used with virtual tendering, enterprise, shared facilities and resources, novel organization, incubation units, knowledge management and trading and electronic commerce.

Examples of advanced manufacturing technologies

Big data processing

This refers to the analysis of large data sets obtained through various business intelligence systems. It helps businesses better understand what their customer demand is, track product quality and monitor workflows.

Artificial intelligence (AI) and machine learning

Manufacturers use artificial intelligence and machine learning to automate aspects of [quality control](#), maintenance logistics and inventory control. For example, they can use AI and machine learning to predict when machine failures and breakdowns are expected to occur.

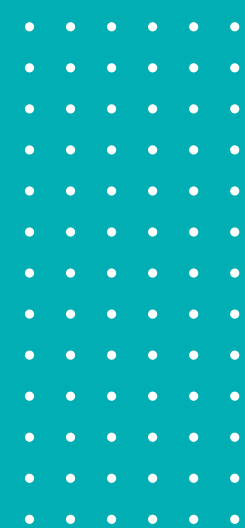
Internet of Things (IoT)

The term Internet of Things refers to the devices, sensors, software and networks that are used to transfer data throughout smart manufacturing. For example, aerospace manufacturers use such devices to test the durability of the components of an aircraft.

Benefits of advanced manufacturing

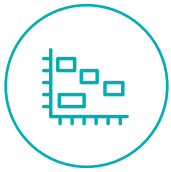
- ✓ **Innovation:** Using advanced manufacturing technology allows manufacturers to stand out from the competition by creating new, innovative products
- ✓ **Better product quality:** Companies can improve product quality through using innovative technologies in the manufacturing cycle. These technologies can be applied to designing, producing and testing goods.
- ✓ **Lower production costs:** These technologies help companies reduce labor costs, produce cheaper materials, cut steps in the production line and lower inventory costs.
- ✓ **Faster production of goods:** Manufacturers can produce goods faster, which helps them outperform their competitors and pursue more business opportunities.

Dynamic manufacturing projects can prove difficult to manage if you don't have the right tools. This is where [manufacturing project management software](#) comes into play.



Manufacturing project management with ProjectManager



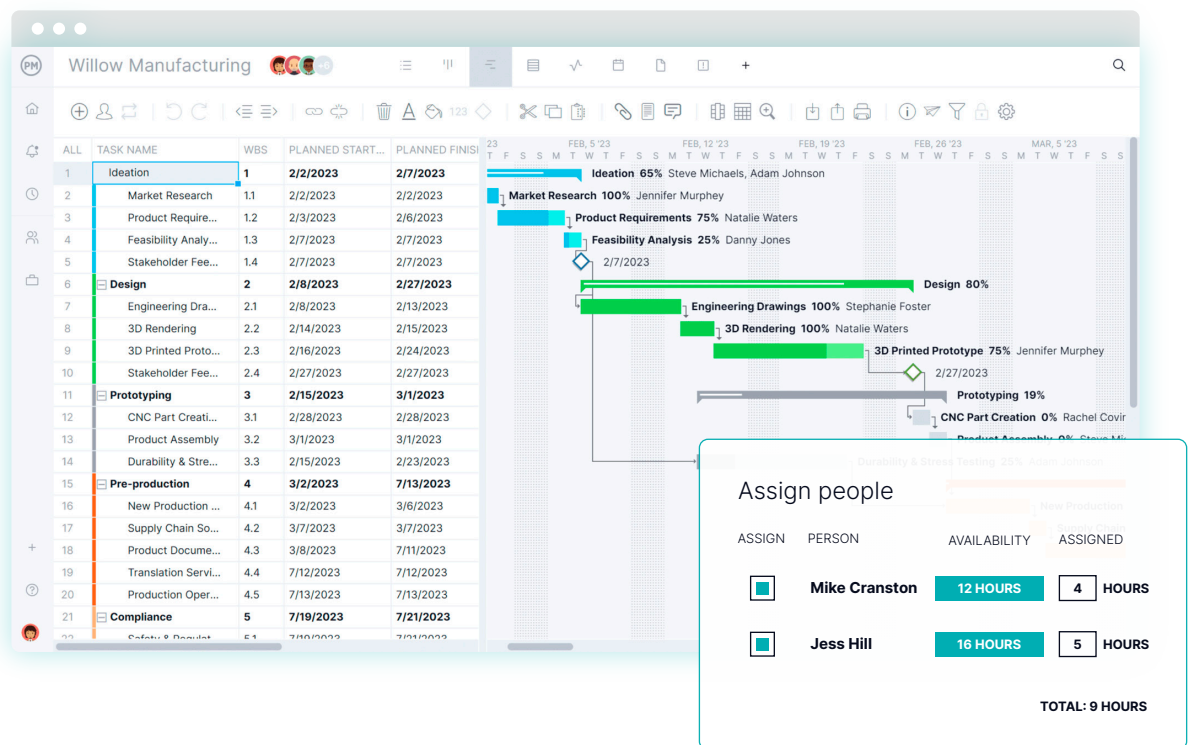


Plan and track production on Gantt charts

To organize manufacturing resources and timelines, use [ProjectManager's Gantt chart](#) to create a production schedule. Gantt charts are planning tools that schedule tasks across a timeline. Then, link any dependent tasks to avoid bottlenecks. For example, if a strap needs to be stitched to the body of a handbag before the embroidery can be added, identify this dependency and link the two tasks to keep production running smoothly.

On our powerful Gantt chart, project managers can set up individual or recurring tasks, assign them to the right team members and set milestones. Using our online Gantt chart helps manage manufacturing projects across a timeline with resources, such as raw materials, tracked by cost to make sure there's no overspending.

Even better, the dynamic Gantt chart is flexible and allows for fast edits that reflect changes in orders and capacity. As teams make changes to the project or schedule, the software automatically notifies relevant parties so they have access to the most recent data.





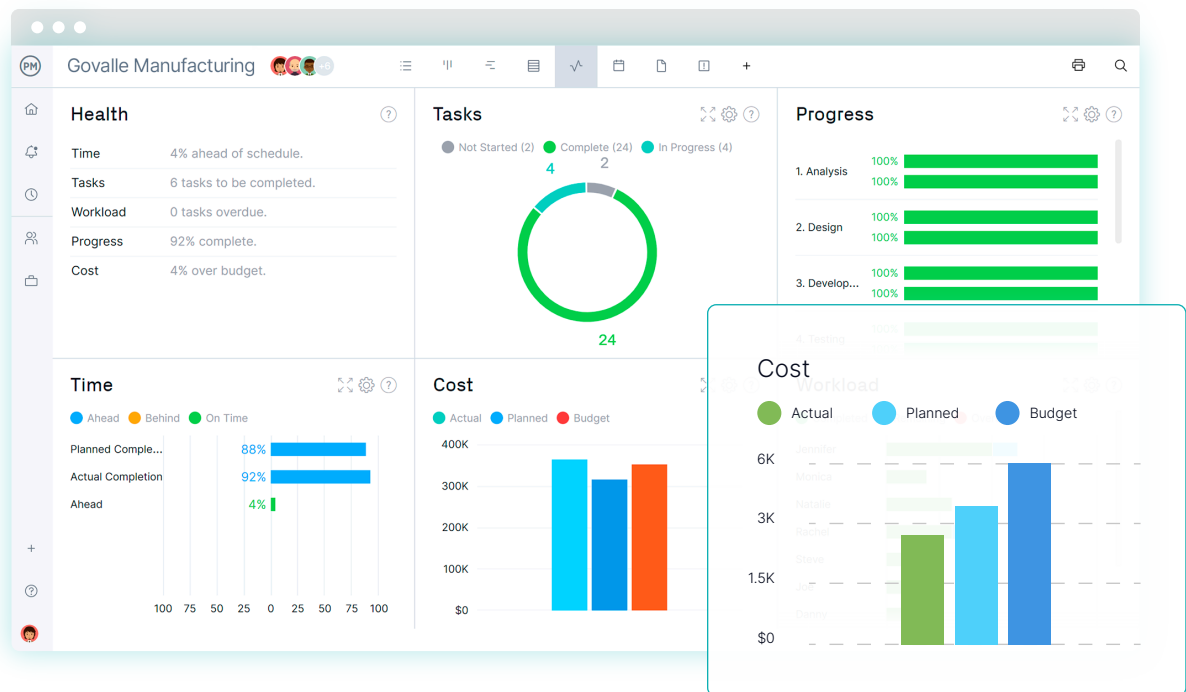
Keep team workload balanced with resource management tools

Manufacturing processes are only as good as the people running them. With our resource management tools, it's easy to ensure the team is working at capacity and that there's minimal downtime in their schedules without overworking them. Use the color-coded workload chart to see who's doing what and then reallocate resources as needed from the workload chart to balance the workload and boost productivity.



Manage project risks

ProjectManager offers different views including the calendar, Gantt, board, list and sheet views. In addition, we offer a customizable risk list view that enables customers to prevent unexpected impacts on project scope, costs and delivery. In the risk list view, establish and oversee project risks all from one location. Attach files, add comments, determine the likelihood, add an assignee and much more. It's simple to address and mitigate potential risks before they evolve into something more serious.





Track your production cycle

ProjectManager has two tools for monitoring production and resources. The real-time dashboard on both a project and portfolio level collects live data and automatically makes calculations, which are displayed in easy-to-read charts and graphs. Dashboards provide a high-level view of manufacturing while keeping close tabs on cost, tasks, progress, workload, time and overall health.

For a deeper dive into project or portfolio data, use our [one-click reports](#). Generate data on everything from timesheets to workload, status reports and more. Once the report is created with customized columns, share it with stakeholders to keep them updated on progress.

The screenshot displays the ProjectManager software interface for generating a 'Project Status Report'. On the left, a sidebar lists various report categories: Reports, Portfolio Status, Project Status, Project Plan, Tasks, Timesheets, Availability, Workload, and Variance. The main area is titled 'Project Status Report' and features a 'TITLE' field set to 'Project Status - Park' and a 'PROJECT' dropdown menu set to 'Park Talks'. Below these are checkboxes for 'Include closed projects' and an 'INCLUDE' section with sub-sections for Summary (Health, Workload, Effort, Target date, Schedule, Budget, Cost), Tasks (Overdue, Due this week), and Special Tasks (Milestones). A 'COLUMNS' list on the right allows users to select specific data points to include in the report, such as Name, WBS, Planned Start Date, Planned Finish Date, Planned Duration, Planned Cost, Planned Hours, Planned Resource Cost, Percent Complete, Assigned, Actual Start Date, Actual Finish Date, Actual Duration, Actual Hours, Actual Cost, Actual Resource Cost, Remaining Hours, Milestone, Complete, Priority, and Baseline Start Date. At the bottom of the main area are 'View', 'PDF', and 'Excel' buttons. A 'Comments' panel on the right shows two comments: one from Laura Wilson saying 'Thanks for getting this over to me!' and one from Joe Johnson saying 'Here is the revised project status report'. Below the comments is a PDF report icon labeled 'Status Report - New.pdf'.

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