



Sizing Systems for Capacity & Volume Output for the Brewer

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Equipment sizing is a tricky topic for any brewery, whether large or small, established or startup. The key to successful sizing for capacity and volume output for the brewer lies in the finer details: cost, efficiency, and capacity. Not only does the desired volume for each batch have to be considered, but the variety and style play an important role as well.

The first step in deciding which brewing system suits your needs best is to determine your annual production. The more beer you are producing, the larger the system that is required. For example, breweries looking to produce several smaller batches of beer may need the same system capacity as a larger brewery looking to produce a select few larger batches of brews. The difference in their system setups is whether the capacity is spread out between a number of small, separate tanks or a handful of larger tanks.

Essentially, you can take the brewery system size, multiply it by the number of brews you would like to brew each week, and then multiply this number by fifty work weeks in a year. This will give you the annual production number you are looking for to help you decide on the system capacity you will need to achieve your brewing goals.



Tank sizes for brewing range from around three barrel tanks to more than one hundred barrel tanks. To give you an idea, your typical brewpub would choose tanks ranging from seven to fifteen barrel tanks. The larger the tank, the more beer you can produce per brew. Another benefit of higher volume output per batch brewed is lower operation costs. A fifteen barrel tank can produce more than twice as much beer per man hour than that of a seven barrel tank. However, it is important to note that these lower production costs associated with higher output really only make sense for larger breweries whose demand matches the larger supply.

Microbreweries have several factors to consider during their startup. First, they have to decide how many different types of beers they would like to have on tap at any time. Next, they need to estimate how much beer the brewery will be able to sell. By figuring out what the sales rate of what the slowest beer will most likely be, these numbers can then be used to calculate how much beer will need to be brewed per session. This will give you an idea of how long a batch of your slowest selling

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beer is likely to stay on tap. To be able to serve your customers the freshest beer possible, your goal should be for this time period to last no longer than the shelf life of the beer.

In general, establishments that keep many different beers on tap are better served by a smaller brew length, with numerous small fermenters and serving tanks. Brewpubs and microbreweries benefit from the flexibility that a system such as this provides. A brewpub utilizing serving vessels should not have beer occupying their serving vessel for more than four weeks. In order to minimize waste and maximize taste, calculate the amount of each batch of beer you estimate will be sold during this time. You can then use this information to determine the tank capacity you will need for your brewery. This calculation should always be based on the beer you plan to sell the least of. Popular beers can be brewed more frequently to maintain a steady supply.

Conversely, breweries that plan to sell only a few different styles of beer at a time would be better served with a larger brew length, along with fewer—but larger—fermenters and serving vessels. Larger breweries with bottling and keging operations need to factor in the shelf life of their brews to determine the brewing capacity needed. Shelf life varies greatly, based on the particular beer brewed and other factors such as pasteurization.

Another important aspect that needs to be considered when determining the size of the brewing system needed is figuring out how many fermenter tanks are required. Ales are assumed to have an average fermentation time of approximately fourteen days. Lagers, on the other hand, take approximately three to four weeks. Going off of the estimate that there are fifty work weeks per year, this would allow for 25 ale brew cycles or twelve and a half lager brew cycles per year. Let's use an example to illustrate these calculations.

For a microbrewery that aims to produce 4,500 barrels per year with a goal of brewing three days per week, the desired tank capacity can be calculated by using the following figures. By taking the 4500 bbl (barrels) per year and dividing by three (the number of brews per week), we arrive at 1,500 bbl. This number is then divided by 50 (the number of work weeks in a year). We now know that the appropriate tank capacity needed is 30 bbl. For a microbrewery that has decided to brew 80 percent ales and 20 percent lagers, using the 4500 total barrels example from above, this means that about 3600 bbl of ale and 900 bbl of lager would be brewed each year.

From here, the fermentation capacity can then be determined. The 3600 bbl of ale would go through 25 fermentation cycles per year, meaning the fermenters would need to meet a 144 bbl capacity to accommodate the brewery's desired number of batches. To accommodate the 900 bbl of lager and their twelve and a half fermentation cycles per year, the fermenters would need to meet a capacity of 72 bbl. Thus, the total fermentation demand for this microbrewery is 216 bbl. Based on these numbers, the system would require eight 30 bbl fermentation tanks in order to accommodate the brewery's planned volume output.

After figuring out the basic brewing goals, there is also the option of doubling or tripling the brewing batch to be considered. This would involve brewing a double batch of beer to later be combined into an oversized fermentation tank. Using our example, two of the 30 bbl fermentation tanks could be replaced with a 60 bbl tank if the goal is to always double one of the brewing batches. Should this plan suit a brewery's planned supply and demand, double or triple brewing could help system costs.

It could also prove to be a helpful solution to accommodating a particular size constraint of a brewing facility.

I recently had the chance to speak with Loui from Marks Design and Metalworks. Marks provides brewing equipment to breweries of all sizes. From small microbrewery startups to well established breweries looking to expand, they provide their clients with the equipment necessary to run a successful brewery. "People come in with an expectation and a budget," says Loui. Whether your goals are for a more modest five barrel or a loftier 200 barrel system, they nail down the details to pinpoint the best brewing system size to meets the client's desired budget.

During the planning process, it is important to remember to give your brewery room to grow. Both new and established breweries should keep in mind the importance of leaving room for expansion. If you are in between sizes, don't be afraid to choose the larger size and assume you will grow into it. "The price between small equipment and medium is nominal," says Loui. However, this is a fine line, as you do not want to overdo it by buying more equipment than you require. This could lead to problems such as product waste and unnecessary expenses. "You don't want kegs full of old beer when you need to make a new batch," says Loui.

While the idea and process of a brewery startup is exciting, Loui urges brewers to err on the side of caution. "There are unexpected costs that always pop up." Things are often overlooked when it comes to the forecasted budget, such as the real cost of a steam boiler installation and other set costs that cannot be avoided during the brewery startup phase. Additionally, the timeline of the startup can last much longer than the client expects. From a stall in Tax and Trade Bureau approval (due to a government shutdown, for instance) to brewery construction that takes much longer than anticipated, there will be moments where the planned timelines do not progress as expected.

The permitting process can also prove to be slow and difficult particularly in areas where there are not many breweries. These areas are often the perfect place for a startup to plant its roots because the local market has not yet been tapped into. However, the individuals in charge of approving the permits often take their time. "They want to know absolutely everything that's going to go on prior to ever saying yes," says Loui. "From water and power usage, all the way through cleaning chemical discharge," they insist on details.

Next to your facility, brewing equipment is likely the largest expense a brewpub or microbrewery will face. The process of sizing your brewery system appropriately for capacity and volume output can be a bit overwhelming and a mistake can mean many long work days or wasted beer. However, by carefully planning out your brewing needs, you can successfully create a system that meets those goals and the demand of the drinking public.

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