

# Distilling 101

The largest part of this guide has been taken in its entirety, unaltered from [learntomoonshine.com](http://learntomoonshine.com). It is an amazing guide and resource and I felt for the most part I was not able to improve on what they had already covered. (hence the horrid US measures you see from time to time in here)

So, onto my bit – the basics:

**The Still** – I use a Copperhead pot still from Barnicol Engineering in Wellington – it's the same thing as the more common Turbo 500 Still but is locally made. Any still will do, but take the time to learn how your still works before using it as every still is subtly different and this can affect your final product and distilling experience.

## Pot still vs reflux still

The reflux produces a very smooth and top quality spirit which is virtually neutral in flavour, therefore it takes added flavours very well. The alcohol can be used to making spirits for sipping as well as mixed drinks. The pot still produces a spirit which is not as smooth, but retains some of the flavour from the wash, i.e. using grain based washes for bourbon or whisky, or molasses for rum. It can also be used for essential oil extraction.

## Pot still numbers

Subject to your wash being fermented out to 990, you would normally expect an average strength of approx 60%. Re the volume, there are too many variables to give an exact number, ie: type of yeast, amount of sugar used, etc, but from a 25 litre wash using commercial home brew yeast and 6 kg sugar, you would reasonably expect approx 4-4 1/2 litres.

## Reflux still numbers

Subject to your wash being fermented out to 990, you would normally expect an average strength of approx 92%. Re the volume, there are too many variables to give an exact number, ie: type of yeast, amount of sugar used, etc, but from a 25 litre wash using commercial home brew yeast and 6 kg sugar, you would reasonably expect approx 3 – 3 1/4 litres. It takes approx 3 1/4 hours to run.

## Water Usage

Modern stills use a lot of water, up to 1 litre per min, so you need to take this into consideration, an aquarium pump set up can help to cut this down by re-circulating the water. But you will still need some method of cooling your water. Period stills use less, or no water, but you lose a lot more product to evaporation. End of the day cooling is probably one of your biggest challenges and esp with period style stills or in places of limited water supply

must be considered carefully. Water use can be reduced by using a decent condenser unit, but these are expensive and take some learning to use right.

## **The Wash**

The Wash is the name given to the fermented product you are going to put through your still. This can be anything alcoholic from beer, wine, mead through to a pure sugar wash often used for basic alcohol to which flavours will be added.

The size of your wash varies a lot depending on the size of your still and the time you have – for a commercial still like mine – aim for between 10 and 25 litres of wash for a run.

A few things are important to remember if you are planning to distil your wash that differ from normal brewing.

Firstly make sure you rack off your wash – remove as much particulate matter as possible – this will prevent it getting burned to the base of your still and ruining both your still and your booze.

Second – aim to keep your wash from getting too fizzy, if you are re-cycling a failed beer – letting it degas a bit first will help a lot. Main reason for this is that the higher the carbonation the larger the chance of a foam up happening in the boiler and contaminating your finished product with some nasty stuff.

Lastly – keep notes! This will help you not make the same mistake twice.

Some people love using Turbo Yeast for distilling. It is fast, makes a strong wash and is fairly easy to get. I do not recommend it for a pot still. The nutrients it uses can leave some off flavours in a pot still so unless you have the time for a full stripping run (see below) and are prepared for the chance of failure – avoid the temptation of turbo yeast and just stick with the standards (for most distilling good old bread yeast works a treat)

## **Making Cuts**

This part of the Distilling 101 guide will teach you about the different fractions that occur within a pot still distillation and how and when to make cuts thus allowing you to control the end flavour and quality of the spirit.

### **What are cuts ?**

Cuts are predetermined points during a distillation run where a stiller will separate product coming from the still into separate containers. The end result is several different jars of product. Each having an individual flavor and abv.

### **How to know where to make cuts during distillation run ?**

In order to determine where to make cuts when distilling you need to understand the different fractions of a run and learn how to recognize them during the distillation.

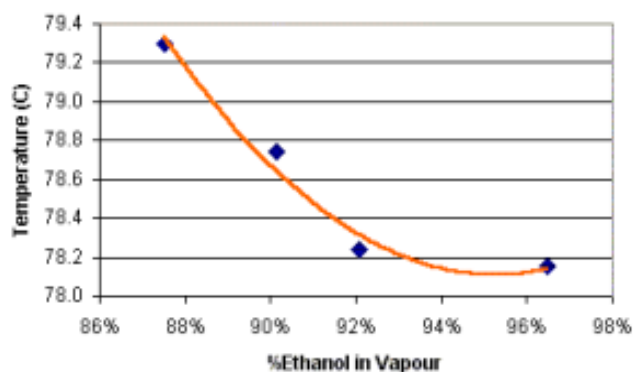
## What are fractions?

Fractions are the individual components of a mixture of compounds that can be divided during phase transition. In our case fractions can be separated during the distillation process.

You can identify fractions using either still head temperature, by abv % or by taste this comes with experience. In any case once you learn how your still performs identifying fractions becomes predictable. Also keep in mind that during distillation still temperature rises and abv drops, they are directly related to each other and are an indication of what is coming out of your still.

Below is a list of compounds present in your wash and their specific boiling points. This gives you an idea at what temperature certain alcohols start to vaporize from the wash.

- Acetone 56.5C (134F)
- Methanol (wood alcohol) 64C (147F)



- Ethyl acetate 77.1C (171F)
- **Ethanol 78C (172F)**
- 2-Propanol (rubbing alcohol) 82C (180F)
- 1-Propanol 97C (207F)
- Water 100C (212F)
- Butanol 116C (241F)
- Amyl alcohol 137.8C (280F)
- Furfural 161C (322F)

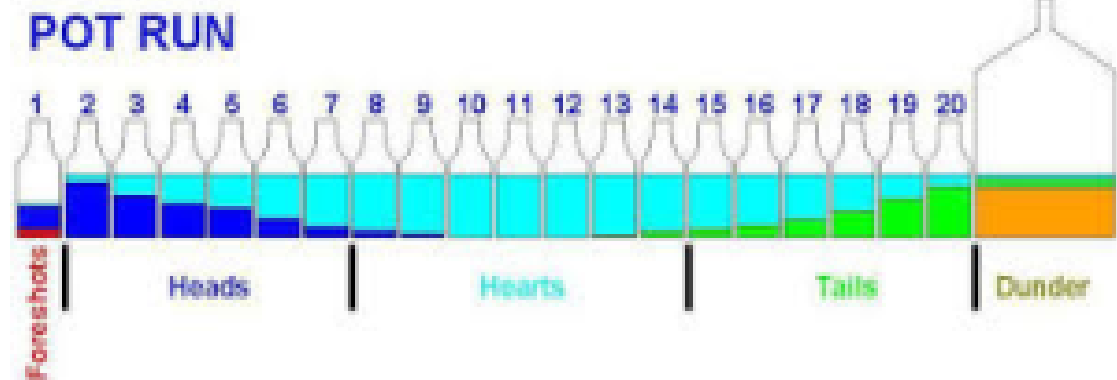
When distilling with a pot still it is often desired to make several [stripping runs](#) before doing a final product run. This saves time and makes blending easier.

## What are the main Fractions that occur during the distillation of moonshine ?

There are four main fractions to be collected with these include:

- **Foreshots** – The foreshots fraction is the first to be collected during the distillation process and contains a large percentage of acetone. **Don't even think about drinking this stuff.** Generally during a pot still run we'll allow for 150 ml per 25L of wash for our Foreshot Fraction. This gets tossed down the drain. Foreshots can start coming from the still at 50 C.
- **Heads** – The Heads Fraction is a mixture of acetone, methanol, ethyl-acetate and ethanol. You can expect the heads fraction to smell slightly sweet with a solvent like sting to it. It's common practice to separate the heads and add them to the next distillation run as they contain a large amount of ethanol. General practice is to take 750 ml for Heads Fraction after Foreshots. You can take more or less personal preference plays a big role in this decision.
- **Hearts** – The hearts fraction contains the highest percentage of ethanol and will have a very clean taste lacking the bite of the heads. It can be collected between 78-82°C or if you prefer abv between 80 -50 % with low wines of 40%. When **blending fractions** to make your final product the Hearts are the base of your product.
- **Tails** – The Tails fraction contains large amounts of fusel oils which cause unwanted flavors in your product. The tails can be identified by the distinctive smell of wet dog. Fusel oils aside there is a substantial amount of ethanol and rich flavors in the tails that are often desirable if you are making a rum or whiskey. These flavors can be extracted by doing a feints run. The feints run will yield a very flavorful product that can be used when **blending the Hearts fraction**. Collection of the tails can be ended

when still temperatures reach 94 – 95°C or abv reaches 20% with low wines.



If you're a newbie distiller and are just learning how to make cuts I'd recommended making the main cuts between heads to hearts, and hearts to tails. Get comfortable with this first before you move on to blending.

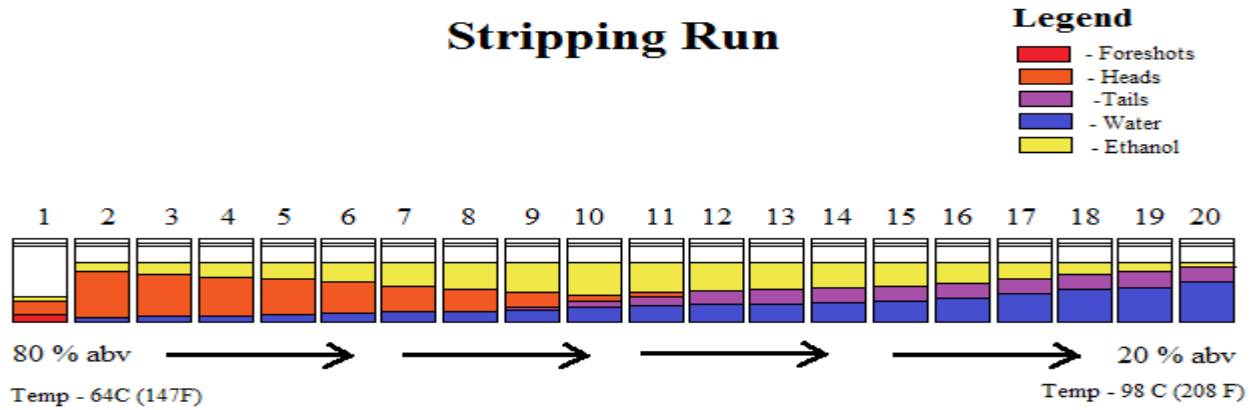
## What is a Stripping Run ?

When distilling moonshine the stripping run is often the first distillation of the mash. The goal of this first distilling run is to strip as much alcohol from the mash as possible. This distilled alcohol is often referred to as "low wines" and what's left over in the boiler is the bulk of the water, sediment and yeast from the fermentation process which can be discarded.

A pot still is often used for this distillation process and is run hot and fast, No cuts are made during the run so the separation between fractions is bad. It's common to see a stripping run abv range between 40% – 60% abv.

Below is a illustration of whats going on during a pot still stripping run. Notice as the ABV drops the water increases. This is why many distillers stop the stripping run around 20% abv it's simply not worth distilling anymore.

# Stripping Run



## Why Should I Do A Stripping Run Before A Spirit Run ( Primary Distillation) ?

The Stripping run allows you to significantly reduce the volume of product that needs to be distilled during the spirit run thus significantly reducing distillation time. It will also produce a better tasting alcohol. For example if we start with 50 Gallons of Wash we can strip this down to 10 Gallons of “low wines” and then run a single spirit run this will take much less time then doing 5 or 6 spirit runs.

## Stripping Run Yields

For 5 Gallons of wash you can expect the stripping run to yield approximately 1 Gallon of low wines. Thus the typical stripping run yield is 20% of original Mash volume.

## Stripping Run temperatures

Common practice is to collect low wines until the stripping run temperature reaches 208 F or 98 C. Remember you don’t make any cuts during this distillation the primary goal is to strip off the water, yeast and sediment contained in the wash.

## Can I Use A Reflux Still To Do A Stripping Run ?

If you don’t have a pot still you can use your reflux still to do a stripping run by removing the packing from the column.

## How Glycerine Is Used To Age Homemade Moonshine

Many home distillers age their moonshine to round out or add flavor to the spirit. Because a home distiller often doesn’t have 5-10 years to age their moonshine in oak barrels it’s often necessary to artificially age the spirit.

When [aging a spirit](#) oak chips are often used to add flavor and glucose or glycerine syrups are used as smoothing agents. These natural syrups are also used when making liqueurs such as **Strawberry or Blueberry Liqueurs**. They are credited for adding smoothness and body to the spirit and are capable of taming the harshness of moonshine.

## **What is glycerine ?**

Glycerine is a naturally occurring product that is produced by most living things. It is naturally present in most animal fat's as well as vegetable fats. It's classified as an organic alcohol that also goes by the name of *glycerol*. Glycerine is also a byproduct in the manufacturing of soap.

Glycerine is a clear oily liquid that has a sweet taste. The human body is unable to digest glycerine and thus it is often used as a calorie free food additive.

## ***Adding Glycerine To Moonshine***

Adding just a few drops of glycerine to poor quality moonshine will conceal the harshness of it. Glycerine is also known as a "Beading oil" because when added to low proof moonshine it will cause "beads" to form in the same fashion as high proof moonshine when a [Shake Test](#) is performed to determine proof.

## **Should I Add Glycerine To My Moonshine?**

You'll have to make this decision on your own. If you find that your homemade hooch is a little sharp for most people's taste buds it might be a good idea. Here are some pro's and con's to help you decide whether adding glycerine is the way to go:

Pro's – Smooths out final product, 100% organic, no known side effects and very commonly used in food and beverage industry. Also decreases time needed to age whiskey and rum.

Con's – can add too much glycerine will notice in the final drink ( small amounts should be added slowly), If added to strong spirits with high proof can turn soapy

## **How much Glycerine should I add to my Moonshine?**

The amount of glycerine you want to add to your moonshine depends on what you're making. Keep in mind 1 tsp is about 5 ml give or take a little. I'd always recommend adding less and test then add more because you can't take it out afterwards. Below are some examples of how much glycerine to add to different spirits and liqueurs.

Homemade Whiskey – Add 5ml per 1L

Homemade Rum – Add 5ml – 8ml per 1L

Homemade Sambucca – Add 10 ml tsp per 1 L

Homemade Kahlua – 15 ml per 1L

Home made Butterscotch Schnapps – 8 ml per 1L

## **Blending Guide For Newbie's – Controlling flavour of rum and whiskey using cuts**

Any Distiller will tell you if you want to make a really great tasting rum, whiskey or other spirit blending is a skill you must master. There is no right or wrong way to blend your cuts personal preference goes a long way here. Below I've outlined a common way to blending cuts made during the pot still distillation process.

Step 1 – Get 20 – 500 ml canning jars and number them 1 – 20 on the lids

Step 2 – Load your pot still with high wines and fire it up. Using the mason jars collect your run. Be sure to mark the fractions including [Forshots, Heads, Hearts and Tails](#) separately.

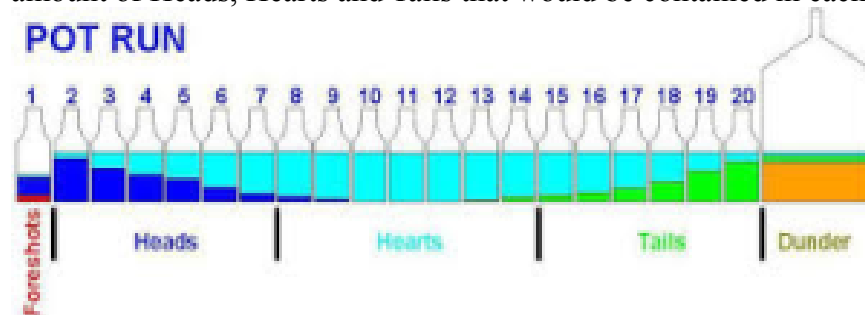
Step 3 – Place a coffee filter over each jar with an elastic keeping it in place and let jars stand for two days. This will allow volatile compounds in your moonshine to evaporate and will make blending easier.

Step 4 – Take small samples of each jar keeping track of where each sample came from and dilute it with water to 40% abv. We do this because the spirit will smell and taste different when diluted so we want to smell and taste it at it's final abv.

Step 5 – Sniff each sample several times, then try each sample. I've made the mistake of drinking the testers in the past. I'd recommend splitting the sample out and rinsing your mouth with water to cleanse your palate.

Step 6 – Make your cuts for Heads to Hearts and Hearts to Tails, using taste and smell.

If you were to divide the pot run up into 20 separate jars the below picture show's you the amount of Heads, Hearts and Tails that would be contained in each jar.



Step 7 – To start blending choose the cleanest section of hearts and pour these jars into a large pot. Then add small amount of heads and tails into your base. Diluting samples and tasting as you go.

Step 8 – Once you are satisfied with the flavor it's time to bottle your moonshine. You can generally expect to keep 40 – 50% of the total volume collected the rest is feints. The feints can be added back into your next run.

Keep in mind if you mess up the blending just toss everything back into the still, add some water and run your pot still again. Practice makes perfect. Don't be discouraged if you're not happy with the flavour after the first time blending cuts. It will take a while for you to pick up the subtle but very important tastes and smells of various cuts. This skill is probably the most important for any home stiller to develop.



Reading and resources

<http://learntomoonshine.com/> - pretty much all you need to know on one site.

<http://www.copperheadstill.co.nz/>