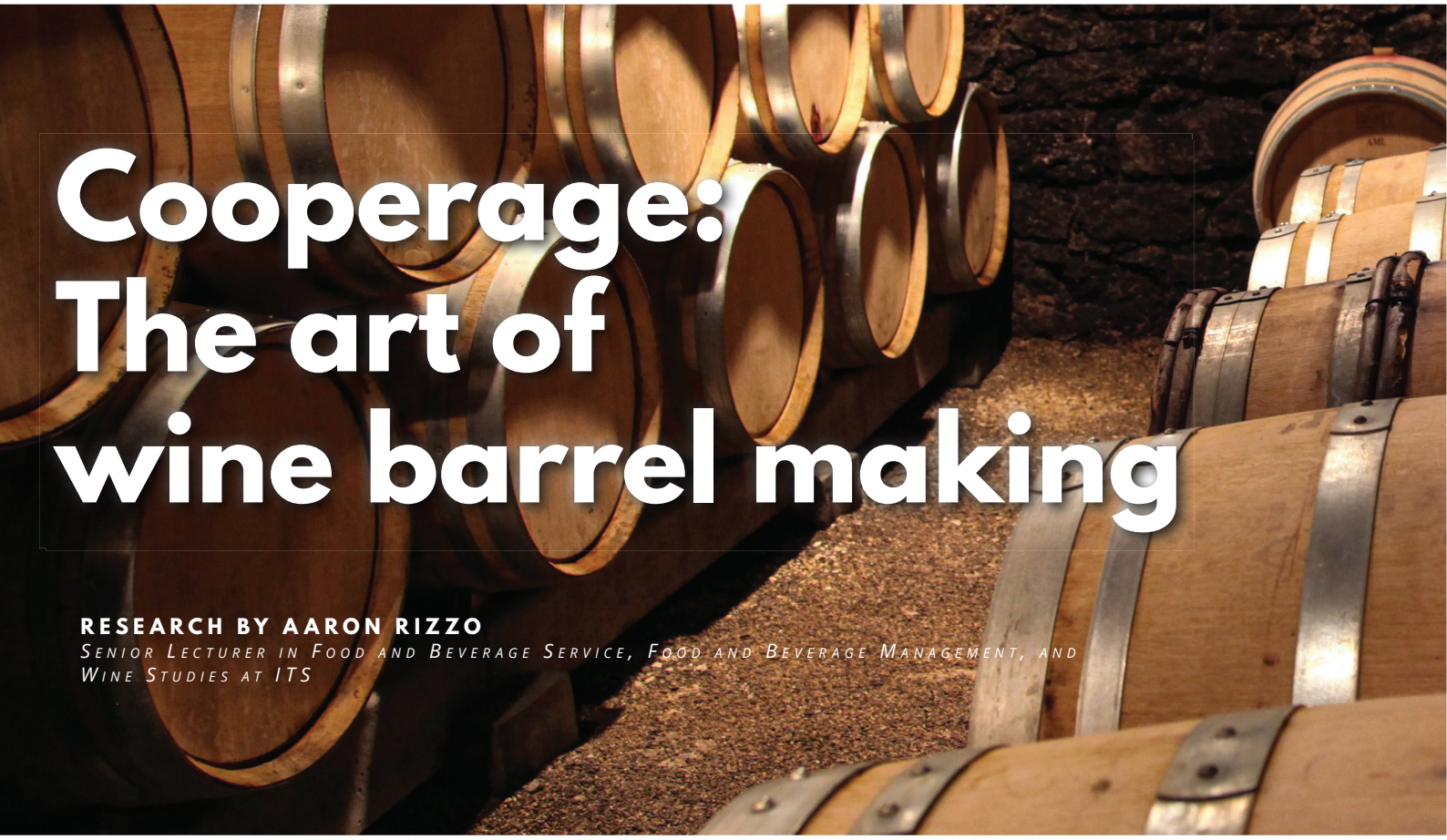

Cooperage: The art of wine barrel making

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This feature is a step-by-step guide to making barrels for cooperage—the art of making barrels. Different criteria are required by different winemakers to purchase barrels depending upon the style of wines being produced. Therefore, a cooper must meet the requirements depending upon the aromas and flavours of the wine. The origins of the wood will also be explained according to the forest regions of France and the different toasting levels available.

Cooperage is known as the practical skill and craftsmanship to make barrels. The cooper is the person responsible in making the barrel by heating the wood with fire, so the inner staves can be bent and made flexible to shape the required barrel. (Wikipedia, 2020) Such craftsmanship is an art-form and a skill that contributes to beneficial effects, aromas and flavours to the wine. There are many different sizes and shapes of barrels (also known as casks) which depend on the cultural aspect of the wine producing region and the style of wine to be produced by the winemaker. Barrels or casks are used for the maturation of several different styles of wines, and for the fermentation of some white wines.

When maturing wine in a barrel, there is a slow oxidation process known as micro-oxygenation. (Kelley, 2016) Wood absorbs oxygen at very small doses so the wine flavours will develop oak flavours known as secondary aromas and flavours. The fruit will develop a dried fruit character with oaky aromas of sweet spices like cinnamon, nutmeg, cloves and vanilla (derived from vanillin found in oak).

Wines with oak will normally have a smoky and toasty aroma due to its level of toasting or heating applied to the barrel. In Bordeaux, France, aromas of cedar wood and tobacco complexity evolve in the wine. The slow oxidation process will impart lots of tertiary aromas of coffee, toffee, caramel, chocolate and nuts (almonds, marzipan, hazelnuts, and walnuts). (Kelley, 2016) For this process of maturation to take place, a cellar is required, either below the ground (called cave) or temperature controlled at ground level (called chai). The temperature must be cool and constant between 10 to 15 degrees Celsius, all year round, from January to December. There must be no drastic fluctuations of temperature as this will speed up the maturation process and the wine will not be able to age for a long period of time. Humidity levels must be kept between 60 – 70%. Less than 60% would heat up the cellar and speed up the maturation process whilst more than 70% would develop unwanted mould and bacteria which could spoil the wine. Bottles fitted with cork must be placed in a horizontal

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position to keep the cork moist and avoid shrinkage and oxidation. Strong lights must be avoided as light can create a lot of heat, and no vibrations are wanted in a cellar as this could disturb its sediment (dead yeast that forms in the bottle after fermentation). (Morgan, 1999)

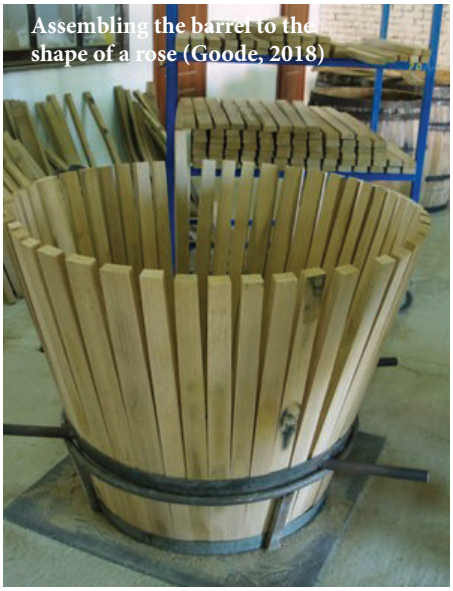
The winemaker will purchase barrels for the style of wine being produced according to different criteria which mainly depend on four factors:

1. The size of the barrel: there are many different shapes and sizes of barrels. The reason being the surface ratio effect on the wine. Smaller oak barrels will have a greater effect on the wine as the surface ratio effect is larger. The larger the barrel, the less surface ratio effect on the wine, but the slower the micro-oxygenation process. The most common used in most wine producing regions is the French oak barrique (also known as the Bordelaise) which is used in the Bordeaux region for the maturation of fine investment red wines. The barrique has a capacity of 225 litres producing 300 bottles of wines, equivalent to 25 cases. There is also the large sized Tonneau with the capacity of four barriques of 900 litres capacity. In the Burgundy wine region, it is called pièce (also known as Bourguigone) with a capacity of 228 litres. An American oak hogshead has a capacity of 300 litres and is widely used in New World countries of USA and Australia. The large sized puncheon has an even bigger size of 500 litres. Even larger is the demi-muid barrel of 600 litres, and the largest of all is the foudre, the standard size being 2000 litres reaching up to 12000 litres. Such large barrels are widely used in Italy (called botte) for both the fermentation and maturation of most Italian wines. (Kelley, 2016)

2. The origin of the barrel: most wine barrels are commonly of European (Quercus robur) or American (Quercus Alba) oak origin. The most common oak in Europe comes from the various French forests which are classified into different regions across the country. The most commonly known forests are from Nevers, Allier, Bertranges, Vosges, Troncais, and Limousin,. Normally, the French oak is more robust than American oak with a finer grain. The French oak is manually cut by an axe whilst American oak is cut by a saw, so there is less wastage of trees to make one American oak barrel. French oak imparts more aromas of vanilla, cedar wood and tobacco whilst American oak provides a sweeter taste and coconut sweet spices. Most winemakers either use French or American oak or a combination of both barrels for an acquired taste or style, or for cost reasons (as American oak is cheaper than French oak). (Nadalie Corporation, 2019)

3. The level of toasting: coopers give different levels of toasting to the barrels by placing a fire in the barrel to toast the inner staves. Different levels are used normally at low toasted (LT), medium toasted (MT) or highly toasted (HT). (Stock, 2019)

Oak barrels in various stages of construction (Goode, 2018)



Assembling the barrel to the shape of a rose (Goode, 2018)

A fire is created to bend the staves and for toasting (Goode, 2018)

4. The age: the newer the oak barrel, the more pronounced flavours will be imparted to the wines including more spiciness and toastiness. The older the oak barrel, the less influence the flavour on the wine. Normally an oak barrel has a lifespan of about four years after which there is risk of cross contamination by bacteria. Therefore, such 5-year-old barrels are either used for marketing purposes or sold to a whisky producer in Scotland for the maturation of cask for finished Scotch whisky.

Premium wines are normally made with new oak barrels as the costs of production can be justified by their high selling price. However, it is the belief of most winemakers that oaky aromas can overpower wine aromas. So the winemaker has to take a decision whether to use oak or not, and to consider the above-mentioned factors. (Nadalie Corporation, 2019) (Kelley, 2016) (Goode, 2018) (Morgan, 1999) (Sogg, 2001) (Stock, 2019)

There are oak alternatives which imitate the micro-oxygenation process such as oak chips or oak staves but will have a very slight influence on the wine and are normally used for wines that are sold at a cheaper price and for entry level style of wines. (Stock, 2019)

The author has visited a tonnelerie (a company making barrels) called Nadalie which is located in the Bordeaux region of France. The oak wood is selected from the French national forestry office keeping all rules and regulations in line with national procedures. The process of making a barrel will be explained in a step-by-step guide of 13 stages, as follows:

STAGE 1: NATURAL CUTTING, SPLITTING AND SEASONING OF THE WOOD

The wood is given an air-drying, natural maturation process starting from the forest and then transported outside the grounds of tonnelerie Nadalie. The natural climatic factors will affect the maturation of the wood and therefore are crucial in the creation of potential aromas and flavours of the wine. The French oak is split using an axe producing a finer grain which contributes to the fine oaky aromas. The staves are produced and left to season outside in the air and exposed to sun, rain, and wind conditions for at least two years. Such conditions will change the wood and release the required complex flavours. This will discard any unwanted tannins (the mouth drying sensation) and therefore reduces its harshness creating aromatic characters in the wine.

STAGE 2: SELECTING THE STAVES: SHORTENING, JOINTING AND FITTING

The master cooper carefully selects each stave by precise visual inspection to produce a barrel. Each and every stave is trimmed on both ends to create a barrique of 225 litres which is then shortened to 95cm. The stave is then given a shape equivalent to a concave (inside) and convex (outside) – a process called dolage. The jointing process will ensure that every edge of every stave will have its desired angle to be joined with the other staves. The fitting process will ensure all staves are sorted into a special machine fitting the staves with the circumference of the barrel. Every barrel needs a stave 9cm wide to drill a bung hole. At this stage, every cask is numbered individually for the identification of the cask.

STAGE 3: ASSEMBLING TO A ROSE

Every cask is assembled together, individually, in the shape of a rose by the use of a special machine. The staves of the barrel must be levelled with the use of a hammer tapping on the ends of the staves.

STAGE 4: BENDING

The cask is placed over a fire. Since a fire has quite a hot temperature, water

is applied to soften the wood that will cause the staves to bend and shape by the cooper using a windlass. This process is done until the required shape of the staves is bent.

STAGE 5: TOASTING

The barrel is toasted by placing it again in the fire at high temperature depending on the winemakers' requests on the level of toasting required. The minimum time required to create an LT (low toasted barrel) is of 20 minutes. This level of toasting will create those smoky and sweet spicy secondary aromas in the wine.

STAGE 6: TRIMMING

This process involves the cutting of a groove or croze at the end of the staves to insert the head part of the cask. The chamfering of the end of the staves is done at this stage (bevelling the edges). The drilling of the bung hole is done at this stage in the 9cm width stave.

STAGE 7: PREPARING THE HEADS

The heads must be sorted according to size, length and width, and assembled with strips of reed between each head. To ensure that all heads are properly aligned, a laser machine is used to ensure assembling precision. (Nadalie Corporation, 2019)

STAGE 8: CUTTING THE HEADS

The heads are cut and chamfering takes place (bevelling the edges to a rounded edge) to be aligned with the staves of the barrel.

STAGE 9: SETTING THE HEADS

A mixture of flour and water is placed in the groove or croze so the heads can be fitted in. this is done using special tools. A tire-fond is used to pull the head from the top part and a tapping-fond is used to lift the head into the croze from the bung hole. The identification numbers, origin, and toasting of the barrel are stamped on the chime (the head part of the barrel) for traceability.

STAGE 10: TESTING AND REPAIRING THE BARREL

Every cask is tested by filling in the barrel with approximately 10 to 15 litres of hot water (normally between 80 – 100 degrees) and with compressed air to increase the pressure inside the cask. The cask is then rolled to observe or discover any leakages and cracks that can be repaired by the cooper. If the barrel does not leak, then it can proceed to the hooping stage.

STAGE 11: POLISHING OF BARREL AND SETTING THE HOOPS (Nadalie Corporation, 2019)

Every barrel is polished using a sanding machine to give the exterior part a fine polish. The heads and the tops of the chimes (the top parts of the staves) have to be polished or sanded physically by a cooper using a very tight sanded grain. Hoops (which have been galvanized to avoid corrosion) are then fitted onto the barrel with a special hydraulic machine. (Sogg, 2001)

STAGE 12: BARREL MARKING AND LOGOS

The markings on the barrel are according to the customer requirements (the winemakers who purchase the barrels) which normally display the origin of the wood forest, the level of toasting required and any other specifications that the winemaker requires. However, a plaque made of brass with logo is nailed onto the barrel showing the cooper who made the barrel. (Nadalie Corporation, 2019)

STAGE 13: PACKING AND LOADING

The finished barrel is wrapped tightly according to strict packaging regulations with all information required by the customer clearly visible. The packaged barrels are stored in a suitable temperature warehouse to be prepared for shipping to the customer or winemaker. (Nadalie Corporation, 2019)

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