How Steel Is Crucial to Champagne Making

From the mechanization of the bottling and storage processes, to the steel caps and cages that help keep the wine fresh and give it its iconic look, steel plays a vital role in champagne production.

The unique and intricate process of opening a bottle of champagne is instantly recognizable and is something likely everyone has seen at some point. Fewer might know, however, that the iconic metal cage that must be removed before the cork can be popped is called a muselet and that each and every one is made from 100% steel.

“The muselet isn’t merely an advantage, it’s a necessity,” says Françoise Peretti, director of the Champagne Bureau UK and spokesperson for the industry. “For the past 174 years and still unrivaled, the muselet has been pivotal in keeping champagne’s precious effervescence in the bottle. Without the muselet, there wouldn’t be any champagne.”

So, what is this industry essential and why is steel the material of choice? In essence, the muselet is a small wire cage designed to secure a cork in the champagne bottle and keep it sealed against the pressure of its carbonated contents until it is opened for drinking.

Originating from the French word museler — to muzzle — these cages are comprised of three distinct parts assembled into a single piece, including a lower ring, four wire legs and a metal circular cap which may show the name, emblem, logo or creative design of the producer. Each muselet is mechanically fastened onto a cork and traditionally covered with a branded foil hood or capsule known as the plaques de muselet.

Muselets perform a vital role in the production of champagne and are key to ensuring the quality of each bottle, so much so that they will have been used to seal almost every one of the 307 million bottles produced.
in 2017, as well as on the estimated 1.3 million bottles held as stock, according to official statistics released by the Comité Champagne. That’s an average hourly production of more than 35,000 muselets, 24 hours a day, all year long — and this is just to satisfy demand from champagne houses, not the other sparkling winemakers, and beer and cider producers also using steel muselets around the world.

**An Essential Element**

It’s the raw material of mild steel — a type featuring no more than 2% carbon and with no other appreciable alloying element — that is key to the muselet’s success. Also known as low-carbon steel, it is strong and easily worked, as well as affordable, contributing to making the muselet so practical, efficient and widespread in its adoption.

“Muselets have to be pressure resistant for safety but they also have to be elastic enough to be shaped, hygienic and anti-corrosive — steel is the essential material,” says Dominique Deneuville, head of production at Champagne Taittinger, a family-owned business headed by third-generation producer Pierre-Emmanuel Taittinger.

According to the Grandes Marques & the Maison de Champagne (Champagne Growers’ Union), each muselet “must allow for the easy twisting and untwisting of the lower ring with no risk of breakage when the bottle is opened.” Irrespective of the size of bottle being opened, this process requires a very precise six half-turns of the twisted wire to loosen and release each muselet.

The wire must also “be supple when drawn but with a tensile strength of more than 300 N/mm²” and be able to “withstand the pressure inside the bottle which is measured at six bar or between five and six atmospheres” — twice as high as in a tire and the equivalent to more than 5 kg of weight on every square centimeter of glass. This translates to the potential cork expulsion of a vigorously shaken bottle of champagne at 40 km per hour and theoretically up to 100 km per hour for an unshaken bottle left out in the sun — a fact discovered by German scientist Friedrich Balck of Clausthal University of Technology, who registered the speed in 2008.

There are four main advantages that make steel the material of choice for the champagne industry. It’s cheaper than brass or copper and has a better lifetime and mechanical properties. It also has excellent elasticity to resist the many twists needed for muselet production and has strong mechanical resistance; maintaining the cork despite the pressure inside the bottle.

Deneuville specifically credits the resistance of steel with the champagne house’s ability to maintain consistently quick bottling lines that sees approximately 6,000 bottles processed an hour. “It’s thanks to steel that we’re able to fulfill that function,” he says.

**An Historic Development**

Historically, the earliest attempts to maintain the pressure inside a champagne bottle involved wooden plugs wrapped in oil cloths and sealed with wax; later cork stoppers were secured to the bottle with simple hemp string formations, which were fastened by hand. However, both methods soon lost favor due to their inconsistency and the amount of spoilage that resulted.

In 1844, Adolphe Jacquesson was the first to incorporate a steel plate between the top of the cork and its ties, balancing out the forces on the cork and preventing the string from becoming embedded in the corks under pressure. The addition of a metal fastener, and then a
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Making a Mark

“What started out as a functional closing device has grown into a true collector’s item and are much sought after around the world,” says Peretti. Not only can the wire cage itself be customized in terms of color-lacquered steel wire, but the capsules themselves are a constant source of house creativity, identification and celebration. Champagne Taittinger, for instance, has a specific muselet for each of their champagnes — pink for its rosé, purple for their sweeter Nocturne style and grey for its Brut Reserve cuvées.

The ability to have customized caps, and to maintain constant stocks of muselets, is essential to Deneuville, especially considering the annual production of Champagne Taittinger totals approximately 6 million bottles, with an eventual sales target of 7 million.

“We use two muselet suppliers — the France-based Le Muselet Valentin and Spanish ICAS — to ensure we always have enough raw materials to fulfill orders. For us, the buying criteria is based on quality, price and servicing. We need to be able to fulfill orders when they come in so our supplier nearby in France is convenient, but for instance only one of our suppliers produces a particular color cap for us.

“For the marketing department, our caps are very important as a means of communicating information to our consumers,” he says.

The specific steel grade used for these discs, which are made to measure and personalized using different printing techniques to make them a unique identifier for each brand, is particularly suitable due to its many qualities. This steel is anti-corrosive — a necessity for products in contact with any alimentation and stored in underground cellars, having an excellent resistance for stamping — an important part of the disc production, and is perfectly suited for coating and printing.

But steel isn’t just used for bottle tops — it can be found scattered all along the 200 km of underground chalk tunnels beneath the Champagne region, playing a pivotal part in the mechanization process of production. Steel is the material of choice for gyropalettes — special remote-controlled metal cages filled with bottles, which are used in their thousands, to replicate and speed up the traditional method of moving the sediment from one end of a bottle to the other by hand on a mass scale.

Roughly 35,000 muselets are produced every hour for the champagne industry.

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