GUARDIAN ANGEL®

Dry Fog by FreshTech SOLUTIONS

Reducing Product Loss and Optimizing Barrel Storage Conditions for Wineries, Breweries, and Distilleries

distributed by:

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Overview

Wine barrels are porous, allowing for wine to breathe and micro-oxidize (aka age), however this also results in evaporative loss or 'Angel's Share'. Over time this volume of product loss can be quite significant. Additionally, this creates headspace within the barrel which may cause oxygenation and microbial infection of the wine. Aside from the detrimental affects to the wine, low humidity also affects empty barrels in storage as dry wood will split and crack, resulting in leaky and compromised barrels.

Dry Fog technology from FreshTech creates humidity levels to suit your wine barrel storage needs. The 1-3 Micron water droplet in fog has shown to be the best possible way to reduce product loss in wineries, all without using an excessive amount of water.

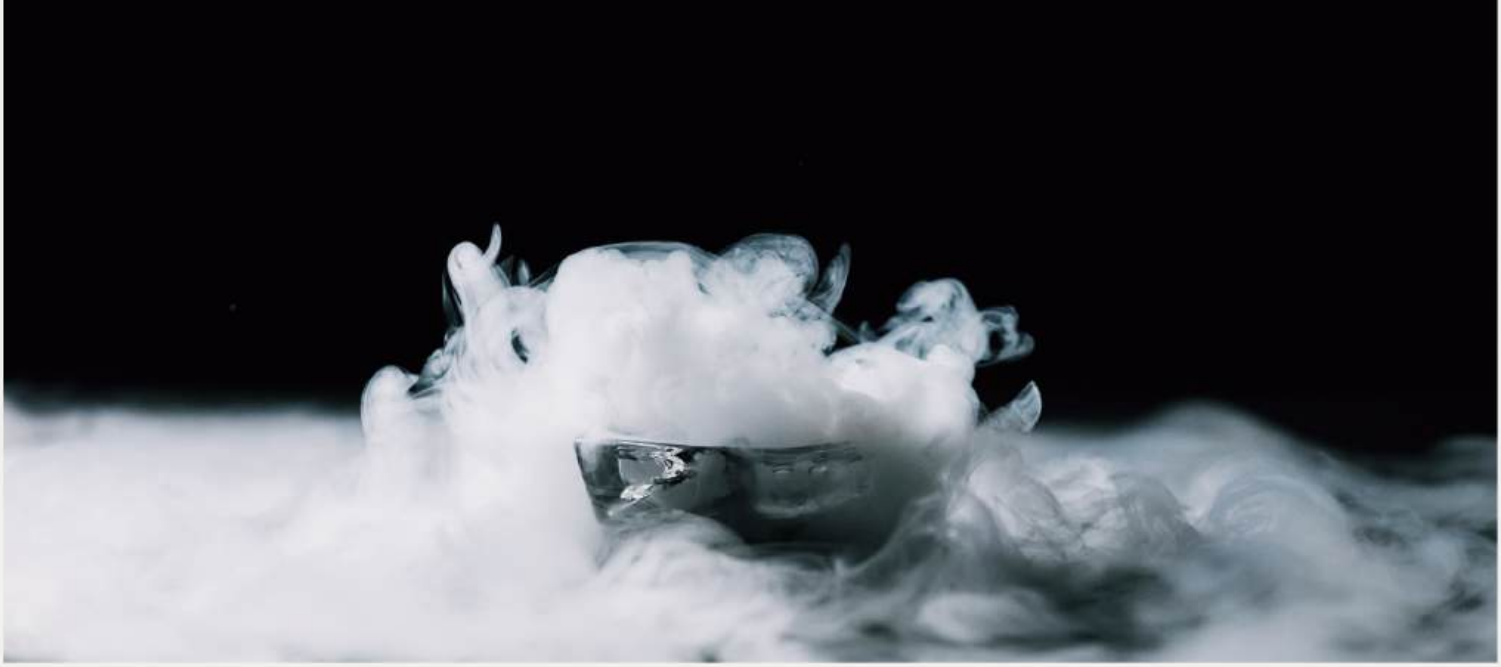
Dry Fog is able to achieve an ideal relative humidity of at least 70%. Several case studies included in this presentation conclude that the savings in product loss at this range of humidity are significant.

FreshTech Solutions is your source for a comprehensive program to reduce product loss in your barrel rooms! Our staff will work directly with your team to provide a customized solution for your facility to achieve the best possible results.

How it Works

Dry Fog from FreshTech utilizes ultrasonic nebulization technology to create a super small water droplet. The resulting fog sits at the same molecular weight as air, allowing the water to permeate every surface in a given space.

Step 1: Filtered Water	Water passes through a 5 stage reverse osmosis filtration system that includes UV. This ensures supply of clean, sanitized water.
Step 2: Nebulize	Ultrasonic sound waves break up the water into super small droplets less than 2 Microns in size.
Step 3: Saturation	Fog saturates the space from ceiling to floor, creating **consistent** humidity to the cellar space.
Step 4: Reduce Evaporation	The moisture created by the fog permeates the outer layer of the wine barrel, causing them to swell and eliminate cracks and pores.



Evaporation Cost

Evaporative loss costs wineries thousands of dollars every year. The average winery will lose up to 7-12% of product annually. That's roughly 2 cases of wine per barrel. In addition evaporation creates headspace in the barrel which leads to the proliferation of microbes that spoil wine. Here are some common culprits:

Acetobacter	An acetic acid bacteria that will turn wine into vinegar. It feeds on the oxygen in the headspace of the barrel.
Candida mycoderma	A white film that forms on barrels with headspace. Oxidizes and spoils wine.
Brettanomyces	Exposure to oxygen binds the sulfur in wine. Low sulfur results in proliferation of this spoilage yeast.

Preventing barrel headspace created by evaporative loss requires humidity or topping. Topping costs a lot in both product and labor!

Seguin Moreau

Dry Fog technology is not a new concept. It has been around for years, primarily utilized in European grocery stores to keep produce fresh. The French were the first to realize its potential in wine. Go figure.

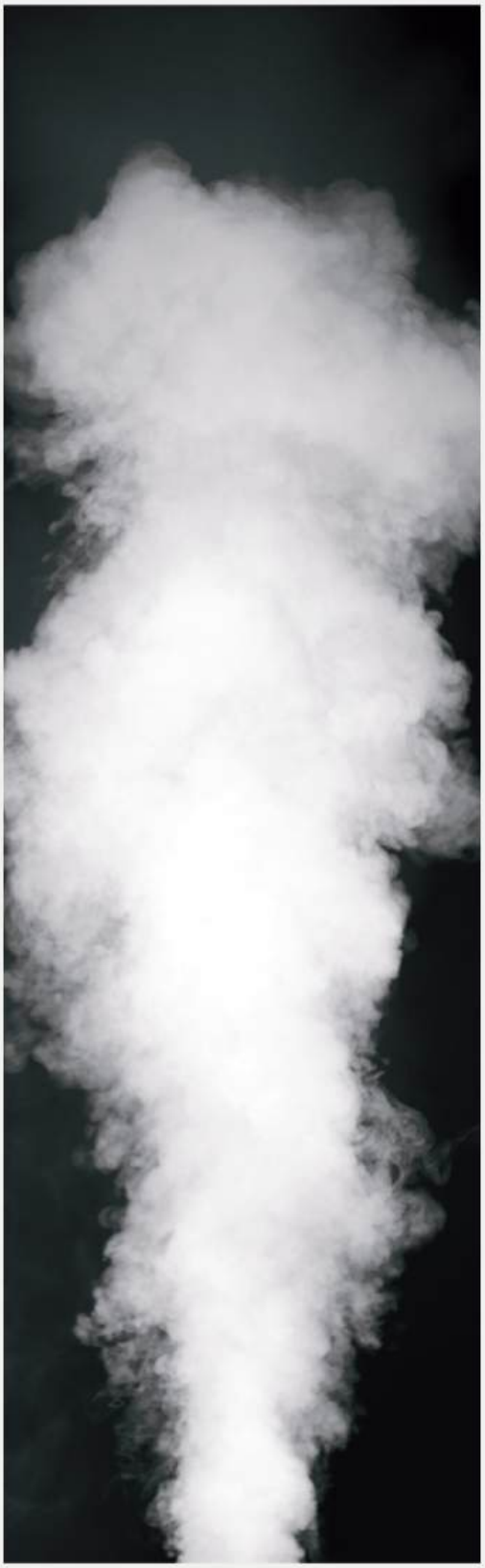
After providing incredible results, Dry Fog made its home in one of the most prodigious wine regions of the world: Bordeaux.

Our friends at Seguin Moreau utilize Dry Fog to ensure the viability of their barrels in storage and have conducted a case study demonstrating it's efficacy in wine production. They found that barrels treated with Dry Fog required **2.62 Liters/Barrel** per year whereas non Fogged barrels took **6.82 Liters/Barrel** per year.

They were able to definitively show that Dry Fog can prevent up to three times the expected evaporative loss. That's a lot of fine Bordeaux wine staying out of the air and in the barrel.

Wineries in France using Dry Fog

- *Möet & Chandon*
  Champagne
- *Château Margaux*
  Bordeaux
- *Château Mouton Rothschild*
  Bordeaux
- *Vieux Château Landon*
  Bordeaux
- *Château d'Yquem*
  Bordeaux
- *Château La Clotte*
  Bordeaux
- *Château Latour Martillac*
  Bordeaux
- *Château La Grace Dieu*
  Bordeaux



Dry Fog Versus Misting

There are other products on the market providing humidification services to wineries. By and large, these are MISTING systems. The difference being they use high pressure to force the water through a nozzle, creating a small water droplet.

There are several disadvantages with these systems. They use a lot of electricity to create the pressure, and they go through a lot of water as well. Furthermore the resulting water droplet is much larger, sometimes up to 200 micron. So lines with nozzles need to be run across the ceiling of the building to distribute a light rain that collects in puddles around the winery. It's an expensive install, and the nozzles are known to clog.

Compare this to the clean, filtered, small droplet dry fog which uses far less water and no noisy air compressor. It's not even in the same league.

Jacob Williams Winery

A 33-day trial was conducted at Jacob Williams Winery comparing the difference in volume required to top barrels stored in a standard barrel storage room compared to one fitted with Dry Fog technology.

Room 1- Control room with no Dry Fog. Average temp: 21.1 Celsius. Average relative humidity 55%

Room 2- Dry Fog installed. Average temp: 18.3 Celsius. Average relative humidity 70%

Room 1 - Control Room		Room 2 - Dry Fog	
Barrel Number	**Milliliters Topped**	**Barrel Number**	**Milliliters Topped**
A2	1450	B1	650
A3	1275	B3	1900
A4	1850	B4	1100
A5	1700	B6	1000
A6	1550	B7	1050
A8	1700	B8	800
Total	**9525**	**Total**	**6500**
Average	**1587.5**	**Average**	**1083.3**

Average difference per barrel: 504.2 milliliters over 33 days period, a 32% reduction in wine loss, extrapolating this to a full year that is 5,576 milliliters saved per barrel, equivalent to over 7 x 750ml bottles of wine.

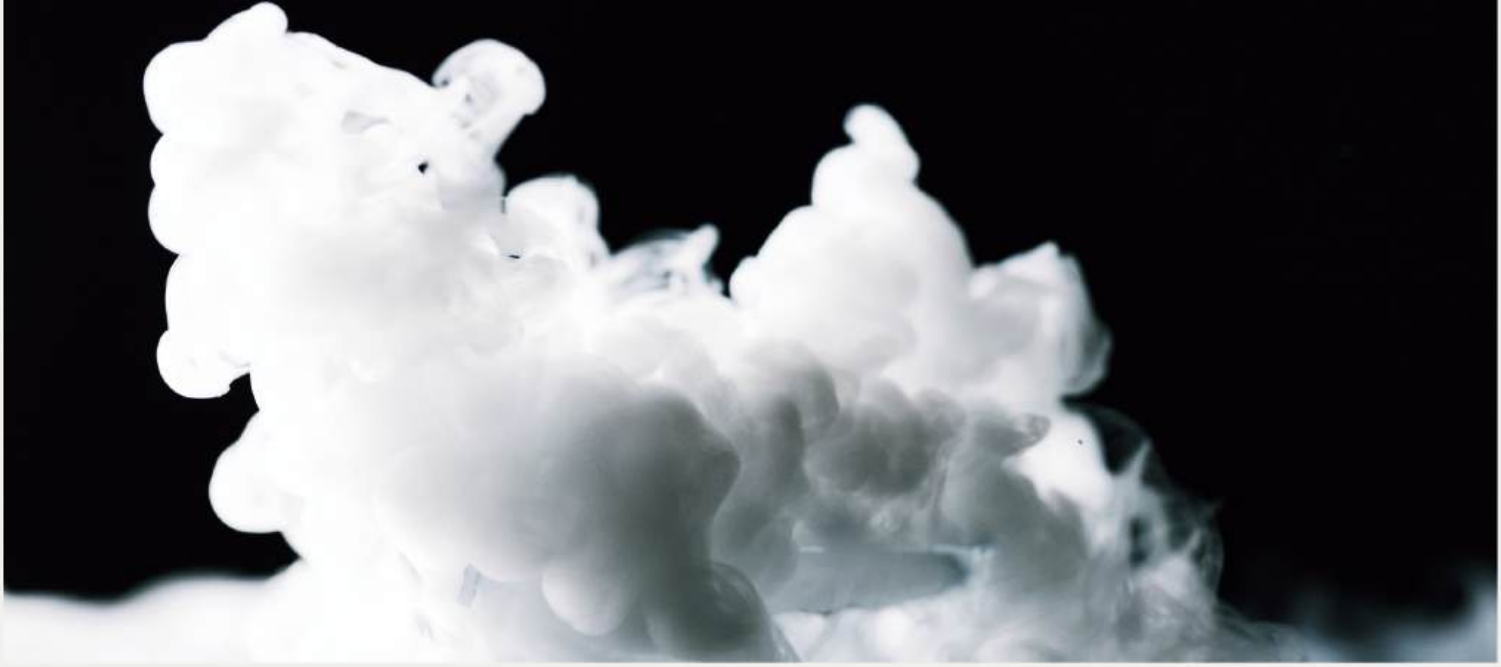
IN A 204 BARREL CELLAR, AT $30 PER BOTTLE THAT IS AN ANNUAL SAVINGS OF $50,400!

Adiabatic Cooling

There is another benefit Dry Fog and this comes in the form of Adiabatic Cooling. In simple terms, adiabatic cooling is the process of reducing heat through a change in air pressure caused by volume expansion. This is a technique already at use in numerous industrial applications as it is a very energy efficient means of cooling a space.

Dry fog, through its impact on the relative humidity of a space, effectively will cool a cellar down anywhere from 5-10 degrees Fahrenheit. The case study done at Jacob Williams showed a 5 degree difference between a cellar with Dry Fog and one without.

Energy costs are high, and cooling a cellar down to 55 degrees can be expensive. Dry fog will not only save a winery thousands of dollars of product loss, but also keep the energy bill low during the hot months.



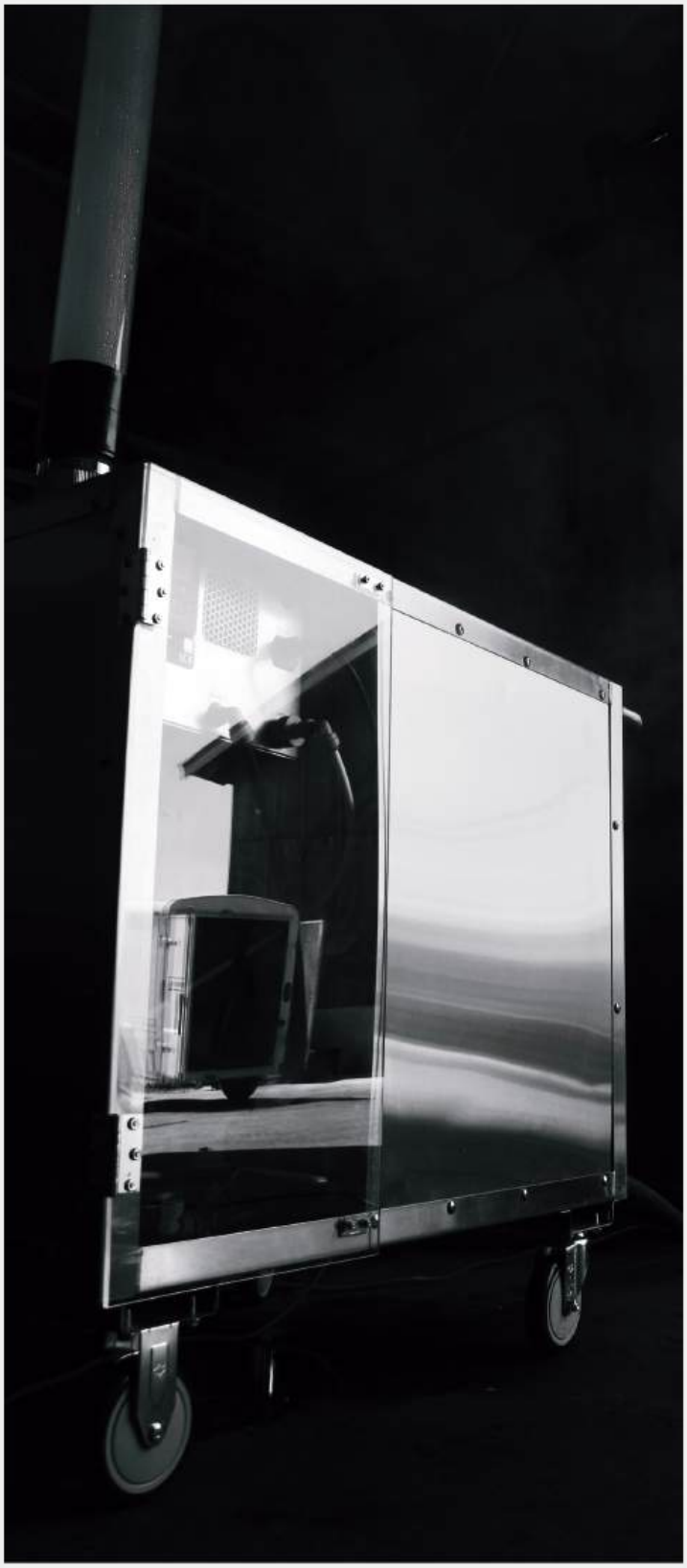
Sanitation Protocols

So Dry Fog can prevent evaporative loss, maintain barrel integrity, cool the cellar, and generally save wineries a lot of money. What else can it do? Well in fact, it can also sanitize the cellar. By using the fog as a vector, the team at FreshTech aim to provide numerous adjuncts that will effectively give winemakers control over the biome of there cellar. Here are some candidates.

Peroxide	Trace amounts of peroxide mixed into solution will effectively sanitize a space. Currently FreshTech employs it in grocery and hospitals.
Chitosan	A product already used in wine application, when nebulized will kill Brettanomyces.
Pyrethrin	A product commonly used to kill fruit flies

Dry Fog is ideal for spreading these adjuncts in the cellar and ensuring that every cubic millimeter of space is exposed. No more spoilage organisms in the air. No more fruit flies spreading bacteria. It cannot be misted without clogging the system. Only Dry Fog can do it!

Guardian Angel®



The Guardian Angel by FreshTech represents the latest innovation in Dry Fog systems. Encased in a stainless steel housing with a built in reverse osmosis unit, this mobile cart can be wheeled into any room and provide instant fog.

It comes with a state of the art ultrasonic nebulizer as well as a batch mixing tank so that whatever adjuncts are chosen can be applied readily to any room in the facility.

The folks at FreshTech are dedicated to giving winemakers the tools they need to bolster the efficiency and sanitation of their production facility.

Who We Are

Jim Aamodt and Austin Culver are two peas in a mostly functional, always interesting pod.

Jim got his start in grocery back in the day. You know the mist that goes over produce? That was him.

Austin has been in wine his whole life from farming to production to front of house. He owns and operates a small label out of White Salmon, WA.

Frank Bakker, or the "Fog Father" as we know him is a pioneer in the world of Ultrasonic Nebulization.

Frank was the first in the world to adapt humidification technology to preserve the shelf life of fruits and vegetables.

For more than 40 years, Frank has overseen over 35,000 installations of this technology around the world in grocery stores, refrigerated storage, and of course, Wineries!