

Wine

Spinning Cone Column Application Bulletin 1-01-1306



The Spinning Cone Column (SCC) is an efficient and versatile wine-making tool that has been commercially and successfully applied in wineries for over 10 years. Over this period a number of specific wine-making applications have been developed, giving the winemaker unprecedented control over both flavour and alcohol levels in the final product. In addition the same technology can be used to recover flavour from grape juice, desulphite single strength grape juice, remove unwanted flavours and to recover useful flavours and alcohol from waste streams.

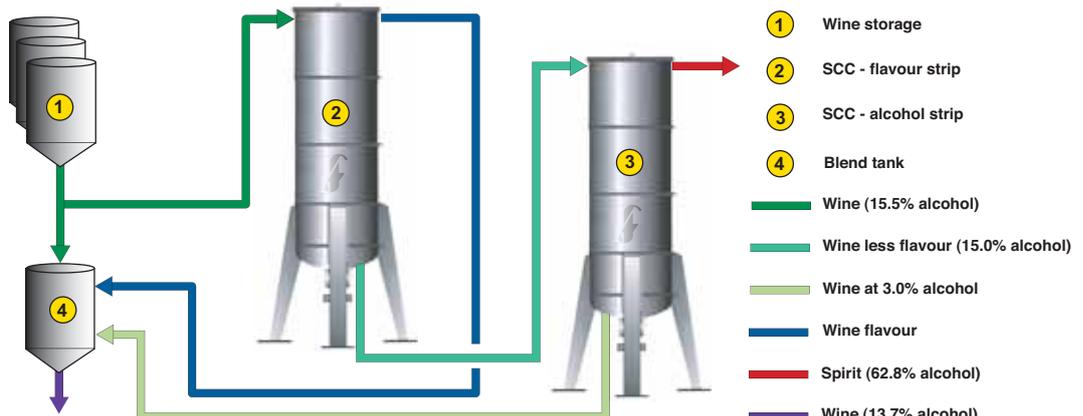
Key benefits of the Spinning Cone Column technology are:

- **Adjustment of alcohol content** in full-strength wines without flavour loss or damage (in fact, flavour impact is increased!).
- **Production of low or reduced alcohol wines** while retaining varietal wine flavours.
- **High quality spirit** is produced as a by-product of alcohol removal or other processes.
- **Energy efficient desulphiting of grape juice** to less than 10ppm total SO₂.
- **Recovery of flavour and alcohol** directly from solids-containing streams such as marc or yeast slurry.
- **Versatility and flexibility** in the wine making process.

Spinning Cone Columns have been installed in wineries around the world increasing profitability by adding value throughout the wine making process.

The Spinning Cone Column

The SCC is a uniquely efficient counter-current liquid-gas contacting device, i.e. a distillation or stripping column, that belongs to the same family of mass transfer devices as packed, plate and bubble-cap columns. The SCC is unique in its use of gentle mechanical forces to enhance inter-phase contact. This allows the rapid, efficient and cost-effective separation



Alcohol reduction using the SCC in a two pass process



SCC 10,000 in a Californian Wine Facility.

of volatile compounds such as aroma and alcohol from a thin-film liquid system. The SCC can process thick, viscous slurries containing high levels of suspended solids just as readily as it can clear liquids without damaging the recovered flavour or the treated product.

Further details regarding the operating principle of the SCC may be found at www.flavourtech.com

Alcohol Adjustment – Full Strength Wines

The Spinning Cone Column is widely used to increase the ratio of flavour to alcohol in wines that without such adjustment are considered to be excessively “hot” - a condition associated with alcohol levels that are too high. The wine is processed in two stages; the first stage involves the recovery of all of the volatile flavour at

low temperature from a portion of the batch of wine to be treated. Most of the alcohol is then removed from the deflavourd wine in a second stage. This alcohol will typically be recovered as a clean spirit at 50 to 60% ABV that, if desired, can be rectified to a higher strength.

The removal of alcohol typically results in an overall reduction of final strength between 1 and 2% ABV when the treated wine is blended with the untreated wine from the same batch. All of the flavour is then returned to the wine thus producing a finished product with all the original flavour, but at a slightly lower alcohol content. Adjustments from 15 to 16% ABV down to 13 to 14% ABV produce wines with more perceived fruity and light characters and the moderation of the “heat” associated with high alcohol content.

Alcohol Adjustment - Reduced Alcohol Wine

For a variety of reasons, markets for several categories of reduced alcohol wines ranging from 1% to 10% ABV are expanding. Underpinning this growth is the ability to produce products which retain all of the desired flavour of the original full strength wine.

By varying the conditions used in the two-stage process described above, it is possible to produce wines across a complete final alcohol range that retain all of the volatile flavour. Careful selection of the starting wine and the SCC operating conditions by the wine maker combine to ensure that a high quality of finished product, previously unattainable, can be achieved.

Flavour Management of Grape Juice

Just as volatile wine flavour can be recovered using the SCC at any desired point once the fermentation has started, it is also possible to recover aroma from grape juice prior to fermentation.

The recovery of grape juice aroma may be considered for a number of reasons. It may be desirable for juice aroma to be added to the fermenting wine towards the end of the fermentation or after fermentation is completed in order to produce a wine with a particular aroma profile.

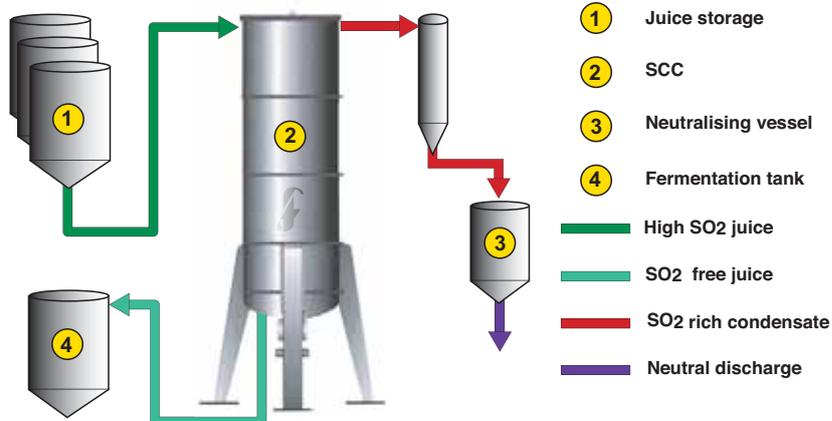
Alternatively, if the production of the very best concentrated varietal grape juice is desired then it is imperative that the characteristic aroma of the starting juice be recovered efficiently and at high concentration, while avoiding damaging rectification processes. As one example, the SCC is used by a number of juice processors to produce very high quality Muscat concentrate whereby the Muscat aroma is recovered from the juice, without damage, prior to concentration of the juice. The aroma that is recovered in a single pass of the juice through the SCC is returned to the concentrate to produce a finished concentrate with fresh Muscat flavour of exceptional quality.

Desulphiting Grape Juice

If fermentation or evaporation capacity is limited for a particular winery or juice processor such that juice must be stored for a period of time, considerable economic savings can be gained by storage of sulphited single strength juice

at ambient temperature compared to the alternative of refrigeration.

The potential disadvantage of storing sulphited juice is that before further use the sulphur must be removed. Conventional stripping columns such as packed, plate or bubble cap columns



Desulphiting Process using SCC

have traditionally been used to remove the sulphur. However, the heat damage that occurs to the juice due to the residence time profile in such devices is highly detrimental to juice quality and usually imparts burnt or cooked notes to the juice.

Use of the SCC for desulphiting avoids this problem as the extremely short residence time within the SCC minimises thermal degradation. Further, the cleanability of the SCC also prevents undesirable characters being transferred to the juice as a result of inadequate cleaning as is common in some conventional desulphiting systems.

The SCC can also be used to recover aroma from the grape juice prior to sulphiting. This aroma can be stored separately, under optimum conditions, and added back to the juice after desulphiting.

Recovery of Alcohol or Flavour from Waste

Throughout the winemaking process a number of waste streams are produced that can contain useful volatile flavours and/or alcohol. The recovery of such flavours or alcohol offers opportunities for use either within the winery or by another party. For example the valuable flavours of certain grape varieties, including Muscat, are lost within the discarded skins after pressing. The unique ability of the SCC

to process streams containing high levels of suspended solids enables the recovery of such volatiles by processing a slurry of skins directly through the SCC.

Further, the SCC can be used to recover high strength alcohol and flavour

directly from tank bottoms at the end of fermentation and fining processes. Such a feed stream contains a high content of settled yeast, however the ability of the SCC to process high suspended solids feed streams makes it possible to recover the alcohol from this yeast by processing it directly through the SCC. This approach eliminates alcohol losses associated with wet yeast and also reduces the effluent problem associated with spent yeast.

Models

Two basic models of SCC are available; the SCC 1,000 and SCC 10,000. Nominal capacities for typical winery applications are given in the table below. If capacities greater than that obtainable on the largest single column (SCC 10,000) are required then plants are constructed with parallel columns sharing feed, discharge, condensing and control systems, resulting in higher capacity plants such as the SCC 10,000-2 (included in the table below). Maximum capacities will depend on the specific operating conditions required to achieve the desired result.

Model	Nominal Feed Capacity Flavour Recovery Mode (L/hr)	Nominal Feed Capacity Alcohol Removal Mode (L/hr)
SCC 1,000	800	200
SCC 10,000	8,000	2,000
SCC 10,000-2	16,000	4,000



Contact details are continually updated on our website. Please visit: www.flavourtech.com

Flavourtech is an Australian based company specialising in innovative process technology, particularly thin film distillation and concentration systems. Technologies include:

- Centritherm® Evaporator
- Spinning Cone Column
- Integrated Extraction System
- Rotating Disc Column

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