



PRODUCT GUIDE:

THE SPINNING CONE COLUMN

Natural aroma recovery and extraction starts here



OUR STORY

Established in 1987 and headquartered in Australia, Flavourtech is a designer, manufacturer and exporter of innovative natural aroma and flavour recovery technology solutions for the food and beverage industries.

Since our original quest to develop a way to remove sulphur from grape juice in the wine making process, Flavourtech has revolutionised the taste, smell and quality of food, beverage and health products consumed around the world every day.

The versatility of our flagship product the Spinning Cone Column (SCC), was quickly realised and its use has spread to the recovery of natural flavours from fruit and vegetables; the processing of tea and coffee for instant and Ready-To-Drink (RTD) products; the production of low and zero alcohol wine and beer; and the deodorisation of milk and cream in the dairy sector.

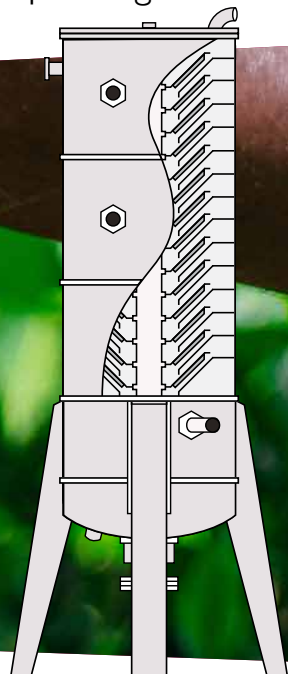
Today, with a portfolio of technologies that span aroma recovery, extraction and evaporation, Flavourtech exports to over 60 countries around the world, serviced by our global network of offices, distributors and agents. We employ only the most highly skilled engineers, technicians and support staff, who share our unwavering focus on innovation, quality and client service.

FLAVOURTECH AND YOU - WHY WORK WITH US?

- 💧 Our technology is like nothing else on the market. It is known for its ability to recover superior flavours and extracts, while maintaining the natural characteristics of the raw material
- 💧 Insights, ingenuity and strategic research and development partnerships allow us to offer customised flavour and aroma solutions that will differentiate your product from your competitors and deliver significant returns on investment
- 💧 While helping to improve systems and reduce production costs, our technology can also be adapted across multiple industries, enabling you to increase profitability by diversifying product offerings

INSIDE THIS PRODUCT GUIDE:

Spinning Cone Column

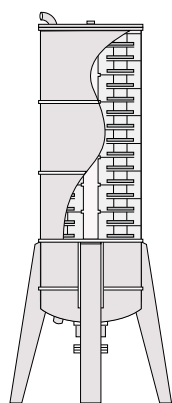


APPLICATIONS

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OUR OTHER TECHNOLOGIES:

Rotating Disc Column



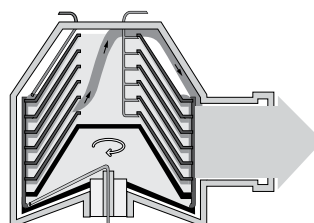
BEST FOR:

High temperature extraction
for instant coffee

Continuous reaction
processes

Continuous mixing of liquid/
solid mixtures

Centritherm® evaporator



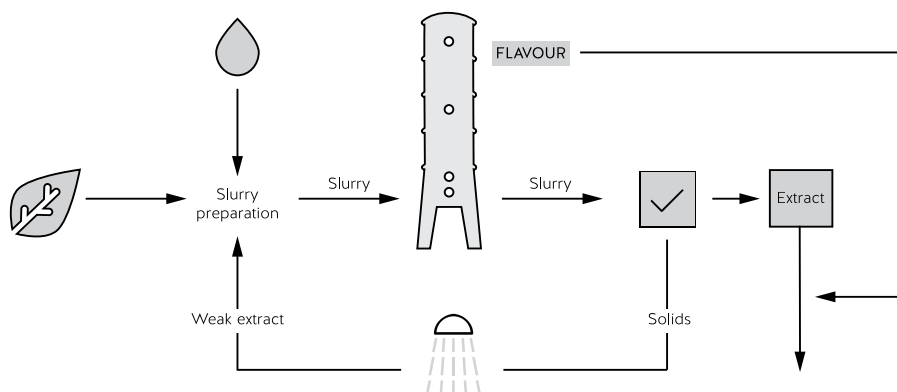
BEST FOR:

Premium tea, coffee, fruit
and vegetable concentrates

Concentration of vitamins,
enzymes and other active
ingredients

Solvent removal

Integrated Extraction System



BEST FOR:

Aroma recovery, extraction
and concentration for instant
and RTD tea and coffee

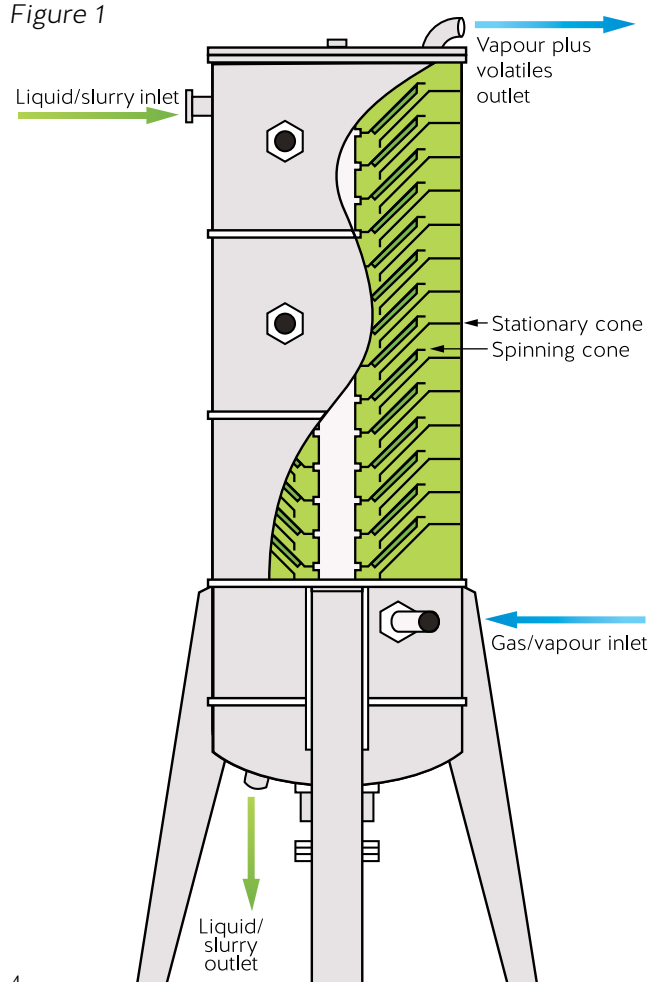
THE SPINNING CONE COLUMN: REVOLUTIONISING FOOD AND BEVERAGE PROCESSING

The Flavourtech Spinning Cone Column (SCC) has transformed how flavours and aromas are recovered and extracted, using a chemical free process that employs only steam under vacuum. This natural process is far gentler than standard extraction techniques, enabling our equipment to better capture aromas and flavours – naturally.

By utilising short residence times and the ideal operating temperature for each product, the SCC is able to recover superior flavours, aromas and extracts while at the same time maintaining the natural characteristics of the raw material. The result is a more exceptional, premium end-product that provides you with a competitive market advantage. Equipped with state-of-the-art control and automation, the SCC operates as a continuous processing system, maximising operational efficiency and factory uptime.

Offering flexibility to suit the varying capacity and throughput needs of our customers, we have designed three different sizes of the SCC: the Mini-SCC, the SCC 1,000 and the SCC 10,000, which are detailed on page 7. The SCC can be designed to process clear liquids, viscous products, such as fruit pulp and purees, or provide the **unique ability to process suspended solids, such as ground coffee bean or milled tea leaf mixed with water**. Pumps, heat exchangers and internal column design are customised to offer the best solution depending on the product being processed.

Figure 1



COMMON SCC APPLICATIONS INCLUDE:

- 💧 Aroma recovery during instant coffee production
- 💧 Simultaneous flavour and soluble solids extraction from coffee and tea for RTD beverages
- 💧 De-alcoholisation and alcohol management in wine, beer and other alcoholic beverages
- 💧 Extraction of natural essences from fresh fruit and vegetables
- 💧 Essential oil extraction from botanicals, herbs and spices
- 💧 Aroma recovery during production of fruit and vegetable juices and purees
- 💧 De-oiling of Not-From-Concentrate citrus juices
- 💧 Deodorisation of cream and flavour management of dairy products

SCC: KEY BENEFITS

-  **NATURAL**
Natural, chemical-free process, where only pure steam is in contact with the product thus meeting the needs of consumers seeking nutritious and natural solutions
-  **COMPLETE**
Low thermal impact allows fresh, natural aromas and flavours to be captured undamaged, and used to enhance your final product or sold separately
-  **SLURRY CAPABLE**
The ability to process slurries allows flavour recovery to be as close to the raw material as possible, instead of it being compromised by damaging thermal and mechanical processes
-  **FLEXIBLE**
Flexibility to process various products and throughputs in the one system
-  **TAILORED AROMAS**
User-friendly system that allows you to easily tailor the recovered aroma profile to your customers' flavour preferences
-  **EFFICIENT**
Continuous, automated processing that delivers superb operational efficiency and maximises factory uptime
-  **CONTINUOUS**
The ability to continuously obtain natural aroma while at the same time extracting soluble solids from tea and coffee for the production of RTD and Instant beverages



SCC: HOW IT WORKS

The SCC is a vertical, stainless-steel vessel with a central rotating shaft. It contains a series of alternating spinning and stationary cones; the spinning cones are attached to the shaft, and the stationary cones are fixed in place within the column (see figure 1 on page 4 and figure 2 below).

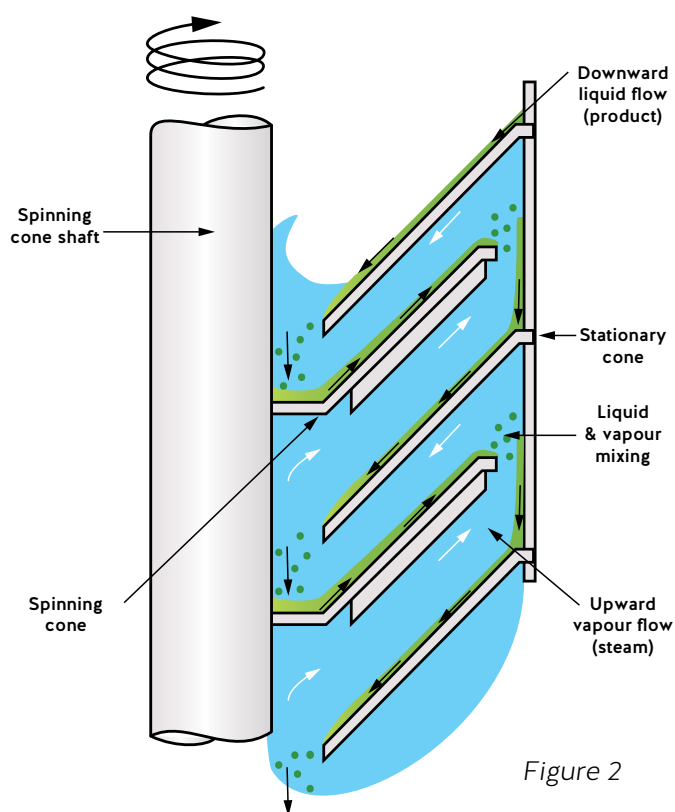
The feed material is pumped into the top of the column, flows down the first stationary cone and onto the base of the spinning cone immediately underneath. Centrifugal force generated by the spinning cone then creates a thin liquid film that flows upwards and outwards across the upper surface of the cone, and falls onto the stationary cone below (see Figure 2). This repeats over the 20 sets of cones in the SCC before exiting at the bottom of the column.

At the same time, steam is introduced to the base of the column and flows upwards, separating the volatile compounds, such as aromas and flavours, from the product. Fins on the underside of the spinning cones promote turbulence in the vapour stream, increasing mass transfer efficiency.

The vapour, which is now steam mixed with volatile compounds stripped from the feed material, flows out of the top of the column and is condensed and captured in liquid form. The low operating temperatures and short residence times within the SCC ensure that these recovered aroma compounds are undamaged.

Importantly, the temperature and flow rate of the steam, as well as the temperature of the feed material, can be controlled, allowing different aroma profiles to be captured to meet the needs of different markets and products.

As the time within the column is only 30 seconds, the dearomatised liquid (or slurry) pumped out of the bottom of the column has minimal to no heat damage, ensuring active ingredients, such as polyphenols, vitamins and antioxidants, are retained thus adding further value to the final product.



TAILORING CAPACITY TO YOUR NEEDS

Through its clever design, the SCC can be configured to process a wide range of feed rates without compromising performance.

The maximum nominal capacity for the SCC when processing a water-like product is:

- 💧 **100 litres per hour for the Mini-SCC**
- 💧 **1,000 litres per hour for the SCC 1,000**
- 💧 **10,000 litres per hour for the SCC 10,000**

Feed throughputs can also be reduced to accommodate low production volumes.

The SCC is designed and built upon a stainless steel skid, containing not only the SCC column but also all instruments, pumps, valves, condensers, heat exchangers, electrical and control panels. All it needs is connection to services such as steam, electricity and cooling water, which makes installation quick and easy, and the system can be operational within a week.

If your requirement is greater than that which can be handled by one column, two or three columns may be installed in parallel upon the same skid. In such cases, auxiliary systems (feed, discharge, condensing and vacuum systems) are common to all columns, reducing capital investment costs.



HOW THE SCC IS BEING USED AROUND THE WORLD

COFFEE

With aroma and taste being critical to the experience of today's sophisticated coffee drinker, Flavourtech's SCC technology has become synonymous with the production of premium soluble (instant) and RTD coffee.

The SCC's superior ability to capture the entire flavour profile of roast and ground coffee provides manufacturers with access to the fresh brewed taste that discerning consumers are looking for. Recovered flavours can even be indicative of the region of origin allowing the production of more specialised end-products.

RTD COFFEE WITH REAL FLAVOUR

The SCC can be used for easy and continuous production of RTD coffee. In this process, the aroma is captured while simultaneously brewing the coffee at temperatures up to 100°C. The captured aroma is chilled, protecting it until it is added back to the final product at the time of packaging. This produces a premium quality RTD coffee with a fresh brewed flavour.

There are now over 90 SCC installations processing coffee, including some of the world's most innovative beverage companies. Many of these companies have subsequently become market leaders due to increased consumer demand for their superior tasting products.





ENHANCING SOLUBLE COFFEE

The SCC is considered the gold standard for aroma recovery in soluble (instant) coffee manufacturing because of its ability to capture genuine aroma and taste sensations from roast and ground beans.

The technology offers two common applications when processing soluble coffee:

ESSENCE RECOVERY FROM A LIQUID EXTRACT

The majority of high volume soluble coffee producers use the SCC to recover aromas or flavours from liquid coffee extracts.

To achieve this, the SCC is incorporated into the processing plant directly after the extraction cells. The liquid from the extraction cells, in either its first draw or complete total volume, is passed through the SCC and the aroma is collected and protected in a chilled tank while the remaining extract is concentrated. This means the aroma is not subjected to thermal damage normally sustained during evaporation and is returned to the concentrated extract immediately prior to drying, vastly improving the aroma of the final coffee powder.

UNIQUE AROMA EXTRACTION FROM COFFEE SLURRY

The SCC is unique among continuous distillation systems in that it can process raw materials containing high proportions of suspended solids. For example, if a slurry of roast and ground coffee beans and cold water is fed into the SCC, it is possible to capture an intense fresh-roasted coffee aroma with the light flavour notes indicative of the country of origin.

Soluble solids extraction also takes place within the SCC and can be complemented with Flavourtech's Rotating Disc Column (RDC) for further extraction during instant coffee production. The resulting process is continuous and automated with an extraction time of only 20 minutes as opposed to hours in traditional instant coffee extraction cells.

As with liquid extracts, the aroma captured by the SCC is added back to the concentrated extract just before drying, thereby protecting it from the thermal damage caused by extraction and evaporation processes.

The aroma recovered from a coffee slurry is not only more intense than that recovered from liquid coffee extracts, but is also generously weighted in distinctive front-end aroma compounds that many soluble coffees lack.

Finally, the flexibility of the SCC allows the operator to capture different aroma profiles from the same raw material, resulting in the production of a variety of final products for different categories or export markets.

HOW THE SCC IS BEING USED AROUND THE WORLD (CONTINUED)

TEA

RETAINING THE NATURAL AROMAS OF TEA

As with coffee, the SCC can be tailored to process both soluble and RTD tea.

Unlike traditional systems, the unique ability of the SCC to gently process slurries allows it to capture the delicate and distinctive top notes of tea so that they can be added back to the concentrate later in the process.

This provides customers with the true natural aroma that is specific to that tea and the area in which it was cultivated. Distinctive top notes of teas such as Darjeeling, Assam or Ceylon single estate can be captured completely and without damage, allowing consumers to enjoy tea aromas representative of their region of origin in both soluble and RTD tea.



YOUR TEA INSTANTLY

The SCC is the workhorse of Flavourtech's unique Integrated Extraction System (IES), used in countries around the world for the production of RTD or iced teas. Processing a slurry of tea provides manufacturers with a simple, automated and continuous brewing method to produce a consistent RTD product with the aroma and health promoting qualities of the tea still intact.

In the traditional manufacturing process of soluble or RTD teas, major flavour loss frequently occurs during the heat-intensive extraction (brewing), concentration and drying stages. Often, there is no aroma recovery step to capture and preserve the delicate tea aroma prior to these processes. Therefore, soluble and RTD teas generally don't contain any of the distinctive floral characters of a fresh brew.

The SCC not only captures the distinctive top notes of the tea, but at the same time brews the tea. When integrated with a slurry preparation system, the SCC is replacing the batch type brewing kettles that are normally at the front end of many tea processing facilities. The SCC assists manufacturers by producing a consistent product, utilising much less labour, floorspace and energy while at the same time capturing the unique aroma of the tea, so that it can be added back to the concentrate to meet consumer taste preferences.



HOW THE SCC IS BEING USED AROUND THE WORLD (CONTINUED)

FLAVOURS

CAPTURING FLAVOURS NATURALLY

Many of the world's top flavour houses are using the SCC to naturally extract the best flavours and aromas from a wide range of products including fruit and vegetables, herbs, meat and seafood.

Using only low-pressure steam, the SCC efficiently captures the complete flavour profile, especially the light, front-end volatiles distinctive of fruit flavours, while avoiding damage to other heat sensitive components.

The SCC can be used to extract and concentrate flavour or aroma contained in:

- 💧 Fruit and vegetable juices, purees, and pulps
- 💧 Streams of evaporator condensate containing small amounts of aroma compounds that would otherwise be discarded
- 💧 Slurries of food processing by-products, e.g. prawn shells, fruit pomace, peel

As well as extracting aqueous essences and essential oils for sale as natural flavourings, there are many examples where the SCC is used to value-add the final product. These food and beverage manufacturers are either capturing more market share or securing a premium price due to the superior quality of their final product.

TRUE TO TYPE AROMAS

With consumers increasingly demanding authentic food and beverage experiences, the SCC provides the ideal solution to ensure flavours hit the mark. Some examples include:

- 💧 Recovering natural aromas early in the juicing process that can be added back after concentration to produce a super-premium juice product
- 💧 Processing strawberries, peach, mango and other tropical fruits for the collection of a 'true to life' natural flavour
- 💧 Recovering aroma from evaporator condensate in the concentration of orange and apple juice to add back to the final concentrate, improving its taste, or to utilise as a separate natural orange or apple flavour
- 💧 Processing ginger, mint and cilantro for the collection of both aqueous flavours and essential oils
- 💧 Processing mustard for production of premium quality Allyl Isothiocyanate (AITC) as used in wasabi



JUICE

THE TRUE FRUIT AND VEGETABLE TASTE

The SCC's superior low temperature and short processing time capabilities produce natural fruit and vegetable flavours that have the complete taste profile of the raw material. Importantly, while recovering aroma, the low thermal impact of the SCC prevents damage to naturally occurring compounds in the juice, concentrate or puree being processed.

The SCC's unique ability to process fruit and vegetable mash prior to the thermal and mechanical processes used in traditional juice production means heat-sensitive flavours remain intact and a superior flavour fraction is produced. The SCC is also capable of processing by-products generated by the juice manufacturing process, such as slurries of pomace and peel.

The recovered flavour fractions can then be added back prior to packaging to create a premium tasting product or sold separately as natural flavours thus maximising the use and income derived from the raw material.

Since the tightening of regulations regarding natural flavour additives, particularly in Europe and the USA, there has been a surge of interest in the SCC's ability to efficiently and effectively recover and concentrate natural fruit and vegetable flavours. Juice manufacturers around the world are capitalising on this interest by using the SCC to recover both aqueous essences and essential oils from their fruit, juice and waste streams.





HOW THE SCC IS BEING USED AROUND THE WORLD (CONTINUED)

WINE & BEER

FULL FLAVOUR, LOW ALCOHOL

Consumer demand for low or no-alcohol wine and beer products is continuing to increase around the world, and the SCC is assisting manufacturers to deliver high quality reduced alcohol beverages without compromising on taste.

To produce low alcohol wine and beer, a portion of the beverage is separated and processed through the SCC in two steps. The first pass is processed at approximately 30°C to capture the delicate volatile aroma compounds. The aroma-stripped product is then passed again through the SCC at approximately 40°C to remove the alcohol. The de-alcoholised product and the aroma fraction are then blended with the untreated portion to give a finished product at the desired alcohol content.

To produce zero alcohol wine (<0.5%abv) or beer (<0.05%abv) the entire volume needs to be processed through the SCC. To recover the aroma compounds contained in the recovered alcoholic condensate,

Flavourtech has developed the Resin Adsorbing Column (RAC). Positioned downstream of the SCC, the RAC 'traps' aroma compounds from the alcoholic condensate before recovering them as an aqueous base that can be added back to the de-alcoholised product creating a flavoursome zero alcohol beverage without the need to add external flavours.

The SCC can also be used to process beer containing yeast (such as wheat beer), unfiltered beer or green beer as well as wine must and lees.

With the growing popularity of Kombucha beverages, the SCC is gaining recognition as the preferred method for removing alcohol generated during the Kombucha fermentation process. This enables manufacturers to comply with alcohol content legislation while preserving the valuable probiotic component of the Kombucha.

SUPPORTING YOU: TOP QUALITY SERVICE AROUND THE WORLD

Our highly skilled engineers, technicians and support staff are backed by our global network of agents and distributors. This allows us to provide our clients around the world with outstanding service and support.

TOTAL CARE PLANS

We understand that maintenance requirements vary across industries and facilities, so we've created three levels of Total Care Plan to provide flexibility, give you peace of mind and ensure your SCC is operating at peak efficiency.

Our Silver, Gold and Platinum Plans are designed to ensure equipment reliability and maximise productivity, and all provide at least two years of cover that can be customised to suit your needs.

CUSTOMER SUPPORT CENTRE

No matter where in the world you are, if you have Flavourtech equipment, you have around the clock support.

All technical enquiries and questions are promptly answered by our experienced and knowledgeable Customer Support Centre.

If operating issues arise, Flavourtech's technicians will use our innovative remote monitoring system to assess and resolve the problem in real time, so you are back up and running as quickly as possible.

Flavourtech - helping YOUR business grow.



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