COCTIO COOKER SYSTEM

DESIGNED FOR PRODUCTION OF

HIGH-QUALITY NATURAL BONE BROTH / CLEAR STOCK / RAMEN / PHO

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1 COCTIO

Coctio is the only company in the world that combines over 30 years of broth production experience with engineering expertise to offer automated turnkey processing lines for the production of additive-free culinary bone broth and sauces. This makes Coctio the ideal partner to enter the emerging bone broth and broth-based sauces, soups and ready meals market.

1.1 Company Background

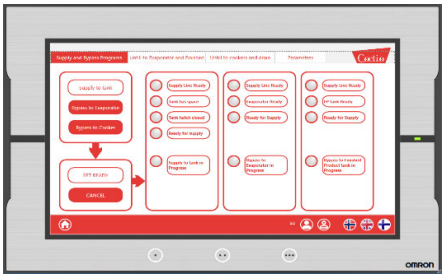
Kai Iiskola, founder and managing director, has more than 35 years of professional experience in the food industry and over 25 years specifically in natural bone broth and sauce production. In 1991, he founded the company Puljonki Oy that became a pioneer in the production of bone broth and sauces for the food service industry including top gourmet restaurants. He continued managing Puljonki until it was sold to Nestlé Professional in 2012. To put things into perspective, the successful operation grew from 150m^2 in 1991, to a production facility of 4,500m^2 in 2013.

1.2 Proven process and technology

The process and equipment designed by Coctio are based on the processes and equipment which Kai Iiskola designed and used at Puljonki Oy for over 15 years and are to this day still used by Nestlé Professional to produce their own culinary products including broths and sauces.

1.3 Automation

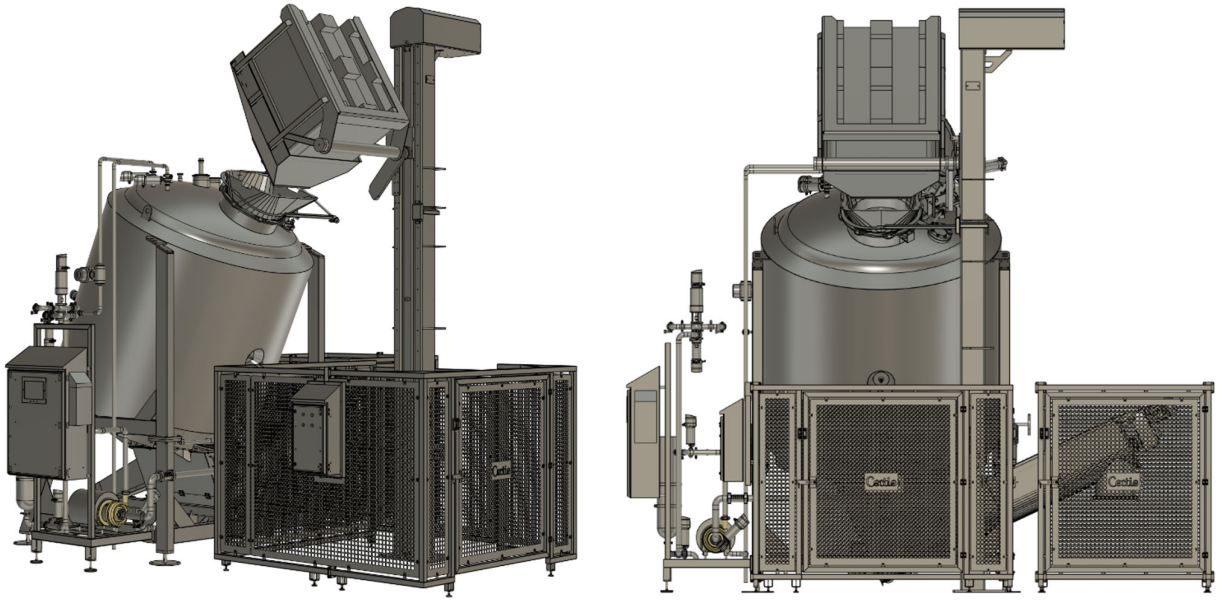
The key processes in the production line are automated to ensure that the most critical processes are repeated as desired for every single batch of bone broth. This allows you to consistently produce large volumes of end-product over a number of batches, maintaining the same level of quality and characteristics across the batches. The automation also allows you to have a very efficient production line that requires very little supervision.



Picture of Coctio AiOS 4300

2 COCTIO COOKER SYSTEM – THE MOST SOPHISTICATED BONE BROTH COOKER ON THE MARKET

The Coctio Cooker System is designed to give the utmost flexibility and repeatability through automation to create the bone broth product you want with consistency batch after batch. Whether you want to create a premium clear broth, a ramen broth, a pho or cloudy creamy broth, all of it is possible!



2.1 Key benefits

Complete automated system for production of bone broth – requires only 1 operator

The unit includes all functionalities you need to produce high-quality stocks and broths at industrial scale. It includes an ingredient loading system, a steam-jacketed closed cooking system with up to 3barg pressure, extraction pump, filtration, separate fat extraction, and cooked ingredients extraction from cooking system. The system will all the heavy lifting so anyone can operate it.

Unique automated boiling control even at high pressure - clear broth, ramen broth, pho broth

Coctio's proprietary automated boiling control allows all levels of boiling even at higher pressure. Whether it is a slow simmer to get a clear broth or fast boiling to get milky ramen broth, you can achieve the results you desire by simply setting the right recipe parameters.

Easy & fast installation

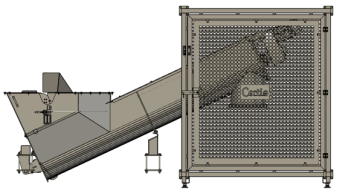
The unit is completed and tested at Coctio facility and shipped in parts which are then connected on site in a few days. Then the unit only needs to be connected to the necessary utilities on site.

Small footprint but large production volumes

The entire unit fits within a 36m2 – 50m2 footprint depending on model and requires little space around it. Each unit can produce up to 1.5million (smallest unit) and up to 3 million (largest unit) liters of bone broth per year.

2.2 Equipment details

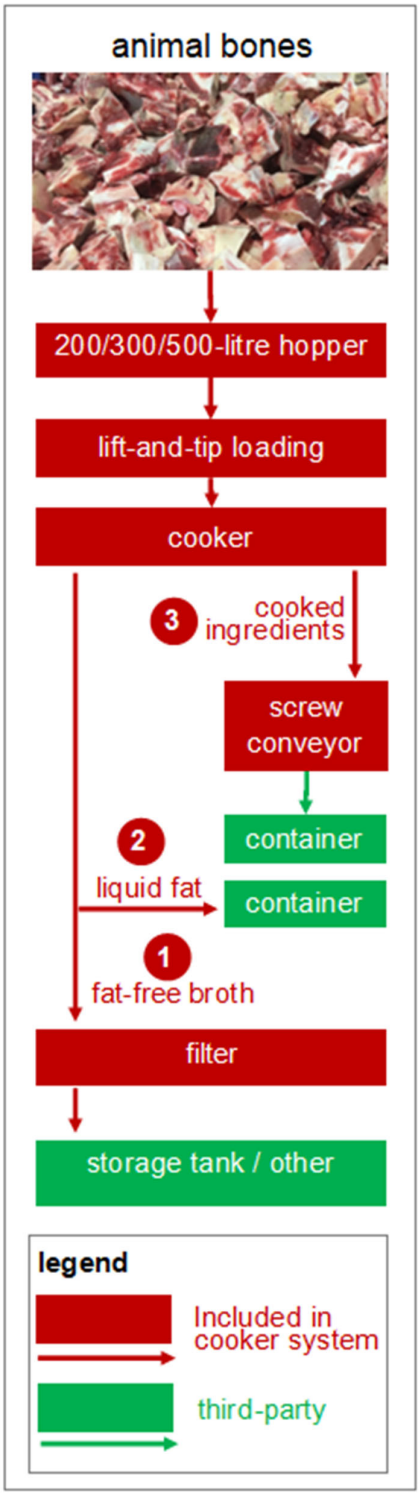
The table below lists the equipment included in the base Cooker System.

Equipment features	
Cooking vessel • Closed, tilted, insulated and stainless-steel sheathed vessel • 3 x steam jackets – 1 on the bottom, 2 on the side. • 1 x cooling jacket located at the top • 3 x temperature measurement sensors • Internal rotating mechanism to extract cooked ingredients from the cooking vessel • Pressure wash jet • Automatically openable hatch on top • Automatically openable hatch at the bottom • Ingredient funnel – easy operation • Automated water feed with flow meter • Drainage box underneath cooker • Necessary safety valves and sensors	
Cooked ingredients screw conveyor • Screw conveyor under the vessel to transport remaining cooked ingredients (2.5-metre long) • Safety fences	

Lift-and-tip ingredient loading
• Single column vertical pillar lift & tip system
• Container size options
  ○ Rollable trolley 200l
  ○ Rollable trolley 300l
  ○ Container 500l
• Safety fences
	

Automation and electrical cabinet • Touch screen control panel • Automated control of cooking process • Automated control of broth and fat extraction **Extraction of broth and fat** • Broth and fat extraction pump • Conductivity measurement for fat separation • Glass pipe section at broth extraction point to view liquids coming out of cooker. **Filtration** • 200-micron sock filter in stainless steel enclosure • Sock filter easily removed/replaced/changed. **Washing** • Pipe connection point for third-party CIP (CIP excluded) • Sieve on CIP connection line	

2.3 Processes



2.3.1 Ingredients supply

Solid and liquid ingredients (except for water) are introduced into the broth cooker via the top hatch with the help of a lift & tip system that accommodates a 200/300/500 litre trolley. Cooking water is measured automatically and added via a direct pipe connection.

2.3.2 Broth cooking

Once the ingredients are in the cooking vessel, the top hatch needs to be closed manually (sensor tells system if hatch is closed properly) and the cooking process is started automatically by choosing the recipe set-up from the automation control panel or by manually inserting values to the available cooking parameters. Individual process parameters (such as cooking temperature, time, cold jacket timing, cooling) are manually selected as a sequence and can be saved as a recipe.

Once the cooking process has been started from automation panel, the system will automatically heat the steam jackets and cook the contents at the predetermined temperature, pressure and time. No supervision required.

2.3.3 Broth extraction

Once the cooking process is finished, the operator can then start the extraction process which will begin with the extraction of the liquid contents. These are extracted through the outlet valve at the bottom of the vessel. First, the broth is extracted and passed directly through a 200-micron sock filter and directed to pipe ending where the broth will exit to be further pumped to a storage tank or collected into a container or other as defined by the customer.

2.3.4 Liquid fat extraction

As the broth is extracted, the fat that has risen to the top inside the cooker will start to mix with the stock at the exit point. Once this happens, the system will stop the extraction and the operator can also see the fat through a glass section of the pipe at the exit point. At that stage, the operator can redirect the rest of the liquid to a separate ending where the liquid fat will exit to be collected into a container or other as defined by the customer.

2.3.5 Cooked ingredients extraction

Finally, the cooked bones are extracted through the bottom hatch, dropped into a 2.5 metre long screw conveyor that will transport the bones from under the cooker to the side where they can be collected into a trolley or other container as provided by customer.

2.3.6 Cleaning

Cleaning the interior surfaces of Coctio vessel, filters, pipes and associated fittings is done by connecting a third-party CIP system. The equipment is split into 2 washing areas. 1 area can be washed while the other is functioning. The two areas are as follows: 1) Cooker and product line, 2)Product line, Product Filtering enclosure

The external surfaces of the Equipment can be washed with foam cleaning equipment.

3 MODEL SIZE AND BATCH PRODUCTION

The table below shows the estimated ingredient quantities to produce broths/stocks (note that actual quantities will depend on recipe) as well as estimated output quantities per CS model:

CS model		CS 4300	CS 6500	CS 9000
Equipment	unit			
cooking vessel (net cooking volume)	litres	4300	6500	9000
Space requirements				
minimum clear height	metres	5.5	6	6.5
equipment width	metres	7	7.5	8
equipment length	metres	6	6	6
Batch production (only estimates, will depend on recipe)				
Batch input				
bones	kg	1800	2700	3800
water	litres	2000	3000	4200
vegetables and herbs	kg	250	375	500
Batch output				
broth	litres	2200	3300	4500
cooked ingredients	kg	1670	2505	3420
liquid fat	kg	180	270	380

The bone mixture is typically made of 90% meat and bones and 10% of fat.

Minimum batch size: Having split steam jackets on the side of the cooker allows minimum batch size to be approximately 50% of quantities show above.

3.1 Indicative batch process times (varies by recipe)

The following table shows the estimated process times for different types of bones.

		Beef	Pork	Chicken	Fish	Vegetable
Ingredient loading	hours	0.5	0.5	0.5	0.5	0.5
Heating up to desired temperature*	hours	1- 1.5	1- 1.5	1- 1.5	1- 1.5	1- 1.5
Cooking	hours	5 – 12 depending on pressure	3-8 depending on pressure	2-6 depending on pressure	1-4 depending on pressure	1-4 depending on pressure
Extract and filter stock	hours	0.5	0.5	0.5	0.5	0.5
Extract and filter liquid fat	hours	0.25	0.25	0.25	0.25	0.25
Extraction of cooked ingredients	hours	0.25	0.25	0.25	0.25	0.25
Total process time	**hours**	**7.5 - 15**	**5.5 - 11**	**4.5 - 9**	**3.5 - 7**	**3.5 - 7**

* Heating up time will depend on temperature of ingredients and water

3.2 Recommended bone specifications

Bones used to produce broth for human consumption have to come from animals that have been deemed fit for human consumption. Ideal size for cut or crushed bones is 4cm x 4cm, maximum size 10cm x 10cm. The following provides some detail on the type of bones used by type of animal:

Beef: mixture of marrow bones, rib bones, back bones and connective tissue/joints

Chicken: hen and broiler bones, but also some chicken skin can be mixed with the bones. Chicken heads and feet are acceptable wherever regulation allows it.

Fish: fish bones and trimmings, small amounts of skin and heads without gills.

Seafood: shellfish shells (shrimp, lobster and crab)

3.3 Cooking water

Cooking water can either be cold or hot but has to be deemed fit for human consumption. The hotter the water, the faster the heating up stage of the cooking process which is why we recommend using hot water.

3.4 Indicative BRIX level

The following table shows estimates of the brix level (indication of total solids content) for broth depending on types of bones used.

Type of bones	Beef & Pork	Chicken	Fish	Vegetable
BRIX range	7 - 12	4 – 8	3 – 7	3 - 6

4 TECHNICAL SPECIFICATIONS

4.1 Vessels

Vessel	Max temperature	Max pressure (gauge)
Broth cooker	140 °C	3 bar

4.2 Pipes and valves

Pumps, valves and other fittings are procured from reputable producers such as Alfa Laval.
All parts that are designed to come in contact with food ingredients and the end-product will be made of AISI 304 stainless steel unless otherwise stated.
All valves and fittings used on the production line will be food-grade.
All product pipes are not insulated unless otherwise stated.

4.3 Sensors and metering

Equipment	Measurement/other
Broth cooker	temperature (location high)
	temperature (location low)
	temperature (location top)
	electric lock (location high)
	inductive sensor (location low)
	flow metering (water fill)
	pressure
	sealant water detection
	level switch
	conductivity sensor
Product line/filter	inductive switch (filter enclosure cover)

4.4 Automation

	Description
Electrical cabinet	Electricity, Automation water-cooled enclosure including 12” touch screen (HMI panel)
Omron automation	Local data storage on usb – other connections available as options. Remote maintenance connection, Firewall / VPN Panel remote operation, VNC server

4.4.1 Process control

Equipment	Automatically controlled processes	Manually controlled processes
Broth Cooker	Water fill/Dosing	Raw material loading
	Heating/Cooking/Pressure relief	
	Use of the bottom mixer after filling	
	Cooking programs, according to the recipe	
	Cooling	
	Broth emptying, filtering, transfer to storage tank	
	Fat emptying	
	Bone emptying	
	Hatch control (bottom and top)	

5 UTILITIES AND CONSUMPTION ESTIMATES

5.1 Utilities

CS model		CS 4300	CS 6500	CS 9000
Utilities	units			
steam (peak demand)	kg/hour @ 8 bar	300	450	600
electricity	Amp @ 400V	85	85	85
cooling water (peak demand)	litres/hour	500	750	1000
pressurized air	litres/hour	300	300	300

5.1.1 Utilities connections

id	Interface	specifications
1	Steam	DN50, flange EN-1092-1 PN16 @8 bar
2	Condensate	DN32, flange EN-1092-1 PN16 No condensate pumping, max 2 m lift height
3	Tap water (1 bar)	DN25, G1” female thread Max supply pressure 1 bar Sealant water for equipment, cooker coolant water
4	Tap water	DN32, flange EN-1092-1 PN16 Normal pressure, @5-8 bar Cooker water fill
5	Cooling water from cooker	DN15, G1/2” female thread
6	Pressurized air	Supply pressure min 7bar
7	Electricity	400 V, 3-phase, 50hz
8	Drainage pipe, one outlet	76mm dairy grade piping Sealant water Drainage from product line Drainage from tanks, vessels Over flows from tanks/vessels Cooker pressure relief Drainage water may contain small amounts of fat, product, detergents drainage water ph 3…12, temp may > + 40 C
9	Safety relief valve	DN50 dairy grade connector, male DIN11851 Installation of the discharge piping according EU Pressure Equipment Directive
10	Bone screw conveyor	Drainage outlet, Bone outlet

5.2 Utilities consumption estimates per batch

The table below sets out the necessary utilities and energy consumption estimates for a batch.The following calculations assume a power voltage of 400V, 3-phase, 50hz (other voltages and frequencies on request).

CS model	Electricity	Steam (3 bar)	Compressed air (5 bar)	Cold water (1bar)
CS 4300	20-30 kwh/batch	300 kg / hour to heat up contents to desired cooking temperature. 30kg / hour to maintain desired cooking temperature *For example: chicken stock* *Heat up 1.5 hours, cook 6 hours => 630kg of steam / batch*	150 litres/batch	0-500 litres/hour (will depend on recipe)
CS 6500	30-40 kwh/batch	450 kg / hour to heat up contents to desired cooking temperature. 45kg / hour to maintain desired cooking temperature *For example: chicken stock* *Heat up 1.5 hours, cook 6 hours => 945kg of steam / batch*	150 litres/batch	0-750 litres/hour (will depend on recipe)
CS 9000	40-50 kwh/batch	600 kg / hour to heat up contents to desired cooking temperature.60kg / hour to maintain desired cooking temperature *For example: chicken stock* *Heat up 1.5 hours, cook 6 hours => 1260kg of steam / batch*	150 litres/batch	0-1000 litres/hour (will depend on recipe)

6 DESIGN STANDARD AND REQUIREMENTS

The design of the equipment meets the criteria of the following legislation and standards

Legislation

The design of equipment is based on the following legislation:

Country/Region	Legislation
Finland	EU legislation/directives

Design standards

The design of equipment is based on the following standards:

Country/Region	Design standards
Europe	SFS-EN ISO 12100:2010 SFS-EN 1672-2:2005 SFS-EN ISO 14159:2008

Other possible standards include ASME, SELO, CSA/CRN. If you require a specific standard, please let us know.

CE Marking

The equipment provided by Coctio will be CE Marked.

Environmental conditions

The design of equipment is based on the following climate conditions in the process room

Parameter	Min. value	Max. value	Unit
Temperature	15	45	°C
Humidity	30	70	%

If you have any questions, do not hesitate to contact us!

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