Pilot plant processing equipment and facilities available at Campden BRI’s Chipping Campden Site

There is a wide array of pilot plant processing equipment available for clients’ use at Campden BRI. This document contains a selection of some of the equipment available at the Chipping Campden site, but companies with activities in the malting, brewing and alcoholic drinks industries will find extensive facilities available at our Brewing Division in Nutfield.

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Canning and Retorting

**Carnaud-Metalbox MB6 Can Seamers x 2**
Adjusted to close 73 x 51mm and 83 x 114mm cans. Both seamers have steam flow close capability. Change parts are available to allow the handling of 73mm diameter two piece cans. Closing speed of 40 cans per minute.

**Carnaud Metalbox MB1A Can Seamers x 3**
May be adjusted to seam all heights of can of the following diameters: 65, 73, 83, 99 and 153mm. The maximum closing speed is 5 cans per minute.

**Carnaud Metalbox MB1A Vacuum Can Seamer**
May be used to vacuum close double seam cans with diameters of 65, 73, 83 and 99mm. Closing speed of 3 cans per minute, up to 25 in Hg may be applied.
**AID SVG Can Seamer x 2**
May be adjusted to close cans of 65, 73, 83, 99 and 153mm diameter. Has vacuum, gas flush and steam flow close ability. Closing speed of up to 4 cans per minute.

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**Can Seam Evaluation Equipment**
Micrometers and gauges for the measurement of double seams. In addition there are Schmalbach Lubeca Seam Projectors and sectioning saws. Further seam assessment equipment includes:
- Seam stripper – used to strip the end hook away from the can body to identify and measure tightness rating during seam assessment.
- Seam saw – used to cut through the double seam to allow a cross section of the internal double seam to be viewed using a seam imager.
- Seam imager – produces an images of the double seam and allows measurements to be taken of the internal seam parameters.

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**Carnaud Metalbox MB200 Vapour Vacuum Capper**
For applying regular twist-off (RTO) and push on-twist off (PTO) closures. Change parts for 53, 63, 68 and 70mm diameter RTO closures are available. There is a steam flow closure facility and a closing speed of 3 jars per minute.
Bead Vertical 3 Crate Retort
May be used as a steam or water immersion retort. Working pressure of 30 psig.

John Fraser Horizontal Laboratory Retort
Pilot scale retort may be used for steam processing in the static, axial or end over end rotation modes. Has a facility for the attachment of a slip-ring assembly. Capacity up to 12 73 x 115mm cans. Working pressure of 1.4 bar.

John Fraser 2 Vessel Horizontal Retort
May be used for static or rotary processing, using steam, steam/air mixture or water immersion as the heating medium. Has a facility for the attachment of a slip-ring assembly. The retort has a glass viewing panel and light system permitting viewing of containers during processing. Capacity up to 100 73 x 115mm cans. Also suitable for pouches, glass jars and plastic containers. Working pressure of 3 bar.
**FlexEJ Vertical Retort**
May be used for static steam processing. Capacity up to 80 73 x 115mm cans. Working pressure of 1.4 bar.

**FMC Retort**
Reel and Spiral hydrostat simulator. May be used for steam or full water immersion processing. Takes a full range of cans up to A10 size; will take up 47 UT cans. Has a slip ring assembly; maximum temperature 130°C.

**Lagarde Retort**
May be used for static or rotary processing using steam/air or raining water as the heating medium. The retort is fully programmable. There is a glass viewing panel and light. There are facilities for the attachment of a slip-ring assembly. Capacity of up to 80 73 x 115 cans. Also suitable for pouches, glass jars and plastic containers. Working pressure of 6 bar.
Shaka Retort
An experimental retort, with novel shaking movement, for improved heat penetration. Mainly suitable for cans processed in steam.

Steriflow retort
This retort is capable of processing up to 135 ET cans in a raining water process, under rotating or static conditions. The retort can operate up to 150°C, 5 Bar and 3rpm.

Fruit Pasteurisation and Exhaust Tanks
Two atmospheric tanks, for the exhausting of cans prior to seaming or for the pasteurisation of fruit packs. Capacity of up to 50 73 x 115mm cans per tank. One tank is fitted with a programmable controller.
Comminuting equipment

**Robot Coupe Food Processor R501**
Products may be sliced, diced or chipped from a continuous feed. Also allows liquidising on a batch basis.

**Hobart Bowl Chopper**
small-scale batch bowl chopper with a maximum capacity of approximately 10 litres.

**Mado Bowl chopper**
A slightly larger scale bowl chopper with adjustable blade revolutions, and bowl rotations. Maximum capacity of approximately 50litres.
Mincers
A variety of mincers available; including both electrically and manually operated varieties.

- Compact mincer – used for mincing meat and fat to a 5mm or 10mm mince size.
- Table top mincer – handfed mincer to mince meat or fat on a small scale.

Fryma Colloidal Mill
Uses a continuous feed system. Coarse or colloidal milling options available.
Mixers

Small Manca Mixer
Two-directional batch mixer with two rotating paddles. Maximum capacity of approximately 30 litres.

Large Mainca Mixer
Two-directional batch mixer with three rotating paddles. Maximum capacity of approximately 100 litres.

Silverson Bench Mixer
A small capacity, variable speed mixer.
Three separate sized heads are available.
Silverson Mixer
Industrial size large capacity high shear mixer.
Single speed with 3 separate sized heads available.

Crypto Peerless EF20 Mixer
Approximately 10Kg capacity. Variable speed mixing.
Dough hook, balloon whisk and K beaters available.
Homogenisers

APV Two Stage Aseptic Homogeniser Lab 100
Capable of being operated in line as part of an aseptic process, or individually, the homogeniser can withstand temperatures of up to 140°C and will homogenise up to 1250 psi.

Niro Soavi Spa Type NS2002H Homogeniser
Bench scale 2 stage homogeniser – approximate capacity 50 litres per hour. Maximum pressure 600 bar.
Fruit and vegetable processing

Steam Jacketed Pans
From 10 to 120 litre capacities, some of which have purpose designed blanching baskets and attachment points for mixers. (Forward tipping design)

Winkworth Steam jacketed pan
200litre capacity jacked vessel – with integral agitator (bottom outlet)

Green Bean Cutter
Commercial sized continuous rotational hopper.
Able to cut beans into 12.5mm or 25mm lengths.
Crypto-Peerless Carborundum Peeler
Catering sized carborundum peeler for root vegetables.

Ditto-Electrolux TRS Food Processor
Fruit and vegetable products may be sliced, diced or chipped. A wide range of cutting plates is available.

Brierley Collier Hartley Fruit Press
Manually operated laboratory scale fruit press.
**Bertuzzi fruit mill and hydraulic press**
Pilot scale system for the manufacture of fruit juices. Requires fruit quantities of approximately 10 Kg and upwards.

**Bertuzzi pulping plant**
Pilot scale system for pulping and screening of fruits to remove skins and seeds. Requires fruit quantities of approximately 10 Kg and upwards.

**FMC Multi juicer**
The FMC Citrus juicer is a catering/semi-commercial sized citrus juice extractor. Handling fruit sizes ranging from grapefruit to tangerines.
Centrifuging and Filtering

**Westfalia Centrifugal Separator.**
Floor standing pilot scale centrifugal separator. Processing capacity ranges from ~ 70litres to 4000L/hour.

**Carlsson Plate filter.**
Frame plate filter, plate size 20cm x 20cm.
Meat processing

Sausage Filler
Motor driven with various nozzle sizes available.
Maximum capacity of approximately 15 litres.
Portioning attachment available, to allow for depositing consistent portion sizes.

Bizerba Meat Slicer
Catering sized adjustable width slicer.

Hanna pH Meter/ Electrodes
Measures surface, and internal, pH of meat muscle and products.
Emerging Technologies

High pressure processing vessel
EPSI batch high pressure processing vessel, 70mm diameter, 200mm length. Maximum working pressure at 700 MPa (7000 bar). Maximum operating temperature of 90°C. Pack temperature during processing can be recorded.

Ultrasound
A 2-kilowatt ultrasonic processor for industrial applications with continuous and batch mode options. The system is fully PC-controllable and is an ideal research tool for the investigation of techniques such as ultrasonic cell disruption, emulsification and homogenisation.

Revtech
A continuous flow system designed for the heat treatment of low water activity products such as nuts, seeds, herbs and spices. It is usually used to decontaminate, roast and toast these types of products, but potentials in enzyme reduction and ingredient functionality have been explored. The three main variables are heat treatment (spiral wall temperature), steam addition and residence time. These can be adjusted and applied and can have numerous effects on the composition, functionality and microbial quality of various products.
Continuous cold plasma system

Prototype plasma system suitable for feasibility studies with food or food contact materials. Plasma is generated on the surface of the electrode panels using the surrounding air and is an indirect treatment. Electrode panels cover a treatment area ~0.45 m² and can be adjusted up to 30 cm from the conveyor belt to allow the treatment of a variety of different sized food products as well as the conveyor material.

Ultraviolet light decontamination tunnel

System suitable to accommodate a variety of products (50mm to 250mm). The system consists of 16 x 95W ‘high output’ UV-C emitters, where the product can be treated from both above and below. Includes variable belt speeds, for different UV-C dosages (10-500 mJ/cm²).
Packaging equipment

**Multivac C200 and A300 Pouch Sealers**

Chamber units for the vacuum/gas flush sealing of pouches of maximum width of 465mm. The sealers have a top and bottom heating elements. The level of vacuum is adjustable. Closing speed up to 6 pouches per minute.

**Packaging Automation PA210CAP Tray Sealer**

Chamber unit for heat sealing pre-formed plastic trays. May be used in atmospheric, vacuum or vacuum/gas flushing modes. Closing speed of up to 2 trays per minute. Specific tooling may be manufactured as required.

**Fords Duckworth 003 Bench Heat Sealer**

Atmospheric heat sealer - for pots with a maximum diameter of 75mm.
Hulme-Martin Bench Top, Hand Operated Impulse Sealers

Various sizes and types of bag/pouch may be sealed. Maximum bag size of 320mm diameter.

Riverside Hot Bar Sealer
Time, temperature and pressure control for sealing

Hulme Martin Free-Standing Hot Bar Sealer
Sealer produces a crimped seal. Temperature control, for material specific sealing optimisation.

RDM Lab Heat Sealer
Sealing parameters can be altered including sealing time, sealing pressure and sealing temperature to assist in finding the optimum sealing parameters for seal strength / integrity purposes. Produces lab heat seals, 25mm wide.
Systech Gaspace Advance Gas Analyser
Equipment for measuring the headspace gas of flexible and semi rigid containers. Measures oxygen, carbon dioxide and balance gas (measured as nitrogen) levels. Programmable sampling times and levels are also possible.

A specific attachment is also available for measurement of gas in metal cans.

Schreiner Creep/Burst Test System
Equipment for the determination of seal strength and seal integrity of sealed flexible and semi-rigid packages

Witt Pack Vac Leak Detector
Leak detection equipment, using a vacuum under water set-up, to test for leaks in flexible and semi-rigid packs.

Systech Permeability Equipment
Equipment used for measuring the oxygen transmission rate, and water vapour transmission rate, of packaging materials.
Zwick/Roell Z050
Multi functional machine which can perform a number of different tests including the tensile and bond strength of seals, compression and edge crush testing of primary and tertiary packages, Mullen burst test and peel testing. Can also conduct coefficient of friction testing, on plastic films and sheets.

Environmental Chamber.
Ideal for use with the Systech permeation analysers. Enables testing of films, packages and bottles under different temperature and humidity conditions. Temperature ranges of +5°C to +85°C. Humidity range 40% - 95% RH.

Torque meter
Used to measure closing force and/or opening force; and measures the maximum force required.
**Internal Pressure Tester**
Used to determine the amount of pressure a bottle or container can withstand without bursting or deforming.

**Glove Box**
A chamber which can contain a controlled gaseous atmosphere e.g. Nitrogen. The use of attached rubber gloves, in an isolated chamber, allows the filling and sealing of product, and packaging, within the controlled atmosphere. Equipment also contains a portal to transfer product and equipment in and out of the chamber as required without displacing the controlled atmosphere.

**Dansensor MAP Mix Provectus**
Enables customised gas mixing i.e. combinations and proportions, to enable products to be packaged in a modified atmosphere.

**Chub Clipper**
Tightly seals casings of cooked meats with a metal clip.

**Tray Overwrapper**
Allows trays to be sealed by a hot wire and base plate, producing a tight Clingfilm overwrap.
Texture and food structure assessment

Campden BRI offers a standardisation service to pea tenderometer users, utilising the equipment below.

**Dodman Digital Pea Tenderometer**
An electronic version of the Martin pea tenderometer, with digital readout. Used as the Campden Master Tenderometer.

**Martin Pea Tenderometer**
Campden Sub-Master Tenderometer.

**Bakery Texture Equipment**

- TexVol L370 Laser volume machine
- C-cell crumb analysis
- Differential Scanning Calorimetry
- Rapid Visco Analyser
- Rheometer and Tensionmeter
- Texture analysers
Data acquisition systems

Madgetech Data Loggers
Squirrel Data Loggers
Anville Data Loggers
Ellab Tracksense Wireless Loggers (various types)
Ellab TM 9616 and Flex systems
Ellab tracksense Reader stations
Ellab Deflection Sensor and Packaging Stand

Anemometer
Biral hot wire model. Unsuitable for operational temperatures greater than 50°C.

Flir thermal imaging camera
Infrared thermometry system capable of reading 3700 temperature measurements, per frame. Measurements can be taken between -30 to 2000°C with an accuracy of 1°C or 1%. The camera itself can withstand environmental conditions of -15 to +55°C

Luxtron data acquisition system
Fibre optic time/temperature data logger, for applications where conventional thermocouple measurement is not possible, such as inside microwaves.
Soft drinks

Soft drinks carbonator- Armfield FT102X

Able to fill, and seam, all sizes of cans; and to fill a wide range of PET, and glass bottles. Variable carbonation settings available, ranging from 2.0 to 4.5 volumes CO₂. Used in conjunction with a 100 litre storage vessel, for product make-up.
UHT / HTST pasteuriser – Armfield FT 74XTS
- UHT throughput of up to 20 litres/ hour.
- Process temperatures of up to 140°C.
- Variable holding tube options available.
- Tubular or plate heat exchanger options.
- Process parameter display and digital data logging to laptop computer.
Chilling and Freezing equipment

Armfield Blast Freezer
Features a fluidised bed, for production of, small batch quantities, of individual quick frozen product (IQF). In addition blast chilling may also be performed. The air temperature required may be pre-set, and air flow through the fluidised bed is adjustable. Lowest chamber temperature is around -40°C.

Cooking/vacuum cooling/drying

BCH Vacuum cooker/cooler
10-20 kg quantity capacity vacuum/pressure cooker. Steam jacketed with an operating pressure of up to 6 bar. The inner vessel has an optimum working pressure of 1.5 bar. The vessel is fitted with an anchor type agitator and also has a steam injection facility. The vessel is also suitable for full vacuum processing.

Birchover freeze dryer
Maximum 4-shelf capacity: 3 at 97cm x 37cm; 1 at 77cm x 37cm
Giusti Vesuvio cook/cool system
A 250 litre vessel with integral scraped surface agitator. Particularly suitable for cooking, and vacuum cooling, liquid foods. Steam injection and steam jacketed capacity.

Microwave and conventional ovens
A range of electric and gas ovens are accessible, for cooking instruction development. In addition, an extensive selection of domestic, and food service, microwave ovens are also available for instruction development purposes.
Frying equipment

Valentine “Maxi” Deep Fat Fryer
Catering sized equipment with 15-litre oil capacity. Uses 2 x 5Kg capacity baskets.

Lincat Deep Fat Fryer
Catering sized equipment with 15-litre oil capacity. Single basket facility.
Fillers

**Enolmatic Bottle Filler**

Mains operated, semi-automated, small scale vacuum bottle filler. Has an adjustable filling level, and speed of fill.

**Turbofill Filler**

Pneumatic food product filler suitable for liquids and semi-solid foods. Filling level and speed are adjustable. Has both a continuous and manual filling operation. Manual filling via a foot paddle.
Other

**Laminar Flow Cabinet**

The Laminar Flow cabinet can be used to provide a clean environment for the hygienic filling of products.

**VeriVide photostability cabinet**

The storage cabinet can offer alternate light sources and the option to alternate between light sources and intensities. The cabinet can be sited in a temperature and humidity controlled storage room via its fan driven ventilation system it is able to maintain the ambient temperature and humidity. Doors and walls are lined with reflector linings to reflect the light onto the samples and avoid shading. The cabinet has the ability to store a range of food and drink products.
Ancillary facilities

Nine, walk-in, controlled temperature stores programmable to temperatures in the range of -18°C to +40°C. Controlled humidity in the region of 50-90% relative humidity is available in some stores.

Product Development Kitchen, and other preparation areas including cookers, domestic blenders/processors, balances, pH meters.

Above: Development kitchen

Large controlled temperature rooms where process machinery can be temporarily located.

Seam evaluation room.

Packaging Laboratory.
Examples of the types of products that can be produced
(Illustrative only – not exhaustive)

- In-pack heat pasteurised and sterilised foods in glass, flexible packaging and cans e.g. ready meals, soups, sauces, drinks, canned fruit or vegetables
- Carbonated and non-carbonated soft drinks including freshly squeezed juices
- Comminuted meat products such as sausages, meat pies, re-formed cooked meats.
- Non-thermal in-pack pasteurised products (using high pressure processing)
- Mayonnaise type products
- Freeze dried fruit and vegetables
- Modified atmosphere packed products such as fresh-cut fruit & vegetables
- Blast frozen products e.g. fruit & vegetables, chips etc
- Fried non-extruded snack products such as crisps
- Batch-made soups and sauces (a few litres up to several hundred litres)

In addition to the facilities outlined above we have a dedicated pilot plant facility for bakery products which includes:

- Pilot scale bread, pastry, biscuit, cake and snack production facilities
- Z-blade, Spiral, Tweedy and Artofex mixers
- Range of moulding options for bread, pastry and biscuits
- Proving cabinets, reel, rack and travelling ovens

At our Nutfield site we have a dedicated pilot facility for malting and beer production.