

LIST OF PILOT PLANT EQUIPMENT AVAILABLE AT PURDUE

THERMAL PROCESSING AND HEAT TRANSFER

1. Plate Heat Exchanger (De-Laval); capacity 1000-2000 lbs./hr.; 8" x 24" plates (1.5 ft² surface area/plate); 2 sections for heating and cooling.
2. Plate Heat Exchanger (De-Laval); capacity 1000 lbs./hr.; 8" x 24" plates (1.5 ft² surface area/plate); 3 sections (includes regenerator section).
5. Scraped Surface Heat Exchanger (2)- Contherm 6X72 scrapes
8. Tubular Heat Exchanger (Stork); 4 individual heat exchanger modules with triple tube design of varying lengths; capacity = 500 gal./hour (for UHT milk) with thermal regeneration efficiency of 75%.
9. Tubular Heat Exchanger (Stork); 2 individual heat exchanger modules with double tube design. 1.25" inside diameter for particulates.
10. Tubular Heat Exchanger (Stork) - 2 individual heat exchanger modules with double tube design 1 3/8" inside diameter for particles.
12. Water Heater (Bell & Gossett) for heating city water up to 270°F.
13. Water heater (Pick) for heating water to 225 °F. Direct Steam injector
14. Pick Steam Injection system for heating product.
14. 1- 40-gallon open steam kettle
15. 1 30-gallon Hamilton scraped surface kettle with dual media hook-ups: steam or city water. (mixer does not lift)
16. 8-gallon Groen (also under evaporation/Dehydration) scraped surface steam kettle. Vacuum concentrator.
17. 2-3 gallon jacketed kettles non-aggitated on table
18. 125 Gallon Lee jacketed kettle. Double action, 110° inclined mixer.
19. 50 Gallon Jacketed tank on wheels
20. 50 gallon jacketed cheese vat.
21. 2- 2 Gallon Lee variable speed agitated kettles.
23. Pressure Retort (FMC Sterilmatic Universal Laboratory Model); this unit is capable of simulating the FMC Still REtort, Sterilmatic, Orbitort, and Hydroflex processing methods. 5' diameter x 2-«' length x 5' height. Equipped with 18 thermocouple hub. Also equipped with 5 small retorts for inoculated pack/thermal death time studies. With can heat penetration tools and equipment.
24. Still Retort for canning. Set up with automated controls on Field bus system.
25. 2-5 gallon groen electric jacketed kettles, 1-10 Gallon electric kettle
26. Readco 2" jacketed , shear pump
27. Double tube Heat Exchanger (Cherry Burrell):1 ½ in product inlet-15 pass with hot water set
28. (2) 150 gallon Double jacketed kettles with agitation
29. (3) 60 gallon Double jacketed kettle w/o agitation
30. Jacketed 100 gallon paddle mixing tank-Horizontal
31. Jacketed 300 Gallon Cherry Burrell mixing tank-Horizontal
32. IMS Microwave thermal Processor. 1.5" ID/ 2.5 GPM 45-250F.
33. APV plate Heat exchanger-2" in/outlet
34. 300 gallon mixing tank with ribbon blender
35. Multi Tube Heat Exchangers(2)-Enerquip

MIXERS

1. Hobart Mixers various sizes
2. Admix high shear
3. Lightnin mixers
4. Bredodo Liquifier-50 gallon capacity

EVAPORATION AND DEHYDRATION

1. Vacuum Kettle (Groen); 8 gallon batch capacity; 28" vacuum by vacuum pump; condenser leg cooled with 35°F cooling water.
2. Spray Drier (Niro Atomizer Laboratory Unit); capacity ~ gallon (milk)/hour; with centrifugal nozzle.
3. Drum Dryer Buffalovac- Vacuum capable steam heated 6"X8". Variable speed
4. Freeze-dryer (Virtis) Laboratory model; 4 heated 10" x 24" trays.
5. Drying Oven-Blue M
6. Drying oven-
7. Ceramic Ultrafiltration cartridge-Tetra Pak-.05micron,5-8 GPM

FREEZING EQUIPMENT

1. (2)Soft-serve Freezers (Taylor)
2. Still-air Chest Freezer. -25°F

MEMBRANE SEPARATION

1. Ceramic Ultrafiltration cartridge-Pall- Membralox
2. Pall Centramate filtration modules

FERMENTATION EQUIPMENT

EXTRUDERS

1. Single-screw Extruder (Brabender Co.) for mixing, cooling and extrusion processing of a wide variety of food products; 3/4 inch and 1-inch barrel-ribbon dye and cylindrical die.
2. Single screw extruder (Brabender Co.)

DAIRY EQUIPMENT

1. One steam-jacketed 50-gallon vat.
2. Milk Cans-10 Gallon (33), 5 Gallon (10)

HOMOGENIZER AND PUMPS

1. Homogenizer (Cherry-Burrell); 3 piston model; 2-stage, 3000 psig maximum operating pressure; capacity 233 gal./hr.
2. 2-Homogenizer-APV- 3 piston, 2 stage, 5000 PSI max. operating pressure capacity, 500 ml. Min capacity
3. Centrifugal pumps
 - a. Triclover-10 HP
 - b. 2-Triclover 2 HP, Variable speed control
4. Vacuum pump
5. Peristaltic Pump
6. Positive displacement pumps - aseptic/non-aseptic.
 - a. Waukesha aseptic – 1"
 - b. Waukesha-1 1/2"
 - c. Waukesha-3"
 - d. Seepex - to 1" particulates
 - e. Seepex- to 2" particulates
 - f. Moyno -1" particulates

4. Marlen Piston Pump for doing large particulate or viscous products
 5. Fristam positive placement pump
8. Colloid Mill, Charlotte Mills

PACKAGING EQUIPMENT

1. Dixie can sealer-vacuum, atmospheric or gas flush capable set up for 300 or 303 can sizes.
4. Dixie Can Sealer set for 211,303,300 diameter size cans.
5. Scholle Aseptic Bag Filler- 1-300 gallon. High/Low Acid.
6. All Fill Semi auto piston filler (2-6fl. oz)

RAW MATERIAL HANDLING AND PROCESSING

1. Slicer/Dicer (Urschel); slices, strip-cuts, and dices fruits and vegetables.
5. Abrasive Peeler: for mechanically peeling potatoes and various root crops.
6. Finisher/Pulper (Langsenkamp); laboratory model for chopping and juicing or pureeing tomatoes and other fruits and vegetables; variable speed drive.).
8. Fitzmill Pulper/Grinder (Fitzpatrick Co.) for size reduction.
9. Scale Metler- 10,000Lb Max
10. Scale 12000 g capacity
12. Lightning Mixer-Air
13. Lightning Mixer-Electric
14. Small electric mixer
15. Small electric mixer
13. Orange Juice Squeezer (FMC) single head
14. Hobart Vertical Chopper
15. 1 Gallon Waring Blender (2 Bases, 3 cannisters)
16. Quadro Pro high shear mixer- Stand alone
17. Kason vibrating screen separator

OVENS AND FRYERS

1. Pressure Fryer (Henny Penny)
2. Oven (Blue M).
3. Proctor and Schwartz Radio Frequency Oven
4. Microwave Oven.
5. Blodgett Convection Oven
6. Vacuum Oven, JEIO Tech
7. Doyan Convection Oven, CA6R

DATA ACQUISITION/MANAGEMENT

1. 2-Calplex Analog/Digital converter
2. JCS PLC System

SENSORS

2. In Line Refractometer(Maselli)-Measures soluble solids in line
3. In Line Refractometer(Fischer Rosemont)-Measures soluble solids in line
4. In line Density (Calibron) - Measures product density
5. In line Viscosity(Nametre)- Measures product viscosity
2. In Line Viscosity (Brookfield)
3. In Line pH (Leeds and Northrup)
6. (2)Mass Flow Meter (Micromotion)- Measures mass flow (up to 3")

7. (2)Mass flow meter (Endress and Hauser)
8. (3)Volumetric flow (Endress and Hauser)-Magnetic resonance flow measurement
9. RTD's (16)-Stork
10. (6)Pressure transducers-2-Anderson 0-300 PSIG
11. Rosemont Humidity Sensor
12. (6)Differential Pressure Transmitters
13. Turbidity Sensor-McNabb
14. (4)Vortex Shedding Flow Meters

TANKS

1. Stainless, aseptic (Spartenburg Steel)
 - a. 250 Gallon
 - b. 80 Gallon
 - c. 55 Gallon
2. 50 gallon open, jacketed
3. Lee 125 gallon. Double action mixer
4. 2-100 gallon Cherry Burrell mixers
5. 3-60 gallon Double Jacketed
6. COP (cleaning) tank-50 Gallon
7. CIP Cleaning Skid-APV

CUTAWAY

1. Fristam aseptic pump
2. Seepex progressive pump
3. Stork Double/Triple tube Heat Exchangers
4. Cherry Burrell Double/Triple tube/Multi tube Heat exchangers
5. See thru Scraped surface Heat exchanger
6. Cut away Scraped Surface Heat Exchanger-Contherm
7. Cut away valves(Ball, gate, globe)
8. Pick Steam Injector

MOVING

1. Clark Riding Lift Truck-6500 Lb Capacity,Electric
2. Big Joe Hydraulic Lift- 1000 Lb. Capacity, walk behind
3. Pallet Jack-5500 Lb. Capacity
4. Barrel Mover-Manual
5. 5-4 wheel Heavy Duty Carts
6. 1-4 wheel Light Duty carts

ASEPTIC

1. Aseptic divert valve Cherry Burrell- 2"
2. Aseptic Waukesha Pump, 3" Inlet

MACHINE SHOP

1. Drill press
2. Circular saw-Poter Cable
3. Reciprical Saw-Milwaukee
4. Cordless Drill
5. Drill-Milwaukee
6. Various Manual Tools

MISCELLANEOUS

Aseptic valves, sampling devices, several aseptic holding tanks (can also be used as bulk storage tanks); aseptic air and liquid filter membranes (Pall Cartridge Filters).