Equipment watchwords: Energy conservation, pollution control

Equipment manufacturers in the fats and oils industry are emphasizing energy conservation and pollution control in equipment being marketed this year.

Manufacturers responding to a *JAOCS* survey of new equipment developments also indicated there is a continuing interest in larger capacity equipment.

Crown Iron Works Company in Minneapolis, MN, and Lurgi Umwelt and Chemotechnick GmbH are reporting initial installations of the Desolventizer-Toaster-Dryer-Cooler, which both firms license from Heinz Schumacher of Hamburg, Germany. Lurgi calls their unit a Toaster-Drier-Cooler (TTK). Fewer than two dozen are in operation.

Crown Iron's first installation, a 400 tons per day peanut unit, went into use earlier this year with a second scheduled to start up this year. Lurgi says it has supplied units to Italian and Brazilian plants.

The unit combines the functions of a desolventizer toaster, a meal dryer and a meal cooler into one piece of equipment. "It has a lower capital cost, takes less space, has lower maintenance costs and offers considerable energy savings," Crown Iron says. Based on a 1,000 tons a day soybean installation, crown Iron estimates capital costs would be 35% lower and operating costs, including energy consumption, about 10% lower. The DTDC (Fig. 1) is slightly larger than a conventional desolventizer-toaster, Crown says.

Hexane-lade flakes are introduced into the top chamber for desolventizing by live steam, followed by toasting under influence of heat and moisture. A sweep arm prevents channeling. The meal is then metered into the middle chamber by a precision rotary valve. Heated air is used to dry the meal in the middle chamber. The bottom chamber is where outside air is used to cool the meal.

Crown Iron says existing designs indicate maximum capacity for a single unit may be about 1,200 tons a day. Thus two units would be required for higher tonnage or a DTDC-type dryer-cooler could be installed in conjunction with a conventional desolventizer-toaster.

Lurgi says the unit provides simplified operation requiring less supervision and provides a more even quality of meal because of more precise control and less handling than with a conventional system.

H.L.S. Ltd. of Petah Tikva, Israel, says it began construction during 1977 of the first industrial plant for palm oil fractionation by transesterification. The plant, at Eilat, Israel, will have a rated capacity of 50 metric tons per day. The plant will produce a liquid palm fraction (65%) with a perfect chilled stability not obtainable by conventional methods, H.L.S. says. The triglyceride of the liquid fraction is similar to that of peanut oil, with an iodine value of about 80. The solid fraction (35%) has an iodine value of 5 and a melting point of 62 C, with more than 90% palmitic acid, H.L.S. says. The process is shown in Figure 2.

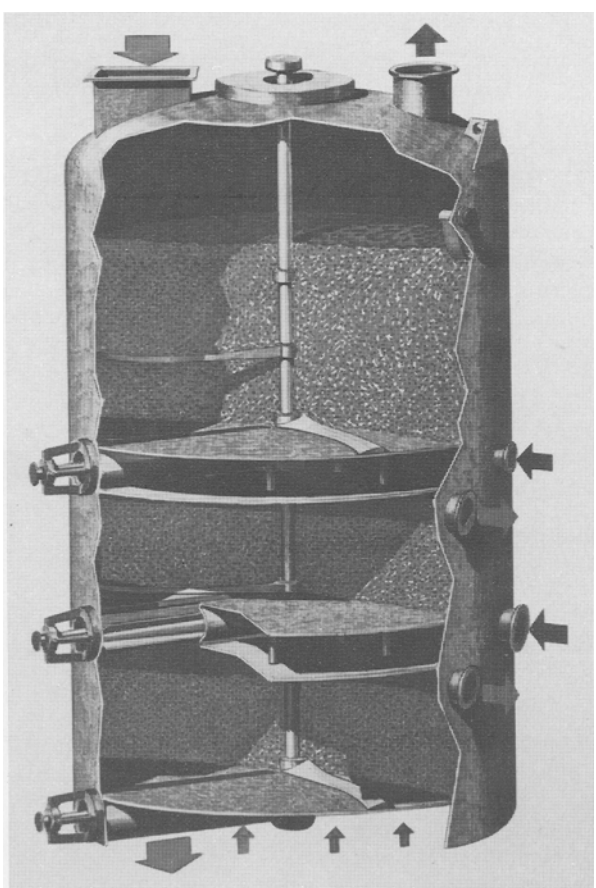


FIG. 1. Crown Iron's DTDC, Lurgi's TTK.

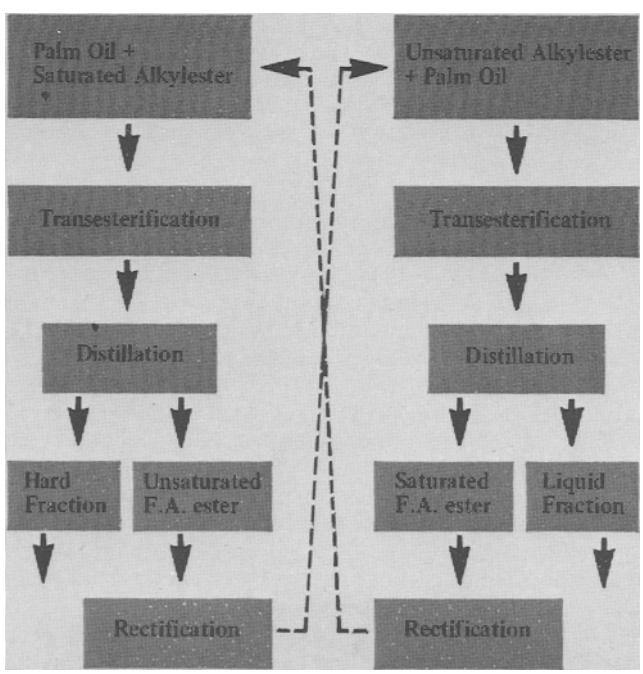


FIG. 2. HLS' transesterification for palm oil fractionating.

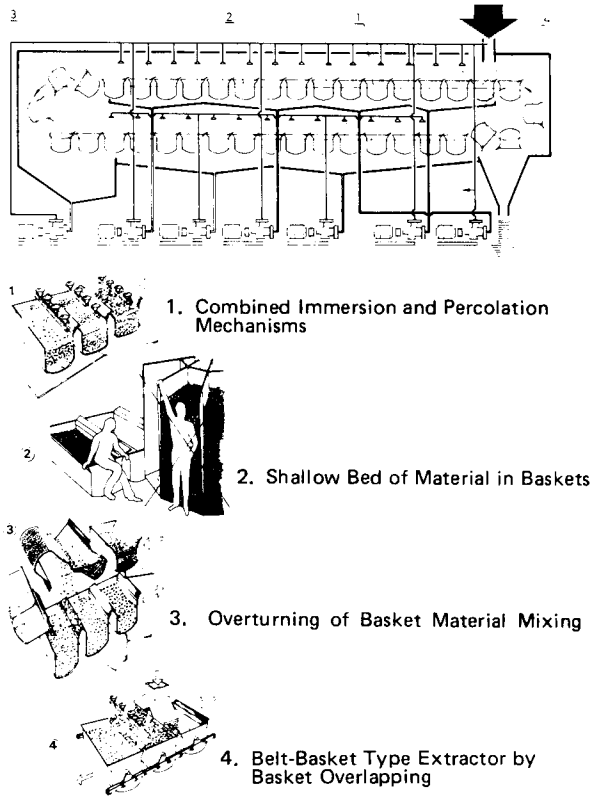


FIG. 3. Belt-basket extractor by HLS.

The firm also is promoting its belt-basket continuous solvent extraction method (Fig. 3). H.L.S. says it has increased the number of baskets and miscella recirculating pumps to keep the material in shallow beds and to improve control. The extractor inverts each basket midway through the process to promote mixing and avoid formation of an impermeable layer, thereby reducing extraction time. An overlapping strip of flexible material between baskets avoids spillage and permits continuous feeding.

H.L.S. also has patented a winterizing, dewaxing and fractionating system that does not use filters or contrifuges. The system involves crystallization of the oil with isopropyl alcohol as a solvent, H.L.S. says. The solvent decreases crystal density, permitting the crystals to float on the surface of the oil. Best results were obtained with 1 part palm oil to 0.6 parts isopropyl alcohol of 95% concentration, H.L.S. says. Two plants are using the system for cottonseed oil winterizing and fractionating of a selective hardened soybean oil.

Throughout its deodorization and deacidification systems, H.L.S. has incorporated the following features: (a) all heat transfer takes place outside the deodorizer; (b) an oil-to-oil heat exchanger, avoiding use of steam and diesel oil for this purpose; (c) steam-actuated piston valves between trays in the deacidifier-deodorizer prevent sticking pistols; (d) stainless steel construction of the deacidifier-deodorizer with a separate vapor outlet from each of the five or more trays into a collecting pipe; and (e) two different devices are used to introduce steam to the trays to insure efficient fine layer film deodorization.

Campro, Cambrian Processes Ltd., says its compact deodorizer has a unique thin film steam stripping system with a heat recovery unit that saves 40% energy and cooling water, makes efficient use of sparge steam (1 to 2% of design feedrate) and uses fresh sparge in each stripping stage. Feed deaeration is done before heat exchange with a steam ejector separate from the main deodorizer vacuum system.

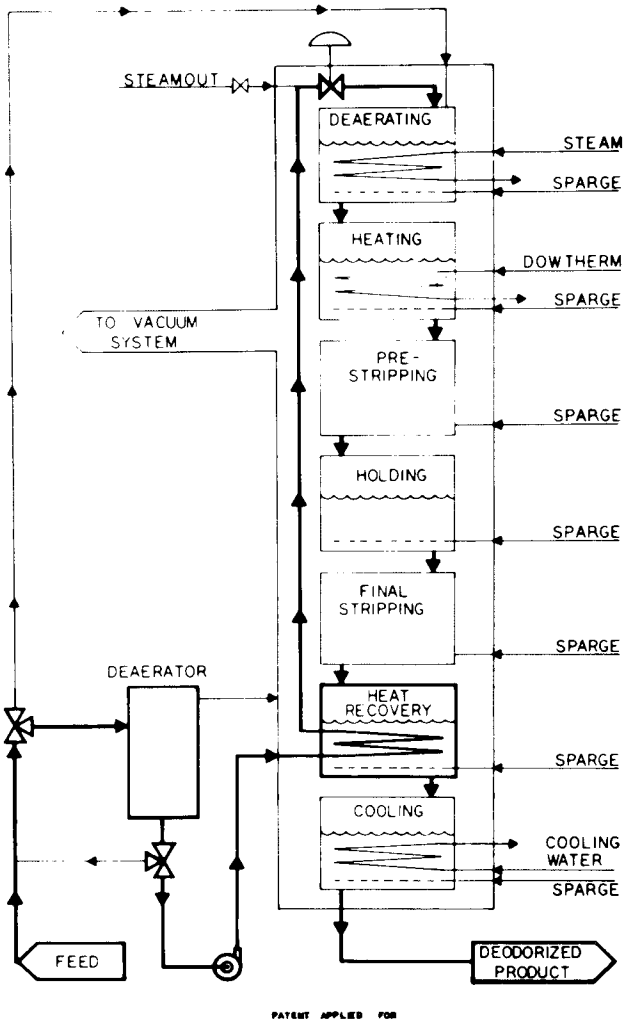


FIG. 4. Schematic diagram of EMI's double shell deodorizer.

The unit has low capital costs, and low maintenance costs, Campro says. The shell can be removed without disconnecting process piping or instrumentation, and sparge tubes can be easily removed for inspection.

EMI Corporation says its energy saving deodorizer has reduced by 50% the energy required to heat oil during deodorization. A deodorizer with a 30,000 pounds per hour capacity will save 3,200 pounds per hour of steam, EMI says.

The EMI double shell deodorizer, with a schematic diagram shown in Figure 4, consists of seven vessels mounted within a single outer shell that is maintained under vacuum. Steam heating is needed only when a change is made in the feedstock. EMI's companion deodorizer pollution control system involves three steps: deodorizer distillate recovery, closed circuit condensing water system, and vapor scrubbing system.

EMI also is marketing its physical refining system and its flash desolventizing system. EMI says its physical refining system, of high interest to palm oil processors, reduces neutral oil loss by 50% compared to caustic refining processes, cuts operating costs 30%, and capital costs by 20%. The flash desolventizing system was used in EMI's integrated soy flour and grits production facility that won *Food Processing* magazine's award for processing systems in 1977. The system uses gentle heat conditions, low moisture and minimum retention time to produce flakes suitable for human products.

Costruzioni Meccaniche Bernardini S.p.A. this year is highlighting processing of slaughterhouse by-products, a

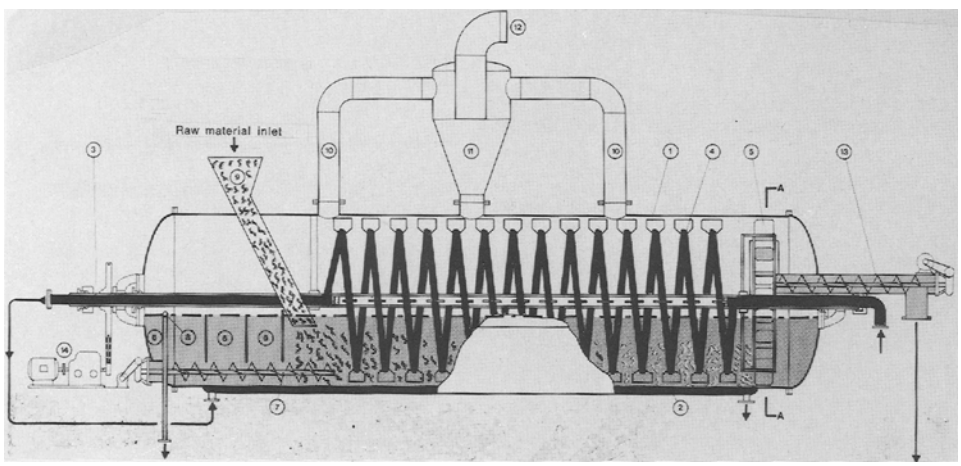
system involving combination of a Technocooker (Fig. 5) made by Tecnologie and a solvent extraction plant by Bernardini. The technocooker is a continuous operation apparatus. Raw material is dumped into a constant hot bath, with temperature maintained by a heating jacket and a rotating heating coil. The method provides quick sterilization, fast evaporation of any water present, and rapid dissolving of fat tissue in the hot bath. Perforated dredge buckets maintain agitation and remove solid material. The Bernardini immersion extraction plant brings the fat content of the meat meal leaving the cooker from 24% to 26% down to around 3%.

Effluent water is kept separate from the raw materials and by-products; condensation water is recovered and reused. Malodorous gases and uncondensables are burned in the system's high temperature heating unit, Bernardini says.

French Oil Mill Machinery Co. is offering an air-operated roll grinder featuring fully adjustable automatic tapering of roll ends. The unit was designed for simple mounting and operation. It includes automatic reverse eliminating manual reverse at end of each traverse; the grinding wheels and motor are self-cooling.

Arthur G. McKee & Company, is a firm that doesn't produce any equipment but which does provide chemical engineering and process design for fats and oils installations. Kenneth W. Becker, director of the unit that works with oilseeds and proteins, perhaps sums it up by noting, "In today's economy, it is absolutely necessary that we give very careful attention to energy consideration and the control of both water and air effluents for environmental purposes."

Energy conservation and pollution control – the current watchwords for equipment in all industries, including fats and oils. ●



1 - Cooker housing
2 - Heating jacket
3 - Rotary hollow shaft
4 - Rotary coil
5 - Dredge for meat meal
6 - Fat settling compartments
7 - Outfeed screw conveyor
8 - Fat overflow pipe
9 - Charge hopper
10 - Vapours manifolds
11 - Cyclone separator
12 - Vapours outlet pipe
13 - Meat meal outfeed conveyor
14 - Drive

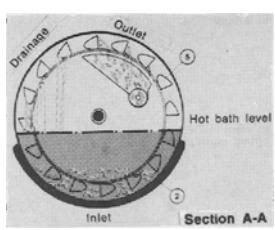


FIG. 5. Diagram of Technocooker in CMB's processing system.