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WHAT'S NEW - IN-VESSEL COMPOSTING

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Based on a survey of in-vessel system manufacturers, there are both new systems as well as new component and design innovations to report. Combined, the 19 vendors responding account for 587 plants worldwide. Part I

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IF YOU are considering some sort of enclosed vessel for composting food residuals, yard trimmings, biosolids, manure, animal mortalities or other waste streams, there is no shortage of options to consider. Domestic and international technology providers offer agitated and nonagitated enclosed systems, as well as rigid and nonrigid containment. Unlike some of the other equipment categories in BioCycle's What's New? series (e.g., grinders, screens), almost all the in-vessel systems, perhaps with the exception of the plastic tube technologies, were developed strictly for composting.

This fifth article in our What's New? series shines some light on the 19 vendors who responded to our 4-page survey of in-vessel composting technologies. It was sent to the 40 vendors listed in BioCycle's 2007 Equipment and Systems Directory (April, 2007) under the following subcategories of Composting Systems: Aerated Containers, Enclosed Aerated Static Piles, Horizontal Agitated Beds, Aerated Piles, Rotating Drums, and Vertical Reactors. For purposes of this What's New? article, however, we decided to group the respondents' technologies into three more general categories of enclosed (in-vessel) aerobic composting:

Enclosed Aerated Static Piles: Aerated Piles covered with fabric, and Aerated Containers/tunnel reactors. None of these systems use agitation other than periodic remixing of the material.

Agitated Beds and Vessels: Horizontal concrete bays with mechanical agitators, and horizontal or vertical metal or plastic vessels of various shapes with mechanical agitators.

Rotating Drums: Cylindrical vessels that are automatically turned on a continuous basis, usually at speeds of 1 rpm or less.

Given the volume of information received, we are running What's New? In-Vessel Composting in two parts. Part I covers the first two categories of systems - Enclosed Aerated Static Piles and Agitated Beds and Vessels. Part II will include information received on Rotating Drums.

While not all survey respondents had a "new" feature or application to report, a description of their process is included since some readers may not be familiar with the particular technology. The information reported here was supplied by the vendors and not independently verified by BioCycle editors.

THE BIG PICTURE

The big picture that emerges from the survey is that there is a wide range of technologies to choose from, and that many of these technologies have been around for quite a few years. The greatest number of years on the market is 30 years, for both Rotocom's rotating drum, and Christiaens Group's aerated tunnels. The average number of years on the market for all 19 vendors is 12 years. There are three newcomers: BioSystem Solution's horizontal and vertical agitated system with less than one year on the market; X-ACT System's rotating drum with two years; and Environmental Products & Technologies Corporation's rotating drum with three years.

Total number of plants or sites with the various technologies is over 587 worldwide, with Green Mountain Technology's Earth Tub leading with more than 200 sites, mostly for food waste, a number that reflects the ability to install a unit at a hotel, university or office complex cafeteria. The GORE Cover System comes in second, with 150

installations worldwide for composting biosolids, yard trimmings, MSW, food and agricultural waste streams. BW Organics lists 60 rotating drum facilities worldwide, mostly on farms, followed by RotoCom's 45 rotating drums, 43 of which are in Japan processing animal manure, meat by-products and food waste. VCU's passively aerated vertical chamber is reportedly installed at 38 locations.

Looking back over the past 10 years, there has been a continual evolution of in-vessel composting technology designs and vendors. BioCycle's 1997 Directory, "Equipment and Systems For Composting and Recycling Organics," listed 39 vendors under the Composting Systems category. Technologies were not divided into subcategories, so it is unclear exactly how many were actual "vessels." What is clear is that well over half of those companies are not in the 2007 directory, which, as noted, had 40 vendors under Composting Systems. (That is an increase of nine from 2002 to 2007, which also indicates a steady growth. Additionally, there has been far less turnover in the technology vendors.)

Although more costly than open air composting, in-vessel appears to be gaining ground as more food waste projects are implemented. This is due to a number of very good reasons, particularly control of the process, odor, leachate, vermin, weather and final product quality. Most state and provincial composting regulations call for control of these environmental factors, something in-vessel systems can provide to a greater degree than lower technology systems.

Another trend is toward modular systems since many composting projects start small (especially those processing food waste), and then expand as the program grows. Most of the in-vessel systems described here are considered modular, and either the unit can be lengthened, or additional units added. The survey also reveals several vendors who have added vermicomposting, either as a stand-alone technology, or as an add-on to in-vessel systems.

ENCLOSED AERATED STATIC PILES

The eight vendors who responded to the survey offer two different approaches to aerated static pile (ASP) composting contained in some type of vessel. The simplest systems are those that use some type of plastic bag or a breathable fabric cover to contain the organic material, and provide mechanical (as opposed to passive) aeration. Compared to nonenclosed aerated static piles, these systems are better able to keep out moisture from precipitation, maintain pile temperatures, and control odors. Windrows "in a bag" originated with agricultural applications where silage is mechanically pushed into plastic bags, or sausages, for storage. This technology has been adapted to composting by a number of companies that include pipes and blowers to aerate the material, enhancing the rate of degradation and reducing odor.

The other subgroup is mechanically aerated rigid containers, such as a metal rolloff container modified for composting, or a larger concrete or metal chamber or tunnel. These containers got their start in the mushroom growing industry. There are also vertical containers, with one vendor offering a passively aerated system, and the other a mechanically aerated system. The eight vendor systems in this category are described below.

Christiaens Group

Based in The Netherlands, this tunnel composting system got its start in the mushroom industry 30 years ago, and was introduced into the solid waste market in 1990. In just the last three years, the company reports development of four facilities in Canada, three in the United Kingdom, two in France, and four in Germany. These facilities process between 10,000 and 100,000 tons/year of biowaste, yard trimmings, MSW and/or biosolids. The tunnels are as large as 26.2 feet wide by 184 feet long, and are equipped with an aerated floor system designed to support a front-end loader as it moves material in and out of the tunnel. The tunnels also can be designed for loading with an automated conveyor system, or with a walking floor.

Each tunnel is loaded with one batch of organic material, the door is closed, and the PLC (programmable logic controller) tunnel climate control system is activated. The composting process is controlled based on temperature, oxygen and moisture readings that determine the amount of air to blow through the tunnels. Retention time depends upon local regulatory requirements, but is typically at least 14 days. To control the compost process, fans push air into the plenum beneath a floor designed to provide even air distribution. Air flows up through the organic matter and into the head space at the top of the tunnel where it is captured, mixed with fresh air, and then recirculated into the plenum at the base of the tunnel. Exhaust air is treated in a humidification scrubber, then a biofilter. The temperature of the biofilter is monitored, and can be maintained at optimum ranges through use of a damper and pressure controlled blower system. Air flow to the tunnels and the biofilter is controlled by a PLC, with remote monitoring by Christiaens if desired.

Depending on the size of the installation, labor requirements are a minimum of one operator and two front-end loader operators. The primary maintenance item is to grease the 22 kW to
55 kW fans. More maintenance is obviously required for those facilities that utilize an automated loading/unloading system. To minimize corrosion, stainless steel aeration fans are used, as well as aluminum duct work.

Christiaens also has developed a smaller container composting system. Most of these

units are used for research purposes. The company has developed a working relationship with Maple Reinders, a Canadian company, in order to provide turnkey project development.

Engineered Compost Systems

ECS offers three variations of its in-vessel systems. The SV Composter™ is described as an insulated and stationary system designed for medium to large facilities, processing between 15 and 500 tons/day (tpd) of feedstocks. The system is designed to operate in a wide range of ambient temperature, from 40°C down to -30°C. The vessel walls and ceilings are constructed with insulated concrete, and the doors are gasketed and insulated. Stainless steel is used on the interior door surfaces of the vessel. The aeration floor is designed to provide uniform air distribution; leachate is collected in the aeration floor and drained to a sealed sump.

Some of the installations, such as Hutchinson, Minnesota, process source separated organic waste, while other plants, such as West Yellowstone, Montana and Mariposa, California, process mixed MSW. Several SV Composter systems, e.g., Granby, Colorado, are composting biosolids. A semi-automated conveyor loading system is available, or the units can be filled with a front-end loader. The in-slab aeration floor is compatible with loading and unloading with a front-end loader, and is reportedly "plug-resistant."

The aeration system provides reversing and recirculating process air through motorized dampers in order to achieve uniform temperatures of the biomass in the vessel. All components in contact with the air stream are constructed from either stainless steel or polymeric materials. The aeration system is designed to conserve energy with variable speed fans and a low friction aeration floor. All process air is treated in a site-built biofilter.

Air flow to each vessel is regulated by the ECS Comptroller™ based on temperature probes inserted into the compost bed once the vessel is filled. The control system requires minimal operator intervention during composting and automatically records temperature and other data for each batch. Aeration rates to each vessel are automatically controlled through setpoints, and can be set low to conserve moisture and fan power, or higher for increased drying. ECS can remotely provide technical assistance through this system.

A variation of the system is the CV Composter™, designed for 2 to 20 tpd applications. The CV vessels are fabricated with stainless steel interiors and stainless or galvanized metal exteriors. Vessels contain 20 to 50 cubic yards in one batch, and are built on a rolloff chassis so they can be moved and handled with a rolloff truck. The vessels are loaded with a conveyor, and unloaded with a rolloff truck tipping the vessel. CV vessels are composting source separated organics in Walla Walla, Washington and Ottawa, Ontario, and biosolids at several other sites.

The third, newest ECS system option is the AC Composter™ (Covered ASP) which uses a UV resistant, waterproof fabric to cover windrows up to 30 feet wide and 60 feet in length. Negative aeration of the piles is used to hold the fabric in place, with aeration pipes built into the slab; the Comptroller governs aeration. ECS also offers a less expensive above grade aeration option. The cover is removed manually for piles up to 60 feet in length, or with commercially available tarp rollers for larger piles. The negative aeration system and tarp are designed to minimize fugitive odors, with exhaust air directed to a biofilter. AC Composters were recently installed in Tenino, Washington for a 60,000 tons/year (tpy) source separated organics facility; pilot projects are being conducted at two other locations.

GORE Cover System

With over 150 installations in 15 years, W.L. Gore and Associate's GORE™ Cover System is employed in a large variety of feedstock applications - most recently for mechanical-biological treatment (MBT) of organic waste prior to waste to energy, as well as posttreatment of solids produced by anaerobic digestion. The system is centered on a membrane laminate technology similar to the company's GORE-TEX® fabric. The company does not sell just the fabric for composting, but an integrated system that includes the fabric covers, in-floor aeration, aeration blowers, oxygen and temperature sensors, controllers, computers, software, cover handling systems, training, engineering guidance and installation support.

The fabric has a microporous membrane that is laminated between two ultraviolet resistant support fabrics. The cover is waterproof and windproof to protect composting material from the elements, but it is also permeable to water vapor, allowing moisture to be released, along with CO2 generated from composting. The cover also provides some insulating properties that help maintain composting temperatures.

Odor control from the fabric covers performs as follows: Many odor compounds are soluble in water, and therefore are trapped in the condensate that builds up under the cover. The condensate falls back into the composting mass to be further degraded. The company claims that the covers can achieve 90 to 97 percent reduction in odor concentrations, and that the small pore size of 0.2µ is an effective barrier for dust, aerosols, and microbes which could be released to the environment, impacting workers and neighbors.

Brian Fuchs, GORE's North American representative, explains that another advantage of the system is its ability to keep leachate separate from precipitation since the leachate is collected in a trenching system and can be stored for reuse on the compost. Precipitation is shed off the covers and also can be reused or discharged per local regulatory standards.

The covers are handled in two ways. A wall-mounted winder can serve up to 16 piles located next to each other. For larger installations, a mobile winder straddles the piles, moving slowly along while winding the tarp onto a spool above the piles.

Regarding projects on this continent, Fuchs says that although GORE only entered the North American market in the early 2000s, there are seven installations in North America treating over 315,000 tpy. "Our most recognized and the world's largest GORE™ Cover System is the Cedar Grove Composting facility in Everett, Washington with a design capacity of 160,000 tpy. More recently we installed a small 3,000 tpy plant for the Delaware Solid Waste Authority, which demonstrates our ability to supply systems of any size," he says.

The GORE system operates on a treatment time of eight weeks in total, from input to finished compost. As for it being considered an in-vessel system, he says "the system is internationally recognized as an enclosed or in-vessel system in Hungary, USA, UK, Spain, Sweden, Italy, Ireland, Finland, Estonia, Germany, and Canada."

A recent cold weather innovation was developed by the Greater Moncton Sewerage Authority in Moncton, New Brunswick, for use with their biosolids composting facility. The Authority installed pipes with glycol circulating through them (heating loops) in the compost pads to capture the heat generated under the compost piles. This heated glycol is then piped to areas of the compost pad where snow and ice have weighted down the GORE covers, thawing the ice so that they can be removed. A more detailed article on the Greater Moncton facility will appear in a future issue of BioCycle.

NaturTech

The NaturTech® Composting System has been on the market for 13 years, and is offered by Renewable Carbon Management LLC. The modular units are constructed from modified intermodal shipping containers using either a 20- or 40-foot long box. An aeration system is installed that operates based on temperature probes in the composting material. Process monitoring is done either manually or with a timer and data logger to a PLC. The containers are filled by a front-end loader, and then emptied with a rolloff truck for either remixing or curing in another container.

The system has been installed at 11 locations in the U.S., including a military base. Wastes composted at existing facilities include raw primary wastewater solids, DAF (dissolved air flotation) solids, food residuals, forest products, poultry feathers, chicken manure and dairy manure. Systems can be designed to process from 1 tpd up to 600 tpd.

A new feature for the units is a plastic aerated floor strong enough to drive a front-end loader on. The aeration system is dual negative and positive using differential pressure sensing with actuated valves. For curing containers, negative aeration is used. Leachate is handled with a patented quick couple drain and recirculation system. Odor control is through proper mixing and aeration, coupled with a containerized biofilter.

Corrosion control is accomplished by making the containers with Cor-Ten® Steel and epoxy coating, an abrasion resistant carbon steel designed for 15-year exposure to sea water. A replaceable insulation liner protects the container sidewalls; the plastic floor has an estimated life of 30 years.

Poly-Flex

Poly-Flex recently introduced an acquired technology that offers a patented waste management solution for composting organics. Sold under Poly-Flex CompostingTM, the system utilizes large plastic tubes that are mechanically loaded with organic waste by a moving press. Two perforated plastic pipes are inserted into the tube by the same press during the progressive filling of the tube. The aeration pipes are then connected to a blower to provide forced aeration during the composting process. The flexible plastic pipes are available in two different diameters, 5- and 10-foot, and in lengths of 200 feet.

In addition to the composting technology, Poly-Flex Composting sells biodegradable and compostable bags under the national distributed EcoGuardTM brand for residential and commercial collection. "We are extremely excited to continue to develop and offer full solutions," says Morris Jett. "We believe Poly-Flex Composting is the first company to offer the complete solution that addresses the full lifecycle of 'organic/green' waste from safe, sanitary collection systems to the self-contained in-vessel composting technology that meets EPA and wastewater regulations (controls odor and leachate) while producing high quality compost materials for reuse."

Transform Compost Systems

Transform Compost Systems is the only vendor responding to the survey with an in-vessel technology in two categories, Enclosed Aerated Static Pile and Agitated Bed. The company's Aerated Bunker System utilizes an aerated concrete bunker custom designed for each application. After two to three weeks in one aerated bin, the material is mixed and placed into a second aerated bin for another two to three weeks. The process is designed to maintain temperatures above 55°C for at least 14 days throughout the composting material. Bins are loaded with a conveyor system or front-end loader, and emptied with a loader.

An aerated bunker system is installed at the District of Kent, British Columbia. The bins are equipped with a patented Airfloor™ aeration system embedded in a concrete floor that also allows for leachate collection. Aeration blowers are controlled by a computerized timer and temperature feedback system, with compost batches tracked through the bunkers, and time vs. temperature graphs produced for the entire process.

After the composting phase, material is screened and placed in curing piles for another six to eight weeks. The system can be designed for installation within a building that has a receiving and mixing area, allowing for collection of odors and treatment in a biofilter. The company also introduced the AirPhaser, a new, nonthermal plasma odor control system that destroys odor compounds by passing them through a high frequency and high voltage field. Its installation requires a small amount of space.

VCU Technology International

VCU Technology International Ltd. has been marketing a "modular vertical passively aerated aerobic in-vessel composter" for the past 10 years, with 38 installations in Australia, New Zealand, United Kingdom, Finland, Spain, Scotland and Canada. The Canadian installation is at Halton Waste Recycling in Newmarket, Ontario and processes 20,000 tpy of green waste and digestate from an anaerobic digester. Most of the other facilities process source separated organics and yard trimmings, with others handling fish waste, slaughterhouse and poultry by-products, wastewater treatment plant grit and sludge. One of the larger VCU installations processes 20,440 tpy of household green and food waste for the Merseyside Waste Disposal Authority in Gillmoss, England.

Processing capacities range from 4.5 to 8 tons per chamber per day. Each chamber is 9.8 feet by 9.8 feet by 16.4 feet tall, and is loaded from a blender/mixer to an inclined conveyor, which takes homogenously mixed material to the top of the chamber and then distributes it by another conveyor to the chosen cell in multicell systems. The fresh material is spread evenly at the top of the chamber by a proprietary mechanism. Compost product is harvested daily from the bottom of the cell, and the column then slumps down the chamber to an automatically controlled level. Leachate can be directed to the municipal sewer.

Paul Brown, coinventor and company founder, describes some improvements that have been made in the last few years. "We have changed some mechanical handling components since the Newmarket facility, which has allowed us to increase input volumes per hour. We have also changed the process a little where we are getting steeper heating curves in shorter time periods, postharvest and filling each day. This is enabling us to get the cells (chambers) back into process stasis [steady-state] sooner and be stabilized for 18 to 20 hours/day. Bugs with more hours per day in stasis, before their habitat and conditions are changed again, do more efficient work."

Typical retention times vary between seven and 14 days. Heat from the composting process rises through the chamber pushing temperatures in the top of the chamber to over 70°C, complying with regulatory requirements. Brown explains that gaining full accreditation under the Animal By-Products Regulation (ABPR) of any government is an involved process that takes at least six months. VCU works with its clients to prove that its process meets the requirements of the ABPR.

In Manchester, England, the modular nature of the system has allowed the facility to expand from a single cell chamber five years ago, to three chambers a couple of years later; it now has six chambers. The facility processes fruit, vegetable and flower wastes, combined with green waste and cardboard. It is located on the site of the market in Manchester.

Brown reports that two new size models will come on the market within the next three months. "They are small systems for the remote resort/island community/corporate campus sector," he says. "They will come with a solar cell/ 24-volt operating option and process up to 1 tpd."

Versa Corporation

This elongated plastic bag composting system was first developed in 1990, and was purchased by Versa Corporation in 2004. The Versa CTI System is a patented technology that uses a low cost containment vessel with forced aeration. The bags are 10 to 14 feet in diameter and up to 350 feet in length. Perforated pipe connected to an electric blower runs inside the length of the bag. Raw material is placed into the bag with a machine developed for the agricultural feed storage industry and has been manufactured in the U.S. for the last 25 years. Bags are unloaded by a front-end loader of some type. Four Versa systems are installed in Minnesota, California (2), and British Columbia, and process MSW, yard trimmings, food residuals, wood waste and biosolids. Versa also recommends the bags for storage of finished compost.

AGITATED BEDS AND VESSELS

As summarized in Table 2, six vendors responded from this category. A variety of machines have been developed over the last 20 years to mechanically stir and mix organic material in a horizontal or vertical container of some type. There are basically two subgroups in this category; horizontal concrete beds or bays with an agitator that travels along the top mixing the material below, and containers with an internal mixing paddle or shaft. Some of these systems are also aerated with a blower system.

Backhus

Backhus Kompost-Technologie, which manufactures windrow turners, has developed the Lane Turner (LT), previously model 9.45, to operate on concrete walls 16.4 feet wide, with a pile height up to 8.9 feet. The turning machine is only 5 feet tall above the wall and therefore allows for a low head space above the walls, reducing the amount of air to be collected and treated.

The concrete bunkers are loaded and unloaded with a conveyor, hopper-car or front-end loader. The units can be manually or automatically operated. The company notes that it

is advantageous to the composting process to include an aerated floor. Backhus also has a bridge turner to span and turn much larger quantities of material inside a building.

BioSystem Solutions
Founded in 2002, BioSystem Solutions spent two years in R&D, and introduced a small, school cafeteria-sized vermicomposting unit, BioSafe™, to process up to 20 lbs/day of food waste, producing worm castings. After more R&D focused on large-scale composting, BioSystem launched three new models in 2007, two of which are agitated bed technologies.
The BioChamber™ is a self-contained, automated, agitated, in-vessel composting system designed to process food waste (including meat and dairy), manure and biosolids. The unit provides automated loading, turning and compost discharge. It is a stackable modular system constructed with stainless steel. Agitators inside the unit turn and move the material through the container in seven to 21 days. Process controls measure and record temperature, oxygen and moisture content. All exhaust air is treated through a biofilter. Leachate is also captured for reuse.
A vertical variation is offered in the BioTower™ for use in space-restricted locations, and is designed to process from one to 20 tpd. The third new product, BioLane™, is an automated, self-contained, stackable vermicomposting device.

Green Mountain Technology
More than 200 Earth Tub units have been installed in schools, restaurants, hospitals and supermarkets in the ten years they have been on the market. Described as a continuous batch process for 50 to 150 lbs/day of food residuals, manure or yard trimmings, a person manually rotates the cover while an internal auger shreds and mixes the material in the 4-foot high, 7.5 foot diameter plastic tub. Feedstocks are manually added through top and side doors until the unit is full, and then discharged after three to four weeks of active composting through the discharge door. An aeration system draws air through the compost and forces the exhaust air through a biofilter. Leachate is collected and disposed to a sewer system or holding tank.
The company reports that the system works best with two side-by-side units, which allows the product in one tub to complete composting while fresh compost is added to the adjacent tub. When fresh material is added, the 12-inch diameter stainless steel auger is turned on while the lid is manually rotated.
GMT recently redesigned the lid, which features a prop to hold up the loading hatch when food waste is being added (previously it had to be held up manually while loading). A metal cross bar was added to reinforce the plastic lid and rollers have been added to the ends of the cross bar to make the lid easier to turn. As for new applications, a number of units have been sold to biodegradable plastics manufacturers for use in product testing.

HotRot Exports
The HotRot in-vessel composting unit is a U-shaped vessel, enclosed with removable lids for inspection and maintenance, with a central tine-bearing shaft running longitudinally through the unit. The shaft rotates periodically to provide mixing and aeration. The HotRot 1811 represents the third generation unit, and is designed for 2.5 tpd of food waste and yard trimmings. Each unit is 42 feet long by 7.2 feet wide by 7.8 feet high. A much larger model, HotRot 3518 is constructed from precast concrete, and is designed to process up to 150 tpd using multiple units. Each unit is 72 feet long by 16 feet wide by 14 feet high, and has a capacity of 12 tpd. For some feedstocks, shredding is recommended to reduce particle size prior to loading in the vessel. The units, which typically are located outside, are intended to run in a continuous mode, with weekend storage capacity built into the hopper that feeds the unit via a shaftless auger or conveyor. The tines on the shaft are designed to break up clumps of materials. If biosolids and bulking agent are added separately, the internal shaft can mix them. The rotation of the shaft along with feed rate is used to regulate processing times. Net forward rotation affects retention time, with as little as ten days to achieve significant volume reductions, and 18 to 25 days to produce a more stable product, according to the manufacturer.
Air flow is counter to material flow, and the units are maintained under negative pressure, with biofilters used to treat odors. Temperatures of the process are monitored and recorded. Ancillary equipment such as augers, conveyors and dewatering units can also be supplied as part of a turnkey installation.
A new application of the technology is processing sewage treatment plant grit and screenings, in some cases without the addition of a bulking agent. HotRot has also been used to compost standard disposable diapers. Eight in-vessel sites are listed on the company website.

Siemens Water Technologies
Twenty years ago, at a plant nursery in Lebanon, Connecticut, the Sellew family created a compost company, Earthgro, and an in-vessel compost system designed to process chicken manure for use at their nursery. The composting technology was named International Process Systems (IPS), and was used at the Lebanon site to process manure, yard trimmings and food waste. The innovative design used a rail-mounted machine on top of two concrete walls that traveled the length of the bay, agitating and mixing the organic matter with a series of tines attached to a spinning drum. Eventually, the technology license was sold to a waste management company, who subsequently

sold it to Siemens Water Technologies. Twenty-two of the 27 IPS installations process biosolids, usually with sawdust or yard trimmings as the bulking agent. However, the two most recent facilities under construction, in Tyre, Lebanon and Mindarie, Australia, will process sorted organic food residuals.

The processing capacity of the installations ranges from 10 tpd of food waste at the Rikers Island , New York correctional facility, to over 500 tpd at the Burlington County, New Jersey biosolids and yard trimmings composting facility.

A new, optional feature is a dolly chute for automated off-loading to a conveyor system, with Delaware County, New York having the first installation (see "Composting Mixed MSW And Biosolids To Extend Landfill Life," November 2006). Most installations use a front-end loader to scoop up the compost that the turning machine pushes out at the end of the bay. With the dolly system, the compost can be conveyed to the curing area of the facility, eliminating use of a loader for that job.

Most IPS installations accomplish moisture addition to the bays with overhead sprinklers, or a sprinkler system built onto the turning machine with a reel to hold the water hose as the machine moves down the bay. A new option is to have sprinkler heads installed at the intersection of the rail and the top of the wall. The Rapid City, South Dakota and Mont De Marsan, France facilities utilize this feature, spraying the surface of the piles just prior to agitation.

Siemens/IPS recently added a "mini" agitator for a narrower bay than either the 10-foot or 6-foot wide standard designs. At only 5-feet wide, the miniagitator is small enough to ship in a standard container. It is a more simple design, and does not have some of the features of the larger machines. Barbara Petroff of Siemens observes that the company has recently proposed on several MBT facilities in Europe, an evolving market due to European Union mandates to divert organics from landfills.

Transform Compost Systems

The Transform Agitated Aerated Channel System is similar in many respects to the company's aerated bunker system described earlier in this article, but includes a self-tracking agitator that rides directly on top of a 10-foot wide by 8-foot high concrete bunker wall with no special rail required. The turner utilizes an "Artex" bed chain on an inclined conveyor to move the material 12 feet with each pass. An optional conveyor allows the material to be moved 24 feet with each pass. A transfer carriage moves the compost turner from one bunker to another. The 120 hp agitator is remotely operated.

The bunker can be installed within a secondary cover that allows for collection of gasses from a much smaller area than the entire building. This air can then be treated in a biofilter, or the company's AirPhaser nonthermal plasma odor control system.

Transform also has developed a warning system to alert operators when temperature probes are unintentionally left inside the composting material so as to avoid damage to the compost turner.

The accompanying directory lists contact information and websites for the systems described in this article. Part II of What's New? In-Vessel Composting will run in the June 2007 issue of BioCycle. It will focus on rotating drum systems.

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IN-VESSEL SYSTEMS DIRECTORY

Backhus Kompost-Technologie
c/o North America Inc.
[redacted]
www.backhus.us

BioSystem Solutions, Inc.
[redacted]
www.biosystemsolutions.com

Christiaens Group
[redacted]
www.christiaensgroup.com

Engineered Compost Systems (ECS)
[redacted]
www.compostsystems.com

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[redacted]
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