buyers' guide

The buyers' guide to small-scale composting equipment

Small-scale community and on-farm composters face problems similar to larger scale operations. They do also have a unique set of issues to face when buying or hiring equipment for their operations. Mark Baker from Walker Organics Management, who is also a director of the Community Composting Network, outlines some of the issues that composters should bear in mind when buying equipment for small-scale composting operations.

The considerations for choosing the correct machinery for a small scale and community compost site are pretty much the same as those for larger ones.

The scale of operations will be the principal factor in determining the size of kit required. Establishing your market will decide the compost grade you want to achieve, which in turn may facilitate the decision of what pieces of machinery you are likely to consider

Considerations for choosing the right equipment for small scale composting include:

- its capacity to handle different feedstocks
- daily/hourly throughput capacity
- shredded particle size range
- cost - including depreciation
- training costs
- cost of routine maintenance
- cost of fuel
- cost of non-routine maintenance ie cost of annual services and sets of new blades/hammers and other spare parts

Particle size of machine output or the range of particle sizes will greatly influence the effectiveness of your compost process. It is important to have a range of sizes throughout the heap in order to maintain structure and to keep the process at its optimum level. If particulate size is too large the pile will dry out and if they are too small the pile will run out of oxygen and will be in danger of going anaerobic. Water also plays an important part in the process. If particles are too large it will not be able to hold on to its water content, ending up with a big puddle around your heap. Moreover, if they are too small water will occupy all the airspaces and the pile will start to develop nasty odours.

Chipper or shredder?

Most chippers rely on good quality timber which is free from contaminants (nails, soil, root balls etc), and provided the blades are sharp, they will produce a consistent grade of chip which do not vary much in size. However, some do not deal

well with a mixed stream of waste including grass and hedge trimmings. Shredders in contrast, are usually fed by conveyor and can be loaded using a pitchfork or the grab of a front-end loader. Unlike chippers, shredders use hammers or blades and counter blades that effectively pulverise the waste until it passes through a screen. The product of both machines is also very different. Chippers produce a uniform, cleanly cut chip whilst a shredder literally tears the wood apart, exposing more of it and leaving a larger volume to surface area ratio for the micro-organisms within the compost pile to get to work on.

Some machines incorporate both chipper and shredders and can cope with pretty much anything. The ones I have used did not suffer from combining the two processes in one machine, the chipper could chip timber of the same diameter as their single operation counterparts, and the shredder easily coped with wet grassy May brash.

Screeners

There are three main types of screeners, traditional barrel screeners, vibrating plate varieties and star screens.

Once again, it is essential to know the grade of material you want to achieve, as spare screens can be expensive and difficult to change. It is important to get the correct moisture levels before you start screening. Moisture levels below 30 per cent will create very dry, dusty compost; moisture levels above 50 per cent will make the compost stick to the inside of the drum if the screen size is too small. Factors such as drum speed, input conveyor speed and drum pitch are normally fully adjustable. Small alterations in each of these factors can readily increase output, and different types of compost and water contents will require different settings to achieve optimum output. Different manufacturers also add special features to their drums to make it a more efficient process:

- bounce plates that make the compost tumble across the drum instead of just sliding down its inside edge
- internal screw – by welding an internal screw to the inside of the drum, the compost is forced to cover a larger surface area of the drum, giving it a greater chance to be fully screened
- drum size – larger, longer drums are more efficient than short drums with a smaller diameter

Vibrating plates

Originally developed for sorting aggregate and building waste, vibrating plates may be suited for the smaller operation but are of limited use and little you can adjust on them to improve their efficiency, but the screens are cheaper and

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easier to change than on the drum-based machine. They are also much cheaper than drum based screeners and the mobile units can usually be towed behind a 3.5 tonne truck.

Star screens

Used only in larger sites, star screeners relay the compost over a series of revolving rubber fingers up a slope and allow the smaller fraction to fall through the fingers. It is an expensive machine but does have its advantages. It is better at coping with compost with a higher moisture level and at removing contaminants ie small pieces of plastic, into the oversize pile. Its output is marginally better than similarly powered barrel screens, and it does not suffer from being over loaded. Changing the 'screens' on the machine is expensive but you can adjust the fraction of the compost removed by altering the speed at which the rubber fingers revolve. The manufacturer of the star screener are looking into producing a smaller scale machine to suit the small-scale operator.

Hand fed screeners

Until recently small drum screeners were unheard of. Community and allotment groups use homemade versions

but these systems are very slow and labour intensive. Some groups have developed their own, higher tech solution to the problem. Devon Community Composting Network has built the Devon Rotary Sieve; this is a hand-powered low cost solution to screening compost. The Worm Research Centre has also produced a small screen called the Jimmy Riddler, which unlike the Devon screen, is powered. There are not many things to go wrong with a screener. Unlike on a shredder, there are no wearing parts and maintenance and running costs are, in comparison, much reduced.

Loading and turning machines

From the most basic, long handled pitchforks to specialist loading shovels the choice of loading machines and implements will generally be decided by the variety of shredder and screener you have to load. Other factors will include your yearly capacity, how you manage your compost during its active phase and the type of truck you have to load to get rid of your end product.

Some shredders may require a tractor to run them via a power take-off and that machine will have minimum requirements in power specifications.

Site size and layout will also determine the type of machine used. When planning a site it is useful to know the turning circle and capacities of different machinery and try to marry the two up. It is also an idea to consider what machine you are likely to use to load up lorries. Bulk haulers have very high sides and most tractors and loading shovels do not have the clearance required to load them. Loading shovels can be modified with a toe tip bucket that will improve its reach. Telehandlers have a good reach capacity but lack the sheer power that a loading shovel (wheeled loader) has, but equally they have the ability to stack the compost higher than any loading shovel.

The choice of implements is also an important consideration to make. Oversize buckets on loading shovels and telehandlers are good for moving compost around. However, small buckets are not very good at handling green waste in their unprocessed state. Fitting grabs onto forks is more efficient. Having quick release and interchangeable implements also saves a great deal of time and effort.

For sites with a serious space issue and which do not have a large throughput a skid steer might allow more of the site to be taken up for the composting process and less handed over to turning circles and access. They have the ability to turn on the spot and have a range of attachments and implements that compliment the composting process.

Monitoring equipment

The simplest and cheapest form of thermometer is the analogue variety. They require quite a long time to stabilise in the heap and if you have multiple heaps or long windrows to monitor, the task will take a considerable amount of time to complete.

Digital thermometers usually involve a long probe and a separate box connected by a removable lead. When considering which option to purchase, consider probe length and stabilisation time. Some require upwards of a minute to stabilise whilst others are ready to read within 10-15 seconds. If you have 50-60 monitoring points to record, long stabilisation periods will mean that the data recorder will be standing around waiting.

At the other end of the spectrum, there are automatic data loggers that are placed in a batch and left in situ until the

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Livelink satellite system brings customer benefits down to earth

Customers are set to reap the benefits of a new satellite monitoring system being introduced on the full range of JCB machines for the first time at Conexpo.

Called JCB LiveLink, the advanced telematics system offers the ability for improved performance and accurate monitoring. By plugging into the machine's own diagnostic system, JCB LiveLink provides information, including hours worked, fuel consumption, temperatures and pressures.

One of the major benefits is the ability to better protect machines against theft – a feature which is also boosted by the introduction of immobilisation on JCB machines.

Among the key features of JCB LiveLink are:

- Machine health monitoring
- Machine tracking
- Geofencing
- The ability to set curfews
- Receipt of service alerts

JCB Chief Operating Officer Matthew Taylor said: 'JCB LiveLink provides our customers with an extremely high-tech system which will help them run their businesses more efficiently and profitably by improving productivity and also by enhancing servicing. Coupled with the introduction of immobilisation on JCB machines, JCB LiveLink also provides an extremely powerful deterrent to thieves by making the machines harder to steal and simpler to recover when they are.'

JCB LiveLink, which will be provided in co-operation with North American telematic supplier Qualcomm, uses the latest telematics and satellite technology. A transmitter is fitted on to the machine which sends data via satellite and cellular networks to a database that customers can access through JCB's secure website from anywhere in the world. The unit is hard wired into the machine's electrics, allowing critical machine performance data to be collected remotely.

"LiveLink provides our customers with an extremely high-tech system which will help them run their businesses more efficiently"

Machine health monitoring

Customers can monitor the health of their fleet remotely. Data on the machine's health, such as engine oil pressure or water temperature, is taken from a selection of critical machine sensors. If one of these is activated, an alert will be sent immediately by email or text. This will provide an early warning of a potential problem, thus avoiding costly repairs.

Machine tracking

JCB LiveLink will allow customers to monitor where all machines in their fleet are, whether the engine is on or off and when the engine was last on. Users can also click on each machine for a more detailed look at the hours of operation.

Geofences

JCB LiveLink customers will be able to set a geofence around their machine for improved security. If the machine moves out of the designated area, an alert will be sent by either email or text. Alternatively, a geofence can be set when a machine moves into an area – perfect for alerting customers when it's close enough to a service centre.

Curfews

Curfews can be set for every day of the week to specify the times when machines can be moved or when the engines can be started. If curfews are not adhered to, an email or text alert is sent.

Service alerts

Customers can set the number of hours for machine servicing and when due the system will alert the user next time they log on to the system.

JCB LiveLink benefits

The features of JCB LiveLink bring huge benefits as the system means a customer always knows where a machine is, making it much easier to recover after a theft. The enhanced security results in lower insurance premiums.

JCB LiveLink also gives customers an at-a-glance guide to the location and usage of every machine in a fleet, allowing work to be planned and managed more efficiently and more profitably. The system also brings dual service benefits: customers can set service alerts and in addition JCB dealers can monitor machines and use the data to guarantee timely servicing, providing maximum uptime.

For plant hire companies the system provides a precise record of machine usage for more accurate invoicing. JCB LiveLink also provides customers with a complete picture of their fleet at any given time, allowing the identification of opportunities for greater productivity.

The LiveLink equipment can be purchased either with the machine from the factory, or as a retrofit system direct from JCB's dealers.

Immobilisation

Offered separately from JCB LiveLink, the immobilisation system will work, depending on the machine, by isolating three electrical functions, such as the starter circuit, forward/reverse and fuel supply to the engine. These functions will only become operational by one of two methods: the use of a transponder key which is unique to the machine or by use of a standard ignition key and key pad located in the instrument panel, which requires the operator to enter a unique four digit identification code.

Immobilisation is available on all European-manufactured JCB machines as standard in western Europe, North America, Australia and New Zealand. It is available as an option in other markets.

www.jcb.com.

compost has to be moved or turned. These can send data back to a desktop PC at chosen intervals and do give an accurate picture of what is happening within the heap at any one point in time. Most systems are hard-wired ie each probe is wired to a distribution box which is in turn wired to the computer. Some systems require the probes to be buried completely in the compost. These are sealed units containing the probe, battery and transmitter. An active compost heap is a hostile environment for electronic equipment. Seals mean that batteries are very difficult, if not impossible to replace, and must be sent back to the manufacturer for battery changes. Housing systems that rely on radio telemetry indoors also present certain problems, especially if it is in a metal framed or metal clad building as these can interfere with the signal.

In-vessel composters

Small in-vessel systems allow small-scale food waste producers to effectively deal with their own waste on site. They require a small footprint and as long as the feedstock ratios are correct, they can produce immature compost in a couple of weeks. There are two main types of in-vessel composters, the continuous flow system and the batch system. Capacity on commercially built machines ranges from a couple of hundred kilos a week to units that are modular and can process tens of tonnes a day. The Association for Organics Recycling has produced a comprehensive guide to available technology covering the entire range of scales. It is important to note however that not all systems are currently ABPR approved, which limits the feedstocks they are capable of legally processing. Some machinery suppliers are also selling their products alongside macerators and de-waterers. This allows for a greater throughput of the catering waste portion of the mix, but also creates a net loss of available nutrients in the final product.

Once the immature compost has been removed from the in-vessel composter, it still needs to be matured in order to produce a useable product. The community sector has been proactive in addressing this need and has come up with a number of solutions. The Worm Research Centre in East Yorkshire has carried out extensive research in the development of their Worm Pod, which is a modular bed that can easily be integrated into most small scale composting systems. The sector also addressed other needs and came up with similar solutions that can be seen through Scottys Hot Box, which is a fully insulated sensible sized modular composter that is easy to assemble and unfriendly to vermin.

New, second-hand, reconditioned or hired?

Most dealers will have demonstration units, and will usually be happy to organise a visit with it to your site. It is important to take up these offers and prepare a number of different feedstocks that your project may have to deal with over the year. If you process timber, pallets, grass, or mixed waste ensure you have a suitable quantity to put through its paces. Find out what stresses the machines and ensure you know its weaknesses. If demonstration units are not available, ask the dealer to list his clients, then go to see their machine working. It is also worth contacting other owners, as they will usually have more realistic figures of throughput, running, and maintenance costs than those in the brochures. Ensuring any machinery you acquire is mounted on road-legal trailers

Small scale composting service suppliers								Service
Company	Contact Name	Contact Number	Email	Website	Turners	Shredders	Mixers	Screens
Accelerated Compost Ltd	Huw Crampton	01260 222942	sales@quickcompost.co.uk	www.quickcompost.co.uk				
Air Spectrum Environmental	Chris Colyer	01905 362102	chris.colyer@specenv.com	www.airspectrum.com				
Bubble House Worm Farm	Sheila Nelson	01886 832559	bubblehouseworms@aol.com	www.bubblehouseworms.com				
Celtic Composting Systems/ Celtic Composting UK	Steve Bullock	0044(0)1884-259793/ 0044(0)7872119638	sbullock@celticcomposting.com	http://www.celticcomposting.com	x	x	x	x
CRJ Services Ltd	Rob Symons	01565 723886	enquiries@crjservices.co.uk	www.crjservices.co.uk		x		x
Gemini Data Loggers UK Ltd (Tinytag)	Nigel Palmer	0044 (0)1243813000	info@tinytag.info	www.geminidataloggers.com				
HotRot	Iain Steel	01842 816909	info@hotrot.co.uk	www.hotrot.co.uk		x	x	x
JCB Sales Ltd	Jonathan Garnham	01889 590312	jonathan.garnham@jcb.com	www.jcb.com				
KPS Composting Services Ltd	Steve Usher	01444 831010	steve@kps.uk.com	www.kpscomposting.co.uk	x	x		x
MENART Composting Machines	John Edstrom	01256 397959	johnedstrom@btinternet.com	www.menart.eu	x	x		x
Milbury Systems Ltd	Brian Mees	01275 857799	sales@milbury.com	www.milbury.com				
SmartSoil Ltd	Steve Holmes	01639 701888	info@smartsoil.co.uk	www.smartsoil.co.uk				
VCU Europa Ltd	Peter Hallam	07870 246366	peterh@vcutechnology.com	www.vcutechnology.com				
WamCal Ltd	Jenny Grant	01382 477675	jenny@wamcal.co.uk	www.wamcal.co.uk				
Worm Research Centre	Steve Ross-Smith	01757 630456	srsphoenix@lineone.net	www.wormresearchcentre.co.uk				x

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Cleaners	Odour control	Plastic separators	360 loaders	Small scale in-vessel equipment	Front end loaders	Odour monitoring service	Others (please specify)
				x			
	x					x	
							Worm composting
	x			x			Consulting Services
		x					
							Temperature Monitoring Systems
	odour free in-vessel composters, biofilters and others dependent on projects	x		1206 composter - 400kg per day, 1509 composter - 1500kg per day, 1811 composter - 2400kg per day, MIDAS - aerated floor composting system - 5,000-100,000 tonnes per annum, supply of on-farm anaerobic digestion technology			We supply composters and all other ancillary equipment as part of a turnkey package though we may sub-contract some of the materials handling equipment. We do not supply ancillary equipment separately - only with the sale of a composting unit
			x		x		
		x	x		x		
		x					
							Rocket walls to form storage bays and bunkers. Prestressed concrete walling to form permanent structures eg tunnels and storage facilities
				x			
				x			
							Consultancy and training - Process operational advice, exemption and licence applications, end product testing, consultancy on all aspects of small scale and on-farm composting
				x			WormPod/HotBox/Jimmy Riddle Small Scale Trommel

means you can contract it out. Screeners can sit idle for long periods, and hiring it out can provide your business with a extra income. Commercial shredder hire is also very expensive and not always available to small-scale producers and landscapers. Most will be happy to pay a reasonable rate for a contract shredding service.

The machinery used to run the site will be, in many cases, one of the biggest capital outlays. It may not necessary to purchase new machinery if second-hand or reconditioned ones are available. Dealers will readily sell factory-reconditioned models with a limited guarantee that will be cheaper than new models. Try to get as much information about any second-hand equipment, including age, hours worked, tonnes processed, how long it has been stood, its maintenance log and how well it performed for the previous user. Unless the second-hand machine is ready to work, it may be sold needing a new set of blades/hammers etc. Consider this when negotiating the deal as the costs may be significant for replacement parts.

Hiring machinery is an option if your site has the capacity to stockpile. Industrial shredders cost approx £1,200-£1,400 a day plus fuel, and screeners cost approx £1,200 per week plus fuel. Screeners generally spend a lot of time standing idle, and if you can hire a screen several times a year instead of buying one you could make considerable savings.

However, it is worth noting, if you rent a large screener for a week it is also worth renting a large wheeled loader as a normal tractor or small loader will not be able load it quickly enough. A big advantage of hiring your equipment is that you do not have to pay maintenance costs and you will always have the machine in optimum working condition. However, it would be prudent to plan ahead and book your hire equipment in advance as anyone reliant on hiring a piece of equipment will want it when you do!

The community composting world is a hugely varied sector that has been finding solutions to their composting problems for many years. Lack of funding and other resources has required the sector to find solutions to a number of problems that new composting projects may be facing. So, no matter what your composting process or project entails, someone within the Community Composting Network will probably have already addressed it and found a solution that they are usually very keen to share. When it comes to machinery, don't be fooled by thinking that the community sector only composts a handful of tonnes per year. The majority of groups are still quite small, but a number of not for profit community enterprises have stepped up to the bar and now run fully licensed sites that are capable of composting in the 10s of thousands of tonnes per year. Some have also diversified and have gained valuable experience in the collection of kitchen and catering waste (and the best suited vehicles and equipment for the job), something that the commercial sector is slow to address due to low margins. Advice is available; contact, or become a member of the Community Composting Network and make sure you don't make the same mistakes in setting up a new composting project or buying the wrong piece of machinery that I, and others like me have made; because resources are tight and simple unintentionally made mistakes might make all the difference between sustainability and you becoming a statistic.

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