

# SCREENING AND BAGGING EQUIPMENT

Choosing the right screening and bagging equipment for your facility is not a simple task. There are a number of different machines available, new and reconditioned, all of which vary in capacity, size, feedstock suitability and cost. Depending on the size and operating conditions of your facility, hiring or contracting services might be more economic than purchasing outright.

Many companies now offer screening and bagging services and they can provide good value for money, although it is worth planning ahead as peak season tends to arrive at the same time everywhere.

Contracting, whereby the hire includes a machine operative, will remove the need for on-site trained operatives and thus reduce labour costs. Similarly,

maintenance costs are also eliminated.

If you intend to purchase your own equipment you should identify the equipment specifications that will meet your requirements.

The following checklist may help:

- Annual volume
- Peak demand
- Hourly capacity demand
- Material type when ready for screening/bagging
- Material size when ready for screening/bagging
- Range of product grades required
- Range of bag sizes
- Maintenance / running costs
- Equipment mobility

## COMPOST SCREENING EQUIPMENT

Screening is the process of separating particles according to their size. Most machines sieve material through a moving mesh, allowing smaller material to pass through then fall onto a conveyor or a specific area from which it can be moved to a suitable storage location. Some use air-separation.

Screening compost is the most common method of adding value, the key aims of which are to create compost grades with particle size ranges suited to the product type (eg, soil conditioner, mulch, top dressing, ingredient for manufactured topsoils and growing media) and remove any physical contaminants that may be present in the unscreened composted material. The particle size range for a specific compost grade will depend upon your product type, the markets in which it is intended to be used and any specific requirements of individual customers.

Trommel screens, deck screens and star or finger screens are the most commonly used types of screening machines. A variety of sizes and types are available, some with very sophisticated feeder mechanisms, variable speed motors and interchangeable components and accessories. When making your choice, take into account your processing efficiency requirements.

### TROMMEL SCREENS

Trommels are the most popular type of screen and consist of large rotating mesh drums, positioned at

an angle. The material is deposited into the drum and as it rotates, the material passes through holes in the mesh onto a conveyor. The oversized material remains in the drum and is discharged onto another conveyor when it reaches the end of the drum.

The diameter of the holes in the mesh determines the size of the screened fraction and the length of the drum and its rotation speed determine the throughput. A variety of mesh hole sizes are available and some manufacturers make screens with two or more different mesh sections, which creates more than one particle size range of compost.

### STAR/FINGER SCREENS

Star screens use rubber star shaped components or discs, mounted on a series of rotating shafts. As the material passes over these, the smaller particles drop between the shafts onto a conveyor while the larger particles are carried forward. The speed at which the shafts rotate dictates the particle size range of the compost.

### DECK SCREENS

Deck screens are fitted with the desired mesh size and operate on a horizontal plane or at an incline. The machine vibrates the compost across the mesh and particles smaller than the size of the mesh holes fall through, leaving the oversized matter on the mesh or discharged at the bottom if the mesh is set on an incline. Finger screens are similar but utilise rubber fingers rather than a mesh.

# OPERATIONAL FACTORS

THERE ARE A NUMBER OF OPERATIONAL FACTORS THAT NEED TO BE CONSIDERED BEFORE INVESTING IN SCREENING MACHINERY.

## MARKETS AND PRODUCT GRADES

The compost grades for which market opportunities exist or can be created heavily influence what type of screening machine is appropriate. The grade of compost impacts on the productivity of the screen, as the smaller the grade, the longer it will take to screen a given amount of material and the greater the amount of oversize remaining at the end of the screening process.

As a rule of thumb, a 20-30 % drop in throughput is expected when screening to produce a 0-10mm compost grade compared with a 0-20mm compost grade.

In further explanation of this example, a trommel screen with a 5m drum may process 100m<sup>3</sup> of material per hour when producing a 0-20 mm

compost grade but process only 65 m<sup>3</sup> of material per hour when producing a 0-10mm compost grade. For this reason, always ensure that you **specify what grade of compost is required when asking equipment suppliers for throughput figures.**

To an extent, screening machinery can be adjusted to cater for different compost grade specifications (particle size ranges). For example, changing a trammel screen's drum to one with different mesh hole sizes or varying the speed at which a star screen's shafts rotate.

## MOISTURE AND FEEDSTOCK TYPES

Composted materials' moisture content strongly affects the efficiency and efficacy of screening machines. If the material is too wet for the

machine, it will form into balls and stick to the mesh; this is often called 'blinding'.

On the other hand, if the compost is too dry, screening can generate large amounts of dust, which is a potential health risk to any site workers who are exposed to the dust but do not wear respiratory protective equipment. Composted material moisture content of below 40% mass/mass is recommended when it is being screened.

To combat blinding, most trommels have brushes fitted to the outside of the drum so that as the drum rotates against the bristles, the mesh holes are cleared. However, the brushes are not always 100% effective. Consider brush positioning, wear and ease of replacement when buying a screen.

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**TABLE 1: SCREENS AND BAGGERS**

**TROMMEL SCREENS**

Company	Contact number	Email	Manufacturer	Model	Hopper capacity (cu m)	Throughput (tph)	Feed-stock	Working screen area (m <sup>2</sup> )	Screen size (m <sup>3</sup> )
Blue Group	0845 2178755	sales@bluegroup.co.uk	Doppstadt	SM 414		25-40	various	18.5	1.4dm(d) x 4.2m(l)
			Doppstadt	SM 518		60-70	various	28.3	1.8m(d) x 4.7m(l)
			Doppstadt	SM 620		100-120	various	34.6	2m(d) x 5.5m(l)
			Doppstadt	SM 720		150	various	44.6	2m(d) x 7.1m(l)
			Kiverco	Bespoke	Bespoke		various	bespoke	bespoke
Firstgrade Recycling Systems	0844 800 9357	sales@first-grade.co.uk	Firstgrade	1540	5.5	30	various	19	10 to 60
				2040	10	50	various	25	10 to 60
				2060	16	60	various	38	10 to 60
				2550	16	78	various	39	10 to 60
				25100	25	100	various	78	10 to 60
				Bespoke	2.5-25	up to 150	various	up to 95	10 to 60
Harry West (Prees) Ltd	01948 840465	jeff@harrywest.co.uk	Seko	50/MD	2.3	5	various		
				100/MD	3.8	10	various		
				200/MD	5.3	20	various		
				50/ME	2.3	5	various		
				100/ME	3.8	10	various		
				200/ME	5.3	20	various		
Komptech UK Ltd	01926642972	info.uk@komptech.com	Komptech GmbH	Joker	2.3	20	various	10	13.8
				Primus	3	40	various	16	18.2
				Maxx	5	50	various	22.5	25.5
				Mustang	5	80	various	30	34.6
				Mustang S	5	80	various	30	34.6
				Magnum	7	120	various	47	54
Menart	01256 397959	johnedstrom@btinternet.com	Menart	TS-1535	4	25		15.7 m <sup>2</sup>	1.54 x 3.83
				TS-1850	4	60		29.7 m <sup>2</sup>	1.87 x 6.02
				TS-1860	4	65		35.1 m <sup>2</sup>	1.87 x 6.90
				TS-1868	4	75		39.6 m <sup>2</sup>	1.87 x 7.58
				TSC-1535	4	25		15.7 m <sup>2</sup>	1.54 x 3.83
					2.5	25		15.7 m <sup>2</sup>	1.54 x 3.83
				TR-1850	3.5	60		29.7 m <sup>2</sup>	1.87 x 5.36
				TR-1860	3.5	65		35.1 m <sup>2</sup>	1.87 x 6.26
				TRP-1535-E	N/A	15		15.7 m <sup>2</sup>	1.54 x 3.83
				TRP-1535-D	N/A	15		15.7 m <sup>2</sup>	1.54 x 3.83
				TR-1535-T	2.5	15		15.7 m <sup>2</sup>	1.54 x 3.83
Westcon Equipment (UK) Ltd	01258 859100	sales@westconuk.co.uk	Terra Select	T4	3.4	Up to 20		18.5	21
				T5	4.5	Up to 30		25	28
				T6	5	Up to 50		33	38
				T7	6	Up to 70		47	52

Perforation range (mm)	No. of fractions	Discharge conveyor length	Additional separator?	Mobile?	Power requirement (hp)	Engine type	Cleaning system	New/ refurb/ hire
5-100mm	2	5m	windshifter	yes	90	Diesel (electric optional)	brushes	new/used
5-100mm	2	5m	windshifter	yes	90	Diesel (electric optional)	brushes	new/used
5-100mm	2	5m	windshifter	both	90	Diesel (electric optional)	brushes	new/used
5-100mm	2	4.75m	windshifter	both	90	Diesel	brushes	new/used
bespoke	bespoke	bespoke		both			brushes	new
5-200mm	2	Various	optional	no	20	Electric	Brush	new
5-200mm	2	Various	optional	no	26	Electric	Brush	new
5-200mm	3	Various	optional	no	26	Electric	Brush	new
5-200mm	2	Various	optional	no	33	Electric	Brush	new
5-200mm	3	Various	optional	no	33	Electric	Brush	new
5-300mm	up to 4	Various	air, magnet & water	no	Various	Electric	Brush	new
		4000		Trailed	35kw	Diesel		New
		5375		Trailed	64kw	Diesel		new
		5375		Trailed	64kw	Diesel		new
		4000		Static	15kw	Electric		new
		5375		Static	37kw	Electric		new
		5375		Static	55kw	Electric		new
5-80	2	4m	Magnet	Yes or Static	22hp	Lombardini 3cyl diesel	brushes	Yes
5-80	2	3.3m/5.0m	Magnet	Yes or Static	50hp	Perkins	brushes	Yes
5-80	2	3.3m/5.0m	Magnet/Windsifter	Yes or Static	85hp	Perkins or Electric	brushes	Yes
5-80	2	3.3m/5.0m	Magnet	Yes or Static	90hp	Perkins or Electric	brushes	Yes
5-80	2	5.5m	Magnet	Yes or Static	128hp	Perkins or Electric	brushes	Yes
5-80	2 or 3	3.3m/5.0m	Magnet	Yes or Static	128hp	Perkins	brushes	Yes
8-40 mm are standard on all screens with other sizes per client request	2	7 m	Yes	No	17 kW	Electric	Self-cleaning	New
	2	7 m	Yes	No	33 kW	Electric	"	New
	2	7 m	Yes	No	33 kW	Electric	"	New
	2	7 m	Yes	No	33 kW	Electric	"	New
	2	7 m	Yes	No	17 kW	Electric	"	New
	2	3 or 5 m	Yes	Yes	49 hp	Diesel	"	New
	2	3 or 5 m	Yes	Yes	81 hp	Diesel	"	New
	2	3 or 5 m	Yes	Yes	81 hp	Diesel	"	New
	2	N/A	No	Yes/No	6 kW	Electric	"	New
	2	N/A	No	Yes/No	35 hp	Diesel	"	New
	2	3 or 5 m	Yes	Yes	PTO 80 hp	Tractor	"	New
5-80	2/3	3400mm	Yes	Yes	51	Cummins Typ A 2300	Brush	Yes
5-80	2/3	4900mm	Yes	Yes	81	Perkins Diesel Type 1140	Brush	Yes
5-80	2/3	4900mm	Yes	Yes	122	Perkins Turbo Diesel Type 1104C-44TA	Brush	Yes
5-80	2/3	4900mm	Yes	Yes	122	Perkins Diesel Type 1104	Brush	Yes

**TABLE 2: SCREENS AND BAGGERS**

**STAR SCREENS**

Company	Contact number	Email	Manufacturer	Model	Hopper capacity (cu m)	Throughput (tph)	Feed-stock	Start size range (mm)
<b>Komptech UK Ltd</b>	01926642972	info.uk@komptech.com	Komptech GmbH	Easystar	N/A		various	116/171/330/340
				Multistar M3/M2	5	75	various	116/171/330/340
				Multistar L3/L2	7	100	various	116/171/330/340
				Multistar XL	7	150	various	116/171/330/340
				Multistar XXL	12	250	various	116/171/330/340
				Multistar 2SE	20	50	various	116/171/330/340
				Multistar 3SE	20	100	various	116/171/330/340
<b>Westcon Equipment (UK) Ltd</b>	01258 859100	sales@westconuk.co.uk	Terra Select	S5	7-8	Up to 60		5-60
				S6	6-7	Up to 60		5-80

screens, blinding is not a problem, but the screening can be effective only in one dimension. However, if the operator does not select the appropriate shaft speed for the type of composted material being screened this results in 'spiking'. The particles that pass through the components/discs do not exceed the maximum size in one dimension but do exceed it in another dimension. For example, the graded compost includes many 'pencils' of material which are less than 10mm wide but are up to approximately 50mm long.

## CONTAMINATION

Wood biodegrades relatively slowly compared with food and soft plant tissue wastes. Woody particles are often rejected during screening because in at least one dimension they are larger than the mesh holes or apertures in the screen deck. These coarse particles are known as 'oversize'.

If the oversize material contains problematic amounts of physical contaminants it is disposed of, but if it does not contain such contaminants or they can be removed, the oversize material can be used to provide structure for the next batch of feedstocks.

In addition to oversize particles, physical contaminants detrimentally affect compost marketability.

Contamination is normally checked for and dealt with before feedstocks for composting are shredded, but a very low level of physical contaminants may pass through the shredder.

Bolt-on accessories for some types of screens are popular and include air separators for the removal of fine plastics, magnetic separators for extracting pieces of metal and vibrating belts for removing stones.

## FLEXIBILITY

Whilst it is essential to choose the right screening machinery for your product needs, it is also important that it meets your operational requirements and any restrictions such as noise. If your facility has a dedicated screening area then you will probably prefer a static or semi-static machine with local circumstances determining whether it is powered by electricity or diesel. Alternatively, you might require a mobile screen which can be easily moved from location to location.

## COMPOST BAGGING EQUIPMENT

Compost producers have traditionally sold in bulk. However, greater prices per unit can be achieved by bagging the products, although bagging costs per unit must be taken into account when planning production and

product marketing.

Bagging provides an opportunity to market the products further afield through dispersed outlet networks but transport costs remain significant for such products due to their relatively high bulk densities and low values.

Increasingly, composts are being specially formulated with other materials for the growing media market which requires the compost to conform to technical specifications, based on considerable horticultural knowledge and expertise.

For this reason, producers may opt to sell compost in bulk to growing media manufacturers, who already have the production expertise and an established network for the sale of products through the retail or professional sectors.

Compost producers may bag compost themselves, particularly if there is a local niche for a high value product. After taking the decision to bag locally, there are several options including investing in new or used equipment and contract bagging.

Most small-medium sized composters would be looking to exploit an opportunity locally, through selling the bagged compost to independent garden centres or landscapers, commonly using 40 litre or 80 litre bags. Bagging also provides an opportunity to promote a brand, conveying the quality of the product



Star/finger speed variation fractions	Cleaning system	Additional separator?	Mobile?	New/refurb/hire
Variable 2 Fractions	Patented cleaning finger	Windsifter	Yes	Yes
Variable 2/3 Fractions	Patented cleaning finger	Magnet/Windsifter	Yes	Yes
Variable 2/3 Fractions	Patented cleaning finger	Magnet/Windsifter	Yes	Yes
Variable 3 Fractions	Patented cleaning finger	Magnet/Windsifter	Yes	Yes
Variable 3 Fractions	Patented cleaning finger	Magnet/Windsifter	Yes	Yes
Variable 2 Fractions	Patented cleaning finger	Magnet/Windsifter	Static Electric	Yes
Variable 2/3 Fractions	Patented cleaning finger	Magnet/Windsifter	Static Electric	Yes
2 fraction	Self clean stars	Yes	Yes	Yes
3 fraction	Self clean stars	Yes	Yes	Yes

moisture than similar bulked products. Likewise, screening will require a greater degree of accuracy, and a clean product is essential.

It often makes more sense to produce a range of bagged products including potting mixes, soil conditioners and mulches, thus increasing the point of sale opportunities without further capital outlay. It is important not to forget the potential benefits of using the design of the bag to develop strong branding and effective labelling.

### BAGGING OPTIONS

There are three main types of bagging equipment which are available:

- Pre-formed baggers – where the bags are pre-cut and bottom sealed, the bags are then loaded, filled and sealed automatically or manually.
- Form-filled – where the bags are automatically cut and bottom-sealed, filled and then top sealed.
- Baled – where material is sealed wrapped from free (more commonly used for peat).

through the bag design and brand name, which may also help to promote the business as a whole.

The decision to bag the compost will undoubtedly require far more control

in production as the quality promoted through the branding can only be sustained by a product that emanates quality. The material may have to be matured for longer and require less

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**TABLE 3: SCREENS AND BAGGERS**

**DECK SCREENS**

Company	Contact number	Email	Manufacturer	Model	Hopper capacity (cu m)	Throughput (tph)	Feedstock	Deck size (mm)	Perforation range (mm)	No. of decks	Power requirement (hp)	Engine type
<b>Firstgrade Recycling Systems</b>	0844 8009357	sales@first-grade.co.uk	Firstgrade	Chip-screen	Optional	33	Wood-chip	4 x 2	3-60	2	8	Electric

There are three main bagging equipment operations options, ranging from manual to fully automated systems, depending upon the volumes that need to be processed.

### MANUAL SYSTEMS

Manual systems require a supply hopper, electronic scales and an impulse bag sealer that seals each bag one at a time. They require an operator to manually load each bag to the hopper, and then another operator to remove and seal it, and finally they are manually shrink-wrapped on pallets.

These machines are capable of processing up to 10 bags per minute, but the involvement of manual labour means they are rarely used at the maximum rate. In addition, larger bags will take longer to fill; likewise the time taken will be prolonged when using composts with higher moisture contents that are less friable.

### SEMI-AUTOMATIC SYSTEMS

Semi-automatic systems involve various parts of the system being automated and typically involve bags being manually loaded but

automatically sealed with a continuous heated sealer. These machines are capable of producing 20 bags per minute but again labour will be the limiting factor.

### FULLY AUTOMATED SYSTEMS

Fully automated systems require an automatic in-feed conveyor, in-feed hopper, an upright bag conveyor and a sealer. The bags can then be palletised and shrink wrapped automatically. It is implicit that such a diverse range of machinery will result in large price variations.



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**TABLE 4: SCREENS AND BAGGERS**
**DECK SCREENS**

Company	Contact number	Email	Manufacturer	Model & type	Length (m)	Number of decks	Product size (mm)	Mobile (M) Fixed (F)
Blue Group	0845 217 8755	sales@bluegroup.co.uk	Powerscreen	Chieftain 400-Direct Feed-Wheel or Track	2.4 x 1.2	2	Various	M
				Chieftain 600-Wheel or Track	2.4 x 1.2	2	Various	M
				Chieftain 1400-Wheel or Track	3.3 x 1.5	2 or 3	Various	M
				Chieftain 1700-Wheel or Track	4.8 x 1.5	2 or 3	Various	M
				Chieftain 2100X-Track or RIB	6.1 x 1.5	2	Various	M
				Chieftain 2100X Bivitec-Track or RIB	5.8 x 1.5	3	Various	M
				Chieftain 2400-Direct Feed-Track or RIB	6.1 x 1.8	2	Various	M
				Warrior 1400-Track	3.6 x 1.5	2	Various	M
				Warrior 1800-Track	4.8 x 1.5	3	Various	M
				H5163 & H5163R-Track or RIB	4.9 x 1.6	3	Various	M
				H6203 & H6203R-Track or RIB	6.1 x 1.9	2 or 3	Various	M
				Commander 1400-Wheel	3.6 x 1.5	2	Various	M
				MarkII-Wheel	2.4 x 1.2	2	Various	M
				Powertrack 800-Track	3.1 x 2.1	1 or 2	Various	M
				Powertrack 1400-Track	3.1 x 2.1			



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**TABLE 5: SCREENS AND BAGGERS**

**BAGGERS**

Company	Contact number	Email	Manufacturer	Model	Hooper mechanism	Throughput capacity (cu m)
<b>Firstgrade Recycling Systems</b>	0844 800 9357	sales@first-grade.co.uk	Firstgrade	Volumetric Bagger	Belt	24 m3/hr
<b>White Moss Horticulture</b>	0151 547 2979	paulw@whitemoss.co.uk	Contract bagging service offered for bags from 5 to 75 litre bags. Bespoke bag design and marketing proposals available.			

Brand new machines can range from approximately £25,000 for a manually operated machine to £100,000 for a fully automatic machine (which does not include the cost of palletising and wrapping).

Most compost producers will not produce enough compost to invest in the fully automatic bagging lines which operate daily at maximum production levels. They should look for a manual or semi-automatic bagging systems, which although they are labour intensive when operating, can

use the composting facility's existing labour force for parts of their time. In this way, labour costs may not be significantly increased.

It is possible to obtain a good quality second hand machine for approximately £10,000. However, it can be difficult to obtain second-hand heat sealers.

### CONTRACT BAGGING

Another option compost producers may consider is contract bagging. This is a highly specialised area carried out

by few companies. It involves either transporting the compost to another site or setting the machinery up temporarily on site.

This is likely to be a small machine and therefore the costs will have to include manual labour, particularly if carried out at the compost production site. Scarcity of contract bagging companies results in widely varying costs, depending upon how far the equipment/compost needs to travel.

Selling bagged products can be a highly effective mechanism for

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25 to 120 litre	300 bags/hr	Palletiser	New

realising increases in sales revenue, especially from the retail and consumer markets.

However, in order to realise the full potential of bagged products, compost producers and their sales teams should undertake market research.



This research should identify what the demand is likely to be for composts sold in bulk and bags and thus, whether investing in bagging technology or contract bagging is the best option.

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Whatever your temperature monitoring needs are, from conventional stand-alone data loggers to a robust wireless system, Gemini Data Loggers has a solution for you.

- Robust • Battery-powered
- Compact • Rugged
- Splash and Dust Proof
- Waterproof
- Cost Efficient
- Easy to set up
- Self-healing • Labour Saving
- Quick • Local Recording

Our new wireless, self-configuring mesh network is ideal for use in remote sites giving you fast, reliable and convenient access to your data.

All our loggers are compatible with the Tinytag Explorer software so you can download, monitor and create reports whenever you need to.

**Gemini** DATA LOGGERS

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Gemini Data Loggers (UK) Ltd Scientific House, Terminus Road, Chichester, West Sussex, PO19 8UJ, England. Telephone: +44 (0)1243 813000 email: info@tinytag.info • [www.gemindataloggers.com](http://www.gemindataloggers.com) • [www.tinytag.info](http://www.tinytag.info)