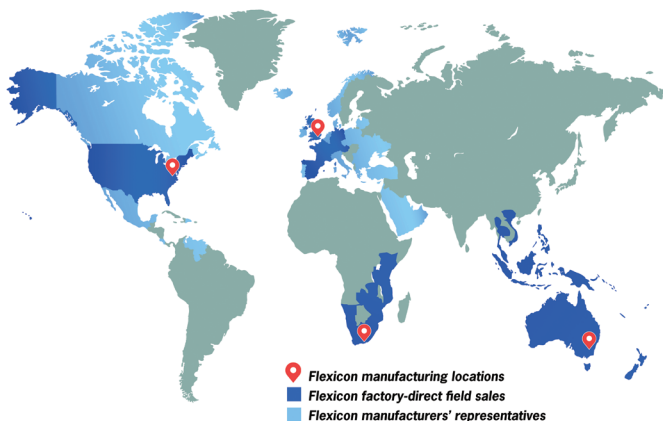




FLOW-FLEXER® plates raise and lower the bag to promote complete evacuation.

Seed Processor Contains Dust with Bulk Bag Discharger, Flexible Screw Conveyors

AA-0932



● Flexicon manufacturing locations
■ Flexicon factory-direct field sales
■ Flexicon manufacturers' representatives

flexicon®

USA

FLEXICON CORPORATION
Tel: +1 610 814 2400
E-mail: sales@flexicon.com
Web: www.flexicon.com

UK

FLEXICON (EUROPE) LTD
Tel: +44 1227 374710
E-mail: sales@flexicon.co.uk
Web: www.flexicon.co.uk

AUSTRALIA

FLEXICON CORPORATION
(AUSTRALIA) PTY LTD
Tel: +61 7 3879 4180
E-mail: sales@flexicon.com.au
Web: www.flexicon.com.au

SOUTH AFRICA

FLEXICON AFRICA (PTY) LTD
Tel: +27 41 453 1871
E-mail: sales@flexicon.co.za
Web: www.flexicon.co.za

SPAIN

FLEXICON EUROPE SPAIN
Tel: +34 930 020 509
E-mail: ventas@flexicon.es
Web: www.flexicon.es

FRANCE

FLEXICON EUROPE SAS
Tel: +33 7 61 36 56 12
E-mail: ventes@flexicon.fr
Web: www.flexicon.fr

GERMANY

FLEXICON EUROPE GmbH
Tel: +49 173 900 78 76
E-mail: vertrieb@flexiconeurope.de
Web: www.flexicondeutschland.de

SINGAPORE

FLEXICON SINGAPORE PTE LTD
Tel: +65 6778 9225
E-mail: sales@flexicon.com.sg
Web: www.flexicon.com.sg

INDONESIA

FLEXICON SINGAPORE PTE LTD
Tel: +62 81 1103 2400
E-mail: sales@flexicon.co.id
Web: www.flexicon.co.id

Seed Processor Contains Dust with Bulk Bag Discharger, Flexible Screw Conveyors

GRIFFITH, NSW, AUSTRALIA — South Pacific Seeds (SPS, www.southpacificseeds.com.au) ranks as one of the world's largest vegetable seed companies. In the 2011-2012 crop year the company produced 3,230 tons (2,930 kg) of seeds from its facilities in Australia, New Zealand, Chile and the U.S. The seeds include lettuce, cauliflower, cabbage, kale, carrots, parsley, onions, cucumbers, beets and other vegetables.

Processing the seeds generated atmospheric dust at the company's Griffith treatment plant, which solved the problem by installing a bulk bag discharger and flexible screw conveyors manufactured by Flexicon Corp. (Australia) Pty Ltd., Wacol, QLD, a subsidiary of Flexicon Corp., Bethlehem, PA.

Bulk bag discharger controls dust

Previously, dust was generated at the beginning of the process where gypsum powder is combined with a glue binder to pelletize seeds for packaging and sale. The powder is extremely free flowing, with a bulk density of 25 lb/cu ft (400 gm/l).

Bulk bags of gypsum were cut open and emptied into a V-shaped bin feeding an auger that transported the material to a rotary treater. Here, the gypsum is mixed with the seeds and pellets are formed by the rotating action. The machine also adds color coatings, pesticides and fungicides to the seeds.

SPS solved the dust problem by installing a Flexicon bulk bag discharger. Gypsum flows from the bulk bag into a floor hopper, from which the material is transported to the rotary machine by two flexible screw conveyors. The enclosed process has essentially eradicated the dust problem, says Peter Pearson, operations manager.

The Griffith plant receives gypsum powder in bulk bags of approximately 770 lb (350 kg). Each bag is loaded by a forklift into the bulk bag discharger frame, where it is suspended by four loops, and unloaded into a 37 gal (140 l), V-shaped floor hopper. The bag is opened, the inner liner is cut, and the powder is discharged through an iris valve.

Bag discharge is aided by Flexicon's FLOW-FLEXER® bag agitation device — two pneumatically driven plates that raise and lower opposing edges of the bag to direct material to the outlet. As the bag empties, the stroke of the plates increases, forming the bag into a V shape and promoting total evacuation.

The iris valve essentially eliminates dust, says Pearson. Nevertheless, the company also uses Flexicon's BAG-VAC® dust containment system, which is attached to the discharger frame and removes any residual dust. "The powder is particularly dusty and for operational health and safety considerations we automatically added this (dust collection) option," he says. "As a result we have a clean and tidy working environment that is safe for the operator."



An inclined and a horizontal flexible screw conveyor transport gypsum powder from the bulk bag discharger to the rotary treater.

Flexible screw conveyor 'fits in'

Material is removed from the bottom of the hopper by a flexible screw conveyor. An agitator and vibrator in the bottom of the hopper help to move and direct the powder to the conveyor inlet.

The flexible screw conveyor contains a rotating, stainless steel centerless screw, housed in a durable polymer tube. It measures approximately 19.6 ft (6 m) long by 3 in. (80 mm) O.D. and is powered by a 3-hp (2.2 kW), 3-phase motor that is located just beyond the discharge point, eliminating material contact with bearings or seals.

From the hopper, the conveyor moves the material at a 45° incline to one side of the rotary treater. At that point the powder is discharged through a small transition hopper into a second, identical flexible screw conveyor that carries it horizontally to an inlet cone on the side of the rotary treater.

The combination of the bulk bag discharger with the flexible screw conveyors assures that the delivery of powder to the rotary treater is consistent and uniform, says Pearson. Also, the screw conveyors solved "a big constraint, which was the amount of floor space we had to work in. The rotary machine is positioned in a tight corner and so to have a delivery system that would fit in was fantastic." He adds that the arrangement of the conveyors provides free access for the forklift.



Forklift loads a bulk bag onto the discharger frame, which is fitted with dust collector (right).

How seeds are processed

Seeds are received in plastic or cardboard bins of approximately 200 gal (750 l) capacity, or in 55 lb (25 kg) plastic bags. In the case of bins, the lids are removed and they are emptied by means of a special bin tipper. Bags are cut open.

The containers are emptied into steel, wheeled V-bins that move the seeds through a series of process steps for the removal of plant material, soil, insects, stones and light, undesirable seeds. The main processes are:

- Cleanup by size, using an air screen cleaner that has a series of screens for scalping and sieving.
- Sorting by length, using an indented cylinder that can pick up either the seed or contaminant, depending on the crop type.
- Separation by weight, using a gravity table. The seeds pass over an inclined, oscillating mesh deck with a fan that blows air up through the seed.

Other cleanup processes include color sorting, spiral separation and washing.

Following cleanup, the seeds are dried to less than 7% moisture content in drying bins, and then delivered to the pelletizer by a V-bin.



Rotary treater produces pellets

The pelletizer mixes seeds with gypsum-based powder and a glue binder (as noted earlier), forming pellets, which are easier to plant than single seeds. The machine can also coat the seed with a film containing colorant, fertilizer, fungicide or a pesticide, says Pearson.

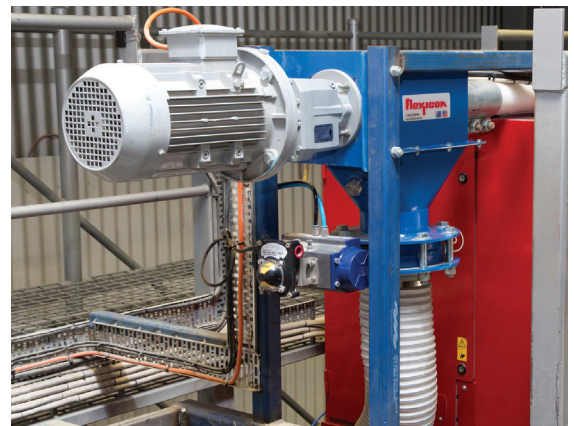
Seeds are weighed and then discharged into the rotary treater, while gypsum powder is delivered by the flexible screw conveyors at a rate of 7.7 lb/min (3.5 kg/min).

Following the rotary treatment, seeds are dried and graded, then packaged for sale in woven polypropylene bags, plastic pails, cans and foil packages. Seeds are sold by seed count per kilogram in packages that range from about 34 lb (15 kg) for the bags, down to a few grams in the foil packages.

The company has installed a similar Flexicon system in its New Zealand sales warehouse in Pukekohe.



Iris valve prevents uncontrolled bursts of material and dust when bag spout is untied.



Horizontal flexible screw conveyor transports the powder through a transition adapter and downspouting, to the rotary treater inlet. Motor at the discharge end drives the conveyor.



Gypsum powder.



Gypsum powder moves from the bulk bag discharger through the inclined flexible screw conveyor which transitions to a horizontal flexible screw conveyor discharging into the red pelletizer.



Coated seeds from the pelletizer.

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FLEXICON CORPORATION
 Tel: +1 610 814 2400
 E-mail: sales@flexicon.com
 Web: www.flexicon.com