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UNIT 2

TOPIC 2

Cylinder separator, spiral separator

Indented cylinder

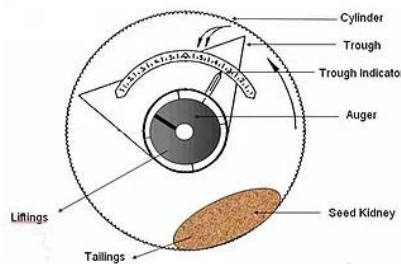
One of the physical separations available is the separation of foreign material which has a different length than your desired product.

Cereal shaped commodities such as wheat, durum and rice have a length which is different than the width or thickness. For applications where a length separation is required an Indented Cylinder or “Trier” is often used.

Principals of operation



Interior of Indented Cylinder



Cross Section of an Indented Cylinder

Length separation can be achieved using an indent machine or separator. The indent separator has become a standard in grain and seed processing industries due to their higher capacities and low costs. When looking at the indented cylinder cross section example from the discharge end, the rotation is usually counter clockwise. The Premier Modular cylinder is about 85” long with an approximate diameter of 23”. Running through the center of the cylinder is a catch trough and screw conveyor.

The size of the indents in the cylinder determines the length of the material that will fit inside. Indent sizes are given in a numerical value and are stamped on the outside of each cylinder on the intake end usually near the long seam. The higher the numerical value, the larger the indent or pocket size. Indent sizes start from a 2.5 (1MM) up to a #64 (25.4mm) pocket. Numerical designations usually correspond to 64’s of an inch. (I.E. # 19 = 19/64 DIA.)

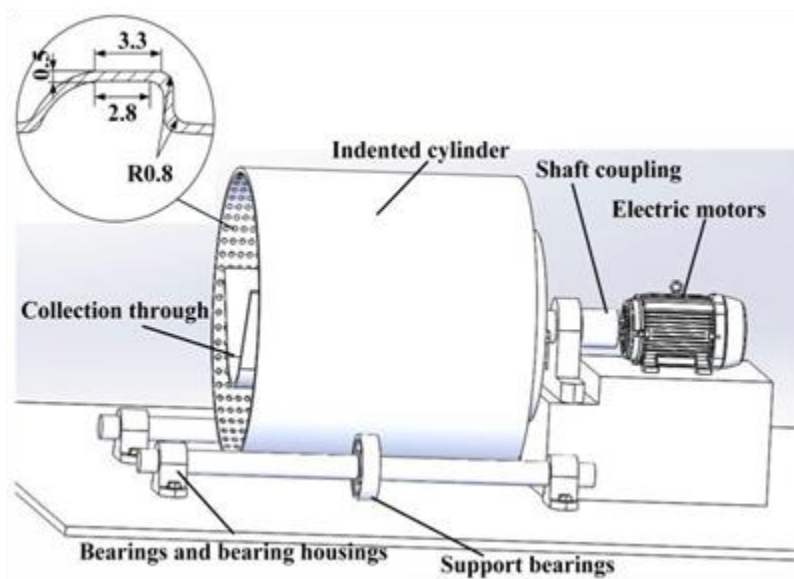
Indented cylinders are designed to lift material the size of the pocket and smaller. The rotation of the cylinder causes the material that fits inside the pocket to be lifted up by centrifugal force until gravity takes over and causes the lifted product to drop into the central trough. The angle of the



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trough can be changed to catch more or less of the lifted product called “liftings”. Material that is not lifted and continues through the machine will discharge out of the “tailings” spout. Material at this point is kept separate thus providing two length separations.

The Indent Cylinder Separator is used for grading by length all granular materials such as wheat, oats, fine seeds, lentils, for separating stalks from sunflower and beet seeds and for separating unwanted long or short product impurities and admixtures. The size of grains can vary between 1.0 mm and 24 mm.



This helps to separate seeds according to the length. The equipment consists of a slightly inclined horizontal rotating cylinder and a movable separating trough. The inside surface has small closely spaced hemispherical indentations. Small seeds are pressed into the indents by centrifugal force and can be removed. The larger seeds flow in the centre of the cylinder and is discharged by gravity.

The product passes from the inlet housing into the interior of the rotating cylinder, the cover of which provided with impressed pockets or so-called indents.

The grains that embed themselves in the indents, will be carried and after a certain distance, will fall out of the pockets into the trough and will be discharged by a screw conveyor. All grains which are larger than the indents, will remain inside the shell and be carried to the outlet where the shell empties into the outlet casing. Depending on the required grading the incoming product will be sorted according to roundness or length.



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The trough position will determine the amount of ‘liftings’ from each of the twenty five cylinders. Each trough control is equipped with a thumb screw lock located on the top of the worn gear cap. The lock should be loosened before trough adjustment and then retightened to prevent the trough from moving by cylinder rotation.

Trough Control



Trough location is indicated with a pointer and a numbered gauge. The pointer indicates the lifting or forward edge of the trough. The lower the number the higher the amount of liftings picked up and conveyed within the trough to discharge. Sample ports on the lifting spouts allow the operator to check the level of the liftings in the product and then adjust the trough to a higher number for less lifting (shorter), or a lower number for more lifted (longer) product.



All cylinder troughs are equipped with grain line blades that aid in conveying the ‘Tailing’ product toward the discharge end. ‘Tailings’ is product which remains in the cylinder and is not picked up into the trough. Tailings are the longer material of the incoming product stream. An adjustable dam or ‘Retarder’ is placed near the tailing product discharge. This enables the



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operator to adjust the depth of the product kidney in the bottom of the cylinder. As the operator raises the retarder, it increases the size and depth of the product remaining in the cylinder.

Cylinder separators are most accurate with a product kidney present, which keeps the indent pockets searching for the proper length material. If a cylinder is starved, (little or no discharge in the tailings) there is a tendency for the pockets to lift longer than desired product.



Spiral separator

The separator, which classifies seed according to its shape and rolling ability, consists of sheet metal strips fitted around a central axis in the form of a spiral. The unit resembles an open screw conveyor standing in a vertical position. The seed is introduced at the top of the inner spiral. Round seeds roll faster down the incline than flat or irregularly shaped seeds, which tend to slide or tumble. The orbit of round seed increases with speed on its flight around the axis, until it rolls over the edge of the inner flight into the outer flight where it is collected separately. The slower moving seed does not build up enough speed to escape from the inner flight. Most spirals have multiple inner flights arranged one above the other to increase the capacity.

Spiral Separators are used on most any free flowing product to sort round shapes from flat or oblong shapes. The separator, which classifies seed according to its shape and rolling ability, consists of sheet metal strips fitted around a central axis in the form of a spiral. The unit resembles an open screw conveyor standing in a vertical position. The seed is introduced at the top of the inner spiral.

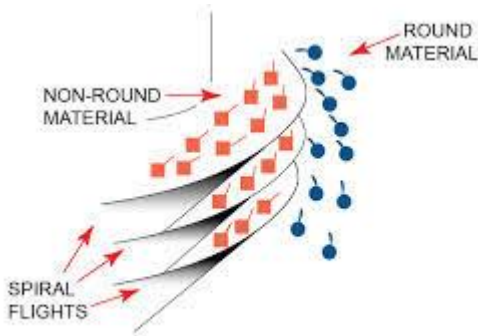
spiral separators work?

It works on a combination of solid particle density and its hydrodynamic dragging properties. The spirals consist of a single or double helical conduit or sluice wrapped around a central



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collection column. The device has a wash water channel and a series of concentrate removal ports placed at regular intervals



Spiral Separators are used in the seed industry for separating good soybeans from splits or weed seed.

Spiral Separators are often used in industrial applications such as separating metal abrasives, metal shot, ceramic beads, glass beads and other types of material.

Spiral separators operate on gravity only – product is loaded in the hopper, or direct feed tube on a single spiral.

The material flows over an adjustable cone and divides the material evenly onto the inner flights.

With increasing speed, the round material will separate and roll off the inner flights onto a larger outer flight and then exits a side discharge chute at the bottom.

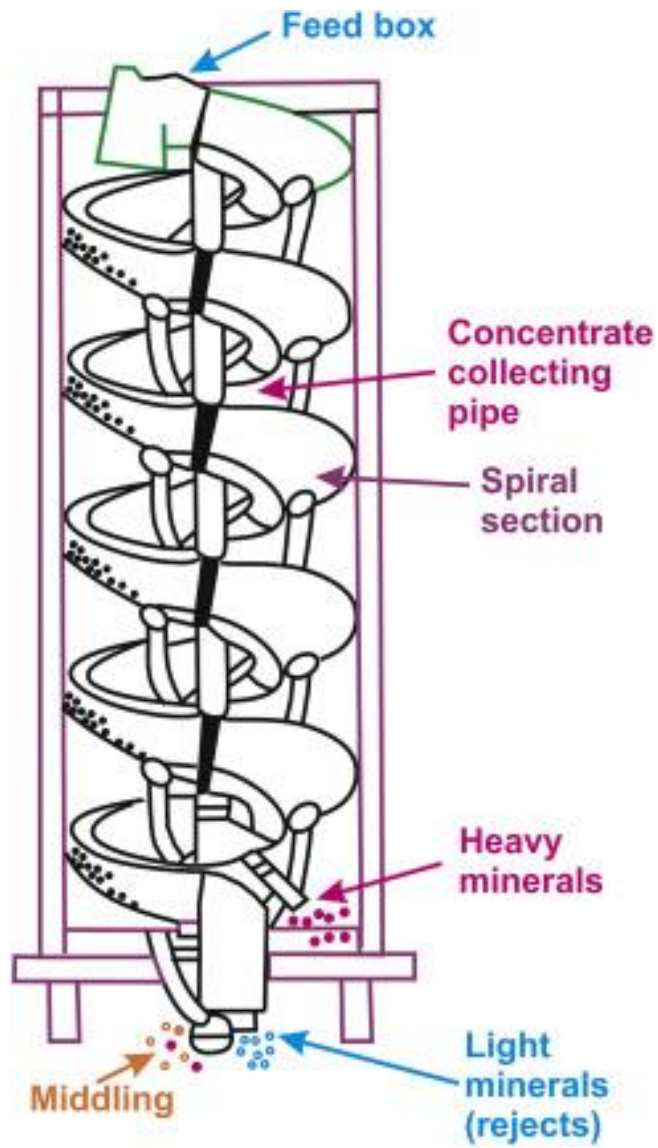
The non-round material on the inner flights will exit a center discharge chute at the bottom.

The advantages of spiral separators?

Once spiral separators are designed and installed in the plants, the spirals are light-weight, wear-resistant, and cost-effective gravity concentration equipment which has no moving parts, no reagent addition, and minimum maintenance requirement.



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SPIRAL SEPERATOR