Customizing and retrofitting for Maximum production efficiency
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Compromise may be the way of life in politics but when it comes to improving the return on investment there appears to be a growing trend away from off-the-shelf equipment with its lower upfront costs. Manufacturing and production engineers responsible for the efficient production of quality products are demanding equipment designed with their specific needs in mind. They'll pay the extra dollars to avoid downtime, production bottle necks, high maintenance and low yield. This has long been accepted in the automated processing of chemicals with sophisticated instrumentation, but it is now becoming obvious that it is just as significant when the problem involves liquid/solids or solids/solids separation. It is particularly true when operations call for the use of circular vibratory screen separators.

Due to their versatility and relatively low unit cost, vibratory screen separators are widely used to effectively separate materials running from approximately 45 microns to 1/2". Smaller particles are impractical to separate by screening, and larger particles are more efficiently handled by rectangular separators. Since this equipment is designed to withstand continuous vibration, it is built to last and many of the units in the field have been around for 20 years or more. That's part of the problem. Production people hate to part with a piece of equipment that has rendered good service over the years and with which they are very familiar. They tend to live with its problems rather than invest in new equipment.

But times are changing. Higher capacity and quality demands, as well as the competitive scene cry out for action. In essence, there are two approaches:

(1) Take a look at the new machines and determine the ROI. You may find that the bells and whistles on new equipment make it possible to get a payout in relatively short time, while upgrading product quality and meeting the variety of rigid safety standards at the same time. New equipment may even reflect on your liability insurance rates.

(2) Retrofit or upgrade your existing equipment to eliminate down time problems, improve quality and meet new safety standards.

New Machine Considerations

The basic new machine consideration lies in the significance of the shortcomings of your existing equipment measured against the cost of a new unit customized to do the job you need done, and to provide sufficient flexibility so as to be able to handle anticipated changes in production requirements. The smart buyer doesn't think short range. It seldom pays to invest in a piece of equipment that will just help you get by. The few dollars you may save by doing this will multiply your costs at a later date. Make the decision based on joint input from marketing, production and quality control. Only then will you be able to tell the machinery manufacturer what your requirements are and get a realistic quotation. That's the quote you want to work with in determining your ROI. If you think in terms of standard off-the-shelf prices, you're heading for trouble.
Close Up on Retrofitting

The basic circular vibratory screen separator is of simple construction. It consists of a number of interchangeable frames that contain screening decks along with discharge outlets. The vibration is supplied by a motor mounted rigidly to the main screen assembly and to a double extension shaft which is fitted at its ends with variable eccentric weights. The entire assembly is supported on the vibration to the circular base by springs that allow it to vibrate freely while preventing transmission of the vibration to the floor. Flow patterns are varied by changing the number of weights or their relative positions. Overall construction is rugged which is why you can expect long life from most circular vibratory separators.

Why The Problems?

Here are a few possible causes:

(1) The throughput requirements have increased significantly since the unit was installed.

(2) The material being processed has been changed causing screen building, flooding, product degradation or other problems.

(3) Excessive moisture in the product is causing corrosion, resulting in product contamination.

(4) Quality requirements are demanding more exacting separation.

(5) Static electricity is causing products to agglomerate and restrict throughput.

Here are some of the customized design aspects which can be incorporated into existing equipment and overcome most of the objections indicated. A review of these will also help you in determining what to ask for when purchasing new equipment whether it be to replace an old unit or as part of a new production line.

Safety Switches

Stop those accidents before they happen by insisting on safety switches on motor access doors. These switches not only prevent opening of the access door for inspection or servicing while the motors are running or coasting to a stop, but they can be hooked up to automatically stop feeding devices upstream of the screen. This prevents the screens from being damaged by overloading and enables the separator to restart without a load.

Screen Blinding Inhibitors

Screen blinding may be caused by resinous or fatty materials, or matted fibers which tend to cover the top surface of the screen and remain unaffected by the vibration. Blinding may also be caused by electrostatically charged particles or interlocked fibers, and frequently by near-sized particles lodging in the openings. Step one is to determine the cause of the blinding. Once this is known there are a number of approaches to the solution. These include:
(A) Cylindrical circular rings supported on a perforated plate just below the screen. They eliminate blinding by repetitively contacting the screen during vibration and dislodging the wedged particles. The upper edges of these hollow cylinders put a shearing force on the fibrous materials that protrude through the screen apertures and offer some release from fiber blinding.

(B) Bouncing rubber balls effectively relieve screen blinding when it is caused by coarse particles (over 20 mesh). Incorporating a large number of these balls within a screen frame provides a high momentum impact on the screen, releasing the wedged particles.

(C) Rotating nylon brushes or rubber wipers on the top side of the screen combine wiping with ‘shearing to remove resinous or fatty materials, or matted fibers from the surface.

(D) Blinding caused by electrostatically charged particles can be eliminated by grounding the screen deck.

Adding Capacity

When actual screen surface area limits capacity, the addition of an external recycle deck will provide double the screen surface for a nominal additional cost. Recycle decks are effective in both solids and liquid/solids separation.

When multiple deck sizing capacities must be increased, an internal Kascade@ deck coupled with an auxiliary discharge frame provides radical throughput performance. For example, a standard configuration two deck 72" diameter unit that processed 15,000 pounds per hour of pellets was modified to process upwards of 55,000 pounds per hour.

When the oversize volumetric rates have become sufficiently high so to cause product to back up on the screening deck because the spouts cannot discharge quickly enough, the 360° discharge is called for. On single deck machines, an external Kascade deck is the usual method for removing these material transport problems. This permits use of the full screen area for effective separation. The screen material falls onto a high capacity discharge ramp which leads to an oversized spout. Screening efficiency therefore increases as a result of screening with a single particle bed depth.

Vibration Amplitude Gauge

The amplitude of vibration significantly affects screening efficiency. That is why circular vibratory separators utilize adjustable top and bottom weights so that maximum efficiency can be secured for each screening situation. The problem is that too often, once you have established the optimum vibration, there is no simple way of determining whether someone has tampered with the setting. The solution to this problem won’t cost you a dime. Kason has devised a stick-on amplitude gauge that permits you to instantly read the horizontal and vertical stroke, providing direct measurement of the amplitude of vibration. In addition to permitting instant periodic checking to ensure that there has been no shifting of the weights or tampering, the gauge is also helpful when starting up the separator with a new material. Once you find the optimum vibration amplitude, record and post the data for simple recheck. Gauges are available free on request.
Adjustable Feed Control

A simple device placed at the inlet of the circular screen separator controls the feed rate by adjusting the clearance between the vibrating throttle plate and the bottom of the feed hopper. This clearance is infinitely adjustable. The Adjust-a-Flo controller can be used with any dry free-flowing material.

Spiral Discharge Ramp

Frequently during high capacity processing there tends to be a recirculation of the product on the vibrating screen. Installation of a specially designed spiral discharge ramp overcomes this. It is interchangeable with any high capacity standard conical dome discharge frame.

Extended Spout

Instead of discharging material to a short conveyor and then moving it to the next unit of process equipment, bin or drum, you can add a special extended spout to direct the material exactly to where it's needed. This saves time and eliminates potential transfer problems.

We live in a changing world and although equipment manufacturers try their best to build solutions to unknown problems, you must admit it's a tall order. If you are not completely satisfied with the throughput or operating efficiency of your vibratory circular separator, or if you are thinking of installing a new one, take the time to discuss existing or anticipated problems directly with the manufacturer. Don't live with your problems or buy off-the-shelf units without considering tomorrow's needs. In these competitive days, it will pay you to customize or retrofit to maximize production efficiency.