# Scrap old approaches to conveying material

## Carefully designed scrap removal systems increase machine efficiency

By Daniel Zimmerman

To get the most from high-productivity equipment, manufacturers must move parts and scrap efficiently and reliably. This makes conveyance equipment an essential consideration. In fact, the right combination of conveyance and feeder equipment can mean the difference between breakdowns and productivity.

In broadest terms, to convey is "to take or carry from one place to another; to transport." In most metalworking applications, material must be conveyed repeatedly throughout the plant. With the trend toward higher-capacity machine tools, the efficient handling of parts and scrap has become increasingly important. Jams or slowdowns in conveyor systems can easily offset machine tool productivity, but a reliable conveyor system that employs the right balance of equipment can promote smooth, uninterrupted production flow.

One of the most important factors in selecting such a system is total cost: initial investment, operating expense, and maintenance requirements. Another important but often overlooked factor is the cost-to-performance ratio per dollar of investment. By balancing all these variables, a manufacturer can design a parts and scrap handling system to improve productivity at a cost that is quickly recovered.

A well-designed conveyor system can take advantage of unused air space to transport parts up steep inclines and across aisles.

While many conveyor systems can and do incorporate standard, off-the-shelf components, the nature of the material being conveyed, available floor space, type and performance of production machines, and temperature or other unusual operating conditions determine the ultimate design.

### Conveyor Styles

Oscillating and Vibratory Conveyors. Commonly used under the press to carry products or scrap to a less rigid conveyance module, oscillating or vibratory conveyors consist of a metal tray that is supported by directional spring members mounted to a rigid base. Horizontal motion is transmitted to the tray by either a mechanical or electromagnetic drive.

Different tray types are designed to handle a variety of either finished parts or scrap in sizes that range from small stampings or chips to large skeletons. Tray size generally is determined by the size and volume of parts or scrap and the distance the material needs to be conveyed. Diamond-plate trays can be used for handling oily or gummy parts. Tray sizes up to 10 feet wide and 100 ft. long are possible with multiple drive units. Maintenance costs generally are low with these conveyors.

Hinged-belt Conveyors. Hinged-belt conveyors provide long-run handling of ferrous and nonferrous parts and press scrap in multiple shapes and sizes—hot or cold, wet or dry. Hinged-belt conveyors may combine horizontal and elevating movements to convey a range of products, from nested material to stampings in large volumes.

These conveyors use a hinged steel belt. Sometimes small parts or scrap can jam in pinch points or work their way under the belt, causing jams or premature wear. Fortunately, replacement parts are available for installation by the user when repairs are needed.

Magnetic-belt Conveyors. Magnetic-belt conveyors are designed for material handling applications involving ferrous materials. Products such as nails, stampings, cans, small machined parts, and related ferrous scrap can be conveyed through magnetic-belt power.

Stationary magnets mounted behind a moving belt provide a uniform attracting and holding force along the entire length of the conveyor. This holding action allows for vertical, inclined, and horizontal transport of parts and scrap. These conveyors hold parts securely, even during outside electrical power lags or failures, and can turn parts over, change flow direction, and travel in and out of liquid-filled tanks.

In general, belt wear is minimized because the parts remain stationary and usually are prevented from getting under the belt to cause wear.

Magnetic Chip and Parts Conveyors. A permanent magnetic chip and parts conveyor can move small ferrous parts, stampings, and chips. In this type of system, permanent magnets moving inside a liq-

uidtight, submersible housing attract, hold, and convey products and materials. There are no moving external parts; the conveyor mechanism is completely enclosed.

Ceramic or rare-earth magnets inside the conveyor housing glide the material along the surface of a stainless steel faceplate. The working face is self-cleaning, and excess fluids drain back into a sump.

A variety of conveyor configurations in many sizes and widths can be assembled from standard sections. This allows unit installation under presses, cutoff saws, and other machines. Standard conveyors are available as straight horizontal units or with an incline up to 90 degrees. Models also are available with large, sweeping radii to elevate long, difficult-to-handle scrap or parts.

An ultrahigh-molecular-weight (UHMW) polyethylene track helps minimize maintenance issues related to conveyor tracks. The lack of external moving parts also contributes to reduced maintenance requirements.

## Conveyors in Action

Carefully designed chip and scrap removal systems can help increase machine efficiency.

For example, a combination of magnetic and vibratory conveyors handles 10,000 pounds of scrap each week for a Midwest supplier of stamped and deep-drawn parts to the automotive industry.

Cylindrical body mounts, open at both ends, are a major product of the plant. Four 300-ton presses stamp out 100,000 lbs. of steel blanks for this product per week. The operation produces 10,000 lbs. of scrap slugs up to a half-dollar in size and thin rings about 3 inches in diameter.

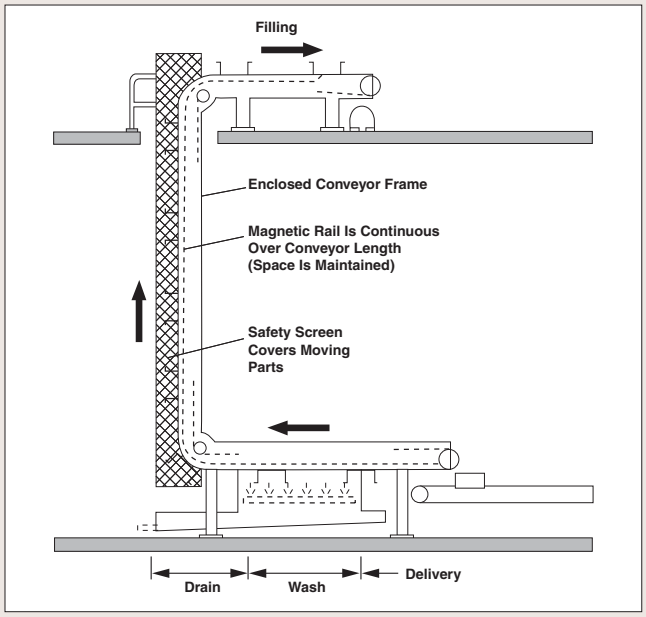
The company installed four small magnetic-belt conveyors, one under each press. Their 4-in.-wide belts carry the scrap 44 in. up to a 20-degree incline. This ferrous material then is deposited onto a 64-ft.-long vibratory conveyor installed at right angles to the four belt conveyors.

This vibrating conveyor actually is two conveyors on a common base. Each unit is the dynamic counterbalance for the other. A standard 2-horsepower motor drives both. This design reduces the oscillating motion transmitted to the supporting structure and eliminates the need for counterweights and cushioning springs.

As scrap pieces reach the end of the mechanical unit, they fall onto another magnetic conveyor. Completely enclosed, this conveyor carries the scrap up a 60-degree incline to a height of 12 ft. for disposal outside the plant. Only routine maintenance is needed for the overall system.

In another example, 1,200-ton coil blankers stamp out automobile front crossbars. Each blanker creates up to 2,400 lbs. of scrap per hour in the form of ⅛-in.-thick steel slugs ranging in length from ¼ to 6 in.

Magnetic chip and parts conveyors beneath the presses hold slugs as they drop and carry them up a 14-ft.-long, 60-degree incline, where they are discharged by gravity into the hopper.




Magnetic conveyors can be used for several functions on one line, including inverting, washing, elevating, and lowering parts.

## Problems and Solutions

Because each company's product, plant, equipment, and personnel are unlike those of others, material handling systems must be unique too. They should be designed and engineered to conform to the user's special requirements.

For companies considering a new process, a reconfiguration of an existing line, or a measure of potential productivity, conveyor experts are available for consultation. Application engineers can present equipment cost as well as estimated total cost, including setup and maintenance.

If the application is complex, such as one requiring part inverting or aligning products for further processing or packaging, some conveyor manufacturers can offer a test facility where the new process can be set up and run until perfected. That way, upon delivery of the conveyor system, potential productivity-slowing kinks can be engineered away.

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