Examining slit coil handling and packaging

Choosing a system for increased productivity

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Source: http://www.thefabricator.com/article/coilprocessing/examining-slit-coil-handling-and-packaging

May 15, 2003

While it is common knowledge that slit coil handling and packaging often limit the productivity of even the most modern, high–speed coil slitting line, coil processors generally spend too little time examining the effectiveness of these operations.

Today slit coil packaging systems are available for almost every operation, production level, floor space restrictions, and budget.

Where does the slitting process end and the coil packaging line begin? Rather than at the turnstile or coil downender, perhaps it begins at the exit end of the slitting line.

Coil Tail Banding

The first production bottleneck is taping or banding the slit coil tails, so this process needs to be sped up for effective coil packaging.

A shear installed at the exit end of the slitting line can save time when all coil tails are cut in a straight line across the coil by eliminating the time wasted jogging the recoiler to position individual coil tails. A recoiler–mounted tail hold–down apparatus can save additional time by containing and tightening each coil tail, making OD taping and banding quicker, easier, and safer.

A turret recoiler (see **Figure 1**) with two rewind drums and two overarm separators mounted on a 180–degree rotating base allows coil tails to be taped or banded while the slitter is running. Additionally, with a turret recoiler, filler plate changes, drum changes, and drum maintenance all are done offline while production continues. Using a coil car to transfer slit coils from the recoiler drum to the turnstile arm can be more efficient because the coil ID tail will not tangle.

Figure 1
A turret recoiler with two rewind drums and two overarm separators mounted on a 180–degree rotating base can save time by allowing coil tails to be taped or banded while the slitter is running.

Although an exit shear, tail hold–down, turret recoiler, and coil unloading car usually are not considered parts of a coil packaging system, these components can have a positive impact on coil packaging efficiency.

Slit Coil Handling

The next element in the packaging line is the downender, a component that retrieves individual slit coils from the turnstile arm and places them eye–axis–vertical on a conveyor.

Downenders come in two distinct types:

1. Pusher. The pusher downender uses a turnstile–mounted coil pushoff to shove individual slit coils from the turnstile arm onto the downender arbor. After a coil is pushed onto the downender arbor, it is tipped 90 degrees, placed onto a conveyor, and discharged. A full–time attendant typically operates this downender using push buttons.

2. Programmable. Instead of pushing the coil from the turnstile onto the downender, a programmable downender (see **Figure 2**) moves to the coil on the turnstile, lifts it off the turnstile arm, carries it away from the turnstile, and then tips the coil onto the conveyor.

Figure 2
Instead of pushing the coil from the turnstile onto the downender, a programmable downender moves to the coil on the turnstile, lifts it off the turnstile arm, carries it away from the turnstile, and then tips the coil onto the conveyor.

This downender is fully automatic; however, an attendant is required to program coil sizes into the controller. No turnstile pushers are required, reducing the chance of damage to the inner wraps.

Coil Strapping

A conveyor should be long enough to stage at least two full–size coils between the downender and the strapping machine to minimize interruptions in the cycle. More conveyor is better than less. The conveyor should be powered independently in 6– to 7–foot sections with fully automatic coil–advancing electrical controls.

Slit coils are advanced from the staging conveyor onto a strapping machine (see **Figure 3**), a device that quickly applies radial straps onto the coil. In combination, conveyor rolls and conical coil rotation rolls position the coil under a powered strapping head. After the coil is positioned, the strapping head is lowered onto the coil and a radial strap is applied.

Strapping machines can be either semiautomatic or fully automatic. With the semiautomatic type, the operator uses push buttons to position the coil on the table, apply the radial strapping, and discharge the coil. The fully automatic type accomplishes the same via an electrical controller.

Semiautomatic strapping machines generally are faster than fully automatic strapping machines and allow the attendant to place the strapping on the ID coil tail and position coil spacer sticks. Fully automatic strapping machines do not require an attendant if spacer sticks are not required in the coil package.

Figure 3

Slit coils are advanced from the staging conveyor onto a strapping machine, a device that quickly applies radial straps onto the coil. In combination, conveyor rolls and conical coil rotation rolls position the coil under a powered strapping head. Once the coil is positioned, the strapping head is lowered onto the coil and a radial strap is applied.

Coil Stacking

After the coils are strapped, they must be stacked on a skid for shipment. One method for stacking coils is a manual ID coil grab with a monorail electric hoist system (see**Figure 4**). The ID coil grab, suspended from an electric hoist, transfers coils from the conveyor onto

skids arranged on the floor under the monorail.

This method requires additional radial straps to be applied to large–diameter coils, slowing the packaging process, but it usually is appropriate for relatively low–quantity slit coil packaging needs. Care must be taken when picking narrow–width coils and when attempting to hold a loosely wound coil by the ID only.

Figure 4
After the coils are strapped, they must be stacked on a skid for shipment. One method for stacking coils is a manual ID coil grab with a monorail electric hoist system. The ID coil grab, suspended from an electric hoist, transfers coils from the conveyor onto skids arranged on the floor under the monorail.

Another coil stacking method is the ID–OD automatic wagon stacker (see **Figure 5**), a device that automatically transports coils from the conveyor to the skid. The coil grab, mounted in a traveling wagon, secures the coil from both the ID and the OD, so large–diameter, loosely wound coils can be handled safely with three or four straps.

A programmable logic control runs the stacker through a cycle that lowers the coil grab to secure the coil, lifts the coil off the conveyor, moves the wagon to a stacking station, positions and releases the coil onto a skid or a coil stack, and returns the wagon to retrieve the next coil. The coil–to–coil stacking cycle takes about 40 to 45 seconds.

The stacker can be equipped with a coil–counter control that allows the ID–OD coil grab to collect and assemble multiple narrow coils before the stacker wagon travels to the stacking station, eliminating travel time for each coil.

Figure 5
One coil stacking method is the ID–OD automatic wagon stacker, a device that automatically transports coils from the conveyor to the skid. The coil grab, mounted in a traveling wagon, secures the coil from both the ID and the OD, so large–diameter, loosely wound coils can be handled safely with three or four straps.

A third stacking option is an automatic turret stacker (see **Figure 6**), which can handle two slit coils at a time. Similar to the wagon stacker, a turret stacker uses an ID–OD coil grab with a fully operatorless automatic cycle, but it has two coil grabs instead of one. The

turret stacker picks a coil from the conveyor while the opposite coil grab is placing a coil on the stack. The turret stacker then rotates 180 degrees and repeats the multitask procedure.

Figure 6
Another stacking option is an automatic turret stacker, which can handle two slit coils at a time. Similar to the wagon stacker, a turret stacker uses an ID–OD coil grab with a fully operatorless automatic cycle, but it has two coil grabs instead of one. The turret stacker picks a coil from the conveyor while the opposite coil grab is placing a coil on the stack. The turret stacker then rotates 180 degrees and repeats the multitask procedure.

Coil Sorting, Weighing, and Banding

Automatic stackers normally are operated in conjunction with a coil sorting table, a large, 20– or 24–ft.–diameter rotating table with six or eight color–coded stations onto which coils can be stacked. The table is indexed both clockwise and counterclockwise to sort out the stream of coils progressing down the conveyor line into separate packages.

A programmable logic control manages the table rotation and always takes the shortest path to the selected station, saving coil sorting time.

A hydraulic pushoff transfers the finished coil package from the coil sorting table onto an adjacent weigh station, where the package weight is established and recorded. The coil package then is banded to the skid and paper–wrapped or stretch–wrapped on a pallet banding station, usually located immediately after the weigh station.

The pallet banding station lifts the package off the conveyor and rotates the package about a vertical centerline to position it for strapping. Stretch film can be applied as the package is rotated. Once the package is strapped and wrapped, it is lowered onto the conveyor and advanced onto the runout–storage conveyor, ready to be removed from the line and transported to a shipping area.

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