Discussion

W. S. Giele.[2] Materials handling in foundry operations is characterized, first, by its relative magnitude. Conditions of foundry operation vary so widely that exact data on any particular operation would have little application in other operations.

It may be said, however, that the total weight of material passing over the shakeout may easily be 20 times the net weight of castings finally shipped. In other words, the shipment of each 100 lb of castings may involve the handling of a ton of material at the shakeout, and every pound of that ton will have been handled several times before it gets to the shakeout.

Materials handling in foundry operations is further characterized by the abrasive nature of the materials handled and by the high temperatures frequently encountered.

The authors have referred to the application of high-pressure-type lubrication to belt-conveyer idlers in order that new lubricant may force out the old and the abrasive grit with it. Where feasible, it is believed to be desirable to go a step further by installing a centralized lubrication system, piped to the various bearings, in order to eliminate the introduction of the abrasive dirt that accumulates on the high-pressure fittings.

It is, of course, advantageous to keep speeds low and to operate with a minimum of lubrication. Ball and roller bearings in conveyer rolls often last longer when run dry than when lubricated, in foundry applications. Impregnated bushings of wood or of metal often give good service in the foundry. Powdered graphite carried into a bearing by some volatile liquid like kerosene gives good service in the wheel bearings of mold-oven cars and in car-hearth annealing furnaces. Where plain bearings are used it is often advantageous to use a wear sleeve on the shaft.

Materials handling in foundry operations is characterized also by wide load surges and by the frequent introduction of foreign material; and equipment must be designed with ample overload protection and surge capacity at every point.

The authors refer specifically to the use of shear-pin hubs on apron-feeder drives. The use of this device or its equivalent is recommended on all drives where an overload might cause serious damage to equipment. It is desirable, also, so to connect the drive that the motor stops automatically when the pin shears.

In any system including a number of units, each feeding the next in sequence, it is important to interlock the electrical controls so that the units will start or stop only in the proper sequence. Pilot lights, to indicate whether or not units not visible from the operating station are running, are desirable.

It is well, also, in a system of this sort to make each unit of a capacity slightly larger than the capacity of the unit which feeds it to make sure that there will be no flooding.

Bucket elevators should have provision to prevent back-tracking in the event of power failure. Self-energizing friction brakes are often used. Positive ratchets are better. They may be of the silent type. Bucket elevators are not well adapted to handling facing sands. An inclined belt conveyer or a skip hoist is preferable for this service.

The authors make a good point in recommending storage bins of large capacity. While the 2-hr supply mentioned in the paper is adequate for continuous systems, as there stated, a much larger capacity is required to absorb the wide surges common in intermittent operation. A 10-hr supply is none too much for a foundry which pours and shakes out all its molds on a Saturday night and resumes operation on the following Monday morning.

[2] Walter Giele Company, Lebanon, Pa.

The authors develop some very good points on bin design. The writer would add only that, if molding sand did not have the property of bridging over an opening, it would never be possible to lift a cope. Vibrators will often relieve a bridging bin. Volumetric or gravimetric hoppers will deliver more nearly uniform batches if provided with vibrators to insure complete discharge at each cycle.

Vibrators are frequently of advantage on molders' hoppers, particularly on facing sand in steel foundries. Where facing hoppers are supplied with shovelout openings, it is possible to make them larger at the bottom than at the top to minimize the tendency to bridge.

Bins with downwardly converging sides opposite each other, particularly when in the shape of inverted cones or pyramids, have a marked tendency to bridge when used for prepared or other damp sand. A vertical partition will often reduce this tendency.

Roller conveyers work to good advantage wherever it is desirable to transfer loads from one conveyer system to another by means of cranes or tramrails. Roller-conveyer systems also work well with high-lift fork trucks. Roller-conveyer lines may be double-checked to segregate finished work from unfinished or to permit return of empty containers, as between a molding station and a pouring station.

Trolley conveyers are adaptable to intermittent operation on miscellaneous jobbing work as well as to continuous mass production.

Among their peculiar advantages are the following:

1 They can be made to travel in any path and will follow vertical as well as horizontal curves. They can be made to go around or over or under obstructions and to serve one or more floor levels.

2 They do not obstruct the floor.

3 The wheel bearings and track surfaces are above the dirt level.

4 They consume very little power.

5 They are endless and will return empty containers.

6 They will assemble components from a series of stations to a single assembly point or distribute to a series of stations. For illustration, they will collect cores from a series of core-making stations, bring them all to one spray station, and then distribute them to racks according to size.

7 They will carry work through process as through a spray booth, a dipping tank, or a drying oven.

8 They will accommodate any time interval between operations by changing length while keeping speed constant, as is done in castings-cooling conveyers.

Authors' Closure

Mr. Giele has brought out several interesting points in his discussion.

Regarding the use of centralized lubrication systems in connection with sand-handling machinery, while this may be desirable, it is hardly practical in the case of belt conveyers, elevators, etc., as this would involve piping the grease over very great distances. In many cases belt conveyers may be several hundred feet long.

We are very much interested in his comments on the running of ball and roller bearings dry. In foundry mold conveyers, which run at a very slow rate of speed, we have found that by running the roller bearings in the wheels dry their life is considerably lengthened. Only a small amount of light oil is added, to prevent the bearings from corroding.

On the subject of bucket elevators, back-stops are certainly desirable. We use the self-energized band brake type. Inclined belt conveyers are certainly preferable in handling facing sands, but in many instances bucket elevators are used successfully when space limitations are such that inclined belts cannot be used.

Regarding the use of vibrators on storage bins, these are sometimes necessary to relieve bridging. However, if the opening or gate at the discharge point of the bin is not open, the vibrator may tend to pack the sand. The vibrators should be operated only when the discharge of the bin is open.

Air jets have been used in large storage bins for the purpose of relieving sticky and bridging action.