

# CONV



**M**any “older” conveyors—those that are more than 30 years old—remain in use in a variety of settings. Usually, this equipment has been purchased used, or relocated to control costs or meet schedule demands. In most cases, these conveyors were originally supplied as part of a conveyor system or as individual units—most with no guards or other safety features. At the time of their manufacturer, such features were neither considered “state of the art” or “industry custom.”

#### **HISTORY OF CONVEYOR SAFETY**

The need to guard “all parts of pulleys within seven feet or less from a flow or platform level to be completely enclosed or

guarded” was recognized in 1913 by Carl Hanson, a consulting engineer for the New York Workman’s Compensation Service Bureau (Hansen). Later, National Safety Council covered conveyor safety in its *Accident Prevention Manual for Industrial Operations* (NSC). Not until 1947, however, did any standards exist to address conveyor safety. That year, American Standards Assn. (now American National Standards Institute) issued Safety Code for Conveyors, Cableways and Related Equipment. This code was issued again as ANSI B20.1-1957, and has since been reissued in 1972, 1976, 1984, 1985, 1987, 1990, 1993 and 1995 (ASME/ANSI).

In the early 1970s, OSHA proposed 1910.186 to cover conveyor safety. At that time, ANSI B20.1-1972 was presented to OSHA; however, because it was written

as a specification standard by industry representatives, the standard was rejected by OSHA. ANSI then prepared B20.1-1976 as a performance specification, but it was rejected again. Consequently, to this date, OSHA has no specific standard that covers conveyor safety; as a result, conveyor accidents are typically cited under the General Duty Clause.

#### **CASE STUDIES**

##### **Case 1**

An older belt conveyor is being operated without a totally enclosed tail pulley guard as required by current standards (ANSI B20.1972, Section 5.15.2.5.3; 5.16). A worker cleaning in the area is accidentally caught in the tail pulley and loses an arm. This unit was originally sold as an individual conveyor to a third party, then



# Conveyor Safety

## REQUIREMENTS WHEN USING OLDER EQUIPMENT

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purchased by a used equipment company. In turn, that firm sold the conveyor to its present owner, who had installed the unit once, then re-installed the unit in its current location.

### **Case 2**

Transfer points between older conveyors used as part of a single system were not viewable from the operator's station. The unit did not have proper guarding, an emergency shutoff switch and/or a start-up warning device, which are required under current standards (ANSI B20.1972, Section 5.14.2). A worker inspecting the system is caught and injured in a conveyor transfer.

In this case, an outside engineering firm had designed the manufacturing operation using existing equipment—

including conveyors—that had been moved from an abandoned facility. The consultant had prepared drawings and specifications for mechanical and electrical subcontracting for removal and re-installation of this older equipment. The owner and engineers acted as their own general contractor and field engineer.

In each case, workers' compensation will cover the owner's/operator's responsibilities, but the employer may be cited, after the fact, by OSHA for not providing a "safe workplace." If the injured worker sues the original manufacturer, a sale agency or an engineering/contracting firm, the courts must decide responsibility. While the details of these cases differ, the defense will usually claim:

•**State of the art.** Technological advance was not required at the time of

original sale (for example, guarding). However, it should be noted that the need for many conveyor safety features has been known for 80 years.

•**Industry custom.** Many conveyors manufactured before 1972 were sold without safety features—which were typically optional. Although this is true, safety precautions are so imperative that their disregard should not excuse omission.

•**Older machine.** "The conveyor was 30 years old" at the time of the accident and, therefore, is exempt from current safety standards. In the author's opinion, necessary safety features must be included with a conveyor for its entire useful life.

It is up to a court to consider these claims, apply individual case circumstances and render its decision. Who then is responsible when older used equip-

**TABLE 1**

**Designer/Manufacturer Responsibilities**

- 1) Define the use and possible misuse of the conveyor.
- 2) Define the environment in which the conveyor is to be used.
- 3) Define the typical use of the conveyor.
- 4) Identify all possible hazards that could result from the use/misuse of the conveyor, and develop a reasonable estimate of the probabilities of these occurring.
- 5) Define design solutions to prevent these hazards, including warnings and instructions.
- 6) Evaluate how these design/safety solutions affect the conveyor's utility and cost.
- 7) Select those design/safety solutions that can be commercially adapted to the conveyor.

4) **Use warning signs or alert workers to hazards.** Warning signs or labels alert workers to obvious safety hazards. Although these signs cannot compensate for unsafe design, they can help modify worker behavior, which in turn may reduce injury severity and frequency. A plant's insurance plan also typically requires the posting of signs.

ment is installed, especially individual conveyors designed and installed by the owner or its representative?

**CONVEYOR MANUFACTURER RESPONSIBILITIES**

With new equipment, the conveyor designer/manufacturer is responsible for using current standards in order to provide functional equipment that will perform effectively and can be safely operated and serviced (Table 1). The owner is responsible for the safe operation and maintenance of the equipment.

**OWNER/OPERATOR RESPONSIBILITIES**

When an owner installs older conveyor equipment, staff or consulting engineers should prepare a conveyor safety strategy (CSS) that encompasses several key steps (Barnett and Switatzh).

1) **Analyze available conveyor safety standards.** A variety of such materials are available. Some standards and sources apply specifically to conveyors, while others cover general safety.

2) **Identify conveyor hazards.** Most conveyor accidents occur at action points, such as drives, head and tail terminals, product loading and unloading points, and areas where workers make repeated or unplanned actions. To identify potential hazards, the engineer must consider the conveyor type, its configuration and its location in relation to other equipment.

3) **Eliminate hazards.** When developing a CSS, the first step is to eliminate any conveyor dangers that involve both hazard and risk. That is, if a particular hazard is present, steps should be taken to minimize the chances that a worker will be exposed to it. For example, if a belt conveyor requires manual lubrication and is installed 25 feet above the plant floor, a central lubrication system can be installed so workers need not climb the conveyor to lubricate it.

5) **Establish training requirements, develop training materials and train workers.** The original manufacturer should have supplied an operations and maintenance manual to the first owner. This information should be located, upgraded and/or rewritten.

According to OSHA, all written information must be presented to conveyor operators and maintenance workers. This information must also be updated as required and shared with workers. For maximum safety, employee training must be an ongoing process. New workers or those newly assigned to the conveyor area must receive adequate training, and safety procedures should be periodically reviewed with all workers.

6) **Require workers to use appropriate personal protection equipment (PPE).** Employers should supply workers with protective gear (e.g., hard hats, safety shoes, gloves, safety glasses, ear plugs, environmental protection garments) per applicable safety standards. In some cases, a plant's general rules about safety equipment can conflict with conveyor safety requirements. For example, a plant may require all workers to wear gloves even though gloves can be a danger around a conveyor's moving parts. All such conflicts must be addressed in the PPE policy.

This CSS procedure overlaps the conveyor designer's/manufacturer's safety responsibilities (Table 1). It will identify other conveyor safety features/requirements including safety features that:

- were not incorporated in the "old" design of the equipment;
- are dependent on the new arrangement and installation of all components in the field;
- are part of the new building or structure and not an integral part of the conveyor components themselves;
- are dependent on specific opera-

tional and maintenance requirements of the user/operator.

The procedure will also reveal additional training and supervision required to enforce safety.

**CONCLUSION**

No employer or employee wants to be involved in a conveyor-related injury. In the absence of an OSHA standard for conveyor safety, a CSS should be developed when using existing or older conveyor equipment. ■

**REFERENCES**

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*(Author's Note: Safety codes and standards are intended to enhance public safety. Revisions result from committee consideration of factors such as technological advances, new data, and changing environmental and industry needs. Revisions do not imply that previous editions were inadequate.)*

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