NIBA
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Technical Article
Technical Article Content Pulled from the NIBA Belt Line Newsletter

Understanding General Bucket Elevator Basics
First in a Series

Bucket elevators are designed to move flowing powders or bulk solids vertically. They are attached to an endless spliced loop of belt/chain which travels in a continuous fashion around the tail pulley/sprocket from the boot section of an elevator, where the buckets are loaded.

The loaded buckets travel up and over the head pulley/sprocket where they are emptied into the discharge throat and then sent back down to the boot section to continue the cycle.

Generally the capacity of an elevator is determined by multiplying the individual carrying capacity of a bucket by number of buckets per foot of belt/chain and multiplying that number by how many feet per minute (FPM) the conveyor is operating. The long hand formula is (cubic inch capacity per bucket)(buckets per foot)(FPM)(60 min/hr)/1728 = cubic feet per hour of elevating capacity. This volume can be converted to a measure of weight for further calculations. There are three basic types of bucket elevators with multiple variations of each.

Centrifugal Bucket Elevator. These are the most commonly used vertical conveyors for handling all types of free-flowing, powdered bulk solids such as grains, animal feed, sand, minerals, aggregates, sugar, chemicals and more. They operate at high speeds which throw the materials out of the buckets into the discharge throats by centrifugal force. The buckets are loaded on either the up or down leg side of the boot sections, and the buckets frequently dig through the material during loading. There are two types of centrifugal discharge elevators, slower speed, industrial type, generally using AA style buckets which are widely spaced on the belt/chain and operate at speeds up to 350 FPM for handling the heaviest of industrial materials up to 100 pounds per cubic foot.

There are also high speed standard duty type elevators most commonly used in grains and other materials of up to 50 pound per cubic foot, operating at speeds up to 1000 FPM. There are many types of elevator buckets available for centrifugal discharge elevators.

Continuous Bucket Elevator. These slow-speed elevators have buckets spaced continuously, so that the force of gravity will discharge their load onto the inverted front of the proceeding bucket. The bucket then guides that material into the discharge throat on the descending side of the elevator. The buckets are positively loaded by direct feed on the up leg side of the elevator and the buckets do not dig into the grain.

Continuous elevators are used to handle fragile, friable materials because they minimize product damage or are used to handle light, fluffy materials where aeration of the product must be avoided. Metal continuous elevator buckets come in a variety of styles, fabricated to order. The most common style and popular sizes are available in molded plastics.

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Positive Discharge Elevator. These specialty conveyors can be built to move products in L, C, or Z configurations. They usually have pivoting buckets, side-mounted between two chains. The conveyors move products at very low speeds in any direction needed and the buckets are inverted and discharged wherever designated. These elevators are usually used in processing plants that desire minimal breakage and spillage while handling products such as cereal flakes, nuts, dried fruits, etc. The buckets for these conveyors are proprietary products usually available only from the original equipment manufacturer.

When selling replacement elevator buckets, it is good practice to determine the type of elevator and identify the bucket currently being used, along with complete specifications. Ask if there are any current bucket problems that may lead to a problem-solving opportunity.

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