

Impact Machines: A Look Back

In the first of a two-part series, the origin of this insect-control device is examined.

The movement of a commodity can kill both internal and external stored-grain insects. Movement of grain through screw conveyors and pneumatic conveyors has been shown to contribute to

some insect mortality. Dropping infested grain into a bin during the filling process can also kill insects.

For example, a twice-daily, 10.8-foot drop at a velocity of 21.0 feet per second resulted in a 100% mortality rate of larvae, pupae, and adults of the granary weevil and the maize weevil.

Utilizing the same principles, impact machines are widely used in the milling industry to destroy and remove insects in grain prior to milling and/or to kill insects in flour before bagging and shipping.

The insects killed by impact are re-

moved by aspiration.

Entoleter's Development

An interesting story about the origin of the Entoleter (an impact machine) was published in the June 28, 1953 *New Haven (CT) Register*.

The person credited with the idea of creating a centrifugal unit for killing insects by impact is Franklin S. Smith.

According to the story, the Safety Car Heating and

Lighting Company in New Haven built its first centrifugal unit using high-speed rotors and employed the impact principle to destroy insects.

This unit was marketed in 1940 as the Entoleter infestation destroyer. The unit occupied 3.5 square feet of floor space and stood four feet tall.

The units have since undergone several modifications to make them more compact and efficient. The speed of the early units was 1,750 to 3,500 rpm. Material fed through the center of the rotor was hurled by centrifugal action. Insects are killed when they impact the rows of vertical pegs on the rotor.

The effectiveness of these units was confirmed by the U.S.

Pest Management

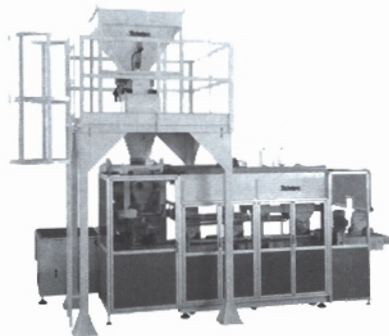
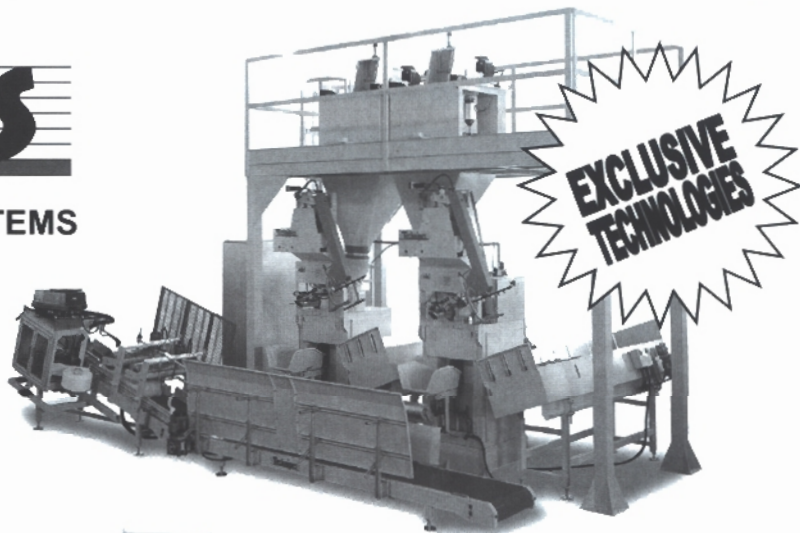


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Entoleter first developed its impact machine in 1940.

Department of Agriculture's (USDA) Bureau of Entomology in the early 1940s.

In addition to destroying insect life, impact machines also can be used for particle size reduction (impact milling of the 4th and 5th break stock), mixing, scouring, degemming, and dehulling.

Other companies, such as Sturtevant, Spomax, and Buhler, manufacture these types of machines and market them as infestation destroyers.

Entoleter's Research

In 1961, George Smutny, a representative of the Entoleter company, wrote an article, "A Discussion of the Various Uses and Applications of Entoleter Impact Machines."

Two-stage process. In the article, Smutny proposed using a two-stage, or double-impact process to kill insects—especially those developing inside the kernels (hidden infestations) for tempered wheat.

With the two-stage process, first a high-speed impact breaks open a kernel to remove early stages of larvae. For this, he proposed using a 3,500-rpm machine with a rotor diameter between 10.75 inches and one foot.

For the second impact, Smutny proposed using a slower speed, such as 1,750 rpm or 2,100 rpm, to kill the insect.

Using Smutny's double-impact process, fragment counts were less than one fragment per 50 grams of flour. The Food and Drug Administration's Defect Action Level for flour is 75 fragments per 50 grams of flour.

Impacting flour. When impacting finished flour, Smutny noted that a rate of 3,500 rpm can be achieved with a larger, 14-inch rotor, due to the difference in the composition of flour versus full kernels. A

27-inch rotor is capable of producing speeds of 2,225 rpm on finished flour.

Smutny said one can expect approximately 98% kill with these machines on finished flour. Complete kill may be difficult because of a cushioning effect which results when finished flour sticks to the inside of the machine.

Horsepower and feed rate. Smutny also made observations that relate the feed rate to the machine's horsepower.

When impacting wheat kernels, if the feed rate is increased from 9,000 lbs. per hour to 16,000 lbs. per hour, the motor

size must increase from 2 hp to 10 hp.

When processing finished flour, a 2-hp machine can process 25 cwt. per hour, while a 50-hp machine can process 500 cwt. per hour. Current Entoleter models range up to 150 hp.

Next time. In the next issue, we will discuss other experiments with the impact machine.

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