"Pistachio Blaster"

Finds Perfect Nuts

When a pistachio is ripened perfectly, its light-tan shell splits open, revealing a rich-tasting, lime-green kernel that's ready to roast and enjoy. This handy split-shell feature makes it easy for you to loosen the plump nut from its protective housing.

Nicknamed "laughing pistachios" because they look like they're smiling at you, open-shell nuts typically make up about 78 percent of the U.S.-grown harvest.

But some of the remaining harvest is made up of closed-shell nuts that cost pistachio processors an estimated $3 million to $7 million in losses every year. That's due, in part, to sorting-equipment errors that misdirect premium, open-shell pistachios into bins of lower-value, closed-shell nuts.

To help solve this problem, ARS agricultural engineer Thomas C. Pearson has invented the Pistachio Blaster, a high-tech sorter that quickly segregates closed-shell nuts from their high-value, open-shell counterparts with about 90 percent accuracy. The Blaster doesn't damage the nuts, performs at the respectable speed of about 25 nuts per second, and can pay for itself in less than a year, Pearson says.

This super-sorter might be used to sort other crops, such as hazelnuts, also called filberts, and wheat, notes Pearson. He developed it while at the ARS Western Regional Research Center in Albany, California, and is now with the agency's Grain Marketing and Production Research Center in Manhattan, Kansas.

The Blaster relies on what's known as "impact acoustics" to correctly sort the nuts. In a sequence of steps that occur faster than the blink of an eye, the Blaster analyzes sounds made during and immediately after each nut strikes a polished stainless steel block.

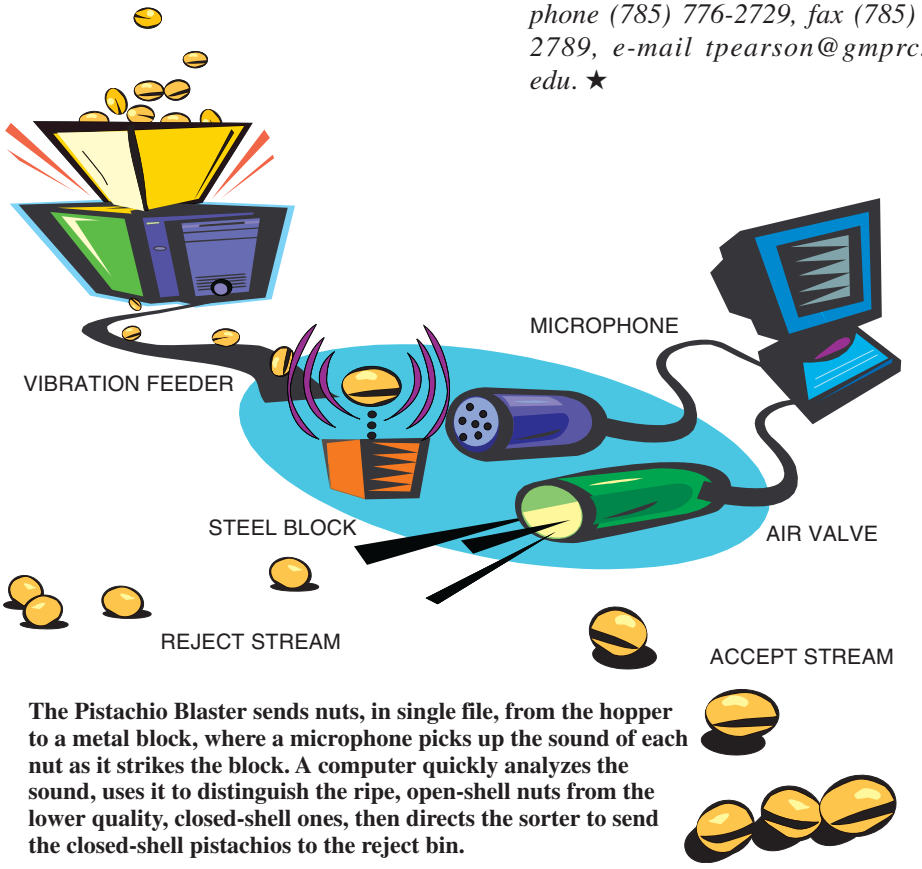
Those sounds, first captured as electrical signals by a precisely positioned directional microphone, are sped to a personal computer, where they are converted into digital data—some 350 pieces of information, or data points, for each nut.

The computer distinguishes the distinctive sound pattern made by the impact of a closed-shell pistachio from that of an open-shell nut, "much like your ear can distinguish a 'plink' from a 'plunk,'" Pearson says. When the analysis reveals the telltale sounds of a closed-shell nut's bounce, the computer sends a signal that causes a blast of compressed air to direct the nut to the reject bin.

One of the nation's largest pistachio processors, Setton Pistachio of Terra Bella, California, holds a license for the Blaster, and is already using several of these novel machines to make sure that more laughing-face pistachios make their way from orchards to you.—By **Marcia Wood,** ARS.

This research is part of Quality and Utilization of Agricultural Products, an ARS National Program (#306) described on the World Wide Web at www.nps.ars.usda.gov.

For further information on U.S. Patent No. 6,541,725, "Acoustical Apparatus and Method for Sorting Objects," contact Thomas C. Pearson, USDA-ARS Grain Marketing and Production Research Center, 1515 College Ave., Manhattan, KS 66502; phone (785) 776-2729, fax (785) 776-2789, e-mail tpearson@gmprc.ksu.edu. ★



The Pistachio Blaster sends nuts, in single file, from the hopper to a metal block, where a microphone picks up the sound of each nut as it strikes the block. A computer quickly analyzes the sound, uses it to distinguish the ripe, open-shell nuts from the lower quality, closed-shell ones, then directs the sorter to send the closed-shell pistachios to the reject bin.