

## **Boeing Donates Microwave Technology to Washington State University**

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Drying process could one day revolutionize fresh food preservation

Boeing has donated patents to Washington State University for microwave technology originally designed to dry out spacecraft after ocean landings and cure composite materials for fighter aircraft that could now be used to produce new, flavorful, dried fruits and vegetables that are free of additives.

Called the Microwave Vacuum Dehydration Technology, or MIVAC®, the technology could revolutionize the commercial process for preserving fresh foods. The process integrates microwave energy and vacuum to dry food quickly at very low temperatures. The result is lightweight dried products that retain their original color, flavor, shape and nutritional value. Strawberries remain naturally red, for example, and grapes stay tangy and tasty without the use of chemical additives.

"It's exciting to think that Boeing might make a major contribution to feeding the world," said Gene Partlow, vice president of the Boeing Intellectual Property Business. "The donation of this patent portfolio represents another advance in Boeing's efforts to seek out new avenues for use of its aerospace inventions for applications in other industries. More research is needed before the process can be refined for the design of a commercial system. But ultimately, successful commercial application of MIVAC could lead to improvements in the quality of the food supply and expand the demand for employment in food processing. We're proud to have made this donation to Washington State University, a fine research organization that has the expertise to bring such a commercial application to life."

The value of the donated intellectual property, including three Boeing patents and numerous documents that provide related know-how for the use of the microwave drying process, has not been disclosed.

"Research into MIVAC technology began in the 1970s at McDonnell Douglas, now part of the Boeing Company, with a view to expanding the utility of vacuum drying techniques developed for space programs and for the curing of composites for our fighter aircraft," said Fred Wear, a Boeing engineer who has been instrumental in the development of the technology. "Over the years, we have spent some \$2.5 million to gather the know-how that has gone into the processing technology and equipment."

"In the 1980s, we designed the microwave apparatus that consisted of the 40-foot-long MIVAC dehydration equipment then being used by Dr. Carter Clary at California State University-Fresno," said Wear. Dr. Clary is now a scientist with Washington State University's Agricultural Research Center and an assistant professor in the department of Biological Systems Engineering at WSU.

The possibilities for the technology's applications, he said, have ranged from the drying of medical waste, removal of toxic solvents from waste, and preparation of pharmaceutical products to the killing of insects in grains.

Dr. Carter Clary, the principal investigator of MIVAC research at Washington State University, worked with the development of the technology for some 20 years. He said, "MIVAC introduces a revolutionary way of uniformly heating fruits and vegetable so that the moisture vaporizes from all areas of the food product simultaneously. The benefits of the process include rapid, low-temperature dehydration without changes in color, flavor, appearance and nutritional value."

"Dried fruits, such as strawberries, exhibit a brilliant red color," he said. "Bananas have a crunchy, fresh taste and grapes maintain a tangy, fresh flavor -- all accomplished without the use of added preservatives."

Moreover, it was found that MIVAC technology produces food quality superior to that of freeze-dried products but at a cost that is only a little more than traditional air-dried process. Its most likely application, he said, would be for cereals, snacks, nutritional bars and other reconstitutable fruit-based products.

In addition to donations of intellectual property, Boeing makes more than \$8 million in charitable investments each year to help develop intellectual talent and promote academic achievement at colleges and universities with demonstrated records of academic excellence, programs fostering critical skills, and opportunities for diverse populations. Boeing further supports universities and colleges through intern and co-op programs for students, equipment donations, research and development funding and executive participation on program and curriculum advisory councils.

Currently, the Boeing work force includes more than 2,000 graduates from Washington State University. Last year, 87 Boeing employees attended WSU through the company's own tuition program. Over the years, Washington State University alumni at Boeing have provided over \$1 million in gifts to the university. The Boeing Company provides matching dollars for employee gifts, which total an additional \$750,000. The Company has provided cash, equipment, and other gifts such as this donation of intellectual property, totaling almost \$12 million to WSU.

The Boeing Company is the world's leading aerospace company, and the largest manufacturer of satellites, commercial jetliners, and military aircraft. The company is also a global market leader in missile defense, human space flight, and launch services. In terms of sales, Boeing is the largest U.S. exporter. Total company revenues for 2002 were \$54 billion.

Founded in Pullman in 1890, Washington State University has been ranked by U.S. News and World Report as one of the top public research universities in the United States. The university has 10 colleges and a graduate School with campuses in Spokane, the tri-cities of Richland, Pasco and Kennewick, and Vancouver, Washington. WSU is the state's land-grant research university. Regional learning centers and the Distance Degree Programs offer access to the university's degrees statewide.

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