ELECTRONIC FINGERPRINTING FOR INDUSTRY

An advanced parts identification system derived from Space Shuttle technology exemplifies spinoff aids to industrial productivity and manufacturing technology

American industry — and government agencies like NASA — are making increasingly greater use of automated parts identification (PID) systems to track the millions of individual parts involved in their operations. Such systems can significantly enhance industrial efficiency when each part is uniquely marked with a machine-readable symbol, or "fingerprint," that provides information about the part and its pedigree.

And therein lies a problem. The growth of automated parts control has been restricted by the fact that a great many tiny or unusually-shaped parts cannot be marked with conventional bar codes such as those used in supermarkets. Some parts — a screw or an electronic diode, for example — are too small to accommodate a printed code label; others must operate in harsh, high temperature environments in which a bar code could not survive.

That was a particular problem for NASA's Marshall Space Flight Center, which was looking for an improved method of identifying and tracking Space Shuttle parts. There was need for a technique of marking parts so that NASA could readily check the specifications, manufacturing history and operational experience data of any single part among the hundreds of thousands in the Shuttle system. And the PID symbol had to be able to withstand operating temperature conditions ranging from minus 250 degrees Fahrenheit to more than 2,000 degrees.

NASA found a possible solution in a technology then under early development by a small business firm, Veritec, Inc., Calabasas, California. Veritec was experimenting with a space efficient binary marking known as the Vericode Symbol™ that could contain a great deal more information than a bar code yet occupy substantially less space; and could easily be marked on a part's surface for permanent identification.

In May 1991, NASA organized a team to further develop the technology and create an advanced PID system that would be targeted specifically at Space Shuttle parts identification but would also be capable of spinoff applications in pharmaceutical, medical, automotive and electronics manufacturing, product distribution and consumer product use. The team included Marshall Space Flight Center, Veritec and Rockwell International, NASA's prime contractor for the Space Shuttle.

The Shuttle-oriented work is still in progress, but the technology has advanced significantly. In cooperation with major firms in several industries, the team has developed marking techniques for many types of parts and a wide range of materials — steel, paper, glass, fabric, ceramics, plastic, metal, etc.

Meanwhile, Veritec introduced the Vericode Symbol to the commercial marketplace in 1994. The company is marketing its VeriSystem™, a complete identification and tracking system for component traceability, improved manufacturing and processing capabilities, and a variety of automated shop floor applications.

This photo illustrates the great many types of small and unusually shaped products that can be marked with the Vericode Symbol. A spinoff of Space Shuttle technology, the marking technique represents a major advancement in automated parts tracking.

The Vericode symbol is a small, checkerboard-like matrix, ranging in size from fractions of an inch to several feet. Each symbol can contain 5 to 100 or more coded characters, which can provide up to 100 times as much information as a bar code in the same or less space. The smallest Vericodes, read with a microscope, are measured in microns (millionths of a meter). Vericodes are scanned by CCD (charge coupled device) electronic cameras that can capture images from a broad range of surfaces. NASA tests have shown that the Vericode Symbol can be read with a high degree of accuracy. The Vericode's direct PID capability also enables bypassing processing steps that introduce human error.

The "compressed symbology" technology clearly has enormous potential for efficiency and cost savings. The applications and methodology vary widely from one possible use to another, but one major example serves to underline the system's utility: labeling automotive parts.

Today, when a manufacturer discovers a defect in a particular batch of auto parts, the company has little information on which autos are specifically affected. Therefore, it becomes necessary to recall thousands of vehicles for inspections, when only a few might really be affected. A Vericode Symbol on a defective part might include such details as the manufacturer, serial number, the lot number of the parent material, design changes, special processing to which the part was subjected — everything needed to determine, accurately and automatically, the extent of the recall needed, which might be a couple of hundred cars instead of tens of thousands. The savings in time, convenience and money are obvious. There is similar savings potential in an ever-broadening spectrum of applications ranging from marking pharmaceutical vials to tracing instances of food poisoning by marking live hogs.

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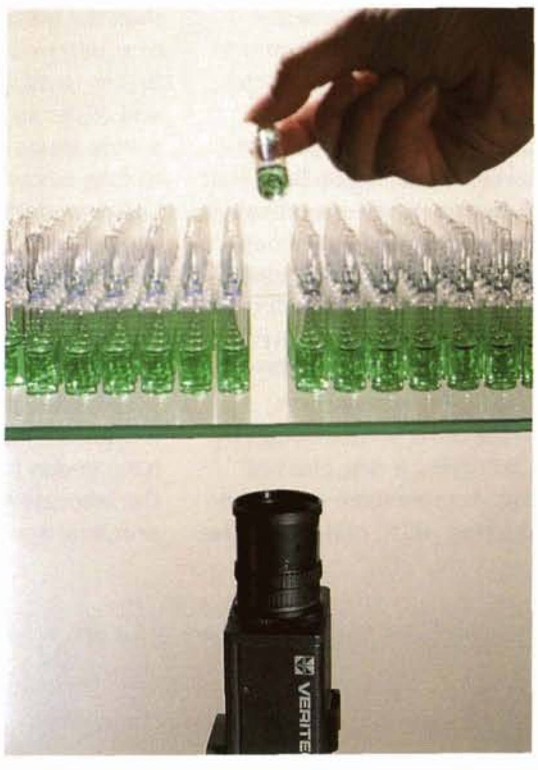

A typical application, use of the Vericode Symbol on pharmaceutical vials. Vials and other products can be quickly marked and read, offering new efficiency in high speed production and quality control tracing.