

## A New Tool for Quality Control

Highlighting spinoffs in industrial productivity and manufacturing technology is a new product inspection system capable of finding tiny flaws previously undetectable

Industry has long employed machine vision systems for quality control inspections and generally they work fine. If there is a problem it is that such systems cannot detect all of the imperfections their users would like to observe and correct.

Diffracto Ltd., Windsor, Ontario is now offering an inspection system that allows detection of minute flaws previously difficult or impossible to observe. Called D-Sight, it represents a revolutionary technique for inspection of flat or curved surfaces to find such imperfections as dings, dents and waviness. The system amplifies these defects, making them highly visible to simplify decision making as to corrective measures or to identify areas that need further study.

According to Diffracto, D-Sight can identify 94 percent of the defects when inspecting stamped sheet metal; that compares with 50 percent for conventional flaw-detection methods. D-Sight is also used to detect imperfections in glass or plastics, such as surface sinks, waviness or paint finish irregularities.

The system is a spinoff from Space Shuttle research. Diffracto Ltd., a major company in the field of machine vision systems for inspection, measurement and robot guidance, was licensed to develop commercial applications for the vision guidance system of the Shuttle Orbiter's remote manipulator arm, known to its Canadian developers—Spar Aerospace Ltd., Weston, Ontario—as Canadarm (see page 132). In the course of experimenting with the vision system, Diffracto engineers noted the phenomenon of reflected light from the target material. This led to a company R&D program that produced an initial CVA 3000 Development System.

The CVA 3000 employs a camera, high intensity lamps and a special reflective screen to produce a D-Sight image of light reflected from a surface. The image is captured and stored in a computerized vision system, then analyzed by a computer program. A live im-

age of the surface is projected onto a video display and compared with a stored master image to identify imperfections. Localized defects measuring less than one thousandth of an inch are readily detected.

Surfaces to be inspected must be reflective. Since some—such as unpainted sheet metal—are not sufficiently reflective, Diffracto has developed a reflectivity enhancing technique that involves wiping or spraying a wetting compound on the surface.

D-Sight is offered in two versions with different levels of capability to allow the most cost-effective selection for a given type of job. The CVA 3000 is the top of the line and there is a lower priced TVA 2000.

Major users so far are auto manufacturers—including Ford, General Motors and Chrysler—who employ D-Sight to inspect external body panels, both metal and plastic, for dings, dents, low spots and waviness. D-Sight's sensitivity allows corrective action before the defects become severe. The system is also useful for die tryout and "first article" inspection.

Aircraft manufacturers are evaluating D-Sight for inspection of external aircraft surfaces, especially those made of composite materials. A variant of D-Sight has been developed for inspection of transmissive objects, such as windshields or canopies. The company is also exploring the system's potential application to wind tunnel and thermal imaging research.



The DiffRACTO D-Sight pictured is a quality control inspection workstation capable of detecting surface imperfections measuring less than one thousandth of an inch. In this test, the target surface is an auto fender (center). The fender is photographed by the camera (right) while the reflective screen (white background) bounces light off the fender to highlight defects. The resulting image is computer analyzed and the discovered defects projected onto the video displays.



D-Sight imagery points out various imperfections, for example, the scratch in this auto door that would not be visible in the showroom.