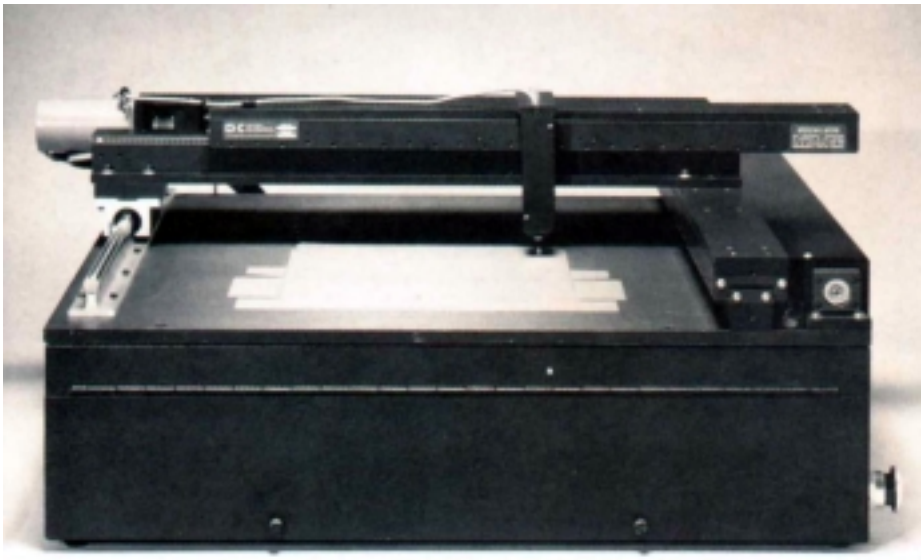
Carton blank testing system introduces computerised quality control

Three major concerns of producers and customers in any industry are quality, cost and delivery. This article reports on a computerised quality control system for folding carton manufacturers and high-speed packagers that can improve all three.

The ACT II carton checking system, manufactured by Indocomp Systems Inc of the United States and marketed in Europe by Paragon International Consulting of Munich, W. Germany, improves quality assurance procedures. This is achieved by precisely gauging score (or "crease") heights, symmetry and dimensional accuracy and comparing the results to predetermined standards without subjective interpretation. It identifies problems in 31/2 to 7 minutes (depending on carton size and design), while conventional manual inspection generally takes half an hour or more. This means less converterdowntime for checking adjustment, which enhances production efficiency and thus reduces costs. Furthermore, the computer stores all data for future reference and can provide it in a variety of user-friendly report formats.

The system is just as popularwith quality control personnel as it is with production managers. It is so fast and easy to operate that they can find time for other duties. They do not experience the eye or back strain common from sitting for long periods peering at a template through a sight glass. This improves quality because the accuracy of the test no longer depends on the operator's eyesight or alertness.



The test procedure is very simple. All the operatordoes is mount a flat carton blank on the X-Y measuring table — a liquid carton, a"hinge-lid" cigarette box, a pharmaceutical blank, or virtually any style — and enter the carton model number in the preprogrammed computer, using the keyboard. The rest is automatic.

HOW IT WORKS

An LVDT height gauge (Linear Variable Differential Transformer) on the X-Y table moves from its home position along a path preprogrammed for the carton model being inspected. Before the actual test, the gauge passes over a gauge block which matches the height of a known score profile. The program then automatically calibrates an output signal from the height gauge to correspond to the height of this block. This compensates for any drift in the analog-to-digital electronics, which can be caused by changes in temperature, or for gauge wear.

This calibration is quickly completed, and then the gauge passes back and forth across the carton blank as many times as necessary to locate and read every pertinent score, edge and dimension. Some 25Oscore height readings are stored for every 6.4mm (0.25 inches) the gauge travels; it moves even faster between inspection points.

All of thedataisstoredin the ACT II computer, which uses it to determine the location, height, symmetry, and centrepoint of each score. Edge pointsarecomputed in the same way. When all the data is collected, panel widths and flap lengths can also be determined.

RESULTS DISPLAYED

Afterthetest is finished, the system can print out (or store on the "hard" disk) the results in a number of formats. Profiles of carton edges and scores can be plotted, and the outline of a blank can be displayed to show:

Actual dimensions: The system calculates and displays the actual

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score-to-score, score-to-cut and cut-to-cut dimensions.

Variances: Actual dimensions are compared to standard dimensions, and the variances (+/–) are displayed in each **case.**

Out-of-tolerance dimensions: Reports only the deviations from standard dimensions which exceed the tolerance values stored in a carton's data base.

Actual score heights: The height of each score is shown (at the point where the probe crosses the score). Scores which are asymmetric (relative to the preset values) are also highlighted, with arrows indicating the direction the score is "leaning':

Out-of-tolerance score heights: Any score height exceeding the maximum height or below the minimum is displayed, as well as any asymmetric scores.

Profiles: Detailed profiles of any scoreoredgecut can begraphically depicted.

Anotheroption is barcharts, which show at a glance the overall blank quality and make it easy to spot trends or problems.

The entire process — from mounting the carton blank to test completion — takes between 31/2

and 7 minutes. Report print time is about 24-30 seconds per page.

CENTRALISED RECORDS

The capacity to store and analyse all this data makes the ACT II system a real asset in record-keeping. Companies like Champion International/DairyPak in the United States, the Elopak Group in Europe, Jujo Paper Company in Japan and others, have found that production planning for their gable-top liquid cartons is greatly enhanced by their ability to track converter performance with the system. Such records can be particularly valuable in providing documentation to resolve customer quality disputes. Reducing scrap, defects and rejected shipments can result in a very fast payback.

The system can be set up to co-ordinate quality control for several converters in a plant, or even in multiple plants. ACT II units in various locations can be interfaced via telephone lines and can be programmed to share information automatically (for example, during the night when telephone rates are generally lowest). It is even possible to integrate the system with other computer-based operations — such as production scheduling programs or CAD/CAM package design systems — because the software and the hardware conform to international standards.

HARDWARE AND SOFTWARE

The Packard Bell PB286/12 MHz computer, which is the heart of the standard system, is IBM AT-compatible and features a 1 MB RAM memory, a high-resolution graphics monitor and a keyboard. The precision X-Y coordinate measuring table has a repeatability of 0.025mm (0.001 inches), so it measures very accurately. A microprocessor-based motion controller enhances both speed and precision, while a high-speed 24 pin dot matrix Okidata Microline ML 393 printer-plotter operates at up to 450 characters per second (draft mode).

Every system comes with a CCITT V.21/22-compatible asynchronous modem, which allows it to transmit data over standard telephone lines at the rate of 2.400 bits per second. The ACT II software supports the commonly used XMODEM protocol, which monitors transmissions to ensure accurate sending and receipt of data. Indocomp Systems Inc also provide a self-diagnostic program for the computer components.

The company plans to offer a number of softwareenhancements to take fuller advantage of the ACT II's capabilities, particularly periods when the system would not normally be in use. These include statistical analysis, data base management, spreadsheet and graphics programs as well as customer-designed productron management programs.