



Our business is making your business better.



Our business is making our business better. In 46 countries and 33 languages.



Our business is the design, manufacture, marketing, and servicing of measurement, control, and information systems. These process management systems control manufacturing processes to save raw materials and energy, increase productivity, lower production costs, and improve product quality...all over the world.

You can find AccuRay® computer-based systems installed in pulp and paper mills, cigarette factories, metals rolling plants, and in plastics, textiles, and rubber operations. Also, you can find them in such diverse locations as Philadelphia, Los Angeles, São Paulo, Toronto, Helsinki, Milan, and Tokyo. Altogether, our installations are in 46 different countries.

Half of our 2,000 people work in our headquarters in Columbus, Ohio, U.S.A. — planning, designing, and manufacturing process management systems. They have to know your business as well as ours, and they are well versed in your technologies, operating costs, and manufacturing problems. Only in that way can they fully understand how their contributions can help make your business better.

The other half of our people live in 46 countries where they must speak some 33 languages. Their major responsibility is to install, monitor, and service AccuRay systems everywhere. They provide the technical assurance that AccuRay systems will achieve maximum uptime and the results projected for them.

What does an AccuRay system do for you?

An AccuRay process management system performs three basic functions:

First, it provides extremely accurate measurement data using a wide spectrum of sensor technologies. Among them are nucleonic, X-ray, radio frequency, infrared, optical, pneumatic, electromagnetic, and microwave.

Next, it automatically controls your products and machines by comparing the measurement data to the limits you have established and making adjustments to keep the product within those limits while optimizing the process operation.

Finally, it assembles, analyzes, and condenses product and process information and presents it to you in the forms you prefer. On your manufacturing floor, it can show the

data on digital and/or video displays in alphanumeric or graphic formats in terminology your operators understand. At the end of the shift, it can print out hard copy reports for a complete history of your production. And it can communicate intelligently with a host computer as an input to your management information system.

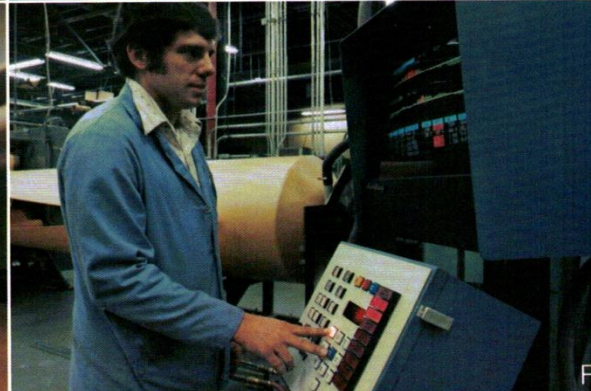
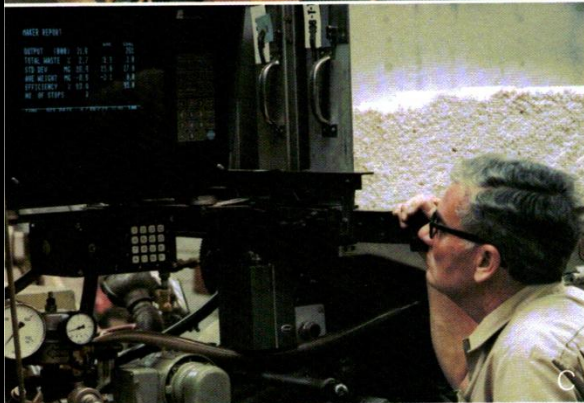
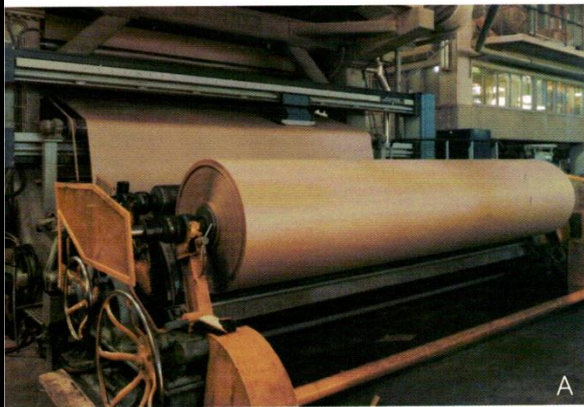
In summary, you get results with an AccuRay process management system: higher, more consistent level of quality; significant reduction in raw materials and energy consumption; and higher productivity.

The benefits of an AccuRay process management system offer you one of the most attractive capital investment decisions you will make.



© AccuRay is a Registered Trademark of AccuRay Corporation.

Our business is making your business better. And we're proving it thousands of times every day.



In the paper industry, from Torino to Fuji, from Augusta to Cali, the 1180 MICRO has been delivering quality improvements of 30 to 60%, fiber savings of 0.5 to 4%, energy savings of 5 to 15%, and reductions in sheet breaks of 10 to 40%. Results like these provide first-year savings that are typically greater than the capital cost of the 1180 MICRO.

In pulp mills around the world, AccuRay systems achieve as much as 40% improvement in pulp quality. Other typical results include 0.6 to 2% increase in pulp yield, 2 to 6% savings in liquor consumption, 12% savings in steam, and 75% reduction in steam demand variations. The AccuRay system is the way pulp mills are boosting performance to the limits of the mills' equipment and designs.

In tobacco, AccuRay 7000 MICRO Systems work in cigarette factories controlling a wide range of cigarette machines, capable of operating at speeds up to 7000 cigarettes per minute. The 7000 MICRO monitors the process and collects information throughout the process to pinpoint

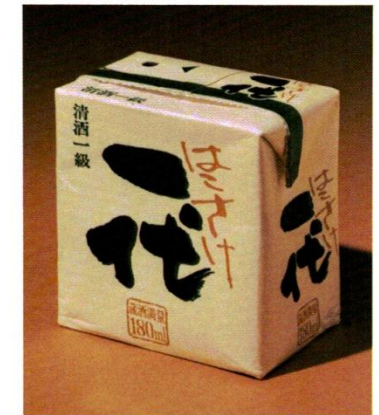
sources of waste and identify other operating conditions that require corrective action. And the new Cigarette Inspection Module (CIM) spots visual faults providing a higher level of quality inspection than was previously possible.

In metals, the AccuRay 500 MICRO helps roll better quality sheet and strip steel, aluminum, and other non-ferrous metals in plants around the world. Typically, the 500 MICRO helps increase yield 0.5 to 1% and reduces thickness variations 50% within the coil and up to 85% from coil to coil. And first-year savings are typically greater than the capital cost of the AccuRay 500 MICRO.

In carpet coating, the AccuRay system uses Target Optimization Control to deliver latex savings of 10 to 15%. Productivity increases of 12%, reduction of seconds by 50%, and reduction of coat weight testing of 80% are other typical results the AccuRay system achieves in carpet and other coating applications.

In plastics, AccuRay systems are used in blown film and sheet extrusion operations. Typically, sheet thickness variations are reduced by 85%. The resulting thickness reductions save 7.5% in resin while the improved sheet uniformity cuts forming rejects by 60%. Such results make an impressive return on investment.

In other industries, including rubber and textiles, AccuRay can transfer its comprehensive knowledge of sensor, measurement, and information functions to reduce process variations, optimize production targets, raise product quality, and improve productivity.



Tetra Pak's® concept of packaging perishables in plastic coated papers for extended storage without refrigeration is shown here in a Tetra Brik. The quality demanded of the plastic coating on the paper is assured by AccuRay systems.

® Registered trademark of Tetra Pak International AB, Lund, Sweden, manufacturers of machines and packaging materials used for the distribution of liquid foods.

- A. AccuRay systems on PAPER machines are measuring, controlling, and reporting on over 60 million tons per year.
- B. Twelve million tons per year of PULP are controlled by AccuRay systems.
- C. AccuRay systems are controlling over 1.3 trillion CIGARETTES per year.
- D. On METALS rolling mills, over 60 million tons per year are monitored by AccuRay systems.
- E. In CARPET mills, AccuRay systems are used in the manufacture of 74 million square yards per year.
- F. AccuRay systems in PLASTICS extrusion operations improve the uniformity of over 3.6 billion pounds per year.

AccuRay systems report their findings.



Measuring and controlling manufacturing processes are only part of the functions of an effective process management system. The information the system acquires should be quickly and intelligently available on the production floor for immediate decisions by operators and supervisors.

AccuRay information systems "close the loop" four different ways: (1) completely automatically; (2) automatically but with provision for operator adjustment to correct variables such as the basis weight target; (3) at the management and supervisory level through review of hard-copy reports allowing you to make timely, cost-effective decisions; and (4) through process engineering with analytical reports of product and process parameters.

All of this information becomes uniquely important when you consider that no two mills and probably no two machines are run exactly alike. Each has its own information requirements for effective manual and management opti-



The systems also report data via digital display modules to keep operators constantly informed. This module, on a 7000 MICRO, can report 64 different key statistics in alphanumeric format.

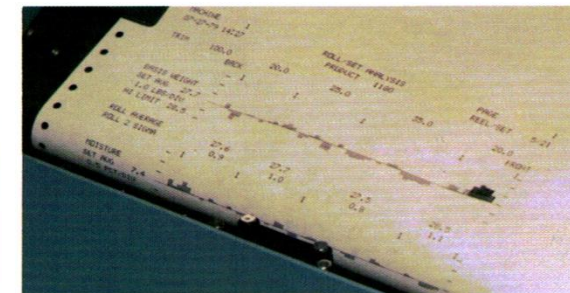
mization. In addition, tomorrow's information requirements will be different from today's, and AccuRay has designed in flexibility to let you modify displays and reports easily and on-line.

Also, the systems information

can become a part of a plant-wide management information system. AccuRay computer-based systems are built with an intelligent communications port to connect them to host computers.



For management, AccuRay systems have the ability to report to a host computer that can build a data base of information from all over the plant to anywhere in the corporation.



Within the mill, data can be assembled and printed in reports at the end of the reel, grade, shift, or day in concise, easy-to-read formats.

AccuRay systems report data to your operators in terminology they can understand, and in a way that allows them to make judgments confidently.

AccuRay's controls make the adjustments that make the difference.



A primary function of any process management system is control. That is, the response the system makes to the measured and computed data to adjust manufacturing parameters for maximum product quality and productivity. That's where AccuRay controls make the adjustments that make the difference.

A good example is the Automatic Target Management control in the 7000 MICRO. While other controls within the system respond with unusually high precision to improve weight uniformity in the cigarette rods, ATM automatically maximizes yield while preserving product quality.

In tissue, paper and board mills, the AccuRay 1180 MICRO has a wide variety of controls. Product controls, such as basis weight, moisture and ash controls keep the paper on target. Machine controls, such as headbox, multi-forming and crepe controls assure smooth and consistent machine

operation. Optimizing controls, such as Automatic Target Management and speed optimization controls provide continuous assurance that economic benefits are maximized.

In the AccuRay/Kamyr™ system control of Kamyr digesters, the Production Rate Change control coordinates all the process level controls in

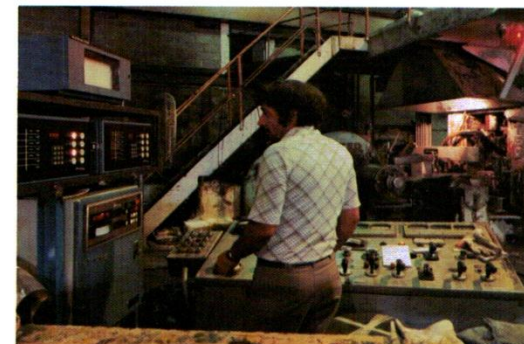
the system to change the rate of production without affecting pulp yield. And the system delivers yield increases up to 3%, with chip savings of up to 5%.

It can truly be said that AccuRay process controls are programmed to make the adjustments that make the difference.

Kamyr is a trademark of Kamyr AB of Karlstad, Sweden, and Kamyr, Inc., of Glens Falls, NY.

PROCESS SUMMARY					
08-17-79 11:50		PRESENT PRODUCT 1180		NEW PRODUCT 1181	
		PRESENT STANDARD	PRESENT TARGET	ACTUAL	NEW TARGET
BASIS WEIGHT	LBS	27.5	27.4	27.3	37.5
MOISTURE	PCT	5.3	5.5	5.5	4.1
BONE DRY WT	LBS	25.9	25.9	25.8	36.8
RUSH/DRAW 1	J/M	0.900	0.872	0.872	0.900
MACHINE SPEED	FT/MIN	1525.0	1513.6	1513.6	1500.7

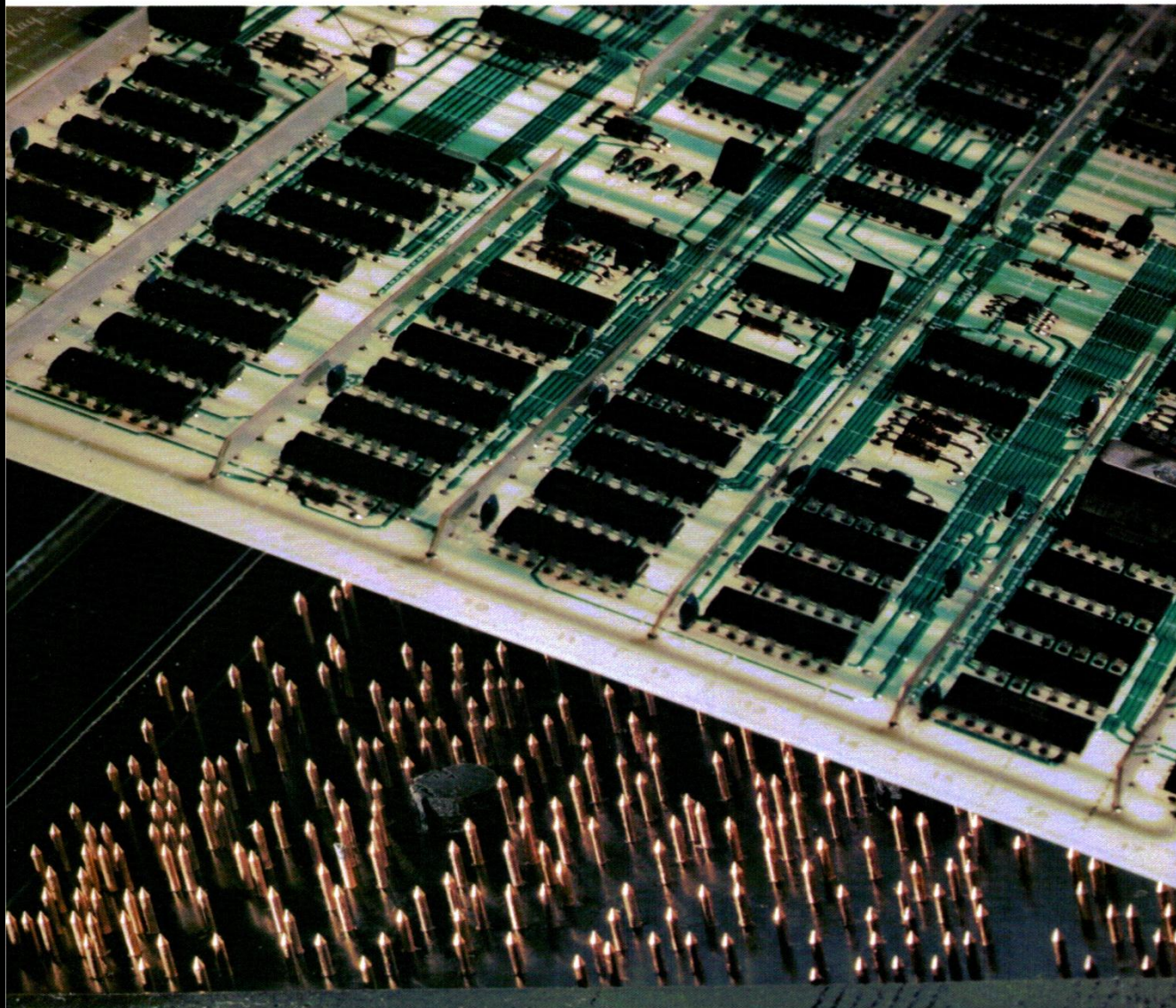
The 1180 MICRO's Automatic Grade Change program simplifies the change from one grade to another on paper machines and results in a 40 to 70% reduction in grade change losses.



Automatic control response to sensor data in the 500 MICRO reduces metal rolling coil-to-coil thickness variations 70-85% to increase the product yield 0.5-1.0%.

The advanced control features of the 7000 MICRO provide improved product uniformity and process yield in cigarette manufacturing.

Demanding standards? We build our circuit boards to performance levels 13% higher than the industry's.



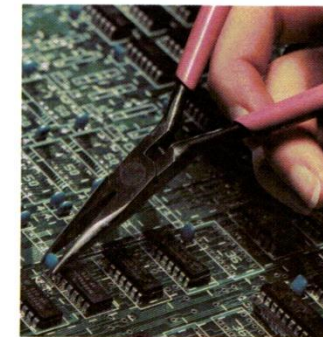
Over \$3 million invested in testing and manufacturing computers is the AccuRay way of assuring customers they will get the most dependable lifetime performance from AccuRay systems.

The "bed of nails" is a good example. Every printed circuit board must pass this comprehensive circuitry test before it can be assembled into a subsystem.

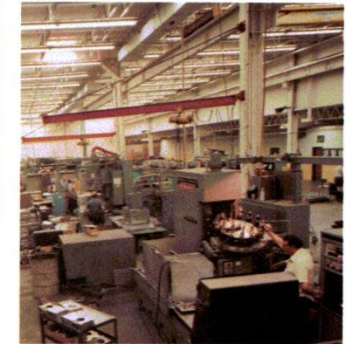
Then, each subsystem must pass circuitry and performance tests before they are ready to go into the complete system. When the system is completed, it too is run through a performance test that simulates field use on a paper machine, rolling mill, digester, or cigarette machine.

AccuRay testing technology helps AccuRay meet circuit board standards that are 13% above those of the printed circuit board industry. That kind of quality

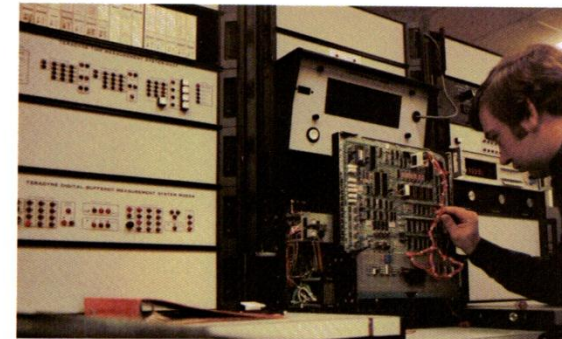
philosophy goes into testing everything from the most minute component to the complete system configured to each customer's requirements. It is AccuRay's assurance of building systems tougher than the machines they control.



AccuRay circuit boards are designed and assembled at AccuRay. This gives AccuRay total control over quality standards.



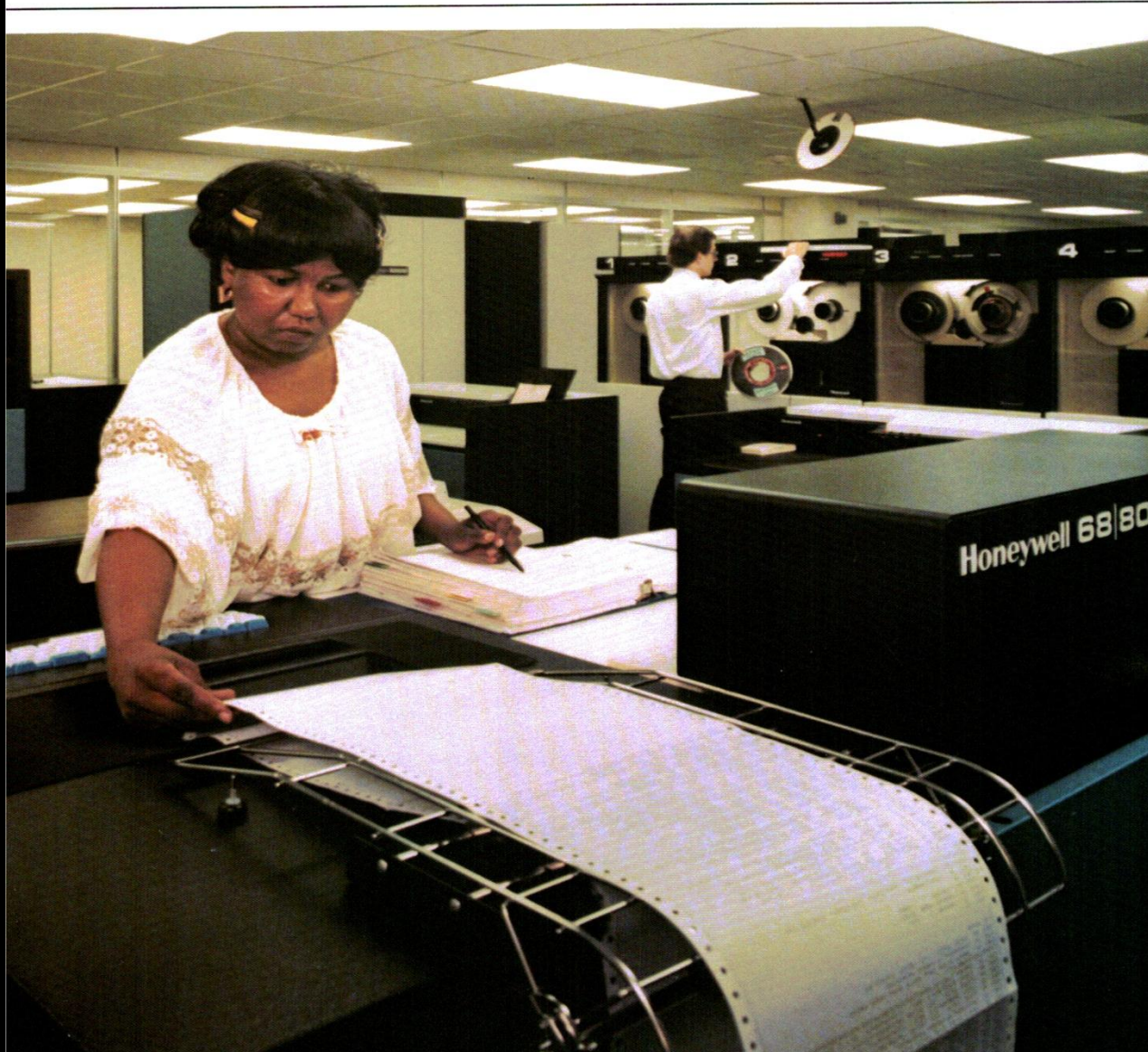
AccuRay manufactures most of the hardware parts that are unique to process management systems.



All possible functions of AccuRay printed circuit boards are tested by computers before being put into systems. Over 30,000 functional tests are made on some boards, each in less than three minutes...a level of quality control impossible through manual testing methods.

This "bed of nails" is a circuit tester for all printed circuit boards at AccuRay. And every board must pass the test before it qualifies for further assembly into a system.

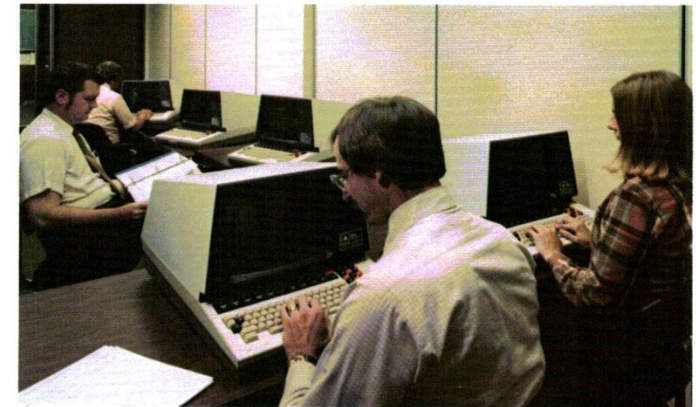
One of the reasons AccuRay's software is so good is because one of the world's best computers helps write it.



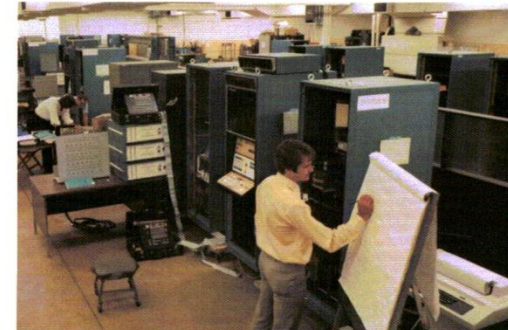
At AccuRay, people think of our software production procedures as a software factory. At the heart of the software factory is Multics which stores over a thousand software modules and the techniques to link them together in the unique configuration for each customer.

Because of Multics and the software factory techniques, we can build the most powerful software available easier and faster than ever before.

In addition to software production, Multics is used as a highly efficient software development center. It reduces software development time and effort to as little as one-fourth that previously required. Previously, in developing software, a programmer would have to work with punched cards and printed listings. Now, he can use an interactive video terminal to develop new programs. Multics compiles the program, presents the results on the video screen, and has the techniques in the computer for debugging.



Programmers communicate with Multics via interactive terminals to assemble the modules of each individually configured system.



Every software program is tested in a system. Only after this test will the software be sent to the user.

Multics is one of the most powerful engineering computers available. It is loaded with system software modules and the techniques to put them together efficiently.

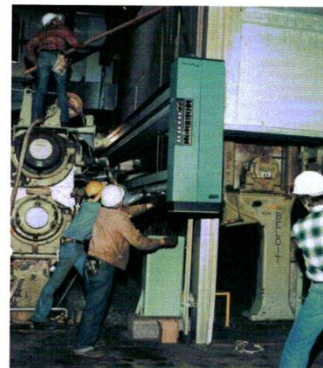
With AccuRay, you can choose between the two best kinds of service: yours or ours.



"Cost effective uptime" is AccuRay's philosophy toward service. It begins with system design and manufacture where hardware and software are designed and built for high reliability and ease of repair. Everything is dedicated to maximizing uptime and minimizing downtime.

"Uptime" first refers to the time it takes to install a system. Here, AccuRay installation specialists work with you in the planning and execution of the installation, process tuning, control tuning, and operator training. Everything is aimed at getting the system installed and operating smoothly in a minimum amount of time.

After installation, we can provide AccuRay service at a level of support that matches your needs. If you prefer, you can use your own service people, having them trained at AccuRay. And they will be backed by AccuRay service engineers when you need them.



Installation specialists can get an AccuRay system on-line in a matter of days... sometimes, hours.

Supporting every service engineer, yours and ours, is the finest replacement parts operation in the industry. AccuRay innovated the Optimum Replacement Unit (ORU) concept for easy, simple, and efficient parts replacement. AccuRay Speed Air Service assures almost instantaneous parts shipments from a worldwide network of regional air terminals.

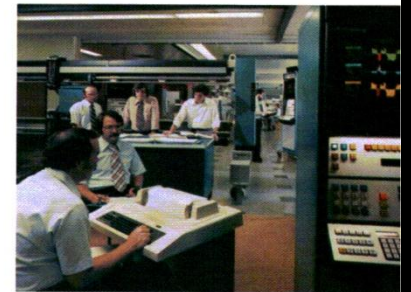
The best documentation in the industry.



With every AccuRay system goes an extensive library of documentation that is unparalleled in the industry and tells how to get the most out of an AccuRay system now and in the years ahead.

Also supporting the entire service operation is the most comprehensive documentation program in the industry, the most completely equipped training facilities, and a corps of specialists in applications, computer hardware, and software.

Service is as important as product at AccuRay. It is your assurance, and ours, that you will get the results you expect from your AccuRay process management system throughout its lifetime.



The AccuRay training laboratory has over \$3.5 million in AccuRay equipment from the very earliest vintage to the very latest.

You can have your own service technicians. At AccuRay, we train them, and our own service technicians, in the most comprehensive training school in our industry.

Tomorrow's efficiencies are available today.

In management councils all over the world, mill-wide process management systems are being recognized as the systems of the future. Whether they are called networks or hierarchies or host computer links, they are being recognized universally as a vital key to tomorrow's efficiencies and profitability.

And they are available from AccuRay right now.

From our experience in 36 plant-wide computer installations we have gained working knowledge of the needs of production management for the right information at the right place at the right time.

As the technology of our

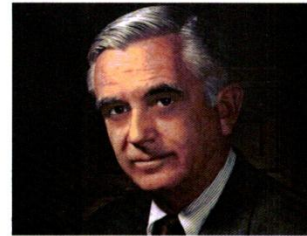
systems is shaped, we take care to make communications between systems easy. For example, within an AccuRay paper machine control system, the various distributed intelligence modules communicate on an intelligent serial data link. The result? AccuRay computer process control power where it's needed, easily interconnected; e.g. a programmable micro-computer module in the stock preparation area and an intelligent printer/plotter in the Quality Assurance office. One large AccuRay system manages eight data bases in one smoothly functioning system.

The minicomputer used in AccuRay systems, the Honeywell Level 6, was itself designed to fit into modern computer networks, and AccuRay is fully utilizing that capability. Our customers can establish two-way communications from AccuRay process management systems directly to their own computers and networks. This can range all the way from communications with large corporate business computers to links with local instrument bus systems.

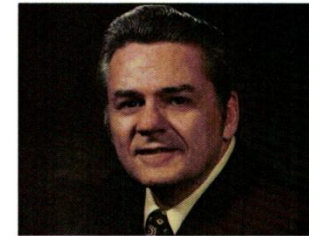
As needs for factory-wide and mill-wide information and management continue to evolve and increase, AccuRay's technology leadership will provide the means to tie unit processes together. Our objective remains to convert performance data into information that leads to more effective business decisions, because our business is making your business better.



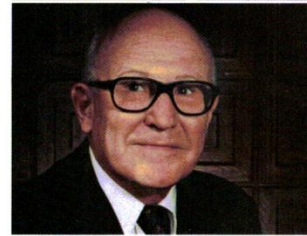
AccuRay Directors.



Edward McC. Blair (1951)
Senior Partner
William Blair & Co.
(Investment Banking)



Christopher J. Campbell (1975)
Executive Vice President
AccuRay Corporation



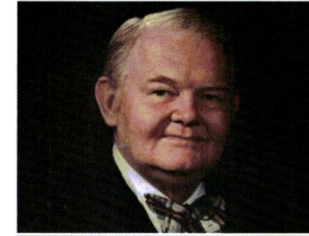
Gordon B. Carson (1959)
Assistant to Chancellor
Northwood Institute (College)



H. Roy Chope (1950)
Executive Vice President
AccuRay Corporation



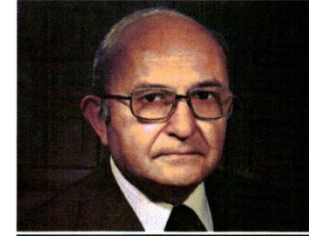
John Eckler (1959)
Managing Partner
Bricker & Eckler
(Attorneys at Law)



Thomas F. Jones (1975)
Vice President For Research
Massachusetts Institute of
Technology



David L. Nelson (1967)
President
AccuRay Corporation



George F. Schlaudecker (1975)
Consultant



Robert E. Swenson (1959)
Vice President and Treasurer
AccuRay Corporation



George B. Young (1955)
Director
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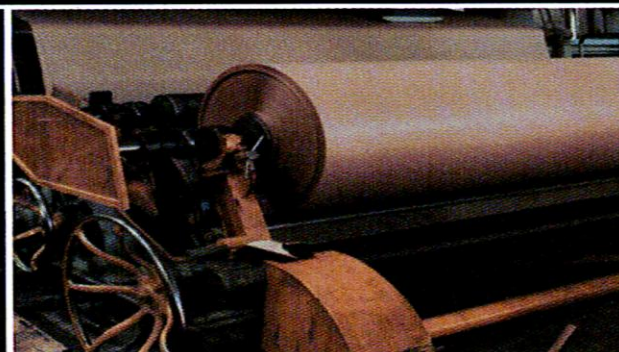
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PROCESS SUMMARY			
PRESENT PRODUCT 1180			
	PRESENT	PRESEN	
	STANDARD	TARGE	
SIS WEIGHT	LBS 27.5	27.	
ISTURE	PCT 5.3	5.	
NE DRY WT	LBS 25.9	25.	
SH/DRAG 1	J/W 0.900	0.87	
CHINE SPEED	FT/MIN 1525.0	1513	

