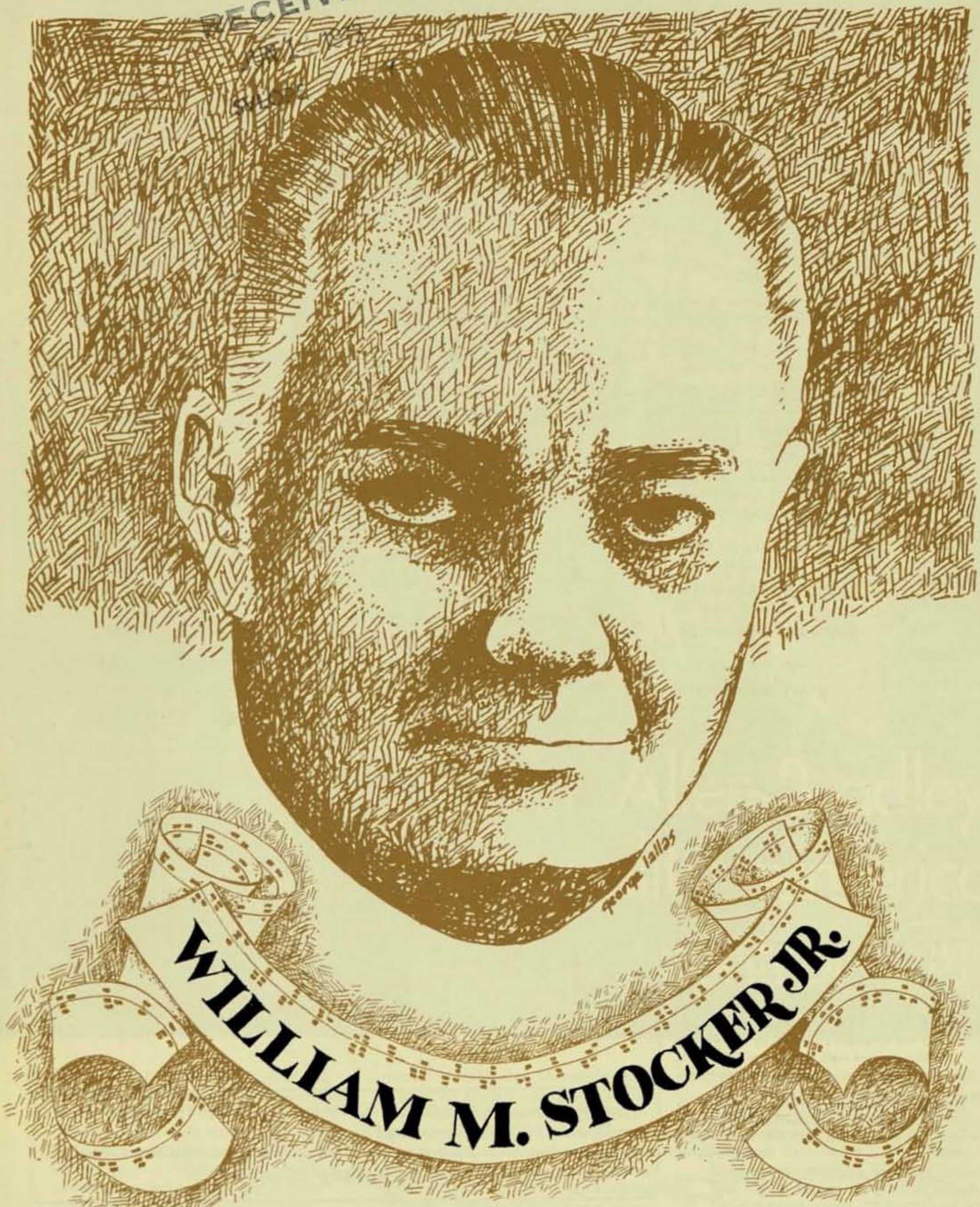
NC SCENE

June 1973



Founder of NCS, 1963—Jacquard Winner, 1973

Official Publication of the
Numerical Control Society

NCS Headquarters Office:
P.O. Box 138
Spring Lake, New Jersey 07762
201-449-1400

Editorial and Advertising Office:
P. O. Box 26
Concord, New Hampshire 03301
603-225-2631

The NC SCENE is published monthly by the NUMERICAL CONTROL SOCIETY. Art direction and editorial production by EDITORIAL SERVICES. Printed by THE VILLAGE PRESS. Statements of facts and opinions are those of the authors alone and do not necessarily reflect the views of the NCS executive staff, officers and directors, or membership.

Subscription rates for non-members are $12 a year U.S. and Canada and $15 a year overseas seamail. Overseas airmail is $10 additional.

NC SCENE

June 1973

CONTENTS

3 **NC PANORAMA: Those Illusive Intangibles, by James J. Childs, Contributing Editor**

Can—and should—economic analysis include the assessment of intangibles?

3 **NCS News**

New Board is Elected; 1973 Award Winners.

5 **NC/CAM—Profits for the 70s, by Carl Natoni**

A special report on the 1973 NCS conference.

6 **A History of NCS, by William M. Stocker, Jr.**

The Society's first decade, from conception to the 1973 "10th anniversary."

9 **Automation Technology, by Ruth M. Davis**

Just what is it—and how important is it? A straightforward, candid appraisal, with some important conclusions.

DIRECTORY

Advertisers: Allen-Bradley 1; Computer Machining Technology 2; De Vlieg 4; United Computing 12

Cover: Design and illustration by George Lallas.

Are you concerned that your NC system will become obsolete before you can write it off? Meet our System 7300 soft wired controller. Software replaces hard wiring. It keeps pace with changing needs and advancing technology by simple reprogramming. Adapts to any machine tool. Can be retrofitted, too. A built-in mini computer handles functions like servo loops, interpolation and machine sequencing. Use the 7300 for individual machine control, or link it to your general computer for factory-wide automation. System 7300 is part of our new generation in numerical control. Allen-Bradley quality throughout, backed with the most extensive pre-shipment testing in the industry. Request Brochure 7300. Allen-Bradley Numerical Control Division, 747 Alpha Drive, Highland Heights, Ohio 44143. (area 216) 449-6700.

NC73-4

is your... NUMERICAL CONTROL production running at a snail's pace?

The reason may be that the "heart" of your numerical control system, tape preparation, is holding up production. Tape not ready when you are; tapes that have to be reworked to properly conform to blueprints. Now *you* can cut costs with CMT's self-contained TAPE CENTER. No time sharing, terminals, special hookups or costly retraining that can cut into your competitive edge.

To find out more about how *you* can control the cost and time of your Numerical Control processing, write today for the TAPE CENTER Brochure or call Mr. Steve Moss, 201-748-7002 collect.

You can not afford not to!

cmt

Computer Machining Technology
5 Lawrence Street Dept. B-2
Bloomfield, New Jersey 07003

☐ Send me your N/C TAPE CENTER BROCHURE.

☐ Send the N/C MASTER PLAN.

Name ____________________ Title ____________

Company ______________________________

Address ______________________________

City ______________ State __________ Zip ______

NC PANORAMA

THOSE ILLUSIVE INTANGIBLES

JAMES J. CHILDS
Contributing Editor

It has been almost twenty-five years since the Machinery and Allied Products Institute released its first major work on business investments policy: **Dynamic Equipment Policy.** With a number of subsequent modifications and additions, this has evolved into what is known as the MAPI "formula." The approach is reasonably straightforward and highly considerate of company dollars by proposing a detailed comparison of the amount of the investment against a listing of numerous savings. The total yearly savings are then compared with the investment which results in either a return, or loss, on the investment. Presumably a good enough return is a green light and a loss, or insufficient return, results in a STOP sign DETOUR, or simply DEAD END. Obviously, this is an over-simplification and a good deal more is involved.[1]

The essence of the MAPI analysis evolves around the concept of dollar accountability for the ingredients of a manufacturing operation. And as close as is possible, this is as it should be, for if a company management must decide whether to *spend* money, it is reasonable to expect more than a corresponding monetary return.

NC critics of the direct MAPI dollar comparison argue that the approach falls short since there are numerous intangible benefits offered by NC. These include better accuracy and repeatability, shorter flow time, better management control, and a requirement for less skilled operators. Viewed by the MAPI analyst, these benefits are almost impossible to hang a dollar sign on. Better accuracy is great—providing it is required. And if it is, there is little argument and economic comparisons are academic. Improved repeatability, an NC forte, is more readily assessed when parts are assembled rather than when machined. The effect of shorter flow periods and improved deliveries may create smiling customers, but how do you quantify a smile? Better management control implies a deficiency and, unreal as it may appear, some managements are reluctant to admit, no less propose, that their performance can be improved.

When economics can be assessed, such as with labor and material savings, the MAPI or other direct economic analysis are in order. Also , if it is at all possible and reasonable to assess seemingly intangibles, every effort should be made to do so. For example, shorter flow time, in addition to creating smiling faces, *may* be internally assessed via greater machine tool use. Savings on the assembly line, due to more accurate parts, may be pinpointed and evaluated under certain conditions.

The general requirement for less skilled operators, while not universal, may prove to be the single most contributing factor in favor in NC acquisition since the ranks of the skilled machinist are conspicuously thinning. When this reality hits a company there is no *need* for an economic analysis. There will be but two choices: either buy the NC machine or wait—to declare bankruptcy. □

1. 367-page text published by the Machinery and Allied Products Institute, 1200 Eighteenth Street, N.W., Washington, D.C. 20036, expands on the subject.

NCS NEWS

1973-74 Board of Directors

Edward E. Miller, senior staff engineer, Corporate NC Applications, Western Electric, became the Society's tenth president, following the announcement of election results at the NCS Annual Business Meeting, April 16, in New York City. A member of NCS since 1963, he previously served five years on the national board of directors, and has been a dedicated, active participant in local and national affairs since the Society's formation.

Joining him in service on the national board for the 1973-74 term are: O. Jack Anderson, administrative vice president; Arthur H. Rice, technical vice president; Michael D. Sestric, Jr., secretary; Stokes F. Burtis, treasurer; Leon B. Musser, director; George Putnam, director; and Howard S. Abbott, director.

Immediate Past President Richard A. Thomas of General Electric in Waynesboro will also serve on the board during this new term. He leaves behind a record of accomplishment and outstanding service as president in 1972-73, having successfully guided the Society through dangerous and difficult economic times, making certain it held its own and even expanded in some areas. He and the other retiring officers from the past year—Peter Senkiw, Harold Baeverstad, Edward Schloss, Lawrence Levine, and G. Ray Gibson—have earned the gratitude and respect of the entire membership.

1973 Awards

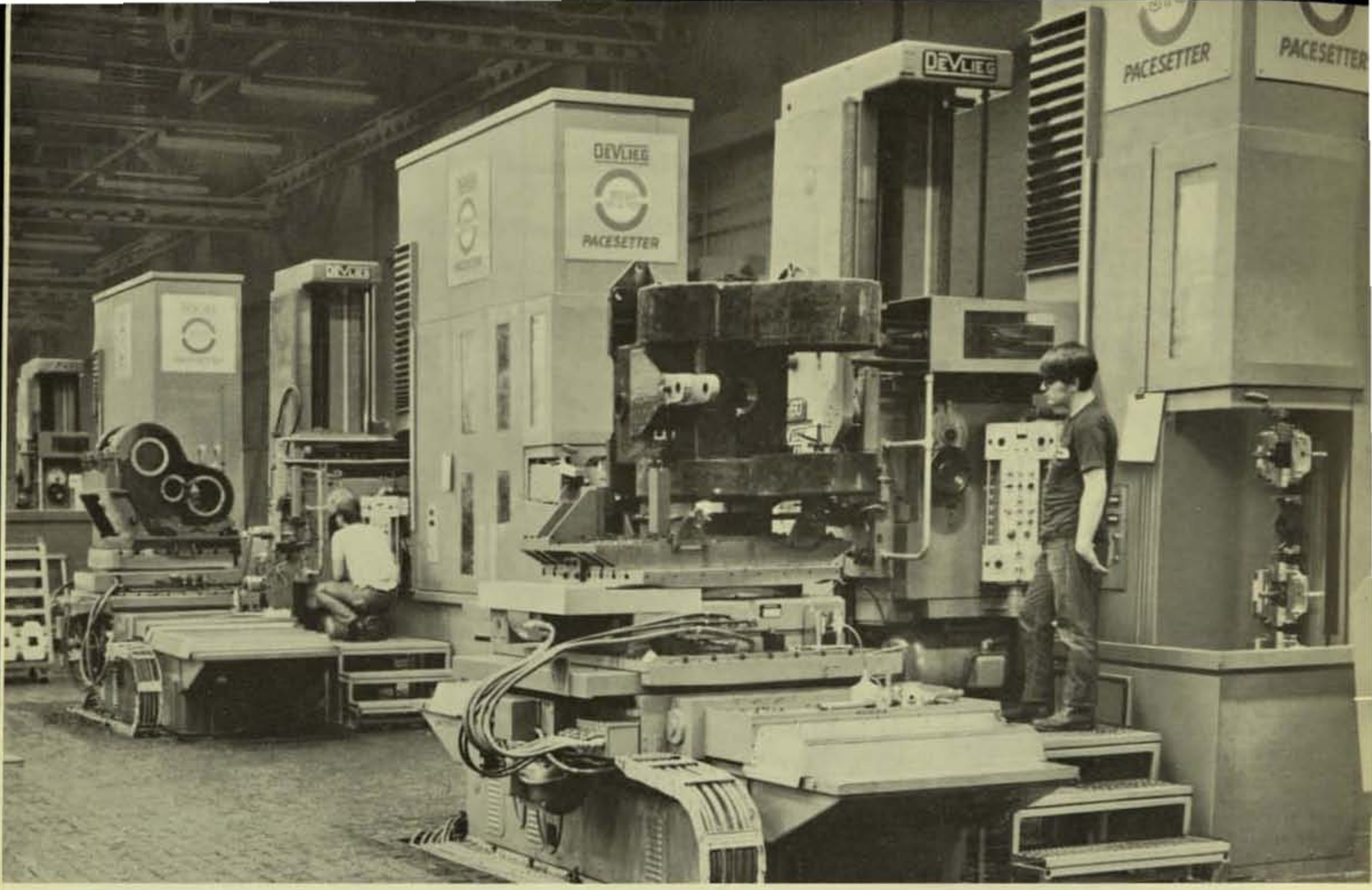
The 1973 "tenth anniversary" celebration at the April 17 banquet in New York City included several important NCS awards.

William M. Stocker, Jr., past president of NCS and director of *American Machinist's* Manufacturing Research Institute, received the Society's highest award, the **Joseph Marie Jacquard Memorial Award,** for his outstanding contribution to the field of numerical control. *See story, page 6.*

Named **NCS Man of the Year was Jack Williams** of the headquarters Army Materiel Command in Washington, D. C. He was honored for his distinguished service to the Society and his extensive contributions to its progress in the past year. Members know him well as a speaker, author, and active participant in chapter and national Society activities.

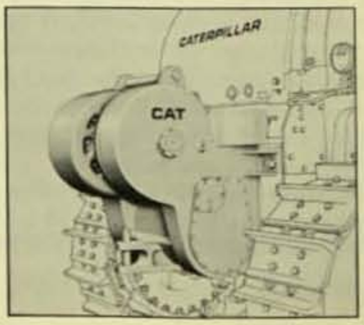
The **Xenex Award for Effective Presentation of a Conference Paper** went to Max N. Lofton of McDonnell Douglas Astronautics. His award-winning presentation was "Goal: Zero NC Tape Rework." A very close runner-up was Bob Chipman of General Radio who presented a paper on "Sheet-Metal Magic." Honorable mention went to Lois Hartheimer of Compusize and Surjit Randhava of IITRI.

Mary A. DeVries, NCS Editor and Publisher, received a **Resolution of Appreciation** for her contribution to the Society through active participation.



Extreme accuracy is held on all bore alignments to assure proper fit of the gear assemblies. More than 300 parts make up the internal mechanism.

Caterpillar powered controlled towing winches feature single lever control and variable line speeds.



NC/CAM

Profits for the 70s

By Carl Natoni

Numerical Control Society Tenth Annual Meeting & Technical Conference

"Let's really make numerical control deliver what it's supposed to." This was the general mood at the Tenth Annual Meeting and Technical Conference in New York City on April 16-18, 1973, where there was a dearth of momentous developments. Rather, there was a searching review of the past, with a candid eye cocked toward consolidating gains. Although the conference title featured CAM, the emphasis was on "gut level" numerical control.

Keynote speaker Robert B. Kurtz, vice president and group executive of General Electric, traced the growth of numerical control from 1955 through the development of hardware technology and software to the reality of DNC in 1970. Kurtz recognized that even though NC has freed man from his previous limits, created new design parameters, multiplied productive capability, and increased manufacturing control, the growth of NC has been less than phenomenal. (The next issue of the *NC SCENE* will feature the keynote address.)

Machine tool justification received an assist through the work of Lawrence C. Hackamack, business research coordinator at Northern Illinois University. His productivity criteria quotient (PCQ) enables a valuable comparison of machine tools to industry, to the state of the art, and to operating costs. Interestingly, his studies showed that a six-to-nine-year gap exists before the impact of an innovation is felt on the market.

A computer-controlled transfer line is the unusual application of NC by Kingsbury Machine Tool Corporation and Itek Corporation. This five-year, one-million-dollar effort was described by R.H. Eisengrein, manager of systems at Kingsbury, as an effort to create a more efficient manufacturing system for small-lot production. Explained Eisengrein: "More than 75 per cent (of all parts manufactured) are produced in small lots or batches. . . The short run transfer line is not a dream anymore—it's just a matter of demand and availability of money."

In talking about computer resources, the utility approach to time-shared tape preparation, Joseph R. Domonkos, marketing specialist, manufacturing, at General Electric Company, observed: "If we purchased steel as we purchase computers we'd all be out in the streets." Referring to the computer utility he contended that big is not bad if it can deliver a product at a cost attractive to users. Even though it has been very difficult to assess the costs of the programming function, he predicted, "You *will* have to spend money for computers in the future."

Xenex award winner for the best presentation of a paper, "Goal: Zero NC Tape Rework," was Max Lofton, branch manager, Numerical Sciences, McDonnell Douglas Astronautics Company. Lofton produced a flurry of knowing chuckles when he said: "The only thing about numerical control which can be guaranteed is that you will *not* receive any guarantees with any parts program."

Lofton noted that the national average for tape reworking is three times, but suspects it is probably closer to five. However, by using more common sense than money or technologic art, McDonnell Douglas has reduced tape rework to an average of .8 per sold tape.

"South Africa is poised for a leap into the local and world industrial market," proudly stated Keith R. McCusker, Technical Services Department of the South African Council for Scientific and Industrial Research (CSIR). Of particular interest was McCusker's observation that South Africa is one of the few countries in the world that has opened its doors to NC manufacturers from any country.

Decrying the rampant confusion and lack of standardization that typifies NC today, John C. Williams, manufacturing technology manager, Headquarters Army Materiel Command, and winner of the NCS Man of the Year Award, sounded a note of warning. He called attention to the proliferation of machine languages, the complete anarchy in post processors, the blatant disregard by quality control of numerical control implications—all which create serious misgivings about a technology that promised so much but has accomplished so little after 20 years.

Williams quoted Department of Commerce statistics for the third and fourth quarters of 1971, showing that only one out of every 100 machine tools sold was NC—which is another way of saying how slow NC progress has been.

A bound book of conference proceedings will be mailed this summer to each NCS member in good standing as of April 1, 1973. Additional copies are available from NCS, P. O. Box 138, Spring Lake, N. J. 07762. □

CONFERENCE HOSTS

New York Metropolitan Chapter in cooperation with NYCCC Student Chapter, Connecticut Valley and New Jersey Chapters

Louis Capasso, Conference Chairman
Howard Abbott, National Coordinator
George Putnam, Technical Program
Robert Hatschek, Technical Program Coord.
Robert Kraus, Workshops and Panels
Peter Budzilovich, Publicity
William Stocker, Historian
Art Sloan, NY Chapter Coord.
Murray Dwight, Banquet & N. J. Ch. Coord.
Frank Schings, Equipment
Tom Landis, Hospitality Suites
William Rynack, Literature Display
George Pranspill, Connecticut Valley Ch. Coord.
Edward Chow, Student Chapter Coord.
Gene Williams, Plant Tours
Anne Pranspill, Ladies Program
Harry Randall, Celebratory Events
Vincent Thomas, Citations & Attendance
Kenneth Thomas, Professional Development

The First Decade
A HISTORY OF NCS

By William M. Stocker, Jr.

Tell the story of creation in 30 minutes—that's what they asked me to do! For me, in a way, it all started in the early days of World War II. I was a "spares expediter." They told me I had a persuasive manner and my job was to talk tough, cranky line-foremen into tearing down elaborate production set ups to make 12 spare parts, then set up again for production. That job was at Wright Aeronautical when the pressure really was on. It's a wonder I don't have a permanent crankshaft protruding from my skull. I always believed there had to be a better way to produce short runs.

Then in 1954 when, as an editor, **American Machinist** sent me to the summer course in NC at M.I.T., suddenly the light bulb flashed. I saw that better way. And it really turned me on! My mind raced with the opportunities it opened—and yet I foresaw only the tip of the iceberg.

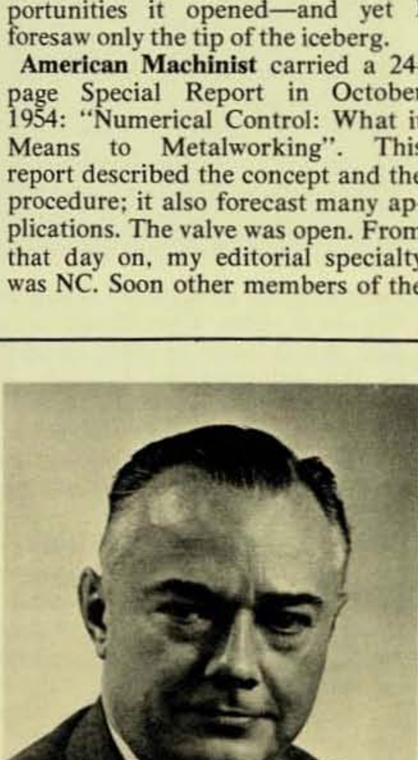
American Machinist carried a 24-page Special Report in October 1954: "Numerical Control: What it Means to Metalworking". This report described the concept and the procedure; it also forecast many applications. The valve was open. From that day on, my editorial specialty was NC. Soon other members of the editorial staff were working on NC articles too; by the 1960 Machine Tool Show, **American Machinist** had carried several hundred pages.

That show opened the first flood gates—that show plus Fred Hill's signature on $150 million of U.S. Air Force money for 125 "elephant" NC machines. From 1954 until 1960 fewer that 1,000 NC machines were in use. By 1963 over 3,000 NC machines had been installed across the nation, and Europe was starting to put its toe in the water too.

And what had started as a sophisticated method for continuous-path control of skin and

---

WILLIAM M. STOCKER, JR.



The 1973 Joseph Marie Jacquard Memorial Award went to William M. Stocker, Jr., director of American Machinist's Manufacturing Research Institute, on April 17 at the Society's conference banquet in New York City. Bill was the fourth president of NCS, the Society's principal creator and founder, and the first man to recognize the potential of NC and report on it editorially. In the world of numerical control and the Numerical Control Society, he occupies a position of exceptional esteem. The tremendous value of his contributions and his neverending dedication to NC and the Society are only in part measured by the Society's highest award. On the night that Bill was honored with this important award, there was an unprecedented display of the widespread respect and affection held for him: words and music especially arranged and written by George Pranspill were passed around to members and guests, all joining in a musical tribute to their "illustrious founder". It was a beautiful and rare moment, almost as great and memorable as the man who inspired it.

I always believed there had to be a better way to produce short runs. Then in 1954 when, as an editor, AMERICAN MACHINIST sent me to the summer course in NC at M.I.T., suddenly the light bulb flashed. I saw that better way.

spar mills now was proving practical for simple point-to-point operations. The fundamental characteristics of the basic concept were dawning on manufacturing engineers and on machine tool designers. NC was a way to overcome the obstacles of mechanical measurement and control.

Only a few years earlier the chief engineer of one major machine tool company wrote my boss a complaint. He said he had been reading **American Machinist** for many years and now the magazine was slipping, obviously, anyone who said an electronic gadget like that was a practical way to run a machine tool had never spent any time in a shop!

Burnham Finney was editor then; he called me into his office and asked only one question: "Bill, are you sure you are right?" I replied that I just could not see how NC and the results it gave might be anything but a major development. Burnham told me to keep writing about it.

In February 1962 I was invited to give a talk at an IBM Customer Executive Seminar. Several weeks later, Pete Prohaska, one of the students, asked me whether **American Machinist** would consider starting a numerical control society. Coincidentally, several people from companies in the NC business had suggested the same thing. (You see, a publication enjoys a position of neutrality under the law.) We had discussed the need for an organization of NC enthusiasts for several years; however, in our opinion the timing and momentum had not been quite right. Now, Pete's request changed the picture. We agreed not to start a society but to invite a group to meet and to decide whether a unique NC society was needed. First, we formed a four-man committee: Pete Prohaska, Harry Randall, Ed O'Brien, and myself.

Invitations were sent to about 130 people—users and suppliers of NC equipment plus government and other interested technical societies such as SME, SAE, and ASME. On June 14 and 15, 1962, some 85 people attended a meeting in New York. The first day of the meeting was a wrangle of pros and cons. As we left that evening it seemed as though the whole idea was dead. Next morning we were astounded to see, right from the start, a concerted, cooperative drive to form a Numerical Control Society—and call it just that.

A slate of initial officers and directors was nominated and the first Board quickly elected. On February 5, 1963 the Numerical Control Society was incorporated. David N. Smith was the first president. Here are the names of the other incorporators: Edward E. Kirkham, Carl W. Haydl, Edward W. Panfil, Harry B. Randall, Jr., William M. Stocker, Jr., William J. Peters, Robert E. McKee, Clair L. Farrand, Jr., Steven I. Burack.

In the spring of 1963 NCS held its first national meeting. It was called the "Charter Meeting" and attracted not only a good audience but many new members. From the beginning, despite inflation, the dues have been $25 per year.

One of our early organization steps was to appoint Jerry Singleton, of Association Associates, executive secretary. Our first official mailing address was 122 E. 42nd Street, New York City.

From a different sector of the economy, the investment business, one of the early enrollees in NCS was Bob DeVries. Bob gave us a business-like basis for record-keeping, especially budgets and accounting. The Society was growing. We realized that we needed more day to day administration so Ed Kirkham and I invited applicants for the job. Then Bob DeVries made his greatest contribution to the NCS—he introduced us to his sister, Mary Ann.

continued next page

HISTORY continued

Mary Ann asked us to gamble on her. She had had some association and seminar experience but her field was creative writing. As part of our agreement, we set up NCS headquarters at 44 Nassau Street, Princeton, New Jersey.

Back in 1964, at the first NCS—AM Management Conference, I described the first 10 years of NC as the "Decade of Decision." It was in fact, a decade of experimentation and selection for both the suppliers of equipment and for their customers. To an editor it seemed that everyday someone was announcing a new, and better, tape format—magnetic tape, colored dots, lines, 7-in. tape, player-piano rolls, and so many others.

Then there were all of the varieties of control systems—electronic, of course, but also mechanical, pneumatic, hydraulic, and variations of each.

establish standards. Other organizations such as EIA were better suited to that task. Nevertheless, NCS and its individual members had key roles in the rate and degree of standardization.

Recognizing that some level of standardization was needed, we also wanted to avoid standards that would restrict further development. I vividly remember our efforts to keep EIA tape standards, and the telegram telling us that ASCII had been selected as the standard. After all, some 5000 machine tools were programmed for EIA. NCs was in the forefront in seeking a joint standard. Today we can use either—and some equipment can be switched to accept the input available to it.

Increasingly, NCS has become the spokesman for NC activity. In both the 1970 and 1972 Machine Tool Shows, the 1972 Show being the first international show in the United States, the National Machine Tool Builders' Association provided space

Look around you. Nowhere else in the world can you see such a concentration of numerical control expertise. And yet this group still is only a nucleus, a cadre, for what is to come.

The fifties did hold an exciting spirit of adventure. There was great enthusiasm for all of the new technical developments—and manufacturing had a generous share. While NC was the most dramatic, EDM, ECM, high-speed machining, high-energy rate forming, and a variety of other innovations also were attracting attention. It was an era of of innovation. It also was a time of terrible burdens for scientifically unsophisticated manufacturing. The blue sky was dazzling, but the earthy problems of getting out products were no less diminished.

And so we entered the second decade NC. In many ways, the development of the Numerical Control Society identifies closely with the patterns of the period. Now we were in a decade of synthesis. From analysis, experimentation, and some confusion, the manufacturing industries were beginning to standardize and consolidate what they thought they knew. The last 10 years or so have been given largely to education, to putting it all together.

For numerical control, this Society has played an increasingly important role in teaching both the concepts and the implementation. By agreement, the NCS would not to NCS for an NC Information Center. More and more frequently, people in the various departments of government are turning to NCS for advice, as well as for recommendations of people having unique talents in NC. Last year NCS, in cooperation with the U.S. Department of International Commerce, conducted a conference on automation in Paris. Currently, NCS is administering a funded study on the standardization of language.

It was Mary Ann DeVries who recommended her own successor. She felt that she wanted to devote more time to her writing and publishing career and she suggested that we interview Bill White, to take over NCS administrative responsibilities. Bill was hired as executive director in 1969. In addition to keeping the organization solvent during a brutal recession, Bill has put a great deal of time into promoting NCS as well as to improving government relations.

Starting several years ago, Bill White has been on a special campaign to foster better, more cooperative relations with other technical and management societies. Results on behalf on the other societies have not been too impressive yet, but the important thing is recognition of the need. Cooperative interchanges of information will, in fact must, happen.

Look around you. Nowhere else in the world can you see such a concentration of numerical control expertise. And yet this group still is only a nucleus, a cadre, for what is to come. Forgive the cliche, but it is true that what is past is prologue.

How will we label the next decade? I believe we will once again climb the heights of innovation. However, creativity will take a different form than in the fifties. Ahead of us I see a "decade of application," of integration of concepts, of hardware and software, to meet the range of needs facing both the U.S. and the world. We will have standards to make learning, equipment design, and application practical. On the other hand, improved interfacing and adaptability will keep the standards from restricting development. NCS has a key role in interpreting needs.

NCS is, essentially, a technical society. Certainly technique is vital to application and it must be a primary function of the Society. However, practically every NCS meeting has included the social and economic considerations with the technical. Labor, management, and government have been encouraged to contribute their point of view. It is important that this interchange continue and, if possible, expand.

Numerical control is not simply a technology. It is a fundamental philosophy. Just as adding a single NC machine to a shop can affect the entire organization and operation of a plant, increasing use of NC, then CNC and, ultimately, widespread application of DNC systems will affect domestic and world economy. It also will affect the way people live and work.

As the planners and doers behind this philosophy, the NCS members must have information which will guide them in the total consideration of problems.

The decade ahead ends on the brink of 1984. In your hands is a considerable part of the decision. The Orwellian concept can happen. But so can an era of tremendous achievement and prosperity for all. □

The above is excerpted from a luncheon address by Bill Stocker on April 17, 1973 at the NCS 10th "anniversary" Annual Meeting and Technical Conference.

AUTOMATION TECHNOLOGY What Does it REALLY Mean?

By Ruth M. Davis

Automation technology, as any other technology, is a process that is not well-understood. In one very useful separation of the technology process there are three phases: invention, innovation, and diffusion.

Invention is the creative process that depends ultimately on the individual and cannot be dictated on demand. The environment provided to the inventor is probably the single most important factor to which government can contribute; the environment that should be provided is one that will allow a creative individual to bring his ideas to fruition.

It is in the second two processes of technology, namely, innovation and diffusion, where government and management can exert the greatest influence. Both the rate and the direction of innovation and diffusion can, to some extent, be directed. *Innovation* is the first introduction of an invention into successful practice; it is sometimes described synonymously as being the first new application of a technology. *Diffusion* is the successive and widespread imitation of successful innovation.

In most countries, and certainly in the United States, the least expertise is shown in the process of diffusion of a technology. But there is no peer to the United States' scientific genius in the area of invention. Also, the United States, both in industry and in government, has excelled in innovation, i.e., the kind in which an idea or a particular application of a technology is tried out in a localized and, usually, controlled environment.

The general result of such innovation is indeterminate. The enthusiasm or delight of the designers, and perhaps the first users of the system, is not matched generally by the responsible financial management. Also, even when there appears to be a widespread consensus that the innovation was a success, there has generally not been the necessary planning for its continuation.

Diffusion of technology, on the other hand, initiates with the assumption that there has been a successful application of technology to a particular service or to the production of a given product. The intent of diffusion is to take advantage of this improvement that has occurred as a result of technology and to spread this improvement and the application of the relevant technology as widely as possible within communities which can benefit.

Mechanisms for public policy are not equally applicable or useful in

continued next page

RUTH M. DAVIS

Author Davis, NBS, presented a candid and critcal examination of "automation technology" in an address to the NCS conference banquet audience on April 17 in New York City. The article appearing here is based upon selected excerpts from that address.

Dr. Davis, who recently established the Office of Developmental Automation and Control Technology, has received numerous awards and honors, including the Gold Medal, highest award of the Department of Commerce. She has received medals from the University of Helsinki and Karolinska Institutet for her work in Information Sciences and was named Systems Professional of the Year in 1972 by the Association for Systems Management.

AUTOMATION
continued

the three phases of the process we call technology. Consider, for example, the mechanism of standardization. The role of standards is minimal in both the processes of innovation and invention. The most successful timing for the introduction of standards is when the diffusion of a successful application of technology is about to commence. Standards introduced at a time much later than this usually become simply the adoption of defacto standards recognized and in being within industry. Such standards do not serve the customer well for services or products. Standards introduced before the suggested timing usually tend to stifle the development of technology and often constrain certain technologies in favor of other technologies. For example, development of standards for computer-numerical control (CNC) at this time could inhibit the development of this and alternative technologies which offer equivalent means for achieving the same improvement in productivity and product.

Although it seems apparent and obvious that standards are essential to any successful diffusion of technology, it is not so in practice. Very few people understand the dependency of successful diffusion on the existence of standards or equivalenty on the existence of consensus-derived agreements.

The role of the federal government, the Numerical Control Society, and the concerned industries in standardization in automation would appear to be highly directed towards those standards which would increase the rate and spread of the diffusion of successful automation technology. These types of standards include those for performance, for levels of service, for documentation of products and services, standards of definition, of procedures to be followed, and standards of measurement, accuracy, and calibration of the devices, sensors, and equipment used in the first successful application of technology.

We must look on this present rapidly changing national scenario with tolerance, compassion, and a desire to assist with our individual and collective talents.

Automation technology can be and should be the most important technology of this decade. Automation has the most potential of any technology for improving the quality, reducing the costs, and allowing for accountability to the public by the producers of the products and the services available today.

It is automation technology that has generated within industry the excitement manifested by the proposed slogan: *Bring industry back home with automation!*

It is automation technology that is beginning to arouse the hope that there can be meaning to the slogan: *Accountability of government to the public in providing public services is possible!*

It is automation technology that will allow consumers to believe the slogan: *Customized production at mass production prices is possible with automation!*

It is automation technology that should be making labor and management equally happy to espouse the slogan: *With automation no person will be asked to work in environments where the occupational hazard exceeds predetermined thresholds!*

And it is automation technology that will rally customers around the slogan: *We want the automation that will give us the service on our appliances we deserve and which is not provided by the appliance manufacturer!*

Consider just the first three of these slogan-like goals, one at a time. Industrial spokesmen and company representatives have articulated well the axiom: U.S. industry cannot compete with foreign industry in labor-intensive areas because of our higher labor costs. U.S. industry which uses a mix of automation and labor also cannot compete with foreign industry for the same reason.

U.S. industry which is "totally" automated using the same technology as foreign industry competes on an equal basis. U.S. industry which uses automation technology more advanced than that of foreign industries has an advantage. Using

Automation is a force today that must and can be judged on its own merits and in terms of its realizable goals. Automation technology can be and should be the most important technology of this decade.

Today, the most expeditious approach to the innovation and diffusion of customized production through computer control appears to be through the leadership of the Numerical Control Society and the affected trade associations.

advanced automation technology, we can bring back those industries we have lost such as the electronics parts, the watch, and the optical industries. Further, we will not continue to lose industries, and as experience has shown, automated industries spawn new industries. Thus labor, management, and stockholders alike will benefit.

Today, the public is demanding more and better public services. The public is also asking for more accountability by government to prove its proper behavior and motivation in supplying these public services. Such accountability requires increased record-keeping. Only computers and computer technology provide us the means for increased public services with increased accountability to the public.

Automation, especially computer-centered automation, makes it possible in the production of parts and goods to alter their design and characteristics without the changes in production-line equipment that require significant capital investment and long lead times. The numerical control tool technology is a superb example of this advantage of automation. It is now almost commonplace in the metalcutting industry.

Off shoots of numerical control technology should be spreading rapidly in such industries as the textile industry and the shoe industry. Some of us at NBS have been discussing the advantages of numerical control and computer-centered automation in many of the design industries with a lot of your companies and, of course, with the Numerical Control Society. None of us expect that this type of innovation will require the same kind of government intervention as did numerically-controlled parts manufacturing in its early history. At the same time, the work of M.I.T. and its Draper Laboratory in getting numerically-controlled manufacturing accepted was a landmark event in government involvement in industrial innovation.

Today, the most expeditious approach to the innovation and diffusion of customized production through computer control appears to be through leadership of the Numerical Control Society and the affected trade associations. Together, they should be generating the support of consumer groups industry, and labor for the planned changes in production, labor specialization, quality, and types of products.

The technology needed is not adequately developed. These lead groups will soon be able to determine whether the companies involved will be able to fund its development on their own. If not, then there is good and proper reason to ask for government involvement or intervention.

There are some generalized comments worth making about automation technology and its various manifestations. For example, one of the most significant changes occurring in manufacturing because of automation is the integration of the design and production process The shorter time to production of the finished product will allow new technologies to hit the market sooner, will eliminate false starts and artificially-induced stresses between design and production engineers, and will result in earlier sales, making both labor and management happier.

The word "automation" is its own worst enemy. Semantic maneuverings have caused delay in all areas labeled "automation." We are only beginning to be able to discuss automation rationally with labor, individual citizens and government. It would be helpful to us if automation really was universally interpreted to mean: *A process using machines (devices) with associated control systems in the production of goods and services.* This definition of automation is independent of the presence or absence of labor and mechanization in the process. Their presence or absence merely categorizes the several types of automation.

Automation is a force today that must and can be judged on its own merits and in terms of its realizable goals. The numerical control industry is one of the better examples of automation with recognizable benefits. Computers in many—but not all—of its applications provide other good examples.

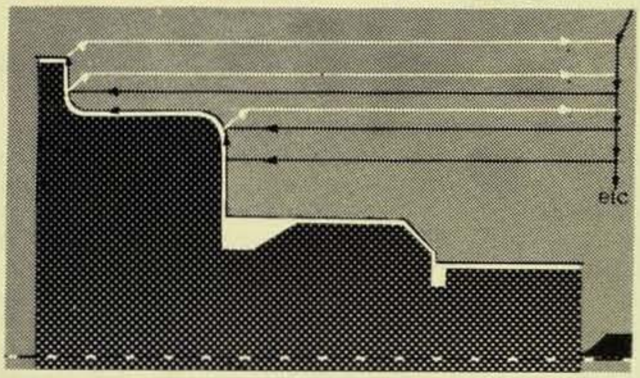
We are experiencing some of our difficulties with automation today because there is no automation industry. An industry is roughly defined as that group of companies which supplies a given product or service. To date, there is no identifiable group of firms that can be said to supply "automation" products. In fact, automation products probably have more characteristics that separate than that unite them. This slows down the aggregation of comfortably-sized customer markets; it slows down concerted efforts on the part of government to help; and obviously it slows down any attempts at a unified approach to automation-induced problems.

In spite of all this, we should all be glad to be associated with automation and to be able to contribute to the most exciting and useful technology of this decade. I congratulate you on being among its pioneers.

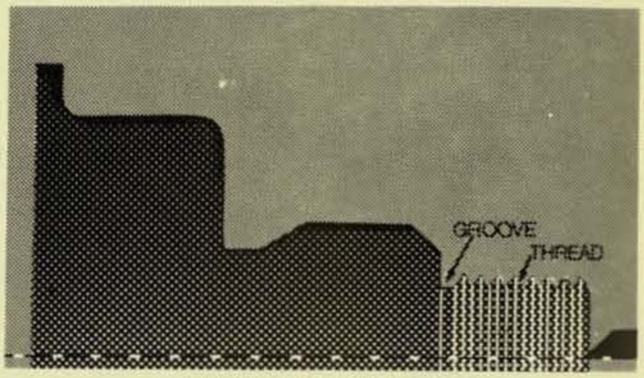
HERE IS THE ANSWER TO YOUR N/C LATHE PROGRAMMING PROBLEMS...

UNITED COMPUTING CORPORATION'S

UNIAPT® LATHE MODULE



ROUGHING FROM BAR STOCK OR FORGINGS



FINISHED PART WITH GROOVE AND THREAD

EXTENDED **APT** VOCABULARY FOR PROGRAMMING **LATHES**

UNIAPT® TURNING PHILOSOPHY

The UNIAPT Lathe Module extends the basic APT language to facilitate rapid and efficient programming of lathes within the UNIAPT structure. This module incorporates into UNIAPT a number of very powerful, but easy to understand, vocabulary words for defining turning part geometry and metal removing objectives. Stress has been placed upon simplicity of use in conjunction with the flexibility to accomplish turning tasks to meet individual machining preferences.

This lathe module is an adjunct to the basic APT vocabulary and not a set of macros designed to ease the burden of lathe programming. All of the advantages of the APT syntax structure, such as: nested definitions, symbolic notation and implied programming are available to the UNIAPT lathe programmer.

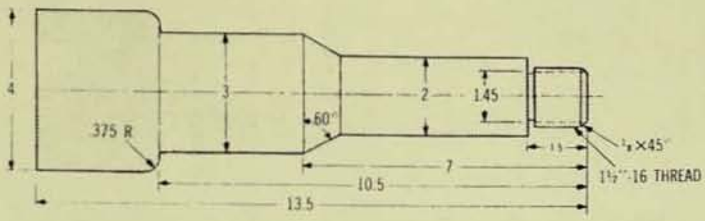
UNIAPT® LATHE PROGRAMMING FEATURES

- SYMBOLIC SHAPE DEFINITION
- VARIABLE DIAMETER ROUGHING
- PROVISIONS TO IGNORE SUBSHAPES DURING ROUGHING
- CONTOUR FOLLOWING METAL ALLOWANCE (ROUGH AND FINISH PART)
- ROUGHING FROM BOTH BAR AND FORGED STOCK
- NESTED SHAPE DEFINITIONS
- NOT LIMITED TO ROUGHING CUTS PARALLEL TO TURNING CENTER LINE
- MULTI-FINISH CUTS WITHOUT SHAPE REDEFINITION
- IPM AND IPR FEEDRATE SPECIFICATIONS ALLOWED
- AUTOMATICALLY OPTIMIZED FEED RATE PROVISIONS
- IMPLIED FEED AND SPEED RATES (IF NOT SPECIFIED)
- AUTOMATIC TURRET SELECTION AND CUTTER SPECIFICATION
- TOOL FILE CAPABILITIES
- EXTENSIVE THREADING PROVISIONS
- SFM AND RPM SPINDLE SPEED SPECIFICATIONS ALLOWED
- GROOVING PROVISIONS
- BORING PROVISIONS
- BASIC APT PROGRAMMING FEATURES AVAILABLE
- COMPREHENSIVE LATHE PROGRAMMING MANUAL

LATHE PROGRAMMING AS EASY AS 1, 2, 3...

1. DEFINE the part shape and cutting tools
2. TURN the part (rough and finish)
3. PERFORM special operations (groove, bore, thread)

UNIAPT LATHE PROGRAMMING EXAMPLE




```
01 PARTNO LATHE EXAMPLE
02 MACHIN/43   $CALL LATHE POST PROCESSOR
03 T1 = TOOL/1,TLPOT,1,TLSET,4,4,RADIUS,.031
04 T2 = TOOL/2,TLPOT,2,TLSET,4,4,RADIUS,.031
05 T3 = TOOL/3,TLPOT,3,TLSET,4,4,RADIUS,.031
06 T4 = TOOL/4,TLSET,4,4,RADIUS,0
07 BLANK = SHAPE/START,0,0,FACE,0,TURN,4,FACE,-13.5
08 PART = SHAPE/START,0,0,FACE,0,SLOPE,-1/8,1.5,45,TURN,1.5,FACE,-1.5,$
08          TURN,2,SLOPE,-7,3,30,TURN,3,ARC,INTOF,-10.5,3,.375,TURN,4,FACE,-13.5
09 FROM/28,15
10 ORIGIN/3.5 + 13.5,0
11 COOLNT/ON,FLOOD
12 LATHE/ROUGH,BLANK,PART,STEP,.2,PERPTO,AUTO,.02,RAPTO,STOCK,.02,SFM,250,T1
13 LATHE/FINISH,PART,STOCK,0,IPR,.011,SFM,350,T3
14 LATHE/GROOVE,-1.5,2,1.45,IPR,.006,SFM,300,T2
15 LATHE/THRED,TURN,PITCH,16,START,.5,1.5,DEEP,1.4233,ROUGH,.015,$
15         FINISH,2,.001,LENGTH,-2,CUTANG,30,SFM,150,IPR,.021,T4
16 END
17 FINI
```

ASK YOURSELF...

	YES	NO
Do I rely on timeshared terminals or service bureaus for my N/C tape preparation?	☐	☐
Are my expenses for N/C tape preparation approaching or exceeding $1000 per month?	☐	☐
Is my N/C tape preparation terminal slow, unreliable and not always available when I need it?	☐	☐
Will my N/C tape preparation costs rise as I increase the usage of my N/C tools?	☐	☐
Are slow part programming turnaround times causing poor utilization of my N/C tools and programmers?	☐	☐

IF YOUR ANSWER IS YES...

. . . Now is the time to consider the UNIAPT N/C Tape Preparation System; A cost effective solution to all your N/C tape generation problems; a complete system for programming all your N/C tools.

Mail the coupon TODAY for more information regarding the UNIAPT system and the UNIAPT Lathe Module.

UNIAPT COMPUTERS

- DEC PDP-8; PDP-11; PDP-10
- GENERAL AUTOMATION SPC-16; 18/30
- IBM 1130 • IBM SYSTEM/3
- HEWLETT PACKARD HP-2100
- CDC 1700 • GEPAC 4020
- KEARNEY & TRECKER SYSTEM GEMINI DNC
- SUNDSTRAND OMNICONTROL DNC SYSTEM

UNITED COMPUTING CORPORATION
22500 SOUTH AVALON BLVD. CARSON, CA 90744 (213)830-7720 (213)775-7167

Please send me information regarding UNIAPT.

Name ____________________

Title ____________________

Company ____________________

Street ____________________

City ____________ State ____________ Zip ____________

Telephone ____________________

NC SCENE
P. O. Box 26
Concord, N. H. 03301

BULK RATE
U. S. POSTAGE
PAID
CONCORD, N.H.
PERMIT NO. 628

Detach and mail to NCS, P.O. Box 138, Spring Lake, N.J. 07762

INFORMATION REQUEST

Please send information on items checked below to:

Name____________________ Company____________________

Street____________________ City, State, Zip____________________

( ) membership ( ) books ( ) correspondence courses ( ) scene subscription
( ) advertising ( ) other____________________

Detach and mail to NCS, P.O. Box 138, Spring Lake, N.J. 07762

CHANGE OF ADDRESS

Please change my mailing address from:

Name____________________ Company____________________

Street____________________ City, State, Zip____________________

to:

Name____________________ Company____________________

Street____________________ City, State, Zip____________________