engineering design graphics journal

FALL 1973 VOL. 37 NO. 3 SERIES 112

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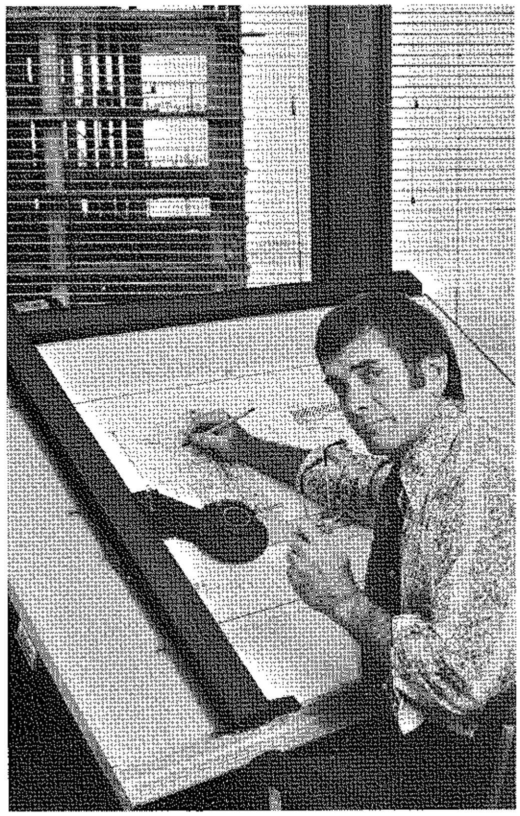

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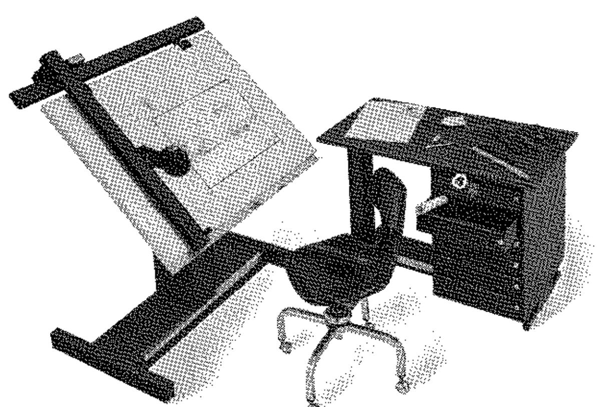

The new Tech 90 Student Training Station.

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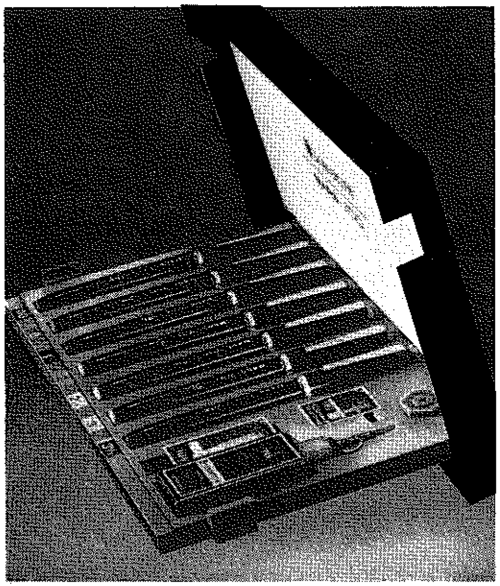
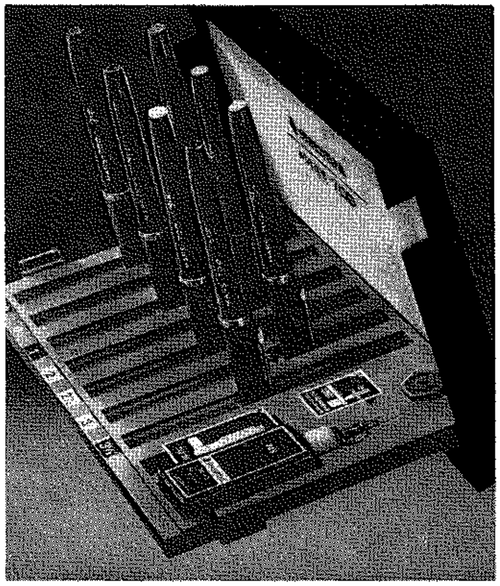


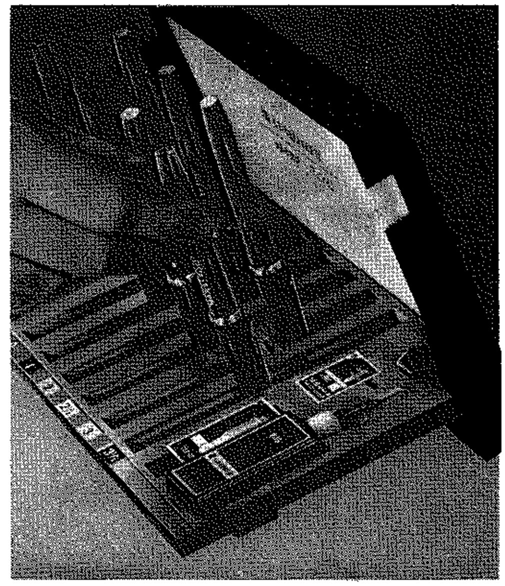
9:00 A.M.

You arrive at work, take your MARS 700 technical pen set from the drawer (it really fits in drawers), and open it. The pen points are resting at a 15 degree angle. This is to keep the ink *away* from the points. (It keeps the points from clogging.)



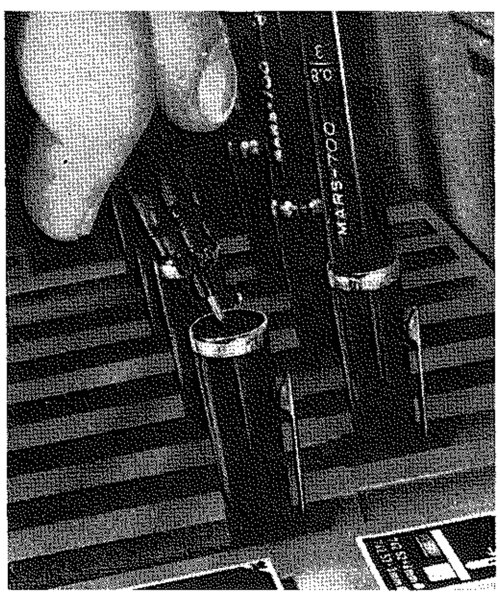
9:02 A.M.

You have now converted your pen set into a working stand. The pens have been removed from their slots and inserted in their keyholes. The caps are locked in their holes.



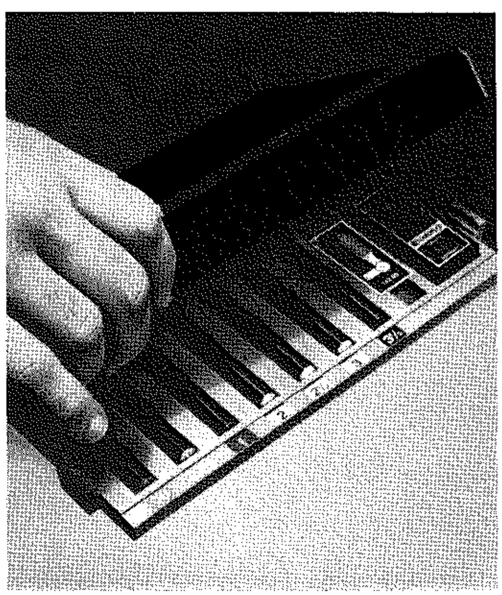
9:03 A.M.

You unscrew your first pen of the day from its cap, and it's ready to go.



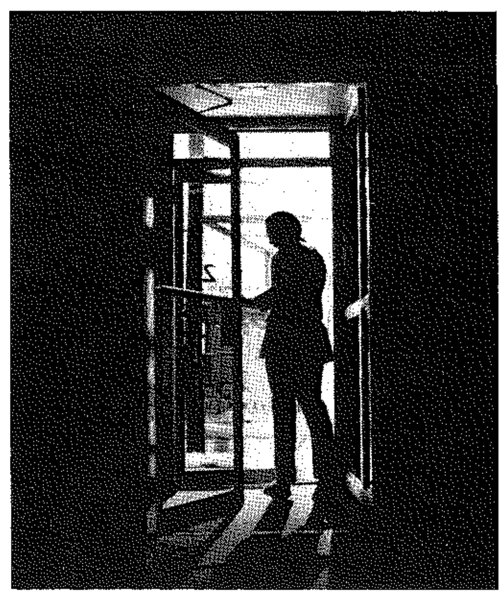
10:32 A.M.

You need a finer line width. You screw the first pen back into its locked (and waiting) cap, and unscrew the second pen. One handed point changing. Marvelous.



4:58 P.M.

Screw the pen you're using into its cap, unplug all pens from their keyholes, lay them into their slots, and close the case.



5:00 P.M.

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STAEDTLER MARS

ENGINEERING DESIGN GRAPHICS JOURNAL

ENGINEERING DESIGN GRAPHICS JOURNAL is published - one volume per year, three numbers per volume, in Winter, Spring, and Fall - by the Engineering Design Graphics Division of the American Society for Engineering Education - for teachers of Engineering Graphics, Computer Graphics and Design Graphics.

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NOTE
The views and opinions expressed by the individual authors do not necessarily reflect the editorial policy of the ENGINEERING DESIGN GRAPHICS JOURNAL or of the Engineering Design Graphics Division of ASEE. The editors make a reasonable effort to verify the technical content of the material published; however, final responsibility for the opinions and the technical accuracy of each article rests entirely upon the author.

ENGINEERING DESIGN GRAPHICS JOURNAL OBJECTIVES:

The objectives of the JOURNAL are:

1. To publish articles of interest to teachers of Engineering Graphics, Computer Graphics and allied subjects.
2. To stimulate the preparation of articles and papers on the following topics (but not limited to them):
3. To encourage teachers of Graphics to innovate on, experiment with, and test appropriate techniques and topics to further improve quality of and modernize instruction and courses.

CALENDAR OF MID-YEAR MEETINGS

1973-74 -- New Orleans, Louisiana
1974-75 -- Williamsburg, Virginia

STYLE GUIDE FOR JOURNAL AUTHORS

The Editor welcomes articles submitted for publication in the JOURNAL. The following is an author style guide for the benefit of anyone wishing to contribute material to Engineering Design Graphics Journal. In order to save time, expedite the mechanics of publication, and avoid confusion, please adhere to these guidelines.

1. All copy is to be typed, double-spaced, on one side only, on white paper, using a black ribbon.
2. Each page of the manuscript is to be consecutively numbered.
3. Two copies of each manuscript are required.
4. Refer to all graphs, diagrams, photographs, or illustrations in your text as Figure 1, Figure 2, etc. Be sure to identify all such material accordingly, either on the front or back of each figure. Your own name should also appear on the back of each. Illustrations cannot be redrawn; they are reproduced directly from submitted material and will be reduced to fit the columnar page. Accordingly, be sure all lines are sharply drawn, all notations are legible, reproduction black is used throughout...and that everything is clean and unfolded. Do not submit illustrations larger than 8-1/2 x 11. If necessary, make 8-1/2 x 11 or smaller photo copies for submisssion.
5. Submit a recent "mug shot"(head to chest) showing your natural pose. Make sure your name is on the reverse side.
6. Please make all changes in your manuscript prior to submitting it. Check carefully to avoid ambiguity, to achieve maximum clarity of expression, and to verify correct spelling throughout. Proffreading will be done by the editorial staff. Galley proofs cannot be submitted to authors for review.
7. Enclose all material unfolded in large size envelope. Use heavy cardboard to prevent bending.
8. Send all material, in one mailing, to:

   James H. Earle, Editor
   Engineering Design Graphics
   Texas A&M University
   College Station, Texas 77843

CALENDAR OF ASEE MEETINGS

1974 -- Rensselaer Polytechnic Institute
1975 -- Colorado State University
1976 -- University of Tennessee

engineering design graphics journal

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FALL 1973 VOLUME 37 NUMBER 3 SERIES 112

CONTENTS

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EDITOR'S PAGE

We of the Journal's staff look forward to 1973-1974 being an outstanding year and the continuation of progress of the Engineering Design Graphics Division and the Journal. We are hopeful that the Journal will reflect current trends, utilization of traditional basics, and contemporary experimentations that will affect future instruction in engineering design graphics.

Through the years, the Journal has survived and has represented the Division with a continuity that has been unmatched by any other Division within the American Society for Engineering Education. Consequently, we are very proud to be a part of this publication. We will attempt to not only maintain its present status, but to contribute to its improvement.

The strength of the Journal has reflected the strength of our Division's membership. Throughout the years, our Division has been blessed with members who are willing to dedicate themselves and their time to the Division's progress.

The previous editor, Al Romeo, was such a person. Under his leadership and efforts, the Journal made significant strides forward and established guide lines that will be used in the future. The Division is grateful for its supporters of this caliber.

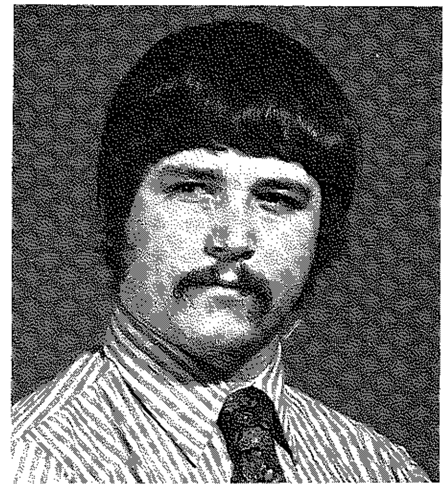
The staff of the Journal would like to invite anyone who desires to contribute materials for publication. Articles should be sufficiently brief, usually not to surpass ten typewritten pages in length. Illustrations should be prepared in India ink for clear reproduction. Photographs should be sharp and distinct to render a quality copy.

We solicite your comments and suggestions as to how the Journal can better serve its membership. We also need your help in increasing the number of our subscribers. Please contact your colleagues who are not presently subscribers.

We look forward to this opportunity to serve the Engineering Design Graphics Division and to the satisfaction that comes from continuing the tradition of the Journal.

Jim Earle

Laboratory in Consumer Product Evaluation



ALLAN H. CLEMOW, TUFTS UNIVERSITY

The era of a number of traditional courses has ended or, at least, been altered in some way. Throughout engineering programs the emphasis has turned to new methods of teaching, involvement of students, and the need for students to assimilate a great deal of information efficiently. The course, under discussion here, was an attempt to try a new approach and format to teach undergraduates instrumentation techniques and experimental procedures. While this was the main import of the course, there were two secondary purposes perhaps as important as the first. This type of course gave the student an opportunity to pull together the component parts of his engineering knowledge into a complete whole. Also, here was an attempt to bring an awareness to the student involved of the very real problems of designing for the consumer. All of these were accomplished by student designed and led evaluations on actual consumer products selected from the marketplace.

The specific details on the course structure and outline are contained later but at this early point it might be advantageous to give an idea of the general procedure in the course. Students, both individually and in groups, were responsible for the selection of representative consumer products to be tested. When the selection process was complete the samples were purchased by members of the groups. A testing plan was developed for the particular product or groups of products. Evaluations were conducted and a written report was prepared. Following the report an oral critique was held to discuss the mechanical aspects of testing.

The motivational aspects of the course were very high as the participants found themselves investigating blenders, toys, refrigerators, and the "trash masher" among others. There was a mixture of laboratory and lectures sessions which covered instrumentation concepts, experimental procedures, statistics, safety, product liability, and other specific inputs to the course. The instructor's role was more that of a coach rather than a formal laboratory teacher. In several instances the instructor became almost a participant joining in to help with a test.

The importance of the course to the student's own personal education is not in question. With the increasing concern for the consumer, it is imperative that engineering students be exposed to the problems of the real world and when this is done responsibly,there evolves a genuine interest with the concepts developed. The work of Consumers Union, Ralph Nader, and other consumer concerns is put into perspective. Perhaps even more important from an educational standpoint is the synthesis of topics and areas such as human factors, materials, statistics, safety, and product liability which are all factors in a product evaluation. On the other side, there is a second synthesis of all the functions from the definition of the need in selecting a product to the final reporting. Therefore, it follows the format for an open-ended problem with constant input and reiteration.

This course was generated from a perceived need to integrate several aspects of engineering education. First, courses involving laboratory work traditionally have been preplanned with set experiments, especially on the freshman and sophomore level. Secondly, the design of experiments course is usually a separate and higher level course while instrumentation courses occur usually after the basic engineering courses(math, thermo, fluids) have been taken. Thirdly, and perhaps most interesting, is the fact that the assigned "real-life" problems presently used are too general as in the area of design projects for freshmen or too specific as in the case of directed research projects for freshmen or too specific as in the case of directed research projects for upperclassmen. This course enabled the instructor to utilize a number of disciplines in one project.

Consider that you have been given a Sears Kenmore Trash Compactor and have been asked to make an evaluation of its performance, safety, efficiency, effectiveness, cost, and market potential. What testing procedures would you conduct and if the product did not measure up to your standards, what would you be willing to tell someone else about it? Do you recognize your own prejudices when you begin to evaluate a product from the open market? The methods of

testing are not always readily apparent when viewed from this perspective. All these aspects and many more are manifest in a typical product evaluation.

The reason that this particular academic venture was undertaken resulted from a curriculum change at Tufts in which a set of freshman elective courses in engineering were offered. As examples of other offerings, there was a course, Seminar in Architectural Design, one given by the Civil Department named Introduction to Community Planning, and five others. A freshman was required to take one of the electives in the spring semester. The choice, however, was up to the individual. This set of courses was designated Engineering Science Electives and the courses were initiated by individual faculty members in the College of Engineering.

The course, Consumer Product Evaluation, was first taught in the Spring of 1971 and repeated this year. Products and laboratory equipment were purchased under a grant from Consumers Union whom the author wished to thank for their support. The class meetings were held two hours twice a week and were spent in lecture or laboratory as the schedule dictated. Although the course was designed for freshmen, members also included a limited enrollment of sophomores, juniors, and seniors. One liberal arts major attended. The course outline below gives an idea of how time was allocated by session.

Class No.	Lecture or Laboratory
1	Introduction to course, laboratory, objectives(Lect.)
2	Methodology of Consumer Testing (Lect.)
3	Methodology of Consumer Testing (Lect.)
4	Basic Instrumentation Concepts (Lect.)
5	Instrumentation Procedures(Lect.)
6	Safety, The Law, and Consumer Products(Lect.)
7	Product Search and Decision
8	Statistical Evaluations(Lect.)
9	Project Work(Lab.)
10	Project Work(Lab.)
11	Project Work(Lab.)
12	Project Work(Lab.)
13	Preparation of Report(Lab.)
14	Critique
15	Product Search and Selection
16	Group Seminar
17	Project Work(Lab.)
18	Project Work(Lab.)
19	Project Work(Lab.)
20	Project Work(Lab.)
21	Project Work(Lab.)
22	Project Work(Lab.)
23	Finalization of Testing and Preparation of Reports(Lab.)
24	Critique

As can be seen, the majority of work was conducted in a laboratory environment. Each student was involved in two complete projects. The lectures served as inputs to the laboratory sessions that followed.

A typical product evaluation was not a set of tightly controlled experiments or contrived instrumentation procedures. Rather an evaluation started with a class meeting to determine the types of products to be tested. (Product search and selection.) A good deal of preliminary work was done here by the students to identify problem areas. From the list developed through this brainstorming session, an analysis procedure narrowed the field through economic and space considerations. Automobiles, always a favorite, could not be tested. Groups were formed to study the surviving products. It should be noted that teams varied in size from one to five. This was developed from the scope of the product to be tested. As examples, mini-refrigerators had a team of five members while an investigation of bicycle locks and chains was conducted by one individual.

The responsibility for the next phase of the evaluation fell squarely on the newly formed groups. They had to determine the market considerations, makes, models, brands, prices, in order to develop the sample, The purchase of the items for each group was then effected. The sample size varied but for the most part was small due to monetary constraints. Usually samples representing three to six competing products were obtained as in the case of kitchen blenders. Those tested were 8-speed, 23-25 dollar, models of Waring, Oster, and Hamilton Beach.

Groups then prepared testing plans, some with the aid of PERT networks. This is the point at which the factors used in evaluating came into play. Factors considered specifically included convenience of use, hazards, performance, durability, and maintenance. Subjective as well as objective judgments had to be separated. It must be realized that products such as kitchen toasters require different testing and evaluation procedures and considerations than do golf balls. Therefore, all students did not experience the same apparatus, experiments, and results. What did occur was, first, a unique open-ended personal laboratory experience and, second, an opportunity to interpret other groups' reports and learn from their work through critique.

The experimental phase of any evaluation was the most critical and also consumed the major portion of time. Students had to design and build any special apparatus. The instrumentation ranged from jerry-rigged torque meters to multiple strain balancing units and stress testing machines. In order to run any tests the student had to learn about the apparatus and its proper use on his own. The lectures on instrumentation plus a large set of notes on available types which prefaced the entire evaluation procedures gave the student an appreciation of what an instrument is, what it will measure, and how it measures.

Following the analysis stage, the groups had to collate the results, determine if any further testing should be performed and then prepare a written report summarizing the the salient features. The report was not expected to be an extensive description of all the work performed but an informative synopsis usually in the range of 2 to 5 typewritten pages. An actual report has been duplicated at the end of this paper for examination. The reports were typed on course stationary prepared for this purpose to give a more professional appearance. The reasoning for requiring this stype of output was to form a concise definition of the work and the product as if it were to be read by the average consumer. Therefore, it is in the mold of a report Consumer Union. It forced the student to decide exactly what was important to himself and in his opinion to the general public. The reports when submitted were duplicated and redistributed. In this way, all participants in the course had not only his own work but that of everyone else. This led directly to the second stage of the output sequence which was the oral critique. Each group discussed their particular plan of investigation, tests performed, results, and conclusions. Information not covered in the report was made known. The audience, being mainly the course members, were free to question the methods and subsequent conclusions of the presenters. This made for a lively forum without animosity in which the criticism was constructive.

Up to this point the discussion has been general with the outline of precedures and objectives. The philosophy of the course is most important as the specifics will fall in place once the initial conditioning has been performed. However, perhaps now it might be relevant to list the products which have undergone the preceding evaluation format. The list has been generated from work over two years, and is not in any particular order.

PRODUCTS TESTED

Electric Hot Pots
Travel Alarm Clocks
Electric Steam Wrinkle Removers
Trash Compactor
Electric 1/4 inch Drills
Electric Solder Guns
Homemaker Toys
Leather Waterproofing Products
De-Icer Sprays and Guns
Bicycle Locks and Chains
Golf Balls
Household Glues and Cements
Hockey Helmets and Goalie Masks
Chemical Drain Openers
Bathroom Cleaners
Mini Refrigerators
Kitchen Toasters
Kitchen Blenders
Key and Combination Locks
Bacon Cooker
Hot Lather
Combination Can Openers and Knife Sharpeners

The range of products can be seen easily. The only products that were abritrarily dismissed from being evaluated(other than those that were too large or expensive) were food products. It is hoped that the reader might stop for a moment and think about the testing plan he would set up for a product such as double-edged razor blades and what significance would be drawn from each test. Only be involving oneself in the course and its objectives can one understand the far reaching implications of this type of educational experience.

Throughout the course there were homework assignments. Most of these fell at the beginning part of the course while a good deal of the time was spent in lecture. The assignments were concerned in one way or another with products and either the setting up a plan for evaluation or a critique of a report already submitted. One assignment dealt with legal case studies in product liability. Several of the questions posed to the students are given below for example.

1. You have been given a package of Sylvania Magicubes. Develop a methodology to evaluate this product for the public. Do some preliminary testing and prepare a set of experiments. Some of the areas that you should be concerned with are, its packaging, claims that the manufacturer makes, construction, materials, operation, unreasonable hazards to user, unreasonable hazards to others as third parties, and light emitted. Your findings in the form of a report will be discussed at our next meeting. (Assignment for Class #1)

2. Visit a toy shop and find a new children's toy, something which you have not seen before and feel might be a good seller on the market because of its name or area of interest. Develop a plan for testing this object as if you were the engineer in charge of produce evaluation. It is important to know at the outset of a problem what procedures you wish to follow. Show this plan of attack in the form of a PERT network. (Assignment for Class #2)

3. You are being given a copy of a magazine containing evaluations of products, either Consumers Report or Consumers Bulletin. Read closely the article noted(Finishing Sanders; as example) and then appraise it as far as the work done, plan of testing, results noted,composition of report, etc. Base your comments on the quality of work, limitations as you see them, subjective decisions, and the general adequacy. Please put your findings in the form of a written critique to be discussed at our next meeting. (Assignment for Class #15)

Although the evaluations of real products took up a major part of the course time, the short assignments covered a great deal of the input information in relation to product testing.

In summary one may ask, what has been accomplished? Indeed, what has been attempted? Certainly the instructor after teaching the course twice has answered these questions for himself. The generation of the new format and its attendant innovations have converted all those who have come in contact with it. The more or less inflammatory aspects of consumerism have not been thrown about within these pages. The problem is a great one but this is a discussion of an engineering course which deals in a real way with these concerns. It is a course in which students had to justify their subjective conclusions and explain how they arrived at the objective considerations. It allowed the participant to reach beyond the classroom but always the emphasis was on the work to be performed.

Perhaps one of the most encouraging features about the course is that both times it was taught, no letter or numerical grades were given on work handed back to students. This was not to be secretive but to de-emphasize the grading procedure. No student throughout the course asked for a grade on an individual piece of work and the instructor found the quality of work better than average over the whole semester. For sure, reports were criticized and corrected, both in critique and in writing, only an interpretive grade was not presented.

Who could use this course? The answer is quite uniform. Any college or university could utilize the format for teaching a number of principles to any level of competence. Combine this with the under-stated need for the inclusion in the curriculum of topics of study which bring to play the actual needs of society and you have a good product. It is hoped that what has been presented is interesting and motivational to the reader if it is, try it, you might like it.

Metric Legislation

Chances for metric conversion legislation to be passed by the 93rd Congress are good, according to Jeff Odom of the National Bureau of Standards, Washington, D.C. Odom made the remark at the ASEE Annual Conference session entitled, "The Move to Metric - Where Are We?"

Odom credited industry with initiating the move toward metrification in the United States. He said the House of Representatives bill No. 5749 has the endorsement of the Commerce Department and is based on the U.S. Metric Study which he helped prepare for Congress from 1968-1971. If the pending legislation is passed, it would give government endorsement to the metric trend.

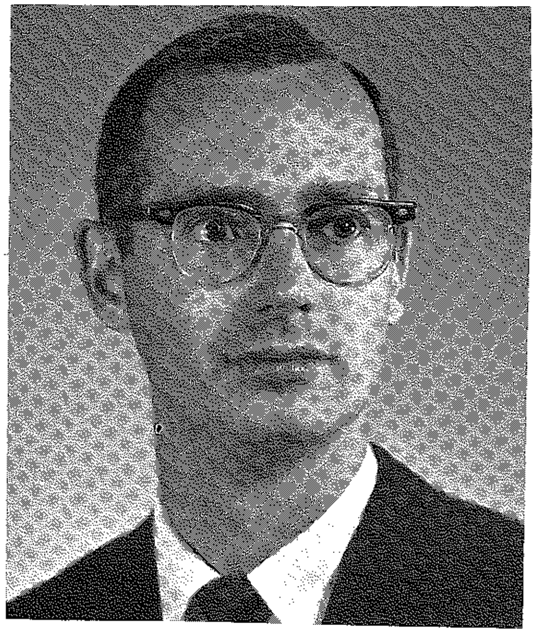
According to Odom, "The objective of the legislation is to provide for a planned changeover on the national scale. We want to convey the knowledge that the metric system is advantageous to the nation and that it is actually easier." He added that at the present time the United States is the only industrialized nation not using the metric system on a national scale.

The pending legislation would provide for a National Metric Conversion Board whose responsibility would be to plan for U.S. metric conversion. The board would consist of 25 appointees who would be given 12 months to arrive at a conversion plan. After their report to the President, Congress and the Commerce Department, the board would be given 10 years to implement their recommendations. At the end of the 10 years the board would be dissolved. The bill also specifies that the changeover to the metric system would continue to be voluntary and that there would be no government subsidies to facilitate the move.

Odom said public acceptance of the move towards metrification is indicated by the large number of metric conversion bills now before the 93rd Congress. He said that one out of every eight U.S. congressmen is a sponsor or cosponsor of some type of metric legislation, which indicates little opposition to metric conversion in the United States.

Odom expressed concern, however, that metric conversion legislation is not considered to be urgent. He said congressional approval of metric legislation is not an absolute certainty at this time.

From the 1973 Annual Conference <u>Daily Engineer</u>, Iowa State University.



ENGINEERING STUDENT RETENTION STUDY

Robert J. Foster, Assistant Professor
The Pennsylvania State University

Engineering education has in normal practice retained only some 50 percent of its entering freshmen. With decreasing enrollments and the recently improving job market, the prospect of too few graduates has alarmed our profession. Therefore, a project has been initiated by ASEE to study causes for baccalaureate students to remain in, or leave, engineering programs.

The IBM Corporation and the General Electric Company have made funds available to ASEE to study engineering student retention over a two-year period, beginning July, 1972. The study is directed by Edward Kraybill with assistance from Robert Foster and James McKeel, all of the Pennsylvania State University. An advisory board is headed by Dean Arthur Burr of Rensselaer Polytechnic Institute.

The objective of the study is to discover those positive and negative motivators in engineering programs which either encourage or discourage students to remain in engineering. If patterns can be detected, it is hoped that recommendations can be made to engineering educators so that programs can be made more effective.

The first year of the study has ended with good progress being made. One activity has been the development and administration of a questionnaire for engineering freshmen. This spring 46 schools participated, seeking to discover what students think about their education while they are still in engineering. The 3,500 usable responses will be correlated with each student's status during the fall, 1973. Did he transfer to another major, withdraw, fail out, or remain in engineering? A correlation study will then hopefully detect varying response patterns between persistors and non-persistors in engineering.

Much of the help for this portion came from members of the Engineering Design Graphics Division of ASEE. Some volunteered support at the Mid-Winter meeting of the EDG Division in Denver. A report to this group is planned for the 1974 Mid-Winter meeting in New Orleans. A status report was made in the May, 1973 issue of Engineering Education.[1] A final comprehensive report is expected in the fall of 1974.

Another aspect of the study is to gather and disseminate information on existing programs which appear to increase retention of engineering students. Unfortunately, the efforts of many are well known to but a few persons since a clearinghouse for information seems to be lacking.

A further aspect of the study is to tap a data bank of the American Council on Education. An excellent study by Alexander Astin[2] examined the dropout characteristics of 51,000 college students. The subset of 4,000 engineering students has been analyzed in the present ASEE study. The intent is to determine in what ways engineering student dropouts are like or unlike the national norms.

Initial results show that in many ways engineering students are typical of all students. About 80 percent of all students and those in engineering returned for a second year, but whereas 47 percent of all students received a degree in four years, only 38 percent of engineering students did so.

The ACE data show that high school grades affect the percentage of students returning for a second year in a manner about equal for engineering and all students: 90 percent returned when high school grades were A, but only some 60 percent returned when such grades were C or less. The situation is similar when SAT college entrance test scores were compared with returns for a second year, but some 20 percent fewer engineering students graduated in four years for a given SAT score than did all students.

Academic difficulty certainly accounts for a fair proportion of students leaving engineering. The reasons why qualified students leave, however, are still under analysis. The ASEE study is endeavoring to get at the roots of this problem.

A replication study is planned this fall to broaden the range of participating schools and to check the reliability of the study. Your school may wish to participate for the first time. Contact the writer at 328 Hammond Building, University Park, PA 16802 for prompt details. Each participating school receives a confidential comparison of its students with national norms. Also, we may have an opportunity to improve engineering education at our respective schools if results point toward a course of action feasible for us individually.

[1]Foster, R.J. and Kraybill, E.K. "Engineering Student Retention - Accidental or Planned?" Engineering Education, May 1973, p. 621.

[2]Astin, Alexander W. College Dropouts: A National Profile, ACE Research Report, Vol. 7, No. 1, February 1972.

DIVISION BITS

FURNITURE GRAPHICS AT NCSU

A course in Furniture Graphics has been developed as part of the Furniture Manufacturing and Management curriculum at North Carolina State University. The furniture curriculum at NCSU is administered through the Industrial Engineering Department and is the only four-year program of its type in the country. When one considers that over 50 percent of all wood furniture made in the United States is produced within a 200 mile radius of High Point, NC (90 miles from the NCSU campus), the need for a curriculum to train people in the area for management positions in the Furniture industry is obvious.

The Furniture Graphics course is the first in a series of core courses for furniture majors and is a combination of graphical methods and furniture construction and the implications of mass production techniques on these two elements of product development.

As no overall graphical standards are now in use in this very diversified industry, one of the primary challenges has been to identify basic practices used by the majority of manufacturers and to develop general guiding principles and methods that can be taught and applied reasonably well in a wide variety of specific industrial situations.

John Freeman
North Carolina State University

Course Structuring for Self-Paced Instruction

JACK B. EVETT, University of North Carolina at Charlotte

The purpose of this paper is to present a new structuring of two freshman engineering courses at the University of North Carolina at Charlotte(UNCC). These courses are structured so that, although they are not strictly self-paced instruction, they do allow the student to proceed at his own pace to a certain extent. This structuring has been used at UNCC during the past year. Prior to presenting the specific details of this structuring, it will be helpful to look briefly at the approach to these two courses used prior to the past year.

In general, the topics that were(and still are) covered included slide rule, trig functions, exponentiation, computer programming, engineering drawing, and charts and graphs. Generally, all students(ranging from 60 to 100 in number) met together in an auditorium for a common lecture each Monday afternoon. During the week the students were separated into groups of approximately 20 each, which met one afternoon during the remainder of the week for a problem, drawing, or laboratory period. Generally three or four professors were associated with the freshman class. Each such professor was responsible for four or five sequential Monday lectures covering a particular subject(e.g., computer programming). This professor was also responsible for preparing problems and handouts for his subject as well as preparing and grading a quiz covering his subject. During the remainder of the semester(when his subject was not being covered), his responsibility consisted primarily of handling his assigned laboratory period during the week.

While this procedure served reasonably well, there were a number of shortcomings associated with it. These included:

(1) The Monday afternoon lecture was generally a frustrating experience. The students were restless late in the afternoon and with a class of 80 or more, the slightest move of paper or whispering could cause a major distraction. Questions and answers between student and professor were difficult.

(2) During the part of the semester when a professor was not covering his particular subject, he might not be interested in the subject matter being covered at that time. He was, however, required to deal with this subject during his laboratory period. For example, the professor responsible for drawing had to deal with computer programming in his laboratory period. This lack of enthusiasm and interest (and in some case possible lack of expertise) might be transmitted to the student.

(3) The teaching of specific subjects was concentrated during a certain part of the semester. This taxed both the computer facilities and the drawing room facilities during the part of the semester they were being used.

(4) The entire class was forced to move at a certain pace. Some students who learned more slowly than others could not keep up with the pace and "flunked our".

(5) Some unusual grading situations occurred. For example, a student might do well in all parts of the course with the exception of computer programming, in which he did poorly. In the grading system used, the effects of good grades in other parts of the course might offset the low grades in the programming part so the final grade in the course was "B" or "C". This gave the illusion that the student knew computer programing since he made a good grade in the course, although he actually knew next to nothing about it.

In order to try to alleviate these shortcomings, a new course structure was conceived and used during the past year. (Incidentally, some of the ideas for this structure resulted from the writer's participation in an ASEE Effective Teaching Institute). Probably the most important goal of a "new" structure was to provide some means for slow students to complete the course successfully even if they took longer than average time and for better students to complete the course in less than average time, if they wished to. A possible solution might have been to use self-paced instruction. However, since some of the topics covered in these courses seem to require lecture time and also since most of the students are just out of high school and many of them either have not developed self-discipline or are not accustomed to large amounts of outside studying on their own, it was felt that formal classes would be necessary.

	I (Jan 17-Feb 17)	II (Feb 23-Mar 23)	III (Mar 27-May 4)
101-1 (MW 4:00-5:20)	Block B (Seevers 102)	Block C (Crippen 245)	Block A (Crippen 102)
102-1 (MW 2:00-3:20)	Block E (Seevers 245)	Block F (Coleman 102)	Block D (Seevers 102)
102-2 (TT 11:30-12:50)	Block F (Coleman 345)	Block D (Evett 345)	Block E (Seevers 245)
102-3 (TT 1:00-2:20)	Block D (Evett 345)	Block E (Seevers 245)	Block F (Coleman 345)

Table 1

In the new structure, each course is separated into three subject groups, or "blocks". These blocks are as follows:

EGR 101

Block A Slide Rule, Trigonometric Functions, Logarithms
Block B Computer Programming I
Block C Engineering Drawing I

EGR 102

Block D Computer Programming II
Block E Engineering Drawing II
Block F Data Analysis and Presentation

(These are the topics we covered the past year. We plan to revise the topics somewhat to include an introduction to engineering design.) Each block covers a period of one-third semester. With the exception that Block B must precede Block D and Block C must precede Block E, the blocks can be taken in any order.

The following rules apply in administering this program:

(1) Each student will get one overall grade for each block.
(2) In order to pass the course, the student achieve a passing grade in each block.
(3) If a student fails a block, it must be repeated until a passing grade is received.
(4) If a student receives a grade for any block in the "D" range, it may be repeated once, with only the last grade counting.
(5) The final grade in each course will be an average of the three(passing) grades for each block.
(6) If at the end of the semester, a student has successfully completed none of the blocks, he will receive the grade "F".
(7) If at the end of the semester, a student has successfully completed only one or two of the required blocks, he will receive the grade "I". This will be changed when the student successfully completes. the remaining block(s) subject to university regulations.

A copy of these rules is given to each student at the beginning of each semester.

Some advantages and implications of this structure are as follows:

(1) Each professor is usually assigned a particulat block, which he teaches three or more times during the semester to three different groups, and usually is not involved in other blocks. Hopefully, the professor generates more enthusiasm if he has to deal with only one subject. The Monday lecture to the entire group is eliminated, and all student-professor contact is in small classes.
(2) Since computer programming and drawing are covered throughout the semester, the use of the computer and drawing room facilities are likewise spread out over the semester rather than being concentrated during certain parts of the semester.
(3) The requirement that a student achieve a passing grade for each block in order to pass the course insures that he has at least a nominal understanding of each topic.
(4) It is felt that the most important advantage is the ability of the student to work at a block at the time and to repeat any block without penalty. It is this feature that allows the student to proceed at his own pace to a certain extent, as will be explained subsequently.

A copy of the block schedule for the last semester is given in Table No. 1. It will be noted that each block is offered at least once; hence a student may take either EGR 101 or EGR 102, or both. Or, he may take only one or two blocks which were not successfully completed during a previous semester. Each student is assigned to a particular section, but he is not necessarily bound to the schedule for that section. For example, a student assigned to EGR 102-2 would normally take Blocks F, D, and E respectively at 11:30-12:50 on Tuesday and Thursday. However, he could, if he so desired, take Block F at the regular time, then seitch to Block E with EGR 102-3 and Block D with EGR 102-1.

As an example of the benefit of this structure to slower students, suppose a student is in EGR 102-3 and fails Block D during the first third of the semester. He could continue with his section and take Block E while simultaneously repeating Block D with EGR 102-2. If he fails again, he could continue with his section and take Block F while simultaneously repeating Block D with EGR 102-1. Assuming that he passes it this time and also passes Blocks E and F, he would complete the course on schedule. As another example, suppose a student took EGR 101 during the Fall semester, passing Blocks A and B but failing Block C. He could enroll in EGR 102-2 during the Spring semester and repeat Block C while simultaneously taking Block D. Having completed Block C during the middle third of the semester, he would then be ready to take Block E during the last third of the semester. (Note that Block E should be taken after Block C.)

As an example of the benefit of this structure to faster students, it is conceivable, of course, that a student could take all three blocks simultaneously in either course and complete the course at the end of the first third of the semester. No one has attempted this so far, but some students have taken two blocks simultaneously and finished the semester ahead of time.

To be more specific, two actual case histories are presented. One of our students took Block A during the first third of the Fall semester and then took Blocks B and C during the middle third of the semester - thereby completing EGR 101. She then took Block D the last third of the Fall semester and Blocks E and F during the first third and middle third respectively of the Spring semester - thereby completing EGR 102. She would probably have finished sooner had not illness forced her to miss a number of classes.

Another of our students took Block A during the first third of the Fall semester and Block B the middle third. He failed Block B. During the last third of the semester he repeated Block B while also taking Block C. He failed Block B again, but according to the rules, he received an "I" (incomplete) for the grade in the course(EGR 101). During the Spring semester he took Block F during the first third of the semester, Block B during the middle third(passing it this time), and Block E during the last third of the semester. Upon completing Block B successfully, he removed the incomplete and received a letter grade for EGR 101. Since he did not take Block D during the Spring semester, he received an "I" for the grade in EGR 102. He is confident that he will complete Block D either during the Summer or during the Fall semester at which time he will remove the incomplete and receive a letter grade for EGR 102. This student would undoubtedly have failed both these courses if taken under the structure used prior to the past year. Under the new structure, it appears that he will satisfactorily complete both courses. One might argue that a student this week might be better off if "flunked out" at this stage. While this may be true, it appears that this student may simply be weak at computer programming and may very well be successful in the remainder of the engineering curriculum.

It is of interest to note that at the end of the Fall semester during the past year, twenty-one incomplete grades were received by students in EGR 101. By the end of the Spring semester, nine students had removed these incompletes - with one receiving an "A", four receiving a "B", and four receiving a "C". These nine students would almost surely have failed the course under the old structure. Of these nine, five successfully completed EGR 102 on time(at the end of the Spring semester). Under the old structure, these would have been ineligible for EGR 102 if they had failed EGR 101 and therefore would be behind in the engineering curriculum. Some of the twelve remaining students who received incompletes will probably remove them subsequently. Those who do not will eventually receive an "F". During the Spring semester nine incomplete grades were received by students in EGR 102. It is, of course, too early to know how these will be resolved.

In addition to the primary asset that the structure related here allows the student to proceed at his own pace to a certain extent, it also has several other assets as related previously. One additional asset that resulted from the new structure is the flexibility with which transfer students can be handled. We get a number of transfer students who have transfer credit for engineering drawing but have had no computer programming. We give them credit for EGR 101 and EGR 102 upon completion of EGR 103 consisting of Blocks B, D, and F. Occasionally, we get transfer students who have transfer credit for computer programming but have had no engineering drawing. We give them credit for EGR 101 and EGR 102 upon completion of EGR 103 consisting of Blocks C, E, and F. In other words, the content of EGR 103, a special course for transfer students, can be varied(within the six block framework) to cover specific material which the transfer student has not had.

In conclusion it is felt that the course structure related here has been extremely effective with our freshman courses. We believe it has already helped us retain some students who might otherwise have been lost from engineering. This structure could possibly be utlized for other courses. The Department of Mathematics at UNCC is re-structuring some of the lower level mathematics courses so that they are broken down into subject blocks smaller than a semester. Under this structure the student has several alternatives in moving through a course - including skipping some parts by better students and dropping back to a slower section by poorer students. Probably any course structure which allows the student some freedom in determining his own pace of study is desirable. The course structure presented herein is offered as one possible alternative toward this end.

(Presented at the ASEE Annual Conference June 1972)

The Engineering Design Graphics Journal is the official publication of those associated with the teaching of engineering design graphics, drafting, computer graphics, and other forms of graphics associated with engineering. The Journal is published three times per year--Fall, Winter, and Spring.

Advertisers interested in learning of the advertising policy should contact:

Professor Clarence Hall
Engineering Graphics Department
Louisiana State University
Baton Rouge, La. 70803
Ph. 504-388-2022

Utilization of Teaching Media

Straws in the Cyclone Country winds during the past year have been swirled into a pattern which should be easily perceived by the faculty members of this University.

Two linguistic phrases that quickly describe the nature of the weave of said pattern are: accountability of faculty work load and emphasis on improvement of teaching and learning methods.

It has long been accepted by most educators that proper utilization of teaching media invariably improves the quality of teaching.

A personal observation is that many, if not most, teachers prefer and/or use only one or two of the many teaching media available to them. They may employ only the verbal lecture, the chalk board and lecture, the overhead projector and lecture, the opaque projector and lecture, movies or film strips, or slides and lecture, closed circuit television.. etc.

Obviously, there are frequently good and sufficient reasons for the selection of only one or two of the diverse systems of communicating between teacher and student or between subject and student.

Availability and convenience of media are two of the more obvious factors involved. Personal preference and habit (especially the latter) are two common contributing factors... "it's easier... I feel more at ease .. do a better job... etc."

Even with those individuals who are willing to try new media, they often do it in "binges" i. e., go all out with the overhead projector or use CCTV to the exclusion of other proven media.

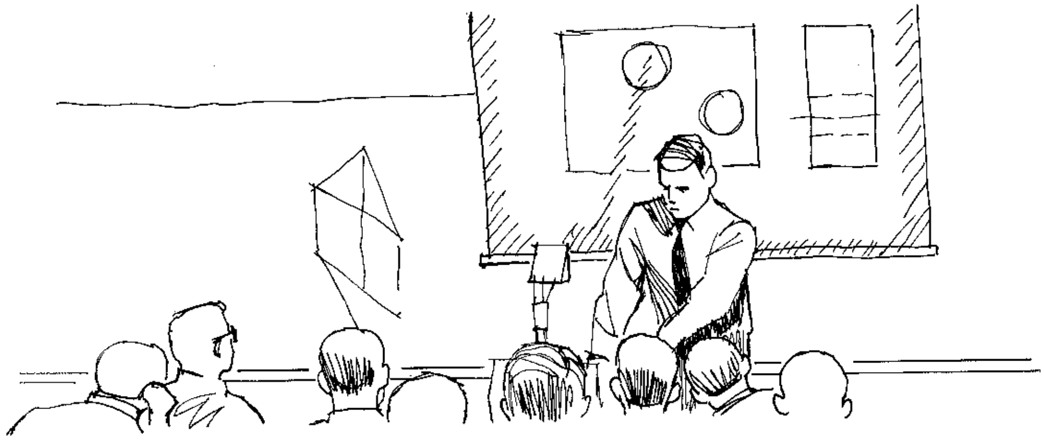
This tendency to "binge" is also understandable. Because it invariably requires significant extra effort to prepare for a class presentation using a "different" medium for communication, it is natural to concentrate one's effort around that medium while neglecting others.

The main thrust of this article is based on a first hypothesis that each of the various mediums in existence for "teaching" or "learning" has its unique advantage(s). As its corollary, a second hypothesis is advanced that the coordinated use of three or more of these basic methods of communication during a given presentation of significant length will improve the quality and efficiency of that presentation over that which can be achieved by the use of only one or two. Although this is not necessarily a new concept, it is, I believe, one which is generally being ignored at this time.

It is the further thrust of this article to advocate initiation of such a plan (integration of multiple media) by anyone truly interested in trying to improve on current teaching-learning procedures. Generally speaking, faculty members of the Graphics Department in the College of Engineering at Iowa State University have gone partially through the cycle of "binges" mentioned earlier. Lately, we have re-discovered the great value of the overhead projector (after more or less neglecting it during prolonged effort focusing primarily on CCTV).

We now have the following teaching media conveniently available in each of our regularly used classrooms: a wide angle overhead projector and good quality roll-down screen; a large portable easel for charts, graphs or similar displays; closed circuit television with which we can transmit either live or taped TV presentations either individually or simultaneously; model cases with some (not adequate) models; and, of course, chalk boards and supplies of chalk in white and in various colors. Other media such as slide and movie projectors etc. are available (although not as convenient) at the University Media Resources Center.

Following is a verbatim copy of established



C. Gordon Sanders
Iowa State University

departmental policy regarding instructor autonomy and academic freedom in the Engineering Graphics classrooms at I. S. U. :

"Media--Policy
Department of Engineering Graphics I. S. U.
C. G. S. 11/30/70

1. In regard to classroom teaching procedures in this department, the policy is to allow maximum autonomy and academic freedom to each instructor, consistent with departmental requirements for uniformity in subject coverage and record keeping together with substantial evidence of effective teaching.

   Uniform coverage means close adherence to the department approved assignment sheet for each course.

   Substantial evidence of effective teaching involves student achievement on departmental examinations and quizzes, class morale, student-instructor rapport and tangible evidence in the required student notebooks. "Grades" alone will not necessarily be considered substantial evidence of effective teaching.

2. In general, the instructor in charge of any given class shall have the prerogative to use, or not to use, CCTV or any other available teaching aid.

   It will be the responsibility of the instructor involved to report those times when he is not planning to use the regularly scheduled CCTV playbacks or when he would like to have unscheduled playbacks. The equipment, tapes and playbacks cost money. If certain tapes are not being used by a majority of instructors, we need to take a critical look at "why not" and perhaps revise or eliminate that tape.

3. Some questions that should be considered:
   1) Is the TV lecture better than the one I will prepare?
      Not: Is the TV lecture better than the one I can prepare?

   2) If the TV lecture is not a good lecture should it be thrown out--or improved?

   3) Is the particular subject area involved better adapted to TV or to live lectures?

4. Please take notes on all lectures and turn over constructive criticism to your Teaching Media Committee."

Although the present department chairman wishes to continue to adhere to this stated policy in principle--some amount of "arm twisting" will be applied to our faculty members to initiate teaching changes during the academic year 1972-73. The faculty will be urged to appropriately integrate the use of short lectures, visuals on the overhead projector, chalk board and/or chart illustrations, hand-out student participation work sheets and other media presentations as desired by the instructor involved. Suggestions and assistance will be exchanged among faculty members as to the selection of the appropriate medium for a given area of learning. Hopefully, all of the faculty will become involved in all or most of the media preparation, e. g., taping a basic lecture, making visuals, making originals for handouts, charts, models, etc. and uncovering background or motivation materials--making the teaching process a truly cooperative venture--fundamentally a team effort.

"We" are under no illusions as to the difficulties inherent in this regard. Such an approach will take thoughtful planning, willing and creative attitudes, and continuing diligence and perserverance on the part of each faculty member.

The Super Dome of New Orleans is scheduled for completion in 1974 and is located in the city's Central Business District. Sports and all other forms of entertainment will be scheduled year round in this massive structure.

Midyear Meeting

Jan. 24-26

The annual midyear meeting of the Engineering Design Graphics Division will be held January 24-26, 1974 in New Orleans. The headquarters for the meeting will be the Fontainebleau Motor Hotel located at 4040 Tulane Avenue, New Orleans, Louisiana 70119.

Fontainebleau Hotel is located .25 miles east of the junction of the Airline Highway(U.S. 60) and the Interstate Highway 10; it is 10 miles east of the New Orleans International Airport by Airline Highway and 13.5 miles by Airline-Williams Boulevard, Interstate 10. Ample parking is provided for vistors staying at the hotel.

Host for this year's meeting is Professor Clarence Hall of the Engineering Graphics Dept. of Louisiana State University.

All reservations should be made directly to the hotel, and they will forward confirmation to you. All meetings and social affairs will be held in the hotel.

New Orleans

New Orleans is one of the most fascinating cities in the United States with both the atmosphere of a modern city and of the old world. Located in the crescent bend of the Mississippi, 100 miles above its mouth, it is the second largest seaport in the United States and an important center of trade. Six universities are located in New Orleans. The famous French Quarters with its basilica and other historic buildings in Jackson Square, its iron-trellised balconies, quaint antique shops, intimate patios, and renowned restaurants, is a delight to the tourist, the student of history, and the most discriminating gourmet.

An average January in New Orleans has a temperature of 55 degrees and ten days of rain. Therefore, be sure to bring a raincoat as a safe precaution.

Plan to arrive early or to stay after the meeting to see many interesting sights in New Orleans and the surrounding area. A number of photographs are shown here depicting famous landmarks that should be visited while at the meeting.

PROGRAM

Theme

ENGINEERING DESIGN GRAPHICS
AND THE METRIC SYSTEM

THURSDAY AFTERNOON, JANUARY 24

3:00-5:00	REGISTRATION Mezzanine (Members: $15, Others: $2)
6:15 p.m.	EXECUTIVE COMMITTEE DINNER Patio Room 1 (For Executive Committee members, wives, and invited guests)
7:15-9:00	SOCIAL HOUR Patio Room 2 (For all members, wives, and guests)

FRIDAY MORNING, JANUARY 25

8:00-9:00	Registration Mezzanine
9:00-11:45	GENERAL SESSION Pelican Room PRESIDING: Dr. C. E. Hall Louisiana State University GREETINGS AND WELCOME ADDRESS Dean Roger W. Richardson College of Engineering Louisiana State University
9:30	"Metrication and Engineering Graphics" Klaus E. Kroner University of Massachusetts "Nomographs and the Computer" Robert R. LaRue Ohio State University COFFEE BREAK "Metric Integration for Basic Engineering Courses" W. George Devens Virginia Polytechnic Institute "Women in Engineering - Past and Future" Naomi J. McAfee President, Society of Women Engineers Westinghouse Electric Corporation

LADIES' PROGRAM

THURSDAY, JANUARY 24

6:15 p.m. EXECUTIVE COMMITTEE DINNER
(For Executive Committee members, wives, and invited guests)

7:15-9:00 SOCIAL HOUR

FRIDAY, JANUARY 25

9:00 a.m. GUIDED TOUR OF THE FRENCH QUARTER

12:15 p.m. LUNCHEON
SPEAKER: Mr. Horace Hayden
Executive Architect "Superdome"

1:30 p.m. FASHION SHOW (no charge)

12:00 LUNCHEON

Napoleon Room

PRESIDING: Dr. Boris W. Boguslavsky
Louisiana State University

Speaker: Mr. Horace Hayden
Executive Architect
"Superdome"

1:20 GROUP PICTURE

Pool Patio

FRIDAY AFTERNOON, JANUARY 25

1:30-3:30 GENERAL SESSION - Pelican Room

PRESIDING: Robert R. LaRue
Ohio State University

"Retention of Engineering Students"
Robert J. Foster
Pennsylvania State University

"Impact of the Computer on Graphics"
Wilford J. Tolman
Brigham Yound University

COFFEE BREAK

"Development of Hardware for Computer Graphics"
Don Beattie
Queen's University

"Human Engineering Design Research of Consumer Products"
Percy H. Hill
Tufts University

"Guided Design for Freshmen"
Thomas R. Long
West Virginia University

COMMITTEE MEETINGS
Pelican Room

6:30 ANNUAL BANQUET

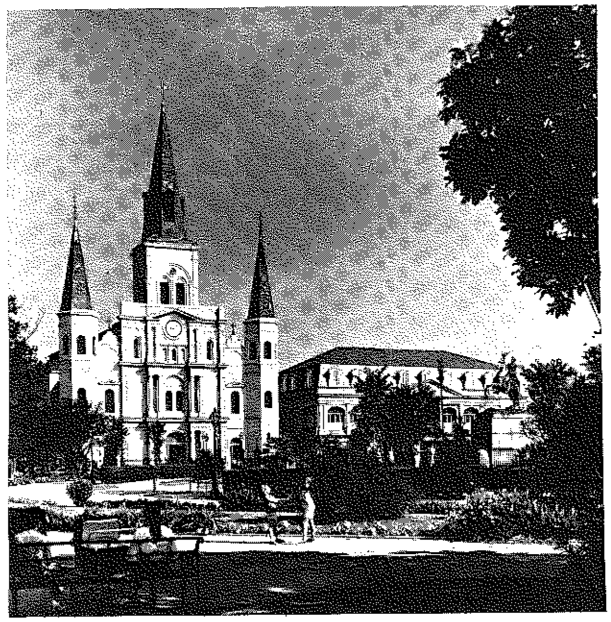
Napoleon Room(Grand Ballroom)

PRESIDING: K. E. Botkin, Chairman
Engineering Design Graphics Division

"Pending Congressional Action on Metrication"
The Honorable Lindy(Mrs. Hale) Boggs
U. S. House of Representatives

SATURDAY MORNING, JAMUEARY 26

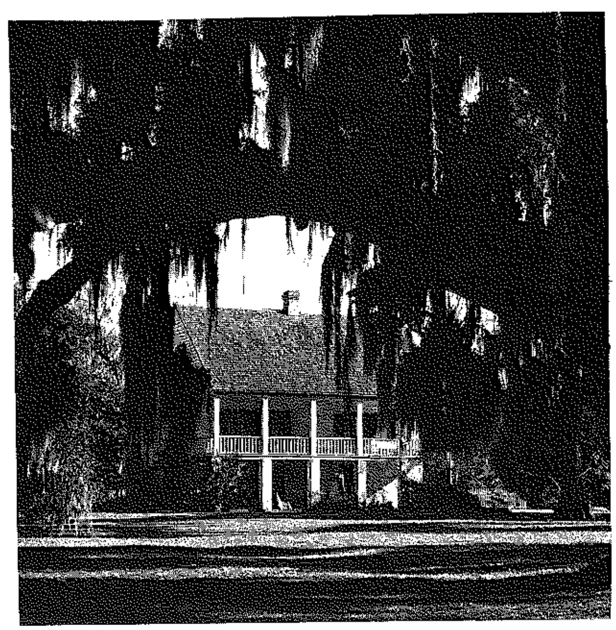
9:00-Noon Tour Site of Louisiana Superdome



JACKSON SQUARE

Jackson Square is the center of the New Orlean's French Quarter and is one of the most famous spots of the city. Entertainment, restaurants, and museums are located throughout this area making it a world-famous tourist attraction.

The Acadian House, built in 1760, is now a museum containing furnishing and other items depicting the way of life of the early Acadian settlers. This famous landmark is located in St. Martinville.



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ENGINEERING DESIGN GRAPHICS DIVISION

MIDYEAR MEETING
JANUARY 24-26

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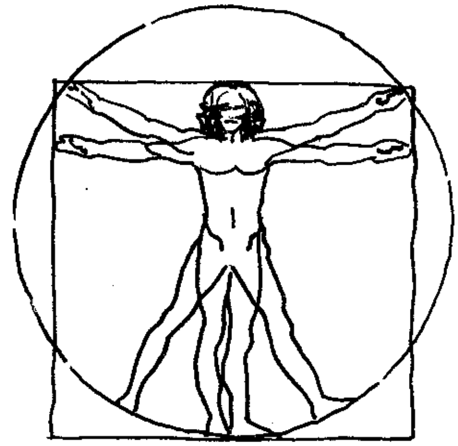


HUMAN ENGINEERING

GOOD HUMAN ENGINEERING IS POSSIBLE USING OFF-THE-SHELF COMPONENT PRODUCTS

by Wesley E. Woodson,
Man Factors, Inc.,
San Diego, California

(Reprinted from HUMAN FACTORS, April, 1971, Vol. 13, No. 2. Published by Human Factors Society, Santa Monica, California)

More often than not, designers must use off-the-shelf components in creating a new equipment design. This is especially true when components relate to maintenance. Because much of this type of hardware is hidden from view, or is not considered part of the operating interface, components related to maintenance often are not selected with proper attention to human engineering considerations, either by the designer or the human engineer. Experience has shown that although many human engineering specialists specify general maintenance criteria, they do not follow through in selection of individual components that may be purchased off the shelf. This paper discusses typical design problems and recommends that human engineers take steps to keep up to date on new products, so that they will be in a better position to recommend those products which are better human-engineered.

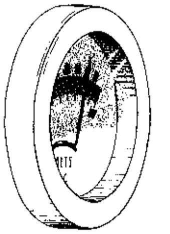
INTRODUCTION

The application of human engineering principles for ease of maintenance has come a long way since the introduction of human engineering to equipment design. A number of excellent guides have been prepared to help the designer and human factors engineer in creating more maintainable hardware (Folley and Altman, 1956; McKendry, Grant, Corso, and Brubaker, 1960; Murphy and Newman; Rigby, Cooper, and Spickard, 1961; Goldman and Slattery, 1967).

In spite of the progress that has been made, many designs still fail to optimize the maintenance man-machine interface. One of the more serious problems appears to be that much of the off-the-shelf hardware available to designers is poorly designed in terms of good human engineering principles.

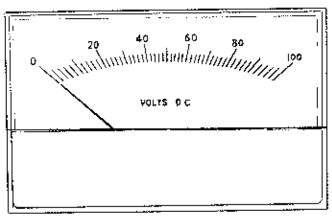
For economic and time reasons, designers cannot design everything from scratch. They must, of necessity, use off-the-shelf components which they purchase from various vendors. Typical items include meters, digital displays, connectors, control knobs, handles, fasteners, switches, terminals, and labeling devices. Some component manufacturers have been sensitive to the human engineering aspects of their products while others have not. Many designers and human engineers have not been careful enough in selecting components. Although considerable attention may have been given to arranging parts for ease of access, poorly designed individual components degrade the result. It is the author's contention that too many human factors engineers leave the selection of maintenance-related hardware to someone else and consider their job done when they furnish a human engineering guide to the designer.

In some companies, a maintenance engineering group has the responsibility for component selection criteria. If such a group has human engineering help, it might be assumed that better human-engineered products would be chosen. Experience has shown, however, that in many instances, maintainability groups

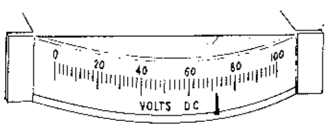


Deep meter face inset.
Scale marking too closely spaced.
Pointer too far from display face.
Numerals oriented radially.
Pointer covers up scale marks and numerals.
Deep bezel casts shadows which mask parts of displayed information.
Numbering system hard to interpret.

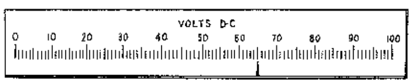
Figure 1. Traditional meter design showing typical human engineering deficiencies.



Bezel removed top and sides provides better illumination.



Edgewise format provides equal-spaced scale graduation.



Solid-state display presents all elements on same visual plane.

Figure 2. Improved meter face designs now available.

do not have human engineering specialists, and depend on independent human factors groups to set criteria. In most cases, such help does not include advice on component selection. This may be due to the fact that many human factors specialists do not care enough about hardware to spend the time to keep up on new products; engineers will not ask for help when they do not expect to find it.

Many human factors specialists, who hesitate to call themselves human engineers, make off-the-cuff references to human engineering principles without paying enough attention to the details involved. They tend to look for "bigger problems" since anyone can use "cookbooks." It is particularly amusing to this author in observing and working with many human factors specialists over the past 25 years that, although most of them hasten to commend the author's Human Engineering Guide (Woodson and Conover, 1964), very few of them have read much of it.

Few human engineering criteria are presented in a form that makes it readily apparent that they apply to components usually related to maintenance. Therefore, the human engineer needs to reexamine current principles relative to so-called nuts-and-bolts hardware.

VISUAL DISPLAYS

Instrument manufacturers have held to traditional design practices perhaps more than have other component manufacturers. Meter faces still look like they did 50 years ago. Numerals are not upright. Index marks are oriented radially and unevenly, are too close together, and are often graduated so that they are difficult to read accurately. Often pointers are too long and too thick, so that scale marks and numerals are covered. Pointers are too far from meter faces, causing parallax. Numerals are obscured by bezels. Complex multiple scales are very common, resulting in frequent reading errors. Figure 1 illustrates the traditional meter with some of the common design errors noted.

Designers do not have to accept this continuation of traditional design. In recent years, a number of manufacturers have demonstrated an awareness of the operator and technician and have begun to apply good human engineering principles to the design of their products. Many improved designs are available. Figure 2 illustrates several newer instrument face formats.

Unfortunately, many of the new designs do not fulfill all of the human engineering principles within a single design. For example, a manufacturer may provide good scale format with acceptable spacing and upright numerals, but with a pointer that covers scale marks and numerals.

Use of digital readouts has been more common in recent years. Although the design of newer solid-state readout devices is more in keeping with good human engineering practice, mechanical, drum-type counters are still in use. These counters are notoriously poor. Deeply inset display face, improper lateral numeral spacing, and lack of illumination are some of their defects. More recent matrix-type digital readouts eliminate these problems but have introduced undesirable character shapes which cannot be read quickly or from a distance. Figures 3, 4, and 5 illustrate both good and bad features of typical contemporary digital readout displays.

The author suggested to a counter manufacturer representative that it would certainly help if the manufacturer would redesign his devices with the counter drums nearer the panel surface and with internal illumination so that they could be seen in typical work conditions. The representative's reply was, "We can sell our present products faster than we can supply them, so why should we go to the expense of a

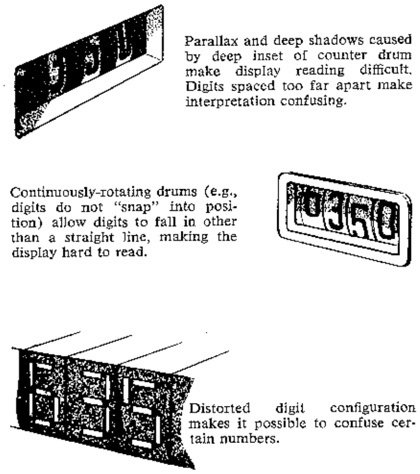


Figure 3. Common deficiencies which should be avoided in selecting off-the-shelf display hardware.

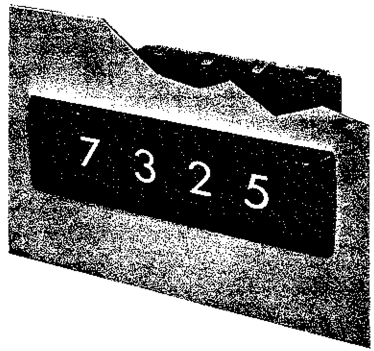


Figure 4. An off-the-shelf digital readout which provides good legibility and wide angle of view.

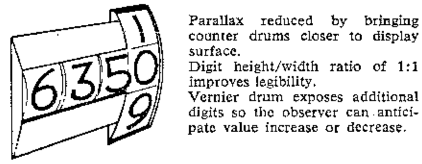


Figure 5. Improved mechanical counter display.

costly redesign?" This response indicates clearly that the consumer is not doing his part in demanding a better product.

Some consumers apparently do not know better. A recent article by an industrial engineer, for example, stated that the trouble with many new digital displays is that their numerals need "bolder stroke widths." From the specifications he gave, it was obvious he was not aware of the many legibility studies that demonstrate the value of proper stroke width for rapid, accurate letter and numeral recognition.

A related experience of the author involved a problem of specifying optimum numeral format and size for design of a classroom clock face. The specifications recommended by the author were followed by the designer, except that the designer decided, on his own, to make the stroke width of the numerals thicker than specified. He thought that the recommended stroke widths were not adequate because the clock face was to be viewed from a long distance. When the designer tried to read the clock face, he came storming back to the author complaining that something was wrong with the author's recommendations. Upon examination, it was obvious what the designer had done. When the designer's changes were corrected, legibility was once again restored.

CONTROL KNOBS

The tremendous variety of available control knobs for all types of applications not only provides an opportunity for good selections, but unfortunately, it also allows more freedom to make poor choices. Many manufacturers capitalize on the natural desire of designers to select components based upon aesthetic appeal. Not that this desire is to be ignored; rather, it is important to see that good human engineering is not compromised for the sake of appearance features. Such features, for instance, should not make it difficult to grasp the knob or to determine its position.

The most common fault appears to be that designers and some human engineers select the wrong type of knob for the job it is supposed to do. For example, they use a round knob when they should have used a pointer-shaped knob, and vice versa. With the variety of knob styles available, there is no reason to select a poor one. For example, there is no reason to select a pointer knob in which the position of the pointer is obscured when it is viewed from other than the normal line of sight, or one which provides insufficient gripping surface, particularly if the technician has to wear gloves or mittens. Figures 6, 7, and 8 illustrate some good and bad features of typical knob designs.

ELECTRICAL CONNECTORS

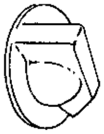
Some common problems created for the maintenance technician by poorly designed connectors are the following:

1. Connector elements are too small, with inadequate gripping surface to apply the gripping and pulling force required to separate elements.

2. Gripping surfaces are slick, making it difficult to apply necessary torque or force to separate connector elements.

3. Many multicable connectors actually require more force than the typical technician can apply.

4. Many connectors have sharp edges or protruding elements which are not only uncomfortable but may cause injury when necessary forces are applied.



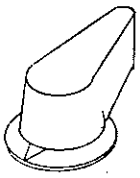
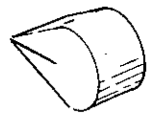


Figure 6. Typical control knob design errors.



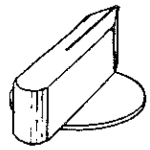
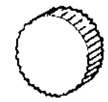


Figure 7. Knob shapes which provide clear indication of which is the pointing end.



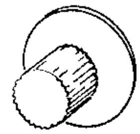


Figure 8. Gripping characteristics of knobs.

Figures 9, 10, and 11 illustrate some of the typical problems created by various connector designs.

It should be noted that the foregoing discussion has purposely excluded a number of often-discussed problems of connector usage such as damage to connector pins and mismating. These design problems are covered in a number of the cited references. A particularly good article on these subjects, suggested for further reading is by Seminara and Weinstein (1964).

FASTENERS

A common fault with many current fasteners is the incompatibility between fastener element size and the forces required to manipulate them. There is an obvious desire on the part of the manufacturer to make such components small and unobtrusive. However, regardless of how ingenious the fastener design may be from the standpoint of miniaturization, mechanical efficiency or simplicity, if the technician has difficulty getting a finger under a lever element, he may waste considerable time or injure his fingers trying to manipulate the component. Very few fasteners provide such aids to manipulation as serration or knurling. Many are designed so that it is not immediately obvious how they work. Some are designed so that during the unfastening process, elements of the fastener interfere with succeeding manipulative steps. Worst of all, many fasteners are designed so that it is easy for the technician to believe that he has secured the fastener when in actuality he has not.

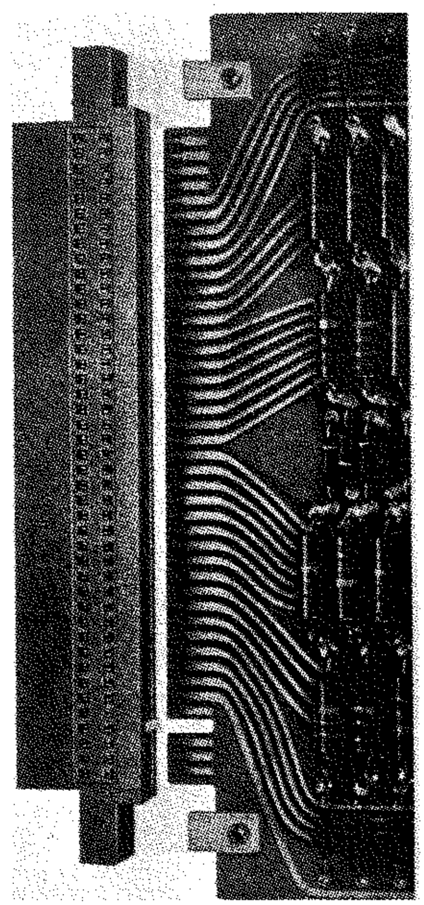
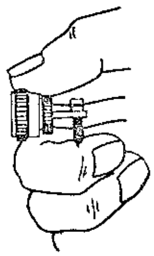
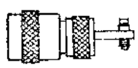


Figure 9. A multicircuit board connector showing lack of concern for technician task of gripping and pulling connector elements apart.

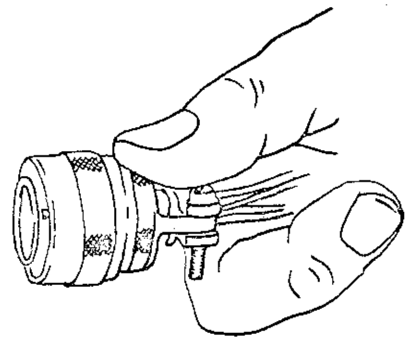


Some connector designs provide too little gripping surface and elements of the connector (including screws) cut into the technician's fingers.
Although serrations aid in unfastening the connector, they are of little help in pulling the connector free.

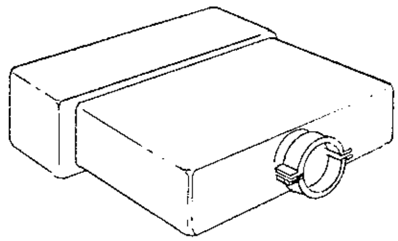


Surface area should be larger and knurling provides both rotating and pulling assistance.

Figure 10. Connector design problems.

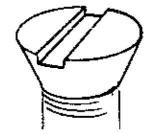


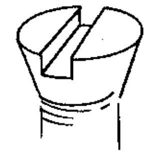
When the technician rotates connector elements or trys to pull the connector apart, his fingers contact the long retainer screws.



The ultra-smooth connector case provides no means for keeping the fingers from slipping off the connector.

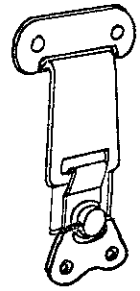
Figure 11. Connector hardware use problems.





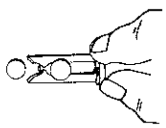
Human engineers should even concern themselves with the depth of the slot in simple machine screw fasteners in order to simplify the eventual maintenance task.

An otherwise satisfactory fastener may be poor when it is too small. There is a tendency to miniaturize everything, not recognizing that the technician's hands stay as they are.

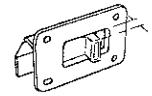


Some fasteners become bottlenecks inadvertently when an attempt is made to design them so they do not protrude from the equipment package. In the case shown, the butterfly handle is difficult to erect since there is no finger clearance.

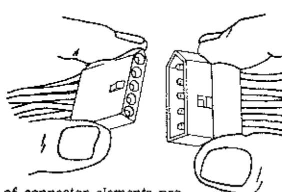
Figure 12. Fastener design problems.



Fastener elements are too small to grip or apply force easily and comfortably.



Slide tab is forshortened by the bezel leaving too little exposed for adequate gripping.



Shape of connector elements provide no effective gripping interface.

Figure 13. Fastener design problems.

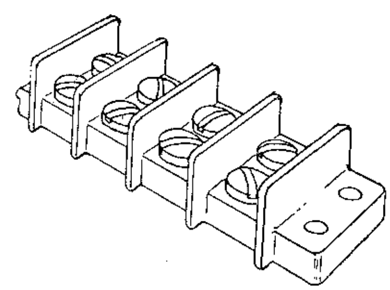
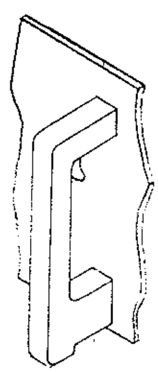
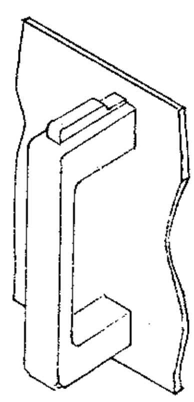


Figure 15. Terminal block which shows poor design characteristics with regard to labeling.

Trigger device may be annoyance while carrying chassis although it is convenient when chassis is in the rack.

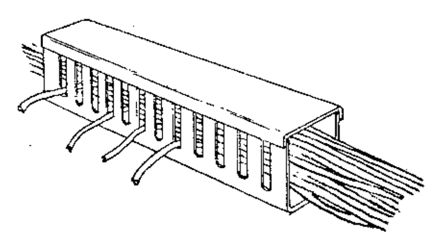


Trigger device out of the way for carrying the chassis, but less convenient when chassis is in the rack —especially if the chassis is mounted shoulder level or above.

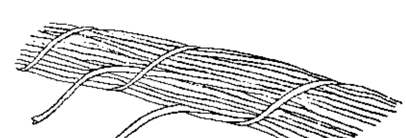


Note that both of these handles are designed with relatively sharp edges which are undesirable for carrying heavy chassis assemblies.

Figure 14. Combination latch handles.



New Methods for Organization and Distribution of Cable and Wire.



Traditional Method for Cable Bundling.

Figure 16. New components with simplified wiring organization.

In a number of new designs the component serves as both fastener and carrying handle. Some fastener/handle designs are quite successful, whereas others may serve one function well but fail to accomplish the other. In selecting such devices, the designer and human engineer must be cognizant of the several technician tasks: i. e., pulling the chassis from a rack, carrying the chassis, and placing the chassis on a workbench. Figures 12, 13, and 14 illustrate a number of fastener problem areas.

Many recent fasteners seem to be designed more for ease of production and assembly than for maintenance technician use in the field or on the workbench. When selecting fastener components, designers and human engineers should not be misled by manufacturers' glowing sales discussions of the merits of "ease of component manufacture." Rather, designers should look for those features which simplify the maintenance technician's task.

WIRING TEMINALS

Considerable ingenuity has been shown by terminal manufacturers in recent years. There are perhaps more intriguing types of electrical terminals available today than of any other component. When these terminals are examined closely, however, it can be seen that much more attention has been paid to such concerns as modular assembly and production flexibility than to the problems of the maintenance technician.

The ease with which a terminal attach point can be identified and a wire inserted, removed, or fastened securely, appears to be a secondary design objective. Manufacturers do not seem to have anticipated the eventual space or the positional problems associated with typical use of their components. Although the component looks good in the catalog, it may be very inconvenient to use in the final assembly. Obviously, the selection of an appropriate terminal component must be considered jointly with selection of wiring attachment hardware. This is particularly important when many very small wires must be attached and removed. The technician's hands and fingers cannot cope with component elements which are too small, or which are crowded too close together. Also, whether we like it or not, illumination will often be less than optimum. The technician's visual limitations must be considered with regard both to his ability to see well enough to insert and fasten the component and his ability to identify the proper terminal. Labels (i. e., terminal identification) may be logically oriented for the assembly on the production line but be practically useless to the technician as he views the assembly in the field or on the workbench in the maintenance van.

A great many terminal components are still stencil-labeled or embossed with raised characters but without application of contrasting color. If labels are important enough to put on the component, they should be correctly applied. Figures 15 and 16 illustrate terminal component and use problems

CABINET AND CHASSIS DESIGN

Seldom do human engineers bother to get involved in the selection of off-the-shelf cabinetry or chassis. As a result, maintenance technicians have to put up with annoying little problems such as sharp corners and edges and chassis slides which stick, fall out inadvertently, or which are difficult to reassemble. A number of off-the-shelf products are designed so that it is possible to "create" a desk-type console. Although some of these designs provide modules which adhere to human engineering recommendations for proper writing surface height, control panel slope, and so on, many do not. When the human engineer fails to get involved in initial selection of such modular components, he may have to settle for less than optimum work station configurations.

Human engineers also fail to "get their two-cents in" when features inside such cabinetry are designed. Although human engineers tend to do a good job when considering an operator work station, they often ignore the maintenance technician interface problems in cabinet selection. Manufacturers almost invariably take more pains finishing cabinet exteriors (i. e., removing sharp edges, metal burrs, etc.) than they do cabinet interiors, the maintenance technician's primary work area. Similarly, manufacturers give considerable attention to ease of operation of drawers and so forth, which may be used by a console operator, but give much less attention to access doors used by the maintenance technician. Typical problems are: improper fit of doors, too many fasteners that require special tools and a lot of time, lack of proper handholds or handles, exposed fastener elements which snag clothing or hands, poor illumination conditions inside the cabinet, difficulties in cleaning, and awkward handling characteristics for installing or repositioning the cabinet. Figures 17 and 18 illustrate a few of the common deficiencies found in cabinet/chassis product design.

HANDLES

In too many cases human engineers as well as equipment designers fail to consider the use of handles at all. It has been common practice for years to force maintenance technicians to carry chassis by basic structural elements rather than provide special handles or handholds for this purpose.

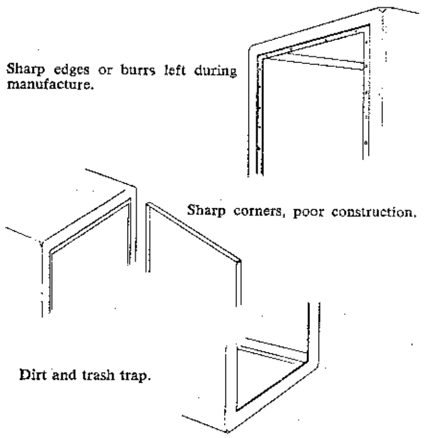


Figure 17. Problems in stock cabinets.

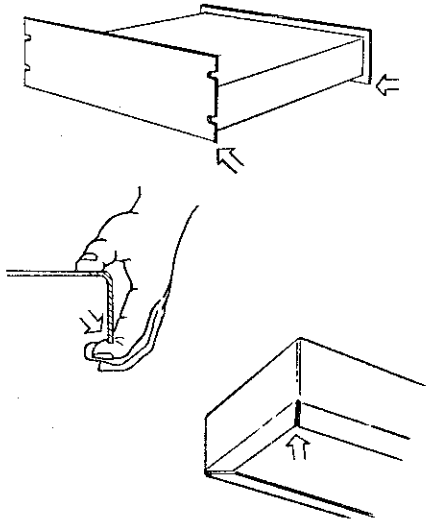


Figure 18. Sharp corners and edges which hamper maintenance task on standard chassis.

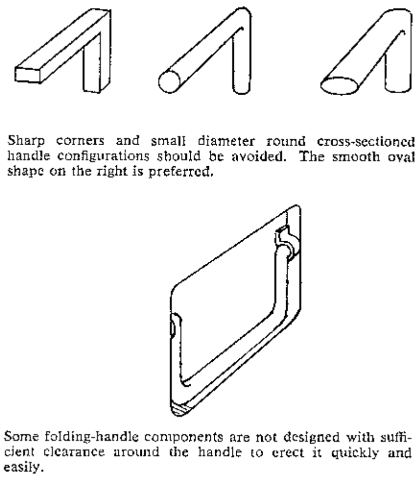


Figure 19. Equipment handle considerations.

Handles, by virtue of their intended use, should be designed to fit the hand. Too often, however, off-the-shelf handles appear to be designed as decorative appointments Many products do not provide enough clearance for a large hand, particularly if there has to be a glove on it. Frequently the shape of the handle is such that edges cut into the technician's hand or fingers when a heavy package is being carried. The desirability of an oval cross-section handle was recognized by some manufacturers quite a few years ago and such a handle is now available from numerous sources. Yet, many recent equipment designs still incorporate traditional handles which are too small in diameter, have a round or square cross-section, or provide insufficient clearance for the right number of fingers commensurate with the load-carrying requirements. Almost none of the off-the-shelf handle designs provides any special aids for gripping. Folding handle configurations are often such that once they are folded in the stowed position, it is extremely difficult to erect the handle due to lack of finger clearance. Figure 19 illustrates some of the design features which should be considered in selecting an appropriate handle. Other dimensional criteria may be found in a number of human engineering references (e. g., Woodson and Conover, 1964).

LABELING

For many years the labeling of components was done primarily for the benefit of the manufacturer to aid stock and shipping clerks in identification. Common practice was to stamp labels on components in a haphazard manner using rubber stamps or stencils. Lately, there has been a trend toward more permanent and businesslike labeling. Many parts even have identification labels cast into certain components, the letters and numerals being raised to prevent their being marred by normal wear and tear. Along with these improvements, manufacturers of special labeling products began to appear. Concurrently, system manufacturers developed their own labeling procedures to augment the labeling on components they purchased. Human engineers may have had some part in stimulating these improvements in labeling. They were not satisfied with illegible labels, those which might appear upside down, and those which could be obliterated by normal use, or with application techniques which did not provide sufficient visual contrast under poor lighting conditions.

In spite of improvements, however, a disturbing number of final product designs exist in which labeling of components is not satisfactory. For example, some manufacturers persist in making their company identification more prominent than the identification number of a part, a panel, a display, or a control. In many cases, there is still insufficient visual contrast between label characters and the surface background. Labels are still placed so that they are partially obscured from view by component obstructions. Even human engineers have not been able to get component manufacturers to put the name of a component on the product: technicians have to recognize parts either by their number or shape. Many components have labels which are visible before they are installed, but which become obscured after they are mounted in an equipment or after wires or cables are attached to the component. In some instances, assemblies are wired on a shop bench so that labels are oriented correctly, but when the assemblies become part of a system, cabinet, or vehicle, the technician sees the labels upside down.

It has been the experience of the author that human engineers and designers frequently believe that their job relative to labeling ends when they have determined and spelled out requirements for nomenclature and type style. They do not follow the entire packaging process to see that the proper labels appear as they should on the final equipment. Designers and human engineers should become thoroughly familiar with labeling materials and processes and make certain that the user's needs are met.

SUMMARY

From the foregoing discussion, it can be seen that a number of commonly used hardware items interface directly with the maintenance technician. Some manufacturers have taken steps to improve the man-machine interface characteristics of their products, others have not. In selecting off-the-shelf components, designers are not careful enough about the man-machine aspects of their selection. Although they may be meticulous in their selection relative to engineering performance characteristics, they appear to exert little care in selecting features which make the maintenance technician's job easier.

Human factors engineers have been developing criteria to guide designers, but like designers, they often accept the excuse that we are stuck with components as they are. The point here is that there are components which are equivalent to others in terms of physical performance but which are better human-engineered. Human engineers, then, need to become better informed about available off-the-shelf hardware so that they can participate in component selection and application.

Human engineers can become better informed by constantly reviewing the component-hardware field. This can be done by reviewing trade magazines, requesting manufacturers' brochures and catalogs, and developing a small component museum. Some of the recommended trade magazines are Design News, Electronic Packaging and Production, Electronic Design, Electronic Products, Electrical Equipment Product News, and Instruments and Control Systems. From these magazines the human engineer can identify components which appear to possess good human engineering attributes Manufacturers' brochures and catalogs should be maintained in an up-to-date file. Many manufacturers will also supply sample components which the human engineer should examine and assess. In this way he will know what to recommend and will be able to supply his engineering and design colleagues with pertinent performance and pricing information; in addition, he will prove to be a more useful and acceptable member of the engineering community.

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Distinguished Service Award

The highest award that can be given a member of the Engineering Design Graphics Division, the Distinguished Service Award, was awarded to Edward W. (Jack) Jacunski of the University of Florida, Gainesville, Florida. This award is given annually to a member of the Division who has distinguished himself by outstanding service and dedication to the goals and objectives of the Engineering Design Graphics Division.

Chairman Bill Rogers made the presentation to Jack Jacunski at the annual meeting held in June at Iowa State University, at Ames. Shown below and at the right is the letter and certificate presented to Professor Jacunski.

Jack Jacunski is a past chairman of the Engineering Design Graphics Division and was instrumental in much of the forward progress made by the division during the past years.

Distinguished Service Award

Presented By

The Engineering Design Graphics Division

Of The

American Society For Engineering Education

The Presentation Of This Award Acknowledges

The Many Outstanding Services Of

Edward W. Jacunski

Presented This Twenty-sixth Day Of June, Nineteen Hundred Seventy-Three

William B. Rogers
Chairman Of The Division

Secretary Of The Division

The Division of Engineering Design Graphics

AMERICAN SOCIETY FOR ENGINEERING EDUCATION

presents its highest honor,

The Distinguished Service Award

to

EDWARD W. JACUNSKI

for his invaluable contributions during the many years of his association with our Division.

Edward W. Jacunski, or "Jack" as he is warmly known to the Division members, provided enlightened leadership in his elected capacities as Chairman in 1966-67, Vice Chairman in 1965-66, and as a working member and chairman of various Division Committees.

One of Jack's major contributions to the work and development of our Division was the role he played as Chairman of the Division and as a member of the "Certified Design Consultant" Committee in helping to promote the Creative Design Displays at the Annual Conferences of the Society. These displays are now a regular and significant part of the Annual Conference, and have stimulated renewed interest in engineering design education throughout the Society and beyond.

Jack has always been an active and vibrant member of the Division who got the job done with amiability and a feeling of friendship and awareness of what is important.

We express our deep appreciation for the leadership and inspiration Edward W. Jacunski has given to our Division by presenting him with our Distinguished Service Award for 1973.

June 26, 1973

WILLIAM B. ROGERS
CHAIRMAN
Virginia Polytechnic Institute & State University

KENNETH E. BOTKIN
VICE-CHAIRMAN
Purdue University

ROBERT D. LaRUE
SECRETARY
Ohio State University

Deaths

JAMES S. RISING 1903-1973

James S. Rising, 70, former chairman of the Engineering Design Graphics Division and head of the Department of Engineering Graphics for 17 years at Iowa State University died on Saturday, June 9, 1973 after an extended illness.

Professor Rising was a member of the Iowa State University faculty for 22 years and had retired from the faculty on May 31. He was named Professor Emeritus on June 1, 1973.

Professor Rising was born on June 7, 1903 at Kanona, New York and graduated from Haverling High School in Bath, New York. He received the ME degree from Rensselaer Polytechnic Institute in 1925 and earned an MS degree from New York State College for Teachers in 1936.

Prior to his appointment at Iowa State University in 1951, he was an assistant professor at Rensselaer Polytechnic Institute from 1925 until 1945 and an associate professor and department head at Syracuse University from 1945 until 1951.

Professor Rising was Chairman of the Engineering Design Graphics Division in 1958. In 1960 he received the Certificate of Honor and Citation from Rensselaer. He received the Distinguished Service Award from the American Society for Engineering Education, Division of Engineering Graphics in 1966. He was also a member of the American Society of Mechanical Engineers. He worked extensively in preparing materials which were subsequently adopted by the American National Standands Institute. Numerous editions of texts and problem books in the field of Engineering Graphics were authored by him.

Survivors include his wife, Mildred; two sons, Edward J. and Donald M.; seven grandchildren and a brother, Col. Harry M. Rising, retired.

MILTON L. ROGNESS 1910-1973

Milton L. Rogness, 63, Associate Professor of Architecture at Iowa State University died at his home, 1904 Hunziker Drive, on June 14, 1973.

Professor Rogness, "Milt" to his many friends, was born January 10, 1910 in Astoria, South Dakota. He received a teachers certificate from Augustana College, Sioux Falls, South Dakota in 1929. In 1938 he received his Bachelor of Interior Architecture degree from the University of Minnesota and in 1954 he received an MS degree in Architectural Engineering from Iowa State University.

Most of Professor Rogness' adult life was spent in the teaching profession. During the years 1929-1934 Prof. Rogness taught in the Brookings County, South Dakota public schools. He was employed in Minneapolis and St. Paul before joining the Iowa State University faculty as instructor in 1940.

After five years at Iowa State University he spent three years in Evansville, Indiana as a Product Designer and two years in Astoria as a retail store manager.

In 1950 he returned to Iowa State University where he taught Engineering Graphics, advised engineering students and was coordinator of advising in the College of Engineering.

Prof. Rogness served as Secretary-Treasurer of the North Midwest Section of ASEE in 1960. He was the co-author of two books.

Professor Rogness is survived by his wife, Ruth, and three daughters. A Memorial Fund in the name of Milton Rogness has been established at Saint Andrews Lutheran Church in Ames, Iowa.

WALTER W. DEVANEY

Walter William DeVaney, a longtime faithful of the EDG Division, died of cancer on December 1, 1972 after about a year's illness.

Mr. DeVaney was born and educated in Florence, Alabama. He moved to Texas in 1929 to work in the construction of oil refineries and gas compressor stations which were being built in the Texas Panhandle. He was construction superintendent for such companies as Kellogg, Fluor, and H. K. Ferguson, and piping superintendent for Stone and Webster on the Savannah River Project. For the last seven years Mr. DeVaney worked with Procon, Inc. in both their foreign and domestic divisions.

Walter DeVaney was a member of the Methodist Church and the Elks Lodge. He is survived by his wife, Amogene DeVaney; two sons, Will E. and David B.; and five grandchildren.

ARTHUR W. LEIGHTON 1894-1973

Arthur W. Leighton, 79, a professor of engineering at Tufts University for nearly 50 years, died at his home in Medford, Massachusetts on March 12, 1973.

Dr. Leighton taught in the Engineering Graphics and Design Department at Tufts from 1917 through 1963, after which he became professor emeritus.

Although he began his undergraduate education at Tufts but never completed it, he was made an honorary member of the engineering class of 1917. He received his A.B. degree at the University of Massachusetts in 1921 and his master's and doctor's degrees in education at Harvard in 1924 and 1932 respectively.

At Tufts he was advisor to the freshmen engineering classes from 1931 through 1960 and director of counseling for the College of Liberal Arts and Jackson College from 1946 through 1948. He spent much of his time with freshmen engineering students, assisting them with the early difficulties that they faced at the University, and he kept track of them through their university years and on into their professional careers.

During World War II, Dr. Leighton served as director of the Veteran's Center at the Tufts School for War Veterans. Dr. Leighton also taught at the Huntington School in Boston for one year (1921-22) and at the University of Maine for three years (1914-1917).

He was a director of the Hillside-Cambridge Cooperative Bank of Medford; moderator of the North Street Union Congregational Church of Medford; a director of the American Congregational Association and Chairman of the Congregational Library Committee of Boston.

He leaves a son, Arthur W. Leighton, Jr. of Alhambra, California.

Rising Memorial

At the EDG Division ASEE, Executive Committee breakfast at Iowa State University it was voted to accept the James S. Rising Memorial Award established by Mrs. Rising (Milly) and her two sons Edward J. (Ted) and Donald M. (Don) Rising.

In the words of Ted - "We would like to set up a memorial to Dad. We can't think of a more fitting way to honor him, recognize the department which was such a large part of his life, and aid the profession than provide an annual student prize in the Creative Design Contest of the Engineering Design Graphics Division of ASEE.

It is our intention to eventually set up a fund for this prize so it will continue in perpetuity, but for the present we will guarantee a prize of $100 each year for the next five years...We propose that the Awards Committee of the Engineering Design Graphics Division of ASEE administer the funds to be used for a student(s) in any manner they think would best forward the purpose that my father worked for during his life. We would like the award citation to make three things clear: First, that the prize is in memory of Professor James S. Rising; second, that it is presented through the Department at Iowa State University that meant so much to him; and third, that it is presented by his family..."

A check for the first $100 award was presented to the Division Chairman at the Annual Awards Banquet at Iowa State University--the actual award to be made at Rensselaer in June, 1974.

PAPERS

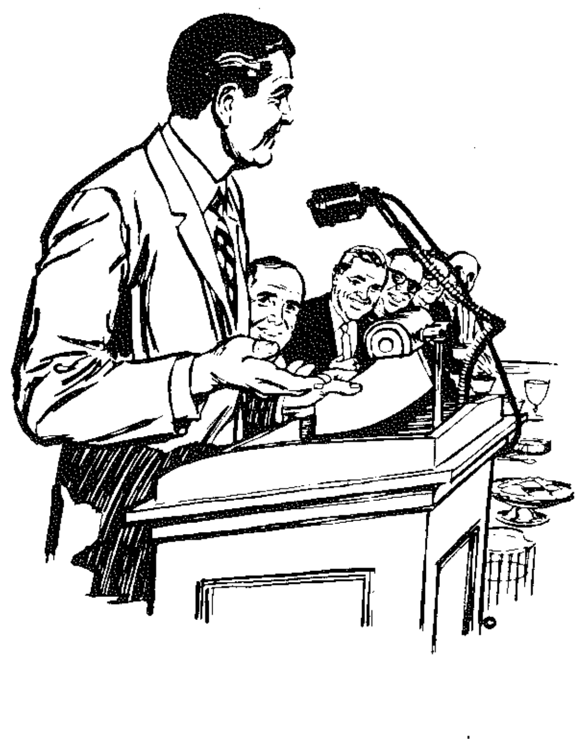
Organizers are expecting about 4,000 people to attend next year's ASEE conference at Rensselaer Polytechnic Institute June 17-20. Organizational activities have been underway for over two years to prepare for the 1974 conference and the 150th anniversary of the founding of RPI in Troy, New York. Next year's conference theme will be "Resources and the Quality of Life."

Gordon Sanders, chairman of the Program Committee for the Engineering Design Graphics Division is diligently preparing our part in the program twelve months---Oops!---eight months hence. Indeed, it is not premature to "call for papers."

Persons interested in presenting a paper at our annual meeting should contact:

Professor C. G. Sanders, Chairman
Department of Engineering Graphics
403 Marston Hall
Iowa State University
Ames, Iowa 50010
Phone (515) 294-3117

A short abstract of the subject area should accompany the request.



ANNUAL MEETING

Highlights of the EDG Division meetings were so many and so bright it seems that it was "high noon" at Iowa State University for four days during the ASEE Convention!

There was such an overflow crowd at "The Move to Metric" session on Monday afternoon that the meeting had to be moved a few meters away to a more spacious auditorium (By any measure--it was a great session). The barbequed chicken at the Family Picnic held in the beautiful and cool coliseum was greasy but good.

Rap Session II got off to a rousing start in Carver auditorium and continued in even more "spirited" discussions at the Rathskeller Lounge at the Cave Inn until the wee woozy hours of Tuesday, AM.

On Tuesday the Plenary Session for all divisions of the Society was held in C. Y. Stephens Auditorium. The play, based on an original written by Paul Barcus of Iowa State, was reported as being both unique and outstanding.

The traditional Business Luncheon was held in the plush Campanile Room in the Memorial Union. It was well attended and well conducted as usual. After the luncheon, new records were set for the 300 meter march to Coover Hall to attend the presentation on Geometric Tolerancing--a sudden rain shower tested wash and wear clothing and the perambulatory proficiency of those caught halfway between coming and going--but that did not seem to dampen their enthusiasm or tolerance for the excellent presentation on tolerancing that followed.

The Annual Awards Banquet capped a very eventful Tuesday and included the excitement of the presentation of the Distinguished Service Award to Jack Jacunski, his response, the announcements concerning the winners of the Creative Design Display Contest, the establishment of the James S. Rising Memorial Fund and the most amusing cartoon capers of Pulitzer Prize winner Frank Miller which seemed to hit a very responsive chord with everyone attending.

Wednesday's first session, Listening to the Voices of Smaller Industries on Engineering Education, was a great beginning for a great day.

After introductions the panelists each gave a brief description of the industrial situation they represented with some general comments about the type of engineer that would best fit into their operation. Though the panelists represented a wide variety of engineering environments, there was agreement that engineers in smaller industries are less specialized than in larger industries. In the smaller industries there is little tendency to fund basic research, although one company did have a program going in the chemistry of plastic materials.

The discussion period produced enlightening ideas on some specific topics. One point that was brought out concerned the engineer's ability to express himself. The panelists were emphatic that this is one area in which engineering students need much better training. Another topic discussed at length was statistics on which there was not good agreement. Some felt their engineers used statistics effectively in their work, and others did not feel their engineers used statistics formally at all. There was agreement, however, that Graphics is an important subject for engineers in smaller industries, and there were comments that they need much more experience in reading and understanding drawings.

It seemed apparent that both the audience and the panel enjoyed the program and benefited from it. The discussions were lively, spirited, and going strong when it was necessary to terminate the program at the end of the allotted time.

No rice was thrown (and only a little corn) during the "Marriage or Media" ceremonies. Sanders, Eide and De Jong, of Iowa State University, explained some of their primary objectives and procedures concerning the utilization of Media in their department, after which, tours of the Departmental facilities and those of WOI TV were conducted. Those attending appeared to be genuinely interested and pleased with the entire program.

The New Users-Computer Graphics session on Thursday closed out the formal meetings for the Division.

From the inside--it seemed to be a very worthwhile program, each session being very well attended; and though we "were glad it was over," we were also glad it was our good fortune to extend the facilities and courtesies of our department and our campus to all of you very wonderful people who converged here during the convention. Thanks for the memories--and see y'all in New Orleans and ahoy, Troy!

Gordon Sanders
Paul De Jong
Joe Crawford

L.A. Contest

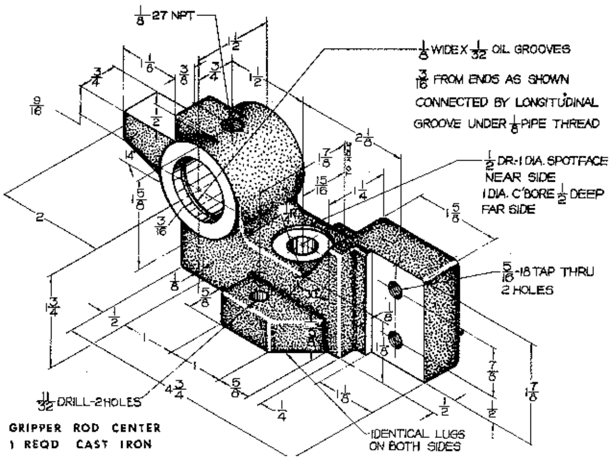
The Los Angeles Trade Technical College sponsored its second annual High School Drafting Contest to foster interest in the Trade Tech drafting program. Mr. George F. Brassine, Coordinator of the Department of Drafting Technology at the Los Angeles Trade Technical College, organized the contest which is coordinated in the Los Angeles High Schools by Mr. Harry M. Piefer. Eighty-eight (88) schools in the Los Angeles City and Community College districts are eligible to participate. This spring twenty (20) schools sent 94 drawings to be judged in the contest.

Each contestant was presented the isometric drawing illustrated in Figure 1, and the contest rules that follow:

1. A pencil drawing is to be made on vellum (special preprinted vellum furnished by Dieterick-Post Company).

2. The student is to select the necessary views which clearly describe the object. Sectional and partial views are to be used as appropriate. The drawing is to be fully dimensioned. Select a suitable scale.

3. All lettering is to be done freehand, vertical or inclined capitals.



The drawings were critiqued by a judging team consisting of the following persons: John Righettini, Byron Jackson Pump Co.; Carl Berglund, Jet Propulsion Laboratory; Ralph Price and Stanley Milic, Los Angeles Trade Technical College.

Awards were arranged by Robert Blumin, President of the American Society of Engineers and Architects, and were presented by Stanley Nelson, Vice President of ASEA.

The winners are pictured in the above photo. Pictured from left to right are: Bron Roylance, Verdugo Hills High (First prize-$100 bond); Jay Stephenson, Verdugo Hills High (Fifth prize-$25 bond); Mr. Maurice Levin, Verdugo Hills High (Instructor); Alan Kawasaki, Verdugo Hills High (Third prize-$50 bond); James Marineau, El Camino Real High (Second prize-$50 bond); Steve Block, North Hollywood High (Fourth prize-$25 bond); Mr. Keith Rogers, North Hollywood High (Instructor).

Information for the above article was submitted by Herbert H. Gernandt, a member of the technical staff, Design Section, Jet Propultion Laboratory. He is also a member of the Advisory Committee for Mechanical Drafting at Los Angeles Trade Technical College.

NOTE

TO: All Fellow Members of the EDG Division

FROM: Bob Hammond

All of us should soon receive, if we have not already, a copy of the Division's new By-Laws as adopted at the 1973 Annual Conference. Please go over them in detail, looking for errors, mistakes, and omissions. Those of us who worked preparing the new By-Laws believe that we thought of everything, but sometimes I wonder if we were not so deep in the forest that we could not see the trees. Please send any comments and corrections that you discover to me, c/o the Freshman Engineering and Student Services Division, School of Engineering, North Carolina State University, Raleigh, NC 27607.

DESIGN DISPLAY AWARDS

Over 30 entries were displayed in the Sixth Annual Student Creative Design Display held in the Hilton Coliseum Monday, Tuesday, and Wednesday of this week. Sponsored by the Engineering Graphics Division for the last six years, the Display has attracted increasing participation from students throughout the country. Several of the previously displayed projects have been accepted for commercial production.

This year's display drew over 30 student entries. Representatives from industry and education judged the entries last Tuesday and announced the following awards:

Freshman Division

1st Prize: University of Detroit - Rhomboid Pattern
2nd Prize: Arizona State University - Converter for Magnetic Tape Storage
3rd Prize: Iowa State University - Safety in Auger Equipment

Sophomore Division

1st Prize: University of Wisconsin-Milwaukee - Toys for Creative Play
2nd Prize: University of Missouri-Rolla - Joy Stick Control System for a Mid-Sized Boat

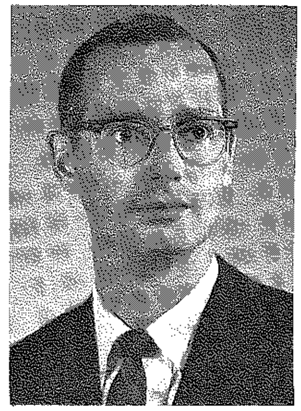
Junior Division

1st Prize: Northeastern University - Initial Attack Vehicle
2nd Prize: Virginia Polytechnic Institute and State University - Aero-Aquatic Vehicle
3rd Prize: North Carolina State University - Computer Graphics Design of Geodesic Dome Structure

Senior Division

1st Prize: University of Dayton - Neighborhood Development Plan
2nd Prize: Milwaukee School of Engineering - Oscilloscope Fabrication
3rd Prize: Louisiana State University - Computed Animation

STAFF



FOSTER

HILLIARD

Associate Editor Bob Foster, Pennsylvania State University, is responsible for soliciting articles of interest to the Journal and for having articles reviewed by experts in the field. Bob will serve also as a coordinator for special editions of the Journal that pertain to specific areas that will be featured in the Journal.

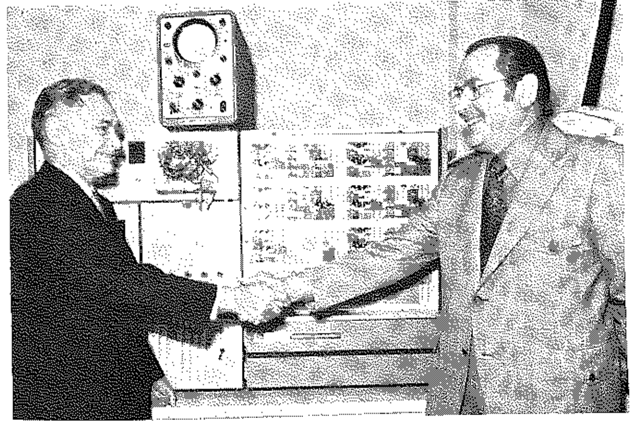
Assistant Editor Garland Hilliard Jr., North Carolina State University, is the Journal's coordinator of Division business. Current topics, meetings, and general happenings that concern our membership may be directed to Garland.

HALL

KEARNS

Clarence Hall, Louisiana State University, is responsible for advertising for the Journal. Prospective advertisers are encouraged to contact Professor Hall.

Clyde C. Kearns, The Ohio State University, is Circulation Manager and Treasurer of the Journal. He is responsible for the development and maintenance of the Journal's extensive subscriber list and the solicitation of new subscribers. Applications for subscriptions should be forwarded to Professor Kearns.



ACES MERGES WITH ASEE TO FORM COED

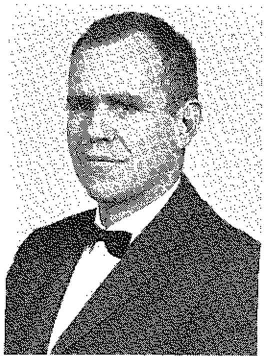
John Curtis (left), Executive Secretary of the Analog/Hybrid Computers in Education Society and ASEE Executive Director, Leslie B. Williams join in a symbolic handshake in front of an EAI, Inc. hybrid computer to symbolize the merger of ACES and ASEE. ACES and the ASEE Computers in Education Committee will form the basis of a new ASEE division, the Computers in Education Division (COED), which came into being on January 1, 1973. Mr. Curtis, former Executive Vice President of EAI is Secretary-Treasurer of the newly constituted division.

PRODUCTIVE GRAPHICS?

Those of us who are engaged in teaching basic drawing to engineering students are quite aware that most courses (with few exceptions) as now structured are primarily concerned with Reproductive Thinking. They stress (1) having students record, via drawings, the solutions of prescribed problems that generally require one correct answer, and (2) analyzing given known data by various graphic methods. The student engineer should possess such basic communicative knowledge. However, little emphasis is placed upon eliciting ideas, generating imagination, solving "open-ended" problems, or in short, developing the student's Productive Thinking capabilities. Dr. Bill Vander Wall of North Carolina State University is in the process of developing an additional graphics course which integrates and stresses visual activities essential to productive thinking. Prime emphasis is placed upon observation, imagination, and idea sketching. The course will aim at developing the students' visual skills and their application toward solving "open-ended" problems of varying degrees of difficulty. It stresses creative ideas and imagination over techniques and, therefore, would serve as a supplement to most of our basic graphics courses.

The following nominees have been submitted for the offices listed below for 1974-75. Ballots will be mailed shortly after February 1974.

VICE-CHAIRMAN

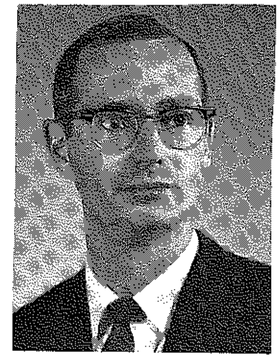


Robert D. LaRue, Ohio State University

Professor LaRue received his B.S. and M.S. in Mechanical Engineering at University of Idaho and is a registered professional engineer.

Bob has been an active member of the Engineering Graphics Division since 1956. He was Circulation Manager and Treasurer of the Engineering Design Graphics Journal and has served on numerous committees within the Division. He has played major roles as co-chairman of the Design Display and also has served as co-chairman of the Self Study Committee. He is a past Secretary of the Division and an active member of the Computer Graphics Committee for several years.

He is presently professor of Engineering Graphics at the Ohio State University.



Robert J. Foster, Pennsylvania State University

Dr. Foster received his Bachelor's Degree in Mechanical Engineering from Pennsylvania State University in 1956. He joined the Department of General Engineering in 1959 as an Instructor of Engineering Graphics at Pennsylvania State University. He is presently in charge of Engineering Graphics at that university.

He has considerable industrial experience working for the Bendix Corporation and the Naval Research Laboratory and for Erie Technological Products.

Bob has been an active member of ASEE in the Engineering Design Graphics Division. He was coordinator of the Creative Design Display for the annual meeting held in 1969.

He has been active as an author producing a number of papers for the Engineering Design Graphics Journal.

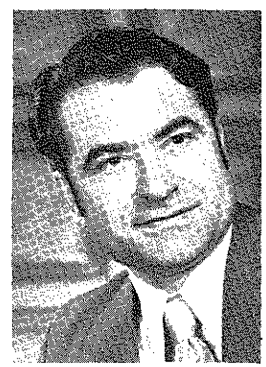
SECRETARY-TREASURER

Burt Fraser, University of Houston

Professor Fraser has been a member of the ASEE since 1950 and has been an active member of the Engineering Design Graphics Division. He is in charge of the Engineering Graphics at the University of Houston since 1963.

He has served as consultant to India for design drafting. He was general chairman of the Gulf-Southwest Section ASEE Meeting in 1969 and chairman of the Gulf-Southwest Section in 1969-1970.

He was co-chairman of the National Design Graphics Meeting in 1970-1971 and chairman of his local ASEE chapter in 1972-1973.



Paul DeJong, Iowa State University

Professor DeJong received his Bachelor's Degree in Mechanical Engineering from Iowa State University in 1960. He is a registered professional engineer in Iowa and South Dakota.

He has had industrial experience as a private consultant, design engineer, draftsman and designer, and a cartographic draftsman.

Paul joined the Iowa State University Engineering Graphics Department in 1966. He is a co-author of Engineering Graphics and has made many contributions to the Engineering Design Graphics Journal.

CIRCULATION MANAGER AND TREASURER

EDG JOURNAL

J. Timothy Coppinger, Texas A&M University

Professor Coppinger received his Bachelor's Degree and Master's Degrees form Texas A&M where he is presently completing his Doctoral Degree in Architecture. Professor Coppinger has been a member of ASEE during the past three years. He is a registered profesionsl engineer.

He has served in the Department of Engineering Design Graphics in many capacities and has been responsible for the development of several new courses. He is a past member of the Industrial Relations Committee of the Division. He has interests in Computer Graphics and has developed and taught this course at Texas A&M.

Clyde Kearns, Ohio State University

Professor Kearns received his Bachelor of Chemical Engineering from the Ohio State University in 1942. He joined the staff of the Engineering Graphics Department at Ohio State in 1946 and has progressed through all ranks and was recently named Head of the Department of Engineering Graphics. He has had teaching assignments in the Deaprtment of Computer Science and Chemical Engineering as well as Engineering Graphics.

His industrial experience includes several positions as project engineer and design engineer with companies such as Pennwalt Corporation, Union Carbide, and North American Rockwell Corporation.

He is the present Circulation Manager and Treasurer of the Engineering Design Graphics Journal

He has been active in research developing programs for computer graphics. He has been active as an author publishing a number of articles for professional journals.

DIRECTOR

Klaus Kroner, University of Massachusetts

Began his teaching career in January of 1950 at New York University as an instructor of Engineering Drawing and Descriptive Geometry. Held a similar position at the University of Maine between 1955 and 1957. At present he is an Associate Professor in the Civil Engineering Department.

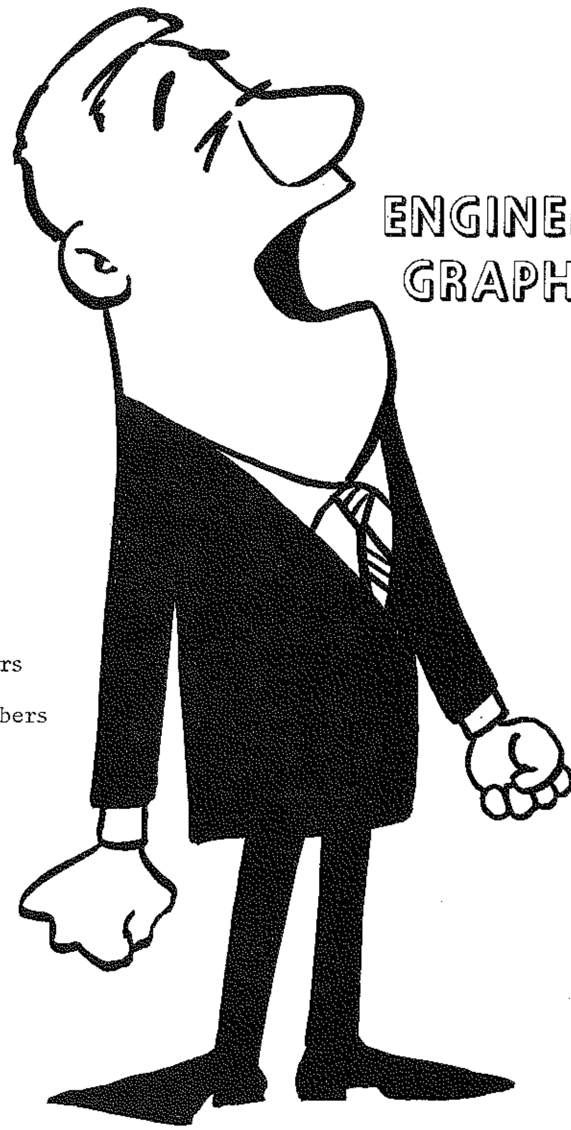
Professor Kroner has been a member of ASEE since 1953 and has held several positions in the Engineering Design Graphics Division, such as membership on Committee on Aims, Scope and Status(1960-1963), Teaching Techniques Committee (1960-1970), Educational Relations Journal Advertising.

Charles McNeese, Tarrant County Junior College

Professor McNeese has been Head of the Drafting Design Technology Department at Tarrant County Junior College located at the outskirts of Ft. Worth, Texas. He has been instrumental on developing this program to serve the job-bound student as well as the four year degree student.

Professor McNeese is a graduate of Texas Technological University at Lubbock, Texas. He has extensive industrial experience in the field of architecture and architectural construction. He has been a member of the Engineering Design Graphics Division for a number of years and has been active on several committees.

HELP



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