COOPERATIVE ENGINEER

UNIVERSITY OF CINCINNATI
NOVEMBER, 1971

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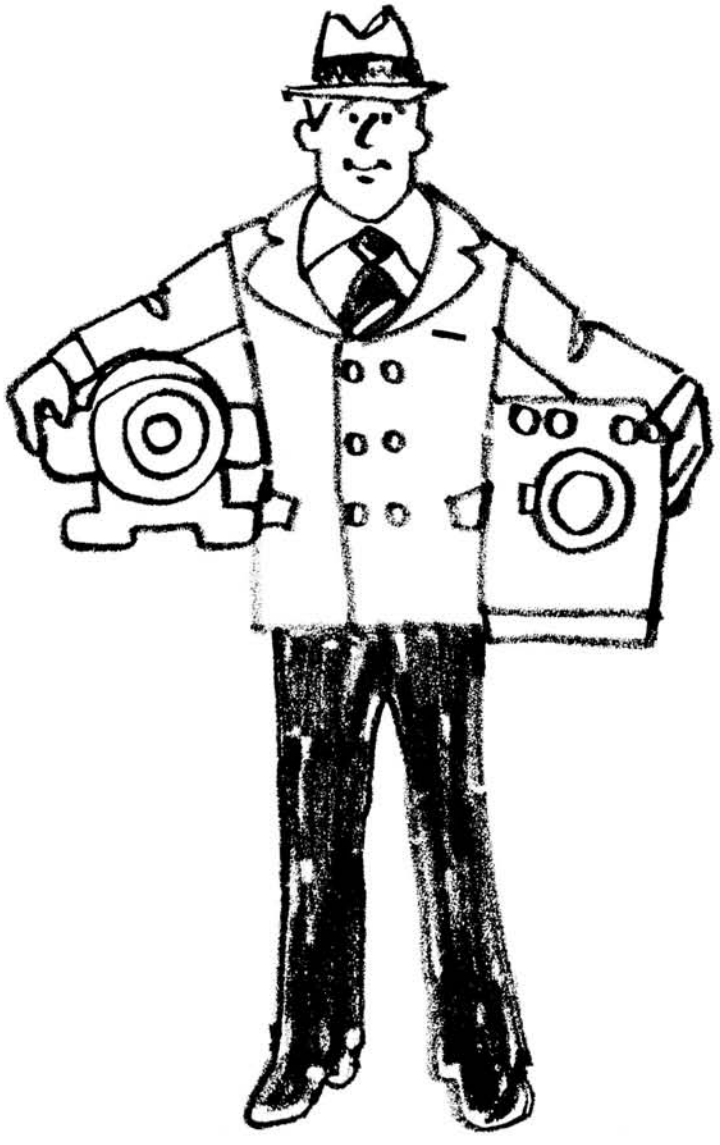

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COOPERATIVE ENGINEER
UNIVERSITY OF CINCINNATI

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This is the November, 1971 issue of the COOPERATIVE ENGINEER (Vol. 49, No. 1), which is published quarterly by the students of the College of Engineering in Room 647, Baldwin Hall, University of Cincinnati, Cincinnati, Ohio 45221. Subscription rates $2.00 per year. 2nd class postage paid at Cincinnati, Ohio.

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The cover features Crosley Tower, part of the Brodie Science Complex.

EDITORIAL

Traditionally, in the November editorial the editor blasts the engineering student body for apathy and encourages engineers to "get involved". After seeing the results of three years of this type of editorial, it is obvious to me that they are at best useless. Those wanting to participate in campus activities will find the time, and those who don't will always find excuses, some legitimate, some lame. No amount of prodding or pleading will change that.

However, some real problems exist that we should do something about. Perhaps if enough people would express their feelings to the appropriate decision-making bodies, then something would be done. As long as we remain silent, *nothing* will be done.

One definite problem existing is the inequities experienced by students during summer quarter. While summer quarter students pay the same general fee as students during other quarters, they are not offered the same services. For example, Tangeman University Center and the University Bookstore have shorter hours during the summer quarter than during other quarters and no "News Record" is offered during the summer quarter. In the area of academics, summer quarter students in some cases are subject to split-session teaching, which many students find detrimental from both a learning and a grading standpoint.

Another problem which exists is the Student Senate's inability to approve budgets for those organizations whose financial status is under the jurisdiction of Budget Board. Allocations which should have been approved last May have still not been approved as of this writing. While measures were introduced to temporarily supply some funds for use by student organizations, many of these organizations have been forced to operate at less than normal pace because of uncertainty concerning their final allocation. Organizations operating during the summer have had no funds with which to work. Hopefully, this situation will have been corrected by the time this magazine is distributed.

If anything at all is to be done to change those existing conditions which are unsatisfactory, then those people affected must communicate with those having the power to make the changes or corrections. Otherwise, all the complaining in the world will go for naught.

Letters to the Editor

A condition exists during the summer quarter of split-teaching which I feel must be changed. This practice, where one professor teaches for 5 weeks then another professor takes his place is not conducive to a good education. First, it is difficult to learn the teaching and testing style of a professor in 5 weeks when he might only give one or two tests. Second, there may not be a uniform grading standard between the two professors and it will be difficult to contact the first professor during final grading since he is on vacation.

If the 4 week vacation at the end of the quarter is not long enough, then they should be given one complete quarter off. If this would leave a shortage of teachers, then more should be hired. Class sizes during summer quarter should not be increased.

A Concerned Student

EDITOR'S NOTE: This column is open to anyone at the University, whether he is a student or faculty member, in or out of the College of Engineering. Letters may be concerned with anything you feel our readership would be interested in. All letters must be signed, but names will be withheld on request. Please also include your organizational affiliation. Address them to:

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Cincinnati, Ohio 45219

The Job Interview

What you should know when applying for a job.

Doug Mehlhorn EE, '73
Bruce Lippard EE, '73

This interview was conducted with Mr. Donald L. Huber, Employer Supervisor at The Cincinnati Gas and Electric Company.

EDITOR: What generally are the criteria used in the selection of applicants for positions as engineers in a company?

HUBER: Assuming that these are engineers coming off the campus, the criteria used are several. Of course, these start originally with the interview, and we're talking mainly about campus interviews for the majority of seniors today. The interview is an important criteria to start with because it does give the framework for the processing that each company will have a student experience. This will then expand into resume, application, any detailed company processing such as company student visits, possibly at some point in time a physical examination by a company medical director, and a review of the educational background of the student which will probably be a submission of grade transcripts. It will also include any other background material available from the particular school. At the University of Cincinnati it is particularily true of the cooperative program for engineers. Their cooperative background is an important factor to consider during the employment process. This processing also in a number of companies might include during company visits or following a company visit various types of aptitude testing which we can explain on as we get into some of the detailed descriptions. Also, another important factor will be the types of interviews and people, engineers, supervisors, and managers, with whom the student will be talking during the process of visiting the plant.

EDITOR: What type of questions should an applicant expect from an interviewer?

HUBER: In the campus interview the applicant might expect questions relating to the students selection of a particular college, the curriculum which he has studied, the success he has found or how content he has been with his program in planning toward his ultimate goals in his career. Many of these questions might relate also to particular courses he has chosen and why, what he has learned from these, and how he might feel these would apply to particular job situations.

Many times you hear the typical question, "What are your career objectives?" or "What do you expect in your employment once you graduate from school?" This has been misleading to a number of students, thinking that they need to have a detailed, planned outline of every step for the next five or ten years. This is generally interpreted by the interviewer to mean a way of arriving at the general framework. Is the engineering student thinking of something in pure research, does he have hopes for performing engineering assignments in operating type functions, and later perhaps hope that he might assume supervisory type positions; or does he have some detailed type of plans formulated that might have an effect on the kind of company, the kind of department he starts in? Our thinking as interviewers normally is to build around this framework so that as we review the credentials back at the company, we'll have an idea of how this might fit our departments' needs. The whole process is aimed at trying to match an applicant's background and general objectives as best as possible with what we are looking for in an individual work situation.

EDITOR: How important is the first impression to the success of a job interview?

HUBER: The first impression is important only from this standpoint – that you have roughly 30 minutes in most campus interviews, and you do not have a great deal of time to spend really digging deeper as to what the student is interested in or as to a lot of details about him, and an interviewer is trying to make some quick judgment as to whether this is a candidate to be invited back to the company at a later date. With only these limited factors available in such a short time period, an impression can be quite an important factor.

EDITOR: Do interviewers generally volunteer information about benefits or do they expect the applicant to make inquiries in this area?

HUBER: The trend the last couple of years in interviewing has been that many of us did not give much out concerning benefit programs. This is not because we are not interested in the student knowing about them, but it is a part of the normal processing once he is in to visit the plant. Also, there is a number of pieces of material available that can be utilized for this and they're usually available at the placement office for review prior to the interview.

EDITOR: Realizing that companies have standard application forms, how important is a resume?

HUBER: It can be an important factor; however, it is not required at most campus interviews. The resume merely expands a company's application. Application forms are normally standarized for each company to fit not only their professional recruitment programs, but all of their other employment. As a result, many of the questions do not seem to fit in detail and if a student has related summer experience to his education or cooperative experience or other activities that do relate directly to the type of job he is applying for, then a resume is an excellent way to do this. Most employers will find that this does add a good factor for them to have to take back to review with their own people.

EDITOR: It is often difficult to fill out the rate of pay space. What suggestions do you have concerning this?

HUBER: First of all let me explain why the rate of pay is normally found on an application. It is more important in interviews for people who are experienced in the work force in making a change from one company to another where they might have a minimum salary consideration. Our general interpretation of this is that it indicates the minimum that is necessary for many reasons, some of them personal. And if we can't get in the same ball park with the rate of pay; at least we can bring it out on the table and discuss it. This factor of discussion about the pay is another use for it.

It is very difficult for the student to put this in. Normally, on a campus, you will find a student filling it in according to the survey run by his particular school and it varies sometimes by a couple of hundred dollars a month. Our suggestion to it is that they indicate just the rate of pay that is commensurate with the job for which they are interviewing. It need not be, in our case particularly, an exact figure. Or it can be open for discussion and can be indicated as such. I really don't feel a student, at least a senior graduating, should be too concerned about this question although we find from experience it does raise a lot of concern. Salary in most cases will be further discussed, again, not much in terms of the interview but back at the company during the student's visit. Some time is devoted to discuss salaries, the framework of salaries, and how pay increases and merit reviews work. So this normally will be a

thing that will handle itself I think in most cases, so just don't worry about it. I consider it one of the more minor items on the application. However, if there is some special need or special expenses that a student incurs and he cannot possibly consider the going rate of pay for a graduate, then he should indicate that this is a minimum and perhaps be prepared to discuss why.

EDITOR: How long are applications usually active?

HUBER: They are held active in file in most employment offices in the area of approximately six months. This will vary when you talk about a senior graduating because most of the interviewing is done in the fall or early spring. These are considered active not those six months during school but, for example, in our case six months beyond the date of graduation because a student, we realize, is not available until he graduates. And because of many companies not having seasonal work or any one particular time to hire, that particular job that is a good match for a student might become available shortly after graduation. And as we experienced this past year, maybe a student has not found appropriate employment at that time. Generally six months is a guideline.

EDITOR: Do companies place much significance upon psychological testing?

HUBER: Companies in general do not. This is a hard question for me to answer because our company is one of those which places a great deal of significance on psychological testing. In our company a plant visit by any professional person does involve almost a complete day of psychological testing. We feel it is important from this standpoint. They are basic aptitude tests; they are not a pre-study type of situation and they are not the learn situation in school. We look at grade transcripts and what you have done on campus for that aspect. But we feel that they are one tool that can be used along with the interview, the academic background, and the experience factors that can give us a guideline as to how good a fit this job is. Are the aptitudes compatible with the requirements of the job? That is, an engineer going into a more-detailed, design-type engineering environment as opposed to an engineer going into a marketing function, where it's very much customer-sales oriented. We feel that some of the basic aptitudes and interests that are a part of our own make-up is important for this. We have found from experience, and this experience numbers twenty-five years plus, that this has benefited not only our company in the placement of our people when used as only one tool with the other factors, but it also is a help to the new student going into the work force. We as a company, you as a student, need every factor we can put together to help determine the uncertainties of a new job.

EDITOR: How does an applicant go about following up an interview and can it make a difference?

HUBER: This would depend on the interview. Usually the direction is given by the interviewer, and it should be by each interviewer. In our case we prefer that the interviewer tell exactly what will follow and approximately what time element is involved for what steps. A student should very seldom in our case have to follow up on his own or make a number of phone calls.

At one time it was important if a student continued to contact a company. Somehow this was measured as the student's interest in a company. This has become pretty much a thing of the past. We do not look at it as any factor. As most students might have experience already in calling companies for summer employment, the phone is so busy that it sometimes even becomes an aggravation to an employment office for a number of phone calls.

No more follow up is necessary than to ask questions that still bother the student at the time or to report a significant change in either the thinking about the job or something that was discussed and not completely answered – that type of follow-up is encouraged any time. Either a visit to the office, or a phone call, or a letter.

EDITOR: How important are activities and hobbies relative to grades in selecting an applicant for a job? For example, would evidence of leadership or technical ability in various activities have a bearing on the selection of an applicant?

HUBER: This is probably one of the best questions in this whole interview in that the importance of activities and hobbies that a student has had – the one key thing that we have not seen many times – is made relative to grades. There is a lot of discussion about the importance of grades and the importance of activities, and they're always asked individually. They do, however, relate together. We have difficulty in finding any valid studies that show a direct relationship of grades to success in performance in the job. This can also be true of activities. But it is when you put the two together.

I think that what most companies look for in grades is going to be the pattern of grades over your college career – realizing that many students will have a couple of bad quarters in their studies for certain reasons. Maybe it was a year when the course load was particularly heavy. They will look at the number of hours taken, then look at the

number of activities. How much time do these activities take? Particularly if their activities are related to the field – student chapter of IEEE, ASME, and so on. Participating as an officer, chairman of a committee. These are development tools along with your education.

Our ultimate goal in hiring a new individual on a professional payroll is to find the best individual overall.

Our ultimate goal in hiring a new individual on a professional payroll is to find the best individual overall. This depends on their academic preparation, but also self-development which many times does come from participation in these other activities. The time element associated with activities and part-time work have a direct bearing on what the grades really mean.

EDITOR: How important is experience in the selection of an applicant?

HUBER: For a college senior we're not talking really about much experience. Of course, at the University of Cincinnati the co-op program is considered the experience factor. This can be an important item. In the interview alone on campus for only thirty minutes you can see a great deal of difference in a co-op student, how he handles himself, what he knows about industry, and what he knows about the relationship of his education to the working world. We don't consider three and a half years of coop experience, or seven work quarters, something like going out and recruiting an individual who has worked in the utility field, perhaps another company, for five years in power engineering. That we consider perhaps an experienced engineer. We do not consider a coop student an experienced engineer. He will, though, gain an experience factor for most companies, including our own, in terms of pay. Also, he may not need some of the nitty-gritty of some of the orientation programs or indoctrinations because he has already been exposed to it. In our case we prefer to handle this on an individual basis so that we can avoid duplication and repetitive information that he is already aware of.

EDITOR: Is the demand greater today for persons with bachelor's degrees or for those with graduate degrees?

HUBER: On this I have to speak strictly for CG&E. I don't have a grasp on it for most companies. From what I read and what I hear, generally I would say the bachelor's degree is the greater source. However, the masters is one step better than a PhD at this point in terms of the job market.

But you need to put it in the context of companies and company locations. In our case we are not planning to recruit this year for any master's programs. We normally do not. This is because we are located, of course, in Cincinnati. We have the University of Cincinnati and a number of other schools at which you can obtain additional courses at a graduate level and eventually a degree. With educational assistance plans in our company, you can have 75% of this paid for. You can also gain your experience while you are going to school to help better decide which program you ought to pursue. Now, if you're located out in Timbuktu, it might be an entirely different story.

EDITOR: Of what value are professional licenses in obtaining a position?

HUBER: This is important only if it's required in the position at the time, but for most students this is literally impossible to achieve by the time they graduate. You normally have availability of the written part of the engineer's exam, and many schools do have this during the senior year. It is encouraged always to take this, but in order to complete the requirements for the license or the certificate, you must also have work experience related to the engineering area. This is going to take some time out of school. To develop in your own professional competency, you should as an individual desire, to continue to work toward your professional license.

EDITOR: Because the draft has made many engineering students uncertain about their future, many would like to know how a company regards their draft status.

HUBER: At this date the draft status has not been in our company an important consideration. We are interested in knowing about it from the standpoint of how we can plan to fit this individual in if this is a candidate we're going to hire in one of those number of slots that we may be recruiting for. Some of our job situations do require that the individual coming in be there and they are needed immediately and for upcoming months. Therefore, we could not consider someone who is going to be drafted three months after starting. However, in most situations we find very little difficulty with those who might be drafted or those who might be in ROTC programs.

We are always happy to have engineering students return to the company who have completed their military service, who perhaps have gotten through some of their technical indoctrination with our company prior to going into the service. The service, too, is one of those broadening type programs that can also help a student. Naturally we're interested in trying to get technical experience in the service, but this is not always possible.

EDITOR: Do companies look for specialization on a bachelor's level?

HUBER: They will look for specialization in several forms. The first, of course, for engineering will be the curriculum the student is studying, that is electrical engineering, mechanical, civil, and so forth. But within this particular curriculum, and let's take the electrical for example, this will depend first on the type of position available at the company. Our company, being a power company, naturally does look for any power courses because they do have a more direct application.

In engineering in general, though, we're looking for the technical background and in many engineering positions it does not make that much difference as to what the courses have been as long as the student has attained a proficiency in the technical field. Many things associated with specialized areas are taught in the company through professional and industry-oriented type associations – the Gas and Electric Institute, the Ohio Electric Utility Institute, and so on. But if available at the school, naturally, we will look for the ones that are more closely associated to our own endeavors.

EDITOR: Is there presently a demand for engineers? Can we be optimistic about the future?

HUBER: The present demand for engineers is a hard one to determine this early in a recruiting season. Judging from our own company, yes, there is a demand and we have planned a full recruiting year as we have in past years. We would suspect that our requirements will be reduced some for several factors. Of course, the tight employment market. For the availability of people we've had during the current year, we've gone to capacity on people we could hire while they're available. But with our continued growth in our own company we will continue recruiting for new people.

Can we be optimistic about the future? I think we have to. We have no other way to be now but optimistic. It can't really get too much tighter, at least we hope not. As far as a time or framework for this, seniors graduating in 1972 probably are going to have a chance to see the change. It is probably going to take some movement into the new fiscal year or the new calendar year in 1972. This will involve new budgets and new programs and so on. Now this is probably one of our greatest involvements to look at right now.

It does involve a lot of uncertainties right now because of some of the administrative things we have seen at the federal government level in terms of our wage and price controls. We do not know the certainty of these after November 12. 1972 is also an election year and it is hard to guess what impact that will have. But it does look like the economic picture will be up from what it has been. At least when we approach that June graduation date.

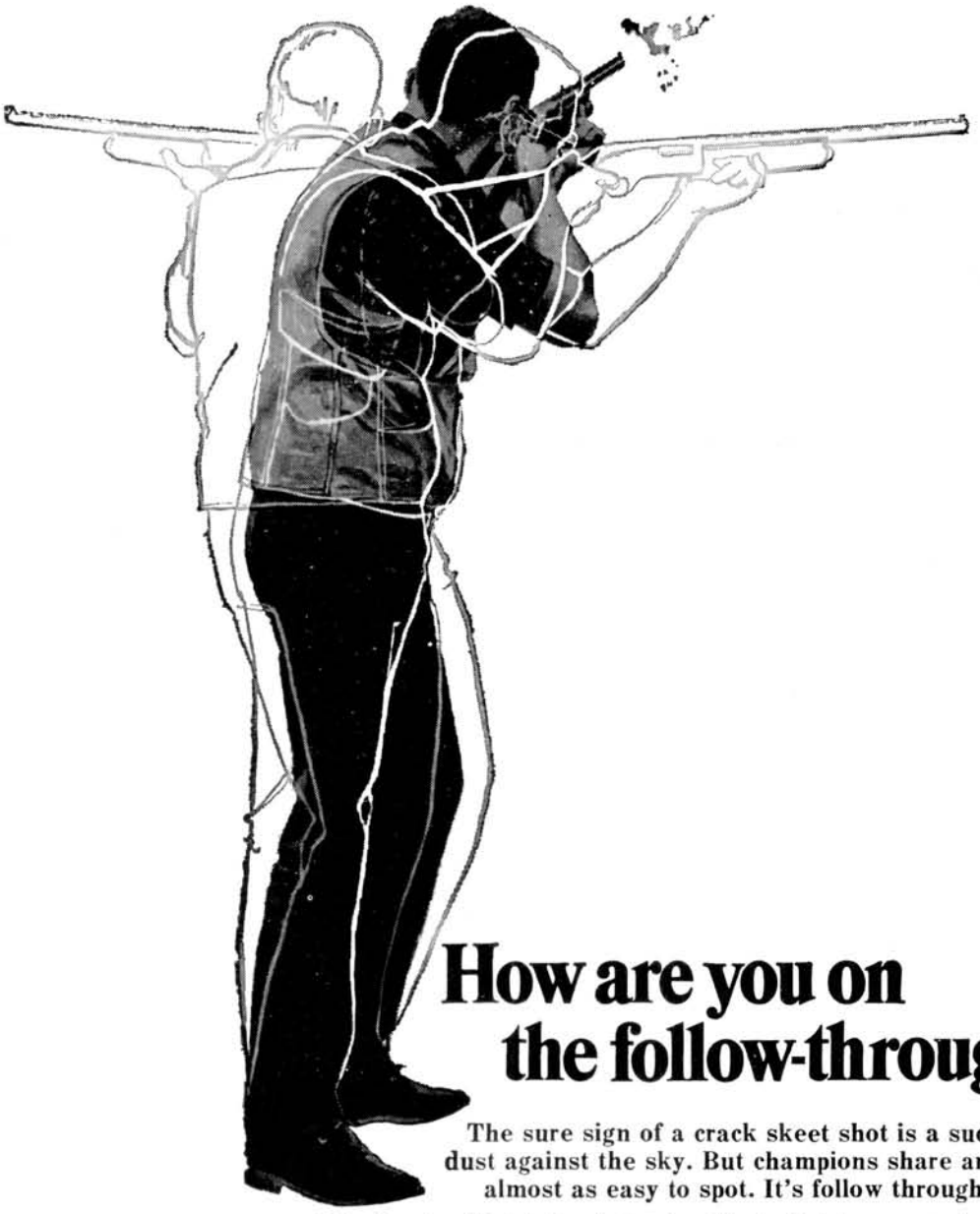
EDITOR: How does the economic picture affect the various types of business in their need for engineers?

HUBER: It affects them a great deal, and it does vary according to the type of business or type of operations a company has. We think of this in terms of ourselves as a utility industry versus those companies that rely heavily on defense contracts or governmental type contracts and projects. There are also those companies that are very seasonal by nature of their work.

The impact of the economy on a company like our own is very limited in that we do not have any seasonal impact, we are free from the ups and downs and the cycles normally associated in the defense contract type work. In our case we would find very little difference here and this is probably why we expect a pretty normal recruiting year for our own company.

But as you go into the other types of businesses this economic picture has a direct bearing. Now take the machine tool industry for example. And this is one we all know well because it's one of the backbones of Cincinnati. Whether you decide to buy new equipment or repair the old equipment you have is determined strictly by the money you can spend. In a low ebb in the economy, we're all going to be inclined to make do with what equipment we have. So, orders for new machinery and equipment as soon as there is an economic downtrend normally will slack off a great deal. And this is what we've experienced this past year. This is probably one industry we can see it happening in first. We can follow the orders coming in. And this happens in many other kinds of industries.

This is one other reason encouragement should always be given to a student to look at kinds of industries. A marketing function, yes, for what you like to do; but that marketing function in a utility type company, in a manufacturing company, in a government contract type company – look at all of them. If you have no apprehension about moving cross-country on a regular basis, there is nothing wrong with being associated with or connected with the aircraft type industry. But you have to be very mobile in these areas. If you prefer to stay in one location then you're going to have to look at kinds of industries whose jobs normally remain in a given location. And this is why we always ask our students to look at several kinds of companies, not two or three more utilities. Look at them, but also look at the manufacturing company and the aircraft industry and so on. Then make your decision on the basis of all of them.



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Engineering Tribunal

THE PROFESSOR:

The professor's involvement in the Academic Climate can be broken into two segments – his *availability* to the student for questions and his *presentation* of material in the classroom.

AVAILABILITY: The professor should make himself available for questioning as much as possible. He should announce his office hours to the class and stress the point that a student should come to see him whenever he is confronted with a problem. Also, the professor should discuss these office hours with the class to determine if there is a conflict with the students' schedule.

PRESENTATION: Whether a professor's presentation is a success or not depends on many factors. Primarily, it is the professor's attitude toward what he is attempting to do that is the governing criteria. Ideally, a professor should be trying to teach rather than just present a given amount of material in a given number of lectures. This means being *fully prepared in class,* trying to *relate the material to practical applications* (where possible), and making sure that the majority of the *students understand from technical and linguistic standpoints.* Being fully prepared for class, such as having a well-planned lecture and good knowledge of any technical procedures used in the presentation, keeps the students interested and instills confidence in the students toward the professor's ability. Relating the material to practical applications also tends to keep the students interested and allows them to justify the time spent on the course with respect to their professional future. Being sure that the students understand from technical and linguistic concerns is very important since, if the student fails to understand, he will in all probability be unable to learn. This problem has been eliminated in some cases by *distributing the lecture notes to the class* before the lecture begins. For foreign instructors, this practice could alleviate some of their communication problems.

Other problems also contribute to a good presentation. The professor should always try to make assignments correlate with the discussion and tests since this is supposed to represent what the professor expects the student to learn and remember. The professor should also attempt to become an integral part of the class. This can be accomplished in many ways but, in general, the result is a more relaxed, friendly attitude where the students have no reservations about confronting the professor with any of their problems.

All in all, these areas are quite important to students and to a successful presentation by the professor. At present, some of these principles are used by many different professors. Hopefully, by the widespread adoption of these ideas, the presentation can be a success and the Academic Climate greatly improved.

THE COURSE:

The learning atmosphere in a class is often affected by the way the course itself is presented to the student. Often a student will go into a classroom not knowing why he is taking that particular course, and many times he will not see the relevance until long after he has finished it, if ever.

On the first day of class the professor should explain what he feels the *objectives of the course* are and how the student should benefit from it. The internal sequence of the course should also be explained to give the student an insight as to why some material is being covered, while some is being skipped.

THE TEXTBOOK:

A textbook should be *readable* and give a *clear and concise explanation* of the material. A student can acquire a better understanding of the relationship between certain aspects of a course if the chapters in the textbook follow the same sequence

as the lecture. A textbook can be very beneficial when it contains a few *representative example problems* in each chapter, so that assigned problems can be worked with better understanding. Answers to at least the odd or even problems should be given in a textbook. Also, a professor should be entitled to select the textbook which he feels would be most profitable to the student.

THE GRADING SYSTEM:

A significant *de-emphasis* of grades must take place to produce a more healthy learning atmosphere for the student. Studying for the almighty grade, rather than studying for the sake of learning, is all too evident in many classes.

A grade should be an evaluation of performance rather than a consuming goal in itself. On McMicken Hall there is an inscription, "Wisdom is the principle thing, therefore get wisdom." Have we in practice altered this inscription to read, "The grade is the most important part of education, so cram, pass the test, get the grade, then forget it"?

It is evident that we need a change in the A-B-C-D-F grading system presently being used by the college and university. In consideration of a new system, our primary goal is to make the learning process a rewarding, personal experience and to increase a student's desire and motivation to learn. The present system fails in these two respects: 1. Studying is a drudgery for many students. The unrelenting pressure of competition for grades turns many imaginative and creative students away from the engineering college. These students recognize that studying for the grade is unimportant and that it is not fulfilling their educational desires. 2. Engineering students are driven by a falsely directed, motivational force. We are being forced into a learning environment where grades replace knowledge and understanding as the primary educational goals. Therefore, achievement of grades becomes the primary source of our motivation to study. This is obviously an unhealthy atmosphere for the mature exchange of scientific knowledge, and therefore, we offer the following alternative to the present grading system.

PROPOSAL: To replace the present A-B-C-D-F system, we propose that, upon completion of each quarter course, a student will receive a report of "Outstanding", "Satisfactory", or "No Grade" (O-S-N). This report will be based on assignments completed, quiz performances, and, wherever possible, class participation and interest. A student who fails to meet the standards set up by the professor or department will receive a report of "No Grade". This report may be removed upon successful completion of the same or equivalent course.

"Wisdom is the principle thing, therefore get wisdom."

ADVANTAGES: 1. A student's final report will show if he has mastered the concepts which his degree-granting department has established as necessary for graduation. Grades measure how well you can take a test, not necessarily how much understanding you have of the subject. For this reason the value of a strict grading system as an evaluation of a student's subject comprehension is questionable. The proposed O-S-N system will serve the purpose of evaluating a student's performance without making questionable claims concerning his degree of understanding.

2. This O-S-N system should reduce the extreme pressure on students and professors alike. Students, who will no longer be hassled by fine line distinctions in performance and failure on tests, will be free to concentrate on learning for the sake of personal fulfillment. Professors will no longer be

forced to make out extensive examinations. Evaluation would be based on day to day assignments and short quizzes if necessary.

3. The O-S-N system will eliminate the stigma of "Failure" which psychologists have found is a major deterent to self-motivation.

4. The report of "Outstanding" will enable superior achievement to be recognized without putting unneeded pressure on the average student. This report shall be given only to a student who has shown significant interest and achievement above the normal scope of the course.

DISADVANTAGES: The major problem will be acceptance of this evaluation system by industry. Recruiters will be evaluating graduates on a more personal basis to determine job qualification rather than by relying on a long transcript of grades. This should prove to the advantage of the student, but at the same time will require recruiting personnel to educate themselves in regard to new criteria for evaluation of students, i.e. activities, positions of leadership in college and campus organizations, personal ambitions and goals, etc. This will make their job more complex, but it will prove, in the long run, to be in the best interests of both the company and the graduate engineer.

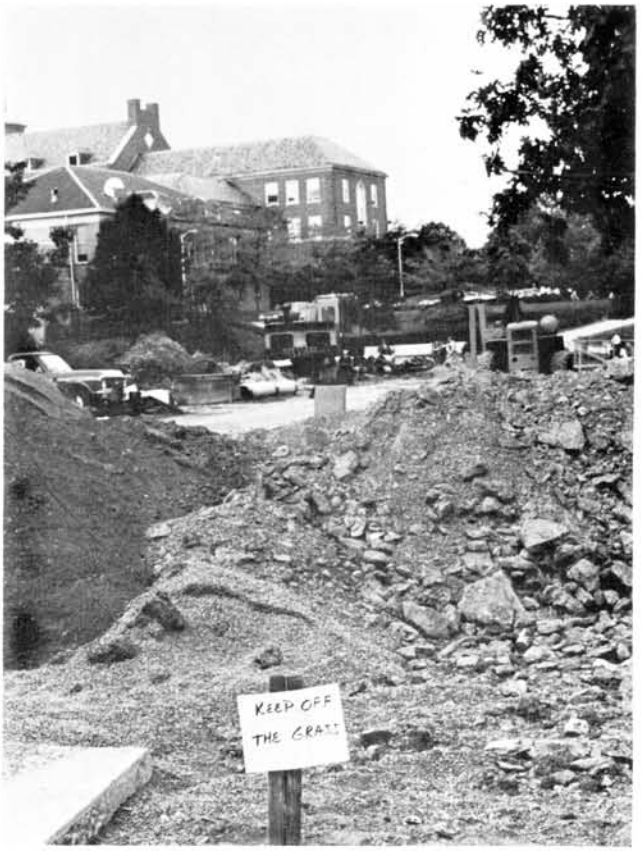
SUMMARY: It is obvious to the members of this committee that an effective alternative evaluation system must be implemented as soon as possible. We realize that this is a significant change, but definitely a progressive step towards a more meaningful academic environment.

The size of all classes, especially technical courses, should be made as small as feasibly possible.

THE PHYSICAL FACILITIES:

Many times the Academic Climate is impaired by the physical surroundings in which a student is trying to learn. It is well known that learning is not at its best when a student is in an extremely large class. There is a definite problem at the Freshman level with class size, which the students feel must be solved. The solution is a reallocation of space and teachers. The size of all classes, especially technical courses, should be made as small as feasibly possible.

Also pertaining to the physical environment in which a student learns is the size of the desk tops in the classrooms. For problem-solving courses, a small desk top is not enough room for the



materials needed to solve the problems during a test. The administration should try to schedule the courses that require the most problem-solving with outside references and drawing equipment in classrooms that have the larger desk tops.

THE PROFESSIONAL PRACTICE EXPERIENCE:

The Professional Practice program is highly favored by most students in the Engineering College. Almost all, however, view the Professional Practice Department as a necessary evil. Students occasionally talk about a good professor, but one almost never hears a good word about a student's coordinator.

A credibility gap is seen by students in their dealings with their Professional Practice counselors. Coordinators have become upset when students relate to each other what happened in their interviews with him. This is not hard to understand from the coordinator's point of view. One coordinator, for instance, told a student with average grades that grades were not very important. The same coordinator told another student who was in exactly the same circumstances as the first but had a very high Q.P.A. that grades were of prime importance.

Another primary area of concern is the coordinators' conflict with college policy. The new curriculum was specifically designed to permit students to transfer easily from one department to another through their sophomore year. However, coordinators pressure students to choose a curric-

ulum while freshmen, and this attitude toward potential transfer students effectively deters mobility. Enrollment in new departments, such as Nuclear Engineering and Engineering Analysis, is low not because of a lack of student or industrial interest but because coordinators have not taken the incentive to contact industry and find jobs.

Despite the stated purpose of Professional Practice many indications point to a new role of this department. That is Professional Practice as a recruiting agency for industry. There seems to be an implied "moral obligation" on the part of students to continue working for their co-op company after graduation. Coordinators have been known to send three students to a company to apply for one job so that the company could choose the student that they wanted.

Coordinators sometimes give the impression that they do not work very hard at finding jobs for unemployed students, which is very demoralizing to the student. One department head, concerned with his students lack of jobs, was told by the coordinator that he, the department head, would have to find the students jobs.

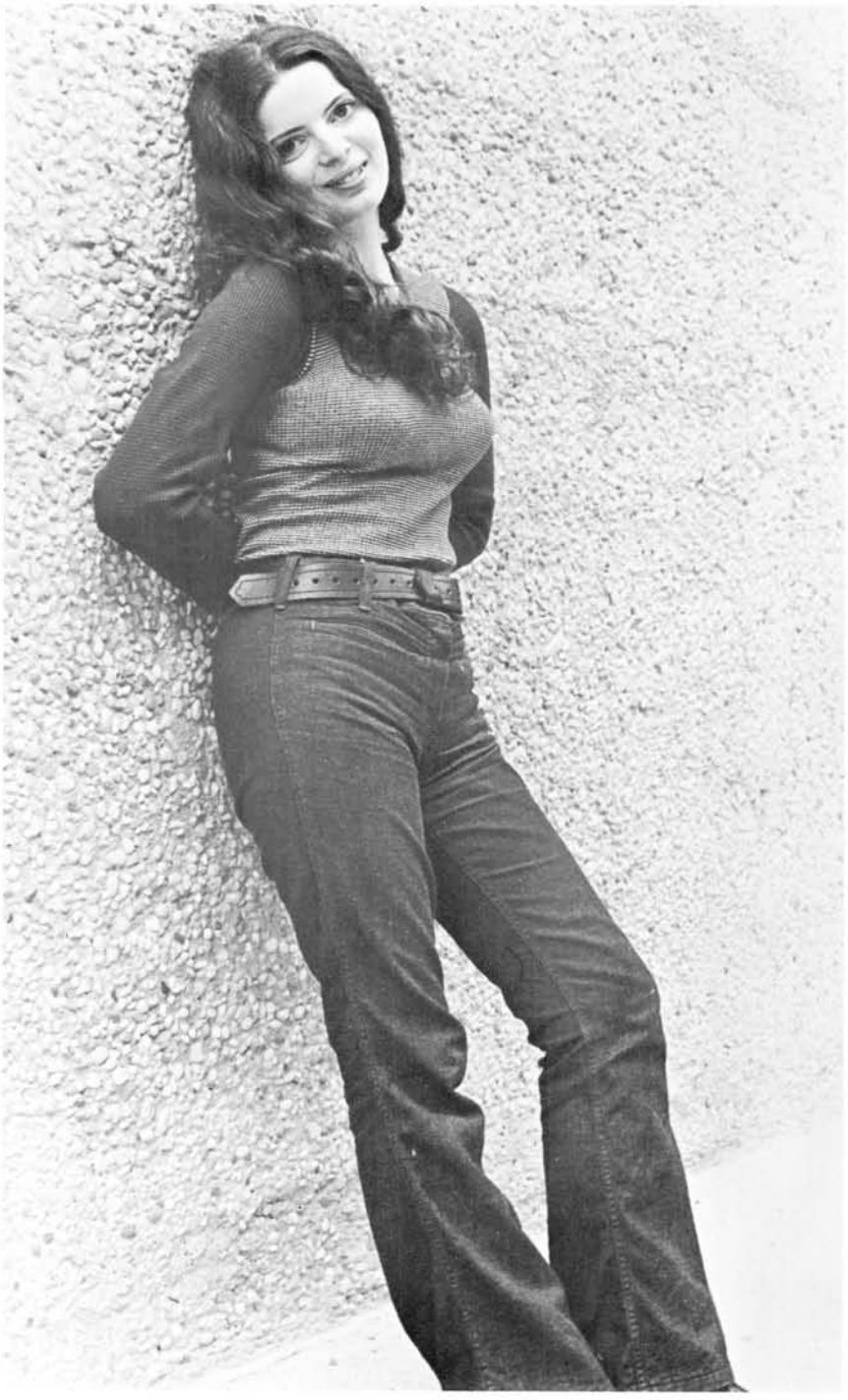
These problems are not universal but they occur frequently enough to make Professional Practice a real and serious problem for students in general.

There seems to be an implied "moral obligation" on the part of students to continue working for their co-op company after graduation.

PROPOSALS: One means of shifting the role of the Professional Practice Department from "industrial recruiter" back to its original purpose of the professional development of students would be greater mobility in job assignments. Engineering students should be able to change job assignments with reasonable ease as has been common practice in other colleges. Realistically, this step should be taken when the economic picture brightens.

The Professional Practice Department's relationship with the Engineering College should be redefined. The proper role of this department is that of a service department to the Engineering College and its students. In this light steps should be taken to de-emphasize the role of "recruiting agency" for industry which Professional Practice has assumed. Also, the appeals procedure for students who have difficulties with their coordinators should be amended so that the body making the final decision in a case is not a committee controlled by Professional Practice but the Engineering College.

Engine Charlie's



Fall Fancy

DONNA FREE

Engine Charlie's fall fancy is Donna Free, a 5'3" brunette, who is a sophomore in Teacher's College, majoring in deaf education. Donna is secretary of Delta Delta Delta sorority and a member of TC tribunal and Women's Advisory. Last year she reigned as Queen of the Sophos Dance. After graduation Donna plans to do graduate work in Deaf Education and Audiometry. It's easy to see how she caught Engine Charlie's fancy.

THE GREAT AMERICAN

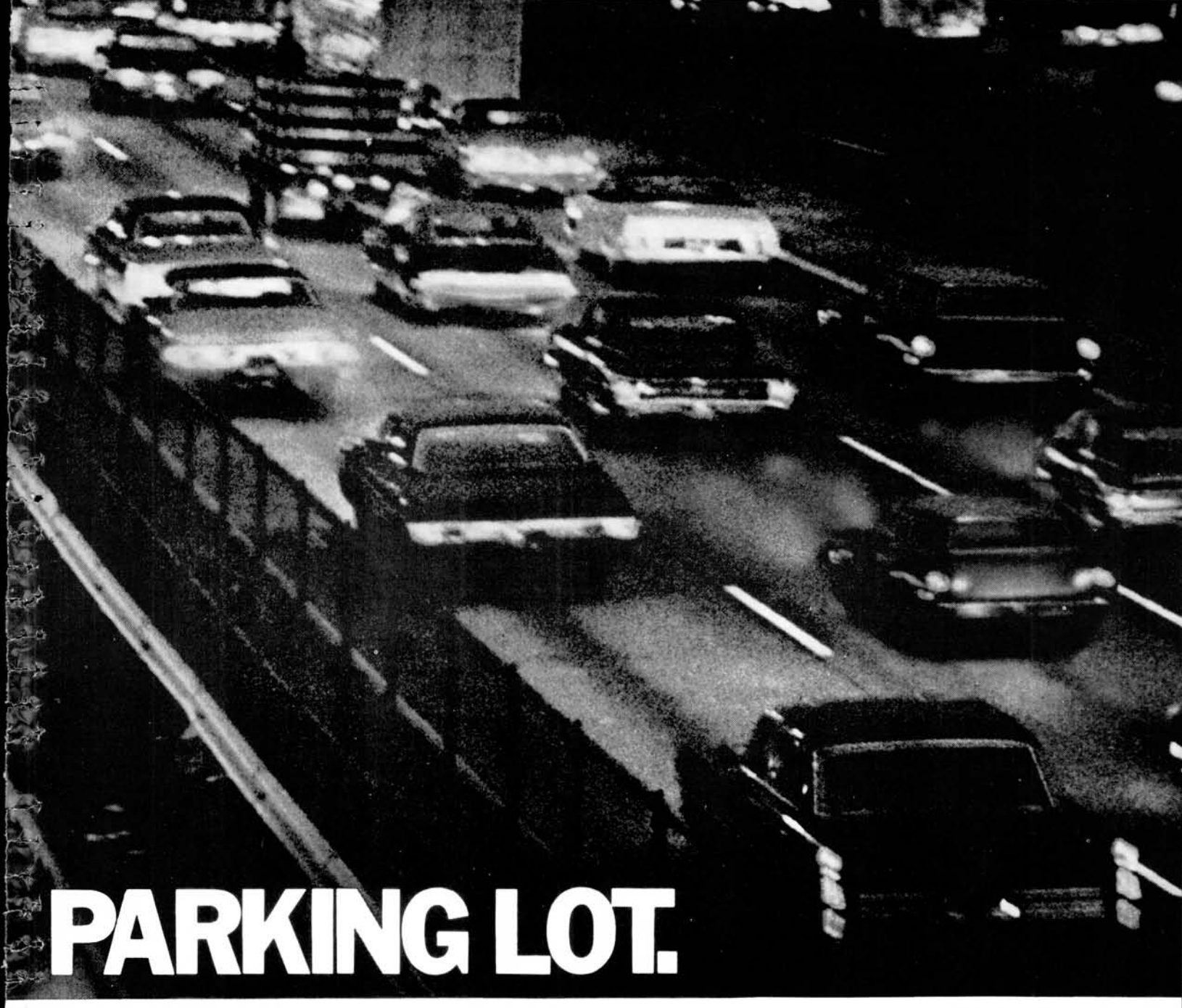
Soon 90-mph commuter trains will put a little more rush back in everybody's rush hour. And nickel's helping make it happen.

At last, true high-speed rail service is on the way. In mass transportation systems from New York to San Francisco.

And, by taking some of the pressure off our clogged highways, it promises to make life easier for motorists as well as rail passengers.

The progress of the Long Island Railroad is typical. Every week now, it replaces six or eight of its old cars with gleaming "Metropolitan" cars. About the middle of next year, after its entire new fleet of 620 cars has been put in service, it will start cutting commuting times throughout its system.

Both the frame and skin of the new Metropolitans are nickel stainless steel. The nickel's in there for several reasons. It makes the steel easier to weld and form, and adds toughness to insure car safety. It also helps arm the car against grime and corrosion. Maintenance can take place at the wash siding, instead of the paint shop.



PARKING LOT.

And, because of the remarkable strength-to-weight ratio of nickel stainless, each new car is about 3,000 pounds *lighter* than if it had been built with ordinary steel. Which means quicker acceleration and braking, plus savings in power costs estimated at $2,700,000 for the fleet over a 35-year lifespan.

Just as our metal is a helper, one that improves the performance of other metals, so International Nickel is a helper.

We assist dozens of different industries all over the world in the use of metals. We offer technical information. And the benefit of our experience. Often, Inco metallurgists are actually able to anticipate alloys that will be needed in the future, and to set about creating them.

This kind of helpfulness, we figure, will encourage our customers to keep coming back to us.

And that helps all around.

The International Nickel Company, Inc., New York, N.Y. The International Nickel Company of Canada, Limited, Toronto. International Nickel Limited, London, England.

New "Metropolitan" car of nickel stainless steel.

INTERNATIONAL NICKEL HELPS

Technology Applied

How Engineering techniques are being used in helping to solve the waste collection problem.

John Purcell ME, '71

COMMUNITY INVOLVEMENT

LATELY there has been a growing demand from students of all fields for more relevant courses, especially of the community involvement type. Although in the past we haven't fully realized it, we in the College of Engineering possess ample capabilities to attack and solve a great number of problems that plague our community, and we can receive academic credit for doing this. Furthermore, the tremendous lack of technical assistance, let alone expertise, that exists in government and other public-related concerns has created an unlimited field of possibilities.

During the 1970-71 Winter Quarter, a community problem requiring technical skills for solution was identified by Professor Dean Shupe of the Mechanical Engineering Department and Professor Richard Shell of the Management Department, and a special project was outlined. Students participating in the project were George Cunningham (B.S.M.E., 1971), Ken Faller (B.S.M.E., 1971), Ed Peterson (B.S.M.E., 1971), Kay Peterson (B.A., 1971), and John Purcell (B.S.M.E., 1971). Credit was earned under the "Special Project" label for the 1970-71 Spring Quarter.

GARBAGE?

Thinking that an urgent community concern might be waste disposal, which has received much national publicity lately, Mr. T. P. Welch, Superintendent of the Waste Collection Division of the Cincinnati Public Works Department was consulted. Much to our surprise, we found that the most urgent problem of the division was not disposal but waste *collection!* It seems that the efficiency of route planning and collection methods is extremely important economically. For example, a survey completed recently showed that in 1968 the U.S. spent 4.5 billion dollars on solid waste management, 85 per cent of which was accounted for by waste collection.[1] In 1970 over 800 million pounds of solid waste were collected in this country *per day*. In Cincinnati alone, the total expenditure for waste collection during 1970 was approximately $4 million. During the same year the 327 department employees collected 182,955 tons of burnable waste, an average of 45 pounds per family per week or 13 pounds *per person per week*. In addition, 12,562 cubic yards of nonburnable waste was collected last year.

A survey of the resources available showed that Cincinnati is indeed a model city for a study on waste collection. Since it contains varied terrain and a wide range of personal income differences, the effects of these on collection could possibly be determined. The presence of the Environmental Protection Agency and U.S. Solid Waste Management Department offer valuable local resource possibilities. Furthermore, we found that the City government and the City Planning Commission in particular are extremely cooperative with any efforts to apply technology to urban problems. Cincinnati's Waste Collection Department, com-

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John Purcell is a '71 graduate in Mechanical Engineering who is currently working in Power System Sales with Westinghouse in San Francisco. John's co-op experience was with Cincinnati Milacron. While at U.C., John was Senior Class President, Student Senator, Sophos President, and a Resident Advisor. He was a member of TBπ, πTΣ, ODK, Cincinnatus, and Metro. He was also selected for Who's Who on College Campuses.

pared to those of other large urban areas, is very progressive; for instance, they combine a truck and can system with a Dumpmaster-Dumpster system, employ uniformed workers for collection, and maintain extensive records on all phases of operations.

Since the immediate problem was to create equity between collection routes, the initial team goal for the project was to develop the capability to predict the time required to complete any given collection route. Of course this time depends on several critical variables, and determining what they are and how to combine them into a time equation were the basic tasks. This completed, the longer-range goals could be attacked, those being first to find a way to optimize the routes so that within any district the most efficient collection possible could be accomplished, and eventually to develop a computer program applicable to any type of collection system in any location. A more general aim of the project was to learn all we could about all phases of waste collection and disposal for use in possible future attempts to deal with other problems in this area.

Early mechanization of waste collection. Photographed December 4, 1928 in front of City Hall*.

ATTACKING THE PROBLEM

To begin to attack the problem, our first step was collection of all relevant data available. An initial literature search utilizing such reference lists as the *Engineering Index* uncovered several journal articles and a couple of books on the subject of waste collection. We also acquired statistics from the U.S. Environmental Protection Agency, the City Planning Commission, and the Cincinnati Traffic Division, and discovered that a possible future resource would be the Institute for Urban Information. Most important among the various data gathered were the extensive records kept by the Waste Collection Division itself.

The first step in this route study was to choose a single area of the city for our model. This area was District 6 in the general area of Price Hill and Westwood, one of the ten districts into which the Collection Department has divided the city, each one being covered by a collection team. Each district consists of five subdistricts, one of which is covered each day of the work-week. District 6 was chosen primarily since it appeared to contain the most varied terrain, traffic conditions, and personal income range. It was thought that the effects of all these would show up most clearly in the collection rates of this one district.

The district was then formed into a grid by locating on a large scale map nodal points at all intersections where a turn could be made by a collection truck. On the map between each nodal pair was listed the following information obtained from the Waste Collection Division Records: distance in feet between nodes, number of collection stops, number of families, number of commercial establishments, and single or double-side pickup.

TIME COMPUTATION

Next, an attempt was made to derive an equation that would predict the collection time be-

tween two nodes. This was done by mathmatically modeling the events that make up a collection between two nodes, carrying and emptying the cans and truck movement from one stop to another. The equation is as follows:

$$T_{ab} = S[.3-.05N+(\bar{C}-1)(.2-.036N)]\ M+.17(S+1) + \frac{1}{V}(D-50)(S+1) + S[.17X(M-1)\ 1.5]$$

where:

T_{ab} = time to collect from node a to node b (minutes)

S = no. of stops between the nodes

N = no. of helpers in the crew

C = ave. no. of cans per stop

V = ave. velocity of the truck

M = no. of sides collected at same time (1 or 2)

D = ave. distance between stops

$X = \begin{cases} 1, \text{ if } 0 < \bar{C}/N \leq 1 \\ 2, \text{ if } 1 < \bar{C}/N \leq 2 \\ \text{etc.} \end{cases}$

Modern 16 cubic yard load packer truck for waste collection and compaction*.

The first bracketed expression represents the time required to empty the cans at one stop. Its derivation was made by a team member using data in the Stone Report published by the Public Health Service[2], which correlates relative cost efficiency to the number of men in a collection crew.

The number .17 in the second expression is a calculated average driving time between stops 50 feet apart, this distance being assumed to be the average lot size. Greater lot sizes are accounted for in the third expression in which:

$1/V = 0$, if $(D-50) \leq 0$

$1/V = .00057$, if $(D-50) > 0$

Here, .00057 is the inverse of 1756 feet per minute or twenty miles per hour, the constant velocity assumed for stop distances greater than 50 feet.

The last bracketed expression applies only to double-side collection, as it drops out when M=1. The factor 1.7 is about ten seconds, the time to cross an average street, pick up one loaded can, and carry it back across. The term X is a numerical factor that correlates the number of cans to the number of helpers as shown, and the 1.5 factor helps to account for the additional time required to return the last can to the other side of the street.

The relationship proposed to apply this nodal equation to the total collection time is as follows:

$$T_T = T_{ab} + n(T_i + T_d) + (n-1)T_r + T_{out}$$

where:

n = no. of loads

T_i = time to incinerator

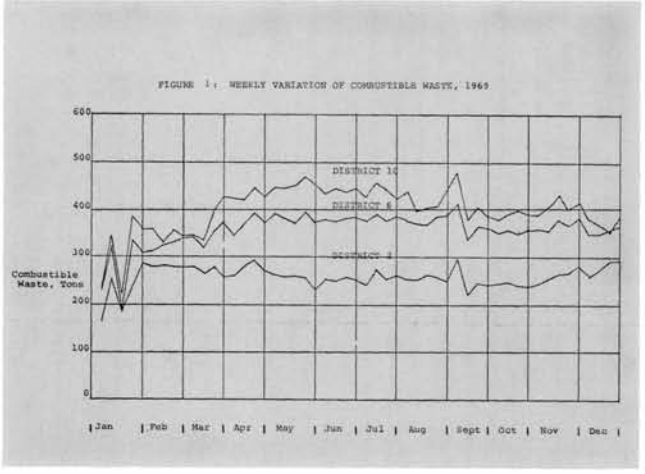
T_d = time of delay at incinerator

T_r = time to return from incinerator

T_{out} = time from garage to subdistrict

TIME CORRELATION

Another equation for the *total* time required to collect in a subdistrict was derived from a much different viewpoint. This time, the nodes being disregarded, the number of trucks, helpers, families, stops, average tons, and the product of the average number of loads times the distance from the approximate center of the subdistrict to the nearest incinerator were the parameters used. The equation was found by means of a stepwise multiple linear regression program using the IBM 360/65 computer, which fits each variable to the data in a stepwise fashion until the best correlation of all variables to all data is obtained. The final form of the equation is:



Collection vehicle of the late 1930's*.

$$T_s - TL = -6.9n - 3.4N - .005F + .01S + 2.6T + .35P + 261$$

where:

T_s = time to collect in a subdistrict (in minutes)

n = no. of trucks

N = no. of helpers per truck

F = no. of families in subdistrict

S = no. of stops in subdistrict

T = no. of tons collected

P = product of ave. no. of loads and distance from subdistrict center to nearest incinerator

TL = no. of minutes in lunch break = 30

The regression program shows that the number of tons collected, T, most affects the time, with the P factor being the second most important consideration of those involved. Since there are three garages and four incinerators in the city, further study could be done on the optimum routing to incinerators and to and from "home" garages.

The results of the subdistrict time equation were surprisingly accurate for a first trial, as the standard error was 14 minutes out of 370 to 400 minutes total, or about 3.7 percent!

TONNAGE CORRELATIONS

The subdistrict time equation shown on the preceding page is of little use to us unless we can accurately predict the tonnage T, which is the greatest determinate of the time T_s. In order to do this the stepwise multiple linear regression program was again used to correlate tonnage with number of dwelling units, stops, and families in a subdistrict. The result was the following equation:

$$T = - .00184DU + .01550S - .00286F + 47.109$$

where:

T = no. of tons per subdistrict

DU = no. of dwelling units

S = no. of stops

F = no. of families

The "Highway Trailer". Photographed May 25, 1931 near Music Hall*.

The results of this first trial were fairly good when the equation was tested for each of the 45 subdistricts of the city. Although the largest error was 16 tons out of about 49, the smallest was .05 tons, and the average error was only about 6.5 tons or around 11 percent plus. A second trial which added population and income per dwelling unit to the data produced a standard error of 10.6 percent.

The results of another correlation study to determine whether seasonal variation would warrant consideration are shown on Figure 1 and Figure 2. It can be seen that the seasonal variation is not great; however, the district differences are very interesting when it is recognized that District 2 is a low-income inner-city area. District 10 a suburban area, and District 6 a relative mixture as far as income is concerned.

So, as Spring Quarter (and five years of Engineering College) drew to a close, the project objective had been reached: two equations had been derived to predict collection time with a fair degree of accuracy. As this article goes to press, it is likely that the long-range goal has also been completed and that an optimum collection system routing program now exists.

The success attained as well as the experience gained through this accredited special engineering project will, I hope, serve as an example of how we can apply our training to society and the environment around us, even while still in college. Through such projects we will slowly open up confidence in ourselves, and also confidence of members within our community because of our ability to help them.

REFERENCES

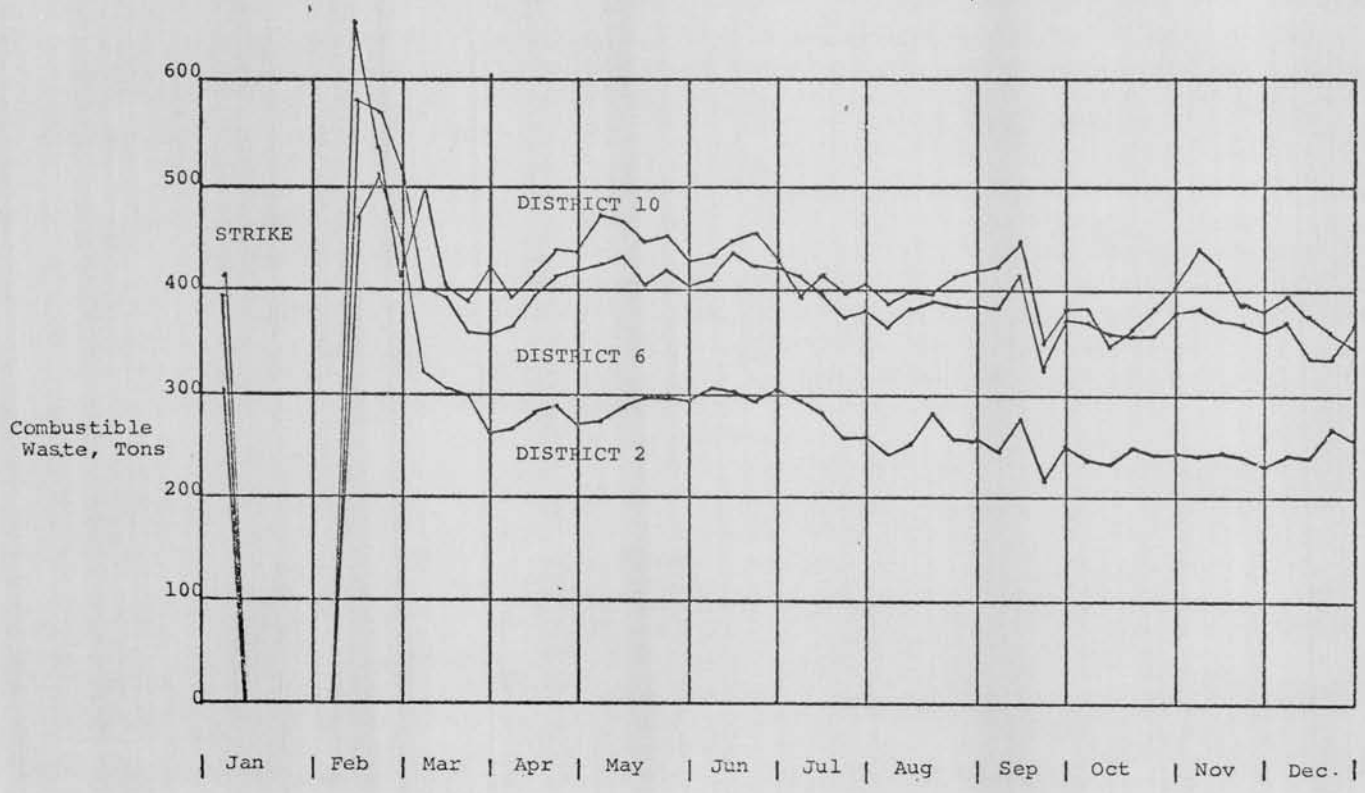
[1] *Mathematical Analysis of Solid Waste Collection,* Johns Hopkins University, Public Health Service Publication No. 2104, p3.

[2] Ralph Stone & Co., Inc., Engineers, *The Study of Solid Waste Collection Systems Comparing One Man with Multi-Man Crews,* Public Health Service Publication No. 1892.

[3] "Neighborhood Business District Study; Population Estimates and Economic Trends," City of Cincinnati Planning Commission, 2/26/71.

*Photographs supplied through the courtesy of the Waste Collection Division, Department of Public Works, City of Cincinnati.

FIGURE 2: WEEKLY VARIATION OF COMBUSTIBLE WASTE, 1970



notes & news

Do corporations care?

Of course they do. WE certainly do! We have to operate profitably—that is, *successfully*—or we'll go broke, which would not be good news to more than 120,000 employees or their families. But there's a lot more to it. For example: caring for employees' health and safety; protecting the environment; hiring, training, and seeing to the progress of minority group members; contributing to civic betterment. It's good business to be a good corporate citizen.

Mindful mining

Mining and quarrying operations must be conducted in a manner mindful of Environment as well as Efficiency. We've always been an industry leader in modern technology and worker safety; today, similar attention is lavished on reclamation, conservation, reforestation, and waste water treatment. This is no idle boast; doubters are regularly invited to tour our mining operations.

Continuing education

At last report some 3,100 salaried employees of Bethlehem Steel were taking or had taken college-level courses at company expense under our Educational Assistance Program.

Ships ahoy

From Sparrows Point to San Pedro to Singapore it's full speed ahead for Bethlehem's Shipbuilding Department. We're at work on the largest shipbuilding basin in the U.S.—to accommodate vessels of up to 300,000 deadweight tons; we have orders for 120,000 deadweight ton tankers; we recently completed the country's biggest drydock, in San Francisco.

Don't belittle benefits

An average U.S. worker gets "fringe" benefits worth about 25% of his regular pay, according to a recent survey. Bethlehem is a leader in this area, providing life insurance; disability benefits; Blue Cross, Blue Shield, Major Medical; minimum of 9 paid holidays; liberal vacation and pension plans, and more!

Computer quiz

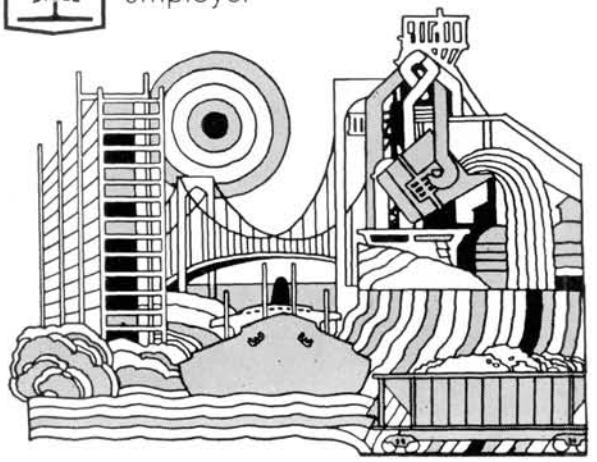
How many computers do we operate? Answer: Currently, about fifty, operated by 1,300 data processors.

Study up

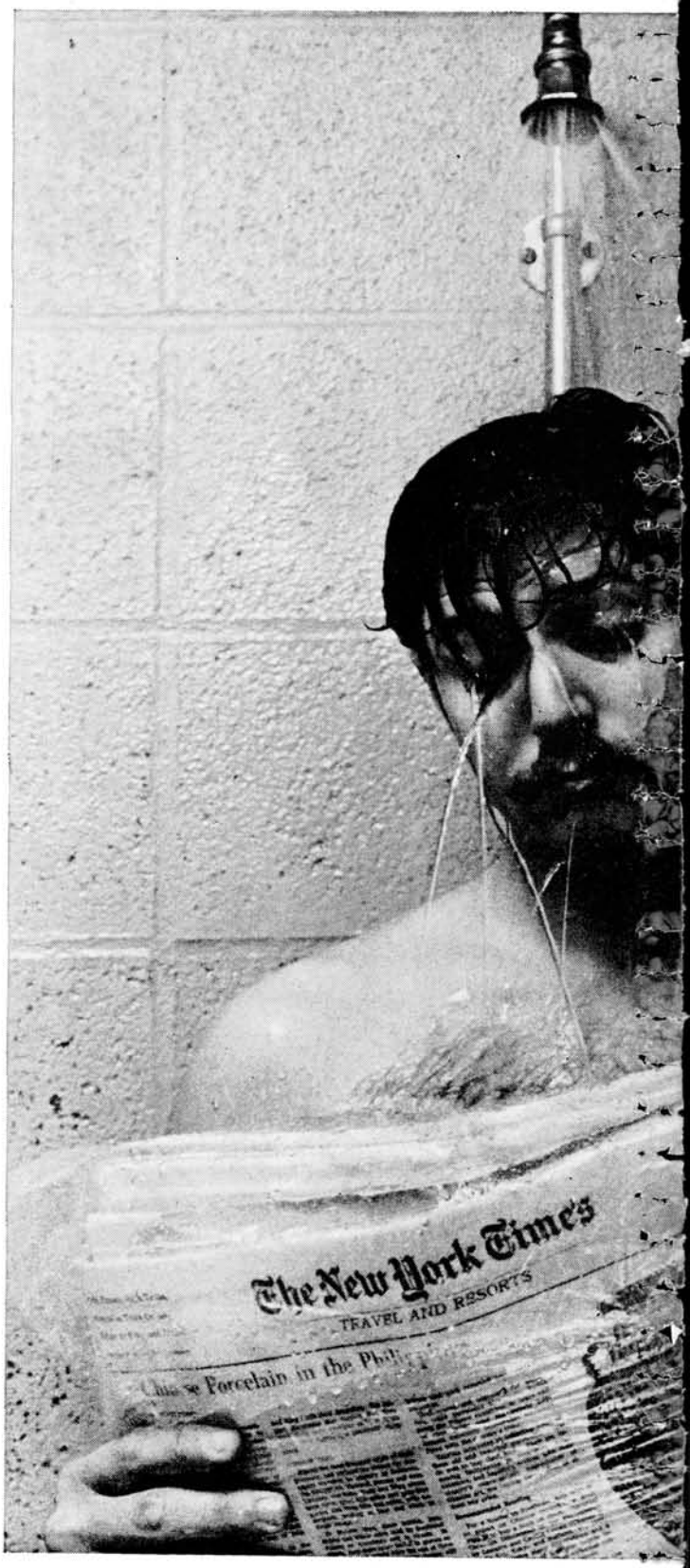
A wealth of information appears in our booklet, "Bethlehem Steel's Loop Course." A copy is available in your placement office. If what you read appeals to you, sign up for a talk with our representative when he visits your campus. Bethlehem Steel Corporation, Bethlehem, PA 18016.

BETHLEHEM STEEL

an equal opportunity employer



We keep the news fit to read.



Each Saturday night *The New York Times* wraps up the news.

Then FMC wraps up *The New York Times.*

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You'd be surprised at all the things we do.

News Briefs

Rick Davies, EE '73

Dick Jacobs, EE '73

Ed Hamilton, EE '73

TBπ FRESHMAN AND SOPHOMORE TUTORING

The Tau Beta Pi tutoring program, which has been very successful in past years, has been expanded this year to include courses at the Sophomore level. A daytime schedule is being worked out in which a Tau Beta Pi member will be available to provide help in any Sophomore engineering course each day of the week. For freshmen, tutoring sessions for CALCULUS I will be on Wednesday night, and ENGINEERING ANALYSIS I on Thursday night at 7:00 p.m., in room 739 Baldwin. Jim Richter is chairman of the Tau Beta Pi committee running the program, and he should be contacted for more information concerning the sessions.

ISA STUDENT PAPER AWARDS

The 1972 Annual Instrument Society of America student paper competition is open to all undergraduate students. One paper will receive a $100 honarium, engraved plaque, and an expense-paid trip for the entrant and his faculty sponser. In addition, eleven district first place awards of $25 will be presented. If merited, second and third place certificate awards in a district will be made. Funds for the ISA awards program are contributed by the Leeds and Northrup Company.

The criteria for judging papers will be depth of understanding, and innovations in work and presentation. Papers must be written and presented by full-time, registered students. Deadlines are: March 15, 1972– Submit intent to enter competition, May 1, 1972– Submit completed manuscript.

For further information, contact Prof. Richard Engelmann, Department of Electrical Engineering, 898 Rhodes Hall, or write: R. L. Simmons, Instrument Society of America, 400 Stanwix St., Pittsburg, Pa. 15222.

FINANCIAL AID APPLICATION DEADLINE

Applications for financial aid for the 1972-73 school year must be submitted prior to February 1, 1972 by students desiring consideration. Applications and Parent's Confidential Statement forms are available at the Financial Aid Office, Room 206, Beecher Hall.

URBAN VEHICLE DESIGN COMPETITION

In an effort to create interest in urban vehicles, M.I.T. announced the initiation of an Urban Vehicle Design Competition to last until August of 1972. Briefly stated, the goal of the program is not only the solution to the problem of constructing a vehicle strictly for use in an urban environment, but also the stimulation of innovative concepts concerning urban vehicle technology. By cultivating new concepts and actual models, the competition is expected to generate future interest in the urban vehicle field.

The competition is open to student teams – full or part-time, undergraduate or graduate – with the anticipation that the competition will provide a real world challenge to the students. Team members must be from accredited educational institutions and must be certified by the dean of the college or a department head.

The deadline for submitting the preliminary team entry blank is December 18, 1971.

Awards will be given in several areas. Not only will an overall winner be named, but winners will also be named for safest entry, entry with lowest emissions, entry with best environmental effects, and the entry with the highest quality innovative ideas.

For further information and a listing of the rules, see either the Pi Tau Sigma bulletin board outside of Room 861 Baldwin Hall or visit the Mechanical Engineering Department office in Room 598 Rhodes Hall.

RESEARCH IN THE METALLURGICAL DEPARTMENT

This summer, two research programs were instigated in the Department of Materials Science and Metallurgical Engineering.

A project propelled in part by the National Science Foundation and industry to investigate Superhard Materials and Superalloys is being headed by Professor Michael Hoch. Dr. Hoch will be assisted by faculty members from the Metallurgical and Mechanical Departments and several interested industrial groups. The project is entitled, "Study of the Failure Mechanisms in Superhard Materials used to cut Superalloys".

Another area of research in conjunction with the Atomic Energy Commission and Dr. John Moteff here at U.C. this past summer has involved radiation of materials in reactors. Dr. Moteff gave a series of lectures for the A.E.C. this summer on "Radiation Effects to Materials in Nuclear Reactors". Professor Moteff has also been involved in irradiation studies of refractory metals and alloys at Oak Ridge, Tennessee in association with Enriched Breeder Reactor tests. Continued studies in irradiation will be done here at U.C. sponsored by the A.E.C.

COLLEGE COMMITTEES

There are currently six college committees for 1971-72 in the College of Engineering. They are the Educational Council, Academic Standards, Computers in Engineering, Library, Recognition, and Student Financial Aid Committees.

Student participation on college committees has been growing rapidly. Several are full and ready to start activity in their particular areas, but some openings for students exist on these committees. Anyone interested in working on a committee should contact Randy Allemang, 475-3665, for more information.

NSF Graduate Fellowships

The National Science Foundation announced plans to award nearly 1,500 Graduate Fellowships for the academic year 1972-1973. About one-third of these grants will be made to unusually qualified students beginning graduate work in actual scientific or related fields; the remaining number of grants will be issued as renewals of current Graduate Fellowships.

Due to the restructuring of the program, new fellowships issued in the Spring of 1972 will be for a period of three years. Of this period, one year **must** begin in the Fall of 1972 and last nine to twelve months, but the remaining two years may be spread over the next four calendar years provided the student is doing satisfactory work.

For the 1972-1973 fellowship year, awards begin at approximately $300. per month, irrespective of the level of study. In addition to this sum, allowance may be made for travel and the student may receive supplementary aid from the school.

The deadline for filing for Graduate Fellowships is November 29, 1971. Results will be announced on March 15, 1972.

For more complete information, see the faculty member who heads graduate studies in your department.

Applications may be obtained from:

Fellowship Office
National Research Council
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

New Aero Facilities

In an effort to provide increased research space and better undergraduate training, the Aerospace Engineering Department has undertaken the expansion of its lab facilities. The expansion will involve a redefining of the role of the current Aerospace Lab and the complete utilization of the new space on the 300 Level of Rhodes Hall.

The current Aerospace Lab will become primarily an undergraduate facility. In this lab, sophomores and pre-juniors will be instructed in the use of equipment and in the techniques of measuring parameters, the purpose being to familiarize the students with fundamentals before they proceed to advanced work.

Located adjacent to the Aerospace Lab is the current combustion research facility. U.C.'s leadership in the propulsion research field will most certainly cause this facility's role to expand. Owing to the nature of the testing, however, this facility will remain at its present location, although the lab may be upgraded.

In Rhodes Hall, the Aerospace Engineering Department lab occupies the 300 Level. This lab is currently being equipped. In the future, this space will provide the facilities for graduate students' work, basic research, and junior and senior projects.

AUTUMN QUARTER EXAM SCHEDULE

First Class Meeting on:		Date of Exam		Period
MONDAY	8:00, 8:30	MONDAY	DEC. 6	I
	9:00, 9:30	TUESDAY	DEC. 7	II
	10:00, 10:30	WEDNESDAY	DEC. 8	II
	11:00, 11:30	THURSDAY	DEC. 9	II
	12:00, 12:30	FRIDAY	DEC. 10	II
	1:00, 1:30	MONDAY	DEC. 6	III
	2:00, 2:30	TUESDAY	DEC. 7	IV
	3:00, 3:30	WEDNESDAY	DEC. 8	III
	4:00, 4:30	THURSDAY	DEC. 9	III
	5:00, 5:30, Irreg.	WEDNESDAY	DEC. 8	I
TUESDAY	8:00, 8:30	MONDAY	DEC. 6	IV
	9:00, 9:30	WEDNESDAY	DEC. 8	IV
	10:00, 10:30, Irreg.	THURSDAY	DEC. 9	I
	11:00, 11:30, 12:00	THURSDAY	DEC. 9	IV
	2:00, 2:30	FRIDAY	DEC. 10	I
	3:00, 3:30, 4:00	TUESDAY	DEC. 7	III
WED. A.M.	& Irregular	TUESDAY	DEC. 7	I
WED. P.M.	& Irregular	MONDAY	DEC. 6	II
THURS.	& Irregular	FRIDAY	DEC. 10	III
FRIDAY	& Irregular	FRIDAY	DEC. 10	IV

EXAMINATION PERIODS:

I	8:00 A.M. – 10:00 A.M.
II	10:30 A.M. – 12:30 P.M.
III	1:30 P.M. – 3:30 P.M.
IV	4:00 P.M. – 6:00 P.M.

Notes: (1) All students will follow this schedule, except for block exams approved by the Committee on Calendar and Examinations.
(2) Examinations will be held in the regular classrooms unless otherwise notified.
(3) Instructions on deadlines for grades and provision for other special problems will be distributed separately for each quarter.

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