NEWS-LETTER

UNIVERSITY OF ILLINOIS

Department of Mining and Metallurgical Engineering Alumni

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MANY CONTRIBUTE TO SEMINAR SERIES

The Department has enjoyed over the past several months a highly valuable and interesting program of seminars, with outstanding people from this country and abroad presenting recent work in their fields to our staff and graduate students. Prof. Beck has been in charge of arranging the seminars, and has done an admirable job in bringing a well balanced program of topics and personalities to our campus.

Although space doesn't permit an adequate report of the individual lectures, a listing of those who have recently appeared, other than speakers from the Urbana campus, will give some idea of the scope of the seminar series.

G. V. Raynor, University of Birmingham. An Approach to the Theory of Ternary Alloys.

Max Hansen, Armour Research Foundation. Titanium Alloys.

J. S. Smart, Jr., American Smelting and Refining Co. Continuous Casting of Copper and Copper Alloys.

R. S. Busk, Dow Chemical Co. Unsolved Problems in Magnesium Alloys.

Robert Artman, Evansville College. Temperature Dependence of Internal Friction of Beta Brass.

D. P. Shoemaker, Mass. Inst. of Technology. Determination of the Crystal Structure of Sigma Phase in Fe-Cr and Fe-Mo Systems.

Bruce Chalmers, Univ. of Toronto. Aspects of Solidification.

W. M. Baldwin, Case Institute of Technology, Fracture of Metals.

D. J. Carney, U. S. Steel Co. Hardenability and the Quenching Constant.

A. R. Troiano, Case Institute of Technology. Transformations in Boron Treated Steels.

Egan Orowan, Mass. Institute of Technology. Recent Developments in the Theory of Brittle Fracture.

R. Smoluchowski, Carneige Inst. of Technology. Theory of Grain Boundary Diffusion.

G. W. Rathenau, Philips Gloeilampenfabriken, Eindhoven, Holland. Direct Observation of Grain Boundary Movements by means of Self-emission Electron Microscopy.

David Turnbull, General Electric Co. Nucleation of Phase Changes.

Papers Presented By Staff and Grads

The department was well-represented in the author ranks at the recent Metals Congress. We recognized these names among those offering papers: J. R. Lane, co-author of a paper "Influence of Grain Size on High-Temperature Properties of Monel." Stan Channon and H. L. Walker collaborated on "Recrystallization of Grain Growth in Alpha Brass. Charles Wert contributed a paper to the ASM Seminar, "Internal Friction."

W. R. Apblett was co-author of two papers presented to the AWS: "The Continuous Cooling Transformations of Weld Heat Affected Zones," and "Factors Which Determine the Performance of Aluminum Alloy Weldments."

Something of a novelty was created when the presentation of a paper co-authored by Paul Beck of our staff was preceded by that of his wife, Lilian, co-authored with C. S. Smith. These papers were, resp., "Intermediate Phases in the Mo-Fe-Co, Mo-Fe-Ni, and Mo-Ni-Co Ternary Systems," and "Cu-Zn Constitution Diagram Redetermined in the Vicinity of the Beta Phase."

Andre Guinier Is Visiting Professor

The Department is privileged to have Prof. Andre Guinier, Professor of Physics at the Sorbonne, Paris, on its staff this year as Visiting Professor of Physical Metallurgy. Professor Guinier has an internationally famous reputation in the field of X-ray technology, and has published results of many important investigations of the structure of age-hardened alloys, order-disorder transformations, the polygonized state in metals, and imperfections in crystals.

His work on imperfections requires strictly monochromatic radiation, diffraction at very small angles, and focusing lave diagrams.

Recently Prof. Guinier was honored by being chosen as the Rosenhain Medalist for 1952.

In the field of electron microscopy, Dr. Guinier has devised, in conjunction with M. R. Castaing, an apparatus with an electronic probe, which will enable a qualitative and quantitative analysis of a metallic specimen to be made on a surface of the order of 1 micron.

While he is with us, Prof. Guinier is conducting a graduate class in advanced X-ray techniques and a seminar on applications of X-ray technology to metalluragical problems, in addition to contributing to the research investigations of our physical metallurgy staff.

Dr. Peter Greenfield Joins Metallurgy Staff

The Department welcomed Dr. Peter Greenfield to the staff this fall as research associate in physical metallurgy. Dr. Greenfield received his B. S. (honors) and Ph. D. in metallurgy from Birmingham University, England, where he also served as demonstrator in metallurgy.

His researches at Birmingham, with Dr. G. V. Raynor, were concerned with the 3/2 electron compounds in alloys of Cu-Zn-Ge and Cu-Al-Ge, and with the gamma phase in transitional elements. More recently, Peter had been employed as scientific officer, Atomic Energy Establishment, Harwell, on crystal structure determination of plutonium.

Dr. Greenfield is continuing work here on ternary alloys of the transition elements with Prof. Beck. After working hours, Peter and his wife are busy becoming acquainted with our people and customs, and in particular, comparing the British brand of contract bridge with that played here in Champaign.

A LETTER TO THE ALUMNI

from H. L. Walker

Occasionally some of you have told me that what you do in practice bears little or no relation to what you learned in college. There is, of course, some truth in what you say. You are, indeed, raising a very old question touching the contrast between the theoretical and the practical, between engineering in books and engineering in action. Few seriously question the fact that we in the engineering colleges are doing an outstanding job in grounding the prospective engineer in the principles of engineering, and that we are teaching him to think. With all of the shortcomings of our modern colleges — and there are many — everyone will admit that nowhere in our universities is better teaching being done than in our engineering colleges and any criticism of the college of today must always be made in the light of that great accomplishment. Granting that our engineering colleges do teach young men to think, the question still remains: "Are we in the engineering colleges doing all we can toward equipping the prospective engineer for the practice of engineering, or are we, as some seem to imply, burying our heads in the sands of handbooks and textbooks, oblivious to our full responsibilities?"

The principal complaint against the engineering colleges is that they do not offer any or at least enough practical training; that they devote their attention to theory and fail to inculcate their graduates with the skills essential for the practice of engineering. The criticism has some validity but it is often made without an understanding on the part of the critic as to what the colleges in fact are doing about the problem. I suspect it also is made without clear insight into what are feasible and sound educational measures or what engineering colleges can do effectively. Here is a subject of such important scope that I risk the danger of oversimplification in attempting to compress a statement on it in a letter.

There is today much activity and ferment in the engineering colleges. I am quite sure that the members of the profession generally are not acquainted with what is taking place. Never before in the history of engineering education in this country has there been such self-examination, self-criticism and soul-searching on the part of engineering teachers as there is now. The College has a permanent committee on "Improvement of Engineering Teaching". This activity has not yet resulted in what can be described as an epochal change in engineering instruction but it has brought about a wide variety of experiments. Many of these, no doubt, are ephemeral, but some are significant and have resulted in new courses that are already occupying permanent spots in the curricula of various schools.

Metallurgical engineering education has developed from a descriptive type of education involving equipment, processes, and in many instances unknown chemistry into systematized subdivisions of chemical, mechanical and physical metallurgy. The chemical and physical subdivisions are becoming more and more scientific in nature, with fundamental laws now rather well understood; whereas, mechanical metallurgy is yet mostly based upon practical experiences without a sound fundamental, scientific knowledge.

Another trend of recent development relates to the rapprochement between engineering teachers and the practicing members of the engineering profession. We must revert to the apprenticeship days of engineering education for anything comparable, but under the apprenticeship system the practicing engineer was the engineering teacher. When West Point (military engineering) and Renssaeler Polytechnic Institute (civil engineering) established engineering curricula a new era in engineering education was ushered in. It marked the beginning of engineering education under the aegis of the universities. Training by apprenticeship, to be sure, did not capitulate at once and to some extent we still have it with us. Only by gradual degrees have the universities taken over and today they dominate the field. We still have, however, many practicing handbook worshipers who call themselves professional engineers.

With engineering education under the control of the universities a new component of the engineering profession was in the making— the professional engineering teacher. Too often the engineering professor is looked upon as being of the profession but taking little active part in it. The practicing engineers are prone to view him all too frequently as an impractical theorist. That this would result in a breach between the colleges and the profession was inevitable. That a breach did develop and that it had unfortunate implications, not only for the engineering professor but for the whole engineering profession is well known. Engineering theory without practice is incomplete but I should view it as not being as nearly incomplete as would be engineering practice without sound engineering theory.

The breach in the relations between engineering teachers and practicing engineers has in the past few decades improved immeasurably. This has been most noticeable in the organized professional engineering societies, in which both engineering teachers and practising engineers now participate quite commonly. Clearly, the criticism that engineering teachers are not informed on what is taking place in the profession is no longer a valid one.

It may interest you to know how the universities proceed in projecting programs of instruction and particularly new courses. I can describe what we do at the University of Illinois, and I believe the procedure is similar in other schools. Since our main responsibility is to train students for the practice of engineering, the first task is to appraise our courses in the light of the contribution they will make in fitting the student for practice. This requires information on and an understanding of what the engineer does in practice and what skills he must have so as to perform his assignments. But before a course is launched in the classroom, it must meet the test of still another question: namely, is it the type of instruction an

engineering department can effectively give? Clearly, we must not permit ourselves to be drawn into something we are not fitted to do, we must be sure we have competent personnel to teach proposed courses and adequate laboratories for instruction and research.

The task of planning an engineering program involves intangibles. One that is highly significant has to do with inculcating in the student engineer an attitude of mind relative to his professional responsibilities. This transcends the routine of determining what the engineer does. It implies more than grounding the student in the art and theory of engineering. It involves stimulating an understanding of the best traditions of the profession, the building of character, and the instilling of vision as to the place and mission of engineers in our economic society, and as to the engineer's responsibilities and opportunities in this context. Schools should stress exposing the student to great minds as one of the major contributions an engineering school can make. The area we are now exploring aims at the inculcation of a vision of the destiny of the profession and this demands great teaching by men with great minds.

Now, departing from generalities, you will want to know something about what we are doing at the University of Illinois. Engineering schools have, in the past, neglected the area of scientific training. Last year the department staff devoted substantial attention to that subject. This resulted in the drafting of new curricula in mining and metallurgical engineering, which have now been approved and are in effect. This teaching of fundamentals and science as an integral field of study, and not as a mere by-product of case study, has been added to our curricula.

The petroleum companies are employing an increasing number of graduate mining engineers for field work in exploration and production. A "petroleum option" in mining engineering has been designed and the faculty is attempting an appraisal of the desirability of adding the petroleum option to its offerings. A course recently established is that of speaking, writing and exposition. The complaint has been perennial in the enineering schools and in the profession that engineering students were not adequately trained in the use of language. It is recognized, to be sure, that this is a skill an engineer must master. The course we have projected is a full year of undergraduate seminar. In addition to the departmental representative in technical matters the department makes use of part-time appointments from the faculties in rhetoric and in speech, who counsel and criticize students in their presentation of seminar subjects.

We are attempting to upgrade our graduate program of instruction and research. The Ph.D. degree is now offered in mining and in metallurgy. Three doctorate degrees in metallurgy and one in mining have been granted in the past two years. As a part of this program we have added new courses of instruction at the graduate level. The current graduate offerings are tabulated below, and others will be added as the need arises:

Metallurgy of Welding, Powder Metallurgy, Metallurgy of Steel Castings, Metallurgical Kinetics and Thermodynamics, Mechanical Behaviour of Metals, Kinetics of Phase Changes in Metals, Advanced Physical Metallurgy, Advanced Metallographic Technique, Stainless Steels and High Temperature Alloys, Advanced Physics of Metals (2 courses), Plastic Deformation and Annealing of Metals, Graduate Seminar in Metallurgy, World Mineral Economics, Geophysics in Mining, Advanced Mineral Dressing and Coal Preparation, Mine Valuation and Taxation, Advanced Mine Administration, Mine Safety Engineering, Advanced Mine Ventilation, Design of Underground Mines, and Mining Geology.

The College of Engineering has recently adopted new entrance requirements to be effective September 1953. For admission to full freshman standing, high school graduates must present two units of algebra; one unit of plane geometry; one-half unit solid geometry; one-half unit trigonometry. This permits introducing courses in physics and calculus during the second semester of the freshman year. Freshmen who cannot meet the entrance requirements cannot meet the degree requirements in eight semesters.

One of the most troublesome problems in the engineering schools relates to a heavily overloaded curriculum. Many of our most serious difficulties, and those on which the schools receive severe criticism, are related to the social and humanistic subjects. The new curricula in mining and metallurgical engineering provide for an increase in the number of nontechnical electives such as business, psychology, speech, letter writing, etc. New fields are constantly opening up which demand attention. But with only four short years that can be devoted to study, it is impossible for the student to get into his program all the courses he should take. Ordinarily, adding new courses is not a solution. We may soon be forced into a new evaluation of a five year curriculum.

One of the functions of an engineering school is research. The

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Professor Walker places high value on the close friendships he has with many of our graduates. Over the past few years, however, the increased pressure of administrative duties associated with a growing department has prevented his maintaining the close relationships with students and alumni. To compensate in part at least for this, Prof. Walker has written this first in a series of letters expressing his thoughts on various subjects of interest to us all, and invites your criticisms and comments on what he has to say. In this first letter, he discusses some trends in engineering education, what we are trying to on this subject in our department, and presents his conception of the functions and responsibilities of an engineering department.

A Letter . . .

(Continued from Page 3)

burden of the scholarship of the profession rests heavily on the engineering teacher. Research and teaching are close partners. It is but natural that teaching stimulates research and that research in turn improves the quality of teaching. I am not thinking of the occasional article a teacher may write, scholarly though it may be, but of research that is more meaningful and significant. Much of the research of the past has involved little more than mere testing programs and the threshing over of old data. I am thinking of research that extends into unknown frontiers. Engineering does not operate in a vacuum. Problems and their solution are found through fundamental research. We are committed to this type of research and we expect to give increasing emphasis to it as a phase of our graduate program.

Last year you read of our inadequate physical plant facilities, and of our plans for new space. We are not neglecting these plans. We had hoped to get an appropriation for a new building at the last session of the legislature, but the University President ruled that three new buildings (E.E., M.E., Ch.E.) in Engineering during the past two biennial budgets meant additional new space in engineering for 1951-53 could not be granted. The department now occupies space in Ceramics, Metallurgy, Mining, Transportation and Mechanical Engineering Buildings. We would welcome the support of alumni and friends in securing a budget for construction of new quarters. Meanwhile, we are hopeful for an appropriation this year for a third floor addition to the Metallurgy Building as temporary relief to our critical lack of space. Designs have been completed for a third story addition to Metallurgy Building. The initial estimate for construction was in the order of $90,000, but the architects' estimate (including University overhead and other incidental costs) amounted to $175,000. This amount of money was not available during 1951-52. We are hopeful that the money will be appropriated this year.

H. L. Walker

Alumni News

Homecoming this fall was a cheerful time until the football game started, but in spite of that cloud, we enjoyed the occasion with visits from quite a list of mets who were here for the game, and came by the Lab: Morrie Wolin '47, Kevin Began M. S. '51, Russell Hyde '50, Bob Necheles '52, Bill Rudin '42, Gene Schwetz '52, Ed Klimek '51. Ed had just returned from a tour of duty with the Marine Corps that took him through the Mediterranean, but is now ready to earn a living at metallurgy. Here for earlier games were Frank Rough '43 and Ken Shimmin '51.

Harry Czyzewski '41, 211 S. W. Vista, Portland, Oregon, sends word that all is well in the consulting business and at home, too, where third daughter Marie Enid was born Oct. 5. Another birth reported was Robert Howard Beede '46, born June 26. Dad's address is 1516 Grant, Berkeley, Calif. The Jim Bechtolds '47, 1065 Findley Dr., Pittsburgh, have become parents of a boy since our last issue. And we in Urbana are doing our part too, as the second son in the Frank O'Connor family arrived last month.

Glen Wensch '46, has resigned his position at Fansteel Metallurgical Corp, and is now Deputy Chief, Reactor Materials Branch, Savannah River Operations Office of the A. E. C. Glen had earlier been associated with the AEC at Los Alamos.

H. B. Nudelman, Met '51, is a research assistant in the Metals Department of the Armour Research Foundation of the Illinois Institute of Technology.

It is always pleasant to visit with grads who stop by when they are in the vicinity, and we enjoyed several such visits during the past summer months. Harry Turner '49 was here en route from the east to his new job in the Test Lab at Consolidated-Vultee in San Diego. His address is 4637 Soria Drive. Among the vacationers who came by the Lab were Frank Lister '44, and his wife, Bill Hoskins '50, Stewart Sandberg '48, Gene Ellis 47, (who brought along a potential met. engineer from his home town) John Beile '50, with his wife and son, Phil Leighly '48, and F. S. Williams '40, on the campus for a conference on precision casting.

Quite a large group of Illini mets are settling in the Pittsburgh area. Latest additions to our men already there are Dick McClintick and Burt Schaner of the '52 class, at Westinghouse Atomic Power Division. Another classmate, Paul Shewmon (who joined the ranks of married men last August) held a summer position with Westinghouse, and is now taking graduate work at Carnegie Tech. Yet another prize for Westinghouse was George Sinclair '48, who resigned his position as Research Asst. Prof. in the T. & A. M. Department here to join the Research Laboratory staff.

If you didn't attend the Alumni Luncheon at the Metals Congress in Philadelphia last month, you missed a chance to break bread with these Met. grads: C. E. Bates, J. M. Bates, John Beile, R. C. Bertossa, R. P. Carreker, Stan Channon, R. R. DeWitt, Ray Fostini, Edgar Hack, R. W. Hailey, Walter Kilimnik, Phil Leighly, John Mendenhall, T. E. Perry, S. L. Rice. D. B. Roach, T. H. Seiben, C. R. Straesser, R. H. Van Pelt, J. L. Waisman, G. W. Wensch, and F. S. Williams. Prof. Walker acted as host, and brought the group up to date on recent activities at Urbana.

Some other of our people were seen at the convention, but were not able to attend the luncheon: R. O. Bayer, Paul Beck, C. R. Cook, T. J. Dolan, Gene Ellis, Andre Guinier, J. R. Lane, A. P. Litman, R. E. Mahr, B. R. Price, Frederic Seitz, P. G. Shewmon, J. A. Snyder, L. N. Wall, C. A. Wert, and R. A. Wilde.

J. R. Burns, Min '39, is now Works Manager of the Hillsborough New Brunswick plant of the Canadian Gypsum Co., Ltd. This operation is in a beautifully scenic country, and also affords opportunity for excellent hunting. Mail will reach John in care of the company.

Wedding bells rang for Sam Leber last August. Mr. and Mrs. (Pauline) are now living at 3602 E. 151, Cleveland.