

**LECTURE NOTES ON SOME
OF THE
BUSINESS FEATURES OF
ENGINEERING PRACTICE**

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Lecture Notes on Some of the Business Features of Engineering Practice by Alex. C. Humphreys

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ALEX. C. HUMPHREYS

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ON SOME OF THE
Business Features
OF
Engineering
Practice

BY
ALEX. C. HUMPHREYS, M. E., Sc. D., LL. D.

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DEPARTMENT OF BUSINESS ENGINEERING
Stevens Institute of Technology

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CONTENTS



	PAGE.
INTRODUCTION. PRESIDENT HUMPHREYS.	5
THE POINT OF VIEW. MR. WALTER C. KEEL.	7
NOTES ON CONTRACTS. MR. HOWARD E. WHITE.	16
GENERAL NOTES. PRESIDENT HUMPHREYS.	48
ACCOUNTING. PRESIDENT HUMPHREYS.	57
ACCOUNTING (<i>Continued</i>). PRESIDENT HUMPHREYS.	71
ACCOUNTING (<i>Continued</i>). GENERAL NOTES. PRESIDENT HUMPHREYS.	86
REPAIRS AND DEPRECIATION. PRESIDENT HUMPHREYS.	96
ACCOUNTING AS APPLIED TO DEPRECIATION. PRESIDENT HUMPHREYS.	133
ACCOUNTING AS APPLIED TO DEPRECIATION (<i>Continued</i>). PRESIDENT HUMPHREYS.	140
SYSTEMS OF CLASSIFICATION—"TAXES." PRESIDENT HUMPHREYS.	144
ANALYSIS OF A BALANCE SHEET. PRESIDENT HUM- PHREYS.	155
ANALYSIS OF DATA. PRESIDENT HUMPHREYS.	169
ESTIMATES AND SPECIFICATIONS. PRESIDENT HUM- PHREYS.	177

INTRODUCTION.

In this department the students are first required to read the "Reprints of Lectures and Papers" which were gathered together for the purpose of cultivating in them a more sympathetic attitude of mind towards the specific instruction which is in part covered in these lecture notes.

In writing these notes and in putting them together I have made no attempt to avoid repetition, but my aim has been rather to consider the same proposition from several points of view in the hope that I might so better remove the difficulties that have developed in the work of the class-room.

Experience with three senior classes has convinced me that this repeating and paraphrasing is required to enable me to give inexperienced students a firm grasp of the essentials included in my course, unable as I am, by reason of insufficient time, to afford them the advantages of extended practice in examples.

The actual repetition is far greater than is here indicated, for, in my lectures as delivered, I give many additional examples from my own experiences, selected to meet the difficulties of the students as these difficulties become apparent.

I do not hesitate to include commonplaces. My hope is that especially where these have to do with the ethics of our noble profession the members of my classes will, through a cultivated receptivity, come to accept these commonplaces as active and controlling truths.

These pages are placed in the hands of the students so that they need not be obliged to rely solely upon my spoken words, but may have something to study outside of the class-room in preparation for examinations.

Notwithstanding the fact that I have not been able so far to cover by written notes all of the matter included in my course, I feel that the students should be able to prepare on all I present because much that is most difficult to comprehend is here given

in permanent form and the remainder I give them full opportunity to discuss with me in class.

The notes on the Law of Contracts were prepared at my request by my friend and counsel, Howard E. White, Esq., of the New York Bar, to whom I wish now to repeat my grateful acknowledgments.

The commencement address to the Class of 1904, delivered by Walter C. Kerr, Esq., would have been included more appropriately in the "Reprints of Lectures and Papers," but as this was not feasible I have reprinted it here that Mr. Kerr's sound advice, so admirably presented, may be preserved for future classes.

I hope that I may be able to develop from these and supplementary notes a text book on the business features of engineering practice, based upon my experiences in the fields of Engineering and Business as to the matter, and upon my experiences in the classroom as to the most efficient methods to be employed in presenting this matter to engineer-students already pressed for time in which to perform their assigned tasks.

ALEX. C. HUMPHREYS.

THE STEVENS INSTITUTE OF TECHNOLOGY,
HOBOKEN, N. J.

THE POINT OF VIEW.

(Address to the graduating class delivered by Walter C. Kerr, Esq., at commencement exercises of Stevens Institute of Technology, June 16, 1904.)

It is a pleasure to talk to a lot of young men who are about to become engineers. It was not so long ago that I came to your age less well prepared, perhaps, than any of you. When I look back at the engineering education through which men of my time were launched, and then consider the training you have had and the opportunities before you, I have reason to wonder why I am here.

I hesitate to advise you. You have already had so much advice that I do not know whether you can hold more. What I can say in a few minutes will amount to little, so let me use these minutes to suggest that you advise yourselves along certain lines which I will propose by way of point of view. If you look straight you will see straight. You cannot think wrong and act right. Your perspective will be distorted if you haven't the right point of view.

You are leaving a good institution for a good world. Your Alma Mater has built up around you excellent facilities for giving you what you need, and other institutions have likewise cared for their own.

The so-called liberal education has always been highly academic. Trade school engineering has been strictly non-academic. The two have joined hands fortuitously in our modern institutions. The liberal education has become less and the technical more academic, with advantage to both. There is, however, danger of engineering education growing too academic, for several reasons: One is the disposition to include in technical training a liberal education, which of itself is not undesirable. Another is that engineering professors often lean unduly towards academic views and processes, and thus lose touch with the spirit of the

engineering world. Greater than either of these is the tendency of all things to move in the line of least resistance, and all learning which depends upon the intellect alone is more easily acquired than that which depends upon other sources. The proof of this need go no further than to remember that no literature is finer than that written two thousand years ago; no philosophy has fundamentally improved upon that of the ancients; the highest flights of intellect and mathematics were reached during the ages in which the world was observed to be composed of four elements—earth, air, fire, and water.

A review of knowledge shows the great preponderance of the intellectual over the material, and it is only within late centuries, in fact almost the past century, that the human mind has seemed capable of turning from the lesser resistance of intellectual attainment to the greater capacity for physical observation and comprehension. We have but recently come to the era of intense mental operations, dealing with laws and principles which require insight greater than the intellect can grasp unless aided by the senses. Contrary, therefore, to common belief, I assert that the highest refinement of knowledge follows from the highest use of the senses; and that it has taken thousands of years of pure intellectual development to attain a state in which the powers of nature can, through the human intellect, be made useful to mankind, and add largely to knowledge. Do not, therefore, get a wrong view of the faculties involved in science, in the application of the laws of nature, applied mechanics, and the powers of comprehension which underlie engineering. There is still room for doubt—not debatable here—as to what constitutes liberal education.

I hope for the time when the spirit of engineering as found in practice will form a more definite part of engineering education. This, I think, must come through the professor keeping in close practical touch with the engineering world. There are various ways in which this may be accomplished, but I know of none better than by each professor doing a reasonable amount of practical work for commercial purposes. Under some conditions, this may be consistently accomplished during a portion of the time, but I am inclined to think that eventually our professors will de-