




12-1974

Engineering at Gettysburg College

William C. Darrah
Gettysburg College

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Engineering at Gettysburg College

Description

This little volume narrates the story of engineering instruction at Gettysburg College, particularly of the Engineering Department that functioned from 1912 to 1940. It includes also an account of the apparently first venture in engineering by an American liberal arts college, undertaken during the brief association of the renowned Herman Haupt with Gettysburg College between 1837 and 1847.

Time dims our memories. Although there are more than fifty living alumni who were graduated from the Engineering Department, many Gettysburgians are unaware of its existence and accomplishments. The purpose of this story is to place on record a significant aspect of our tradition. [*excerpt*]

Keywords

Gettysburg College, Pennsylvania College, Engineering Department, Herman Haupt, college curriculum

Disciplines

Cultural History | Curriculum and Instruction | Higher Education | History | Science and Mathematics Education | Social History | United States History

Publisher

Gettysburg College

Comments

Volume 2 of Gettysburg College's History Series. The Gettysburg College History Series was a series of monographs on various aspects of College history published in anticipation of the 150th anniversary of its 1832 founding.

History Series Number 2

Gettysburg

Engineering at Gettysburg College

The Gettysburg Bulletin
December 1974

In seven short years Gettysburg College will be celebrating its sesquicentennial. The year 1981-82 will be an exciting time, one filled with events in celebration and recognition of the College's 150 years of service to higher education.

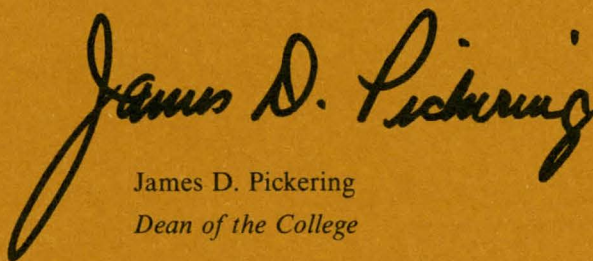
Much has been written about the history of Gettysburg College. On the occasion of its 50th birthday in 1882, E.S. Breidenbaugh edited *The Pennsylvania College Book (1832-1882)*. Fifty years later another volume, entitled *The History of Gettysburg College* and edited by Samuel Gring Hefelbower, was published. A sesquicentennial volume is planned for 1982. Its author will be Dr. Charles H. Glatfelter, professor of history.

In 1970 President C.A. Hanson established an Editorial Board for the purpose of reviewing and approving for publication a series of monographs on various aspects of College history leading toward the 150th anniversary in 1982. Vol. I of the series, *Yonder Beautiful and Stately College Edifice: A History of Pennsylvania Hall (Old Dorm)*, written by Dr. Glatfelter, was published in 1970 in conjunction with the rededication of Pennsylvania Hall following its extensive renovation. Vol. II, *Engineering at Gettysburg College*, was written by William C. Darrah, professor emeritus of biology, and published in 1973.

Upon completion of the first two volumes of the Gettysburg College History Series, the Editorial Board reevaluated the project and concluded that a new format was needed, one which would facilitate wider distribution. Accordingly, the College has approved publication of subsequent monographs as special editions of *The Gettysburg Bulletin*.

This edition is a reissue of Professor Darrah's work. Vol. III, on the relationship between Gettysburg College and the Lutheran Church, is being written by Dr. Harold A. Dunkelberger, professor of religion and department chairman, and will appear in December 1975. Dr. Robert L. Bloom, professor of history, has been commissioned to write Vol. IV, on the history of College athletics, which will be published in December 1976.

The hard-bound edition of Vol. I, the history of Old Dorm, will continue to be available for purchase at a cost of \$5.25 each, including mailing cost. Copies may be ordered through the College's Development Office.



James D. Pickering
Dean of the College

Engineering at Gettysburg College

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The Gettysburg Bulletin
Volume 65 December 1974 Number 5
Editor: Willard G. Books

Published monthly except
February and June. Semi-monthly
in April. Second class postage
paid at Gettysburg, Pa. 17325.
Send POD Form 3579 to
Gettysburg College, Gettysburg,
Pa. 17325.

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Preface

This little volume narrates the story of engineering instruction at Gettysburg College, particularly of the Engineering Department that functioned from 1912 to 1940. It includes also an account of the apparently first venture in engineering by an American liberal arts college, undertaken during the brief association of the renowned Herman Haupt with Gettysburg College between 1837 and 1847.

Time dims our memories. Although there are more than fifty living alumni who were graduated from the Engineering Department, many Gettysburgians are unaware of its existence and accomplishments. The purpose of this story is to place on record a significant aspect of our tradition.

Many persons have assisted in the search for records and other information. Mrs. Lillian H. Smoke and her colleagues on the staff of the Gettysburg College Library, Jay P. Brown, and Charles H. Glatfelter have been most helpful. For recollections of the alumni, and faculty of the Engineering Department, I am especially grateful to C. Gilbert Reen, Wilbur E. Tilberg, John B. Zinn and Wilbur L. Plank.

William C. Darrah
Gettysburg College
December 20, 1974

*To the students of
the Engineering Department,
many of whom aided
in the preparation of this volume.*

Engineering is an ambiguous term. To some it connotes applied science, to others the art of solving technical problems and, of course, in its original meaning it was the skill of operating machines. From the practical experience of managing engines there developed complex interrelations between education, science and technology as the Industrial Revolution engulfed every aspect of modern life in the nineteenth century. What to teach became a critical concern of all educators. Liberal arts colleges experimented cautiously with engineering instruction, but not until the 1860's were there substantial programs.

Twice in the history of Gettysburg College the engineering sciences held a prominent place in its curriculum. In both instances the College's venture into technical education was initiated by the enthusiasm and persistence of single individuals. The differences between the two programs and the individuals who developed them were more striking than their similarities.

In 1837, five years after its founding, Gettysburg College¹ appointed Herman Haupt, then only twenty years of age, Instructor of Civil Engineering and Architecture. A year later he was promoted to a professorship, probably the youngest person to hold this rank in the history of the College. He had been graduated from the United States Military Academy at West Point at the age of eighteen in 1835, but resigned his commission a few months later.

Herman Haupt began his professional career as an engineer in the surveying of a railroad line

from Norristown to Allentown. The following year he accepted a position with the Commonwealth of Pennsylvania to survey and construct a railroad from Gettysburg across South Mountain to the Potomac River. The line, which was known derisively as the "Tape Worm Railroad" of Thaddeus Stevens, is today, somewhat shortened, part of the Western Maryland system. The original railbed borders on the west end of the College campus.

Haupt lost employment when political controversy halted construction of the railroad. At this point he offered his services to the College without compensation. Professor Haupt taught surveying, civil engineering and engineering drawing, the latter a combination of architectural and mechanical drawing. This appears to be the earliest venture in engineering education in any American liberal arts college.

In 1839 the trustees established a Medical Department in Philadelphia and voted to establish a Law School in York. Owing in part to the refusal of Daniel Durkee to accept a faculty appointment, the law school never materialized. We may wonder whether Haupt's association with the College during these years was not a reflection of the trustees' interest in developing higher professional training.

Quite suddenly Haupt resigned in 1839 to accept the position of chief of construction of the York and Wrightsville Railroad. The job required special skill in railroad bridge building, a subject to which he had already devoted considerable study and experiment. At the same time Haupt established in Gettysburg a school for girls which he named Oak Ridge Seminary. Although he assumed the role of headmaster, he left most of the instruction and much of the administration to a staff of five ladies, including a sister who was in charge of the preparatory department.

¹ Pennsylvania College of Gettysburg received its charter from the Commonwealth of Pennsylvania on April 7, 1832. A petition to change the name to Gettysburg College was granted on November 14, 1921. "Gettysburg College" will be used throughout this narrative.

Upon completion of the York and Wrightsville Railroad in 1842 Haupt opened a second school, Oak Ridge Classical and Mathematical Academy, located in a frame classroom building constructed just south of his home, Oak Ridge, now known as the Schultz House, which stands at the west end of Middle Street. Here he taught surveying and civil engineering to a small group of remarkable young men, among them William Wierman Wright, who was to become a distinguished civil engineer. In 1845 Haupt merged his school with the College and accepted the rank of Adjunct Professor of Mathematics, Engineering and French. During this entire period the young ladies' academy continued to function.

In the brief space of five years Herman Haupt had achieved a wide reputation as a bridge engineer. In 1839 he was granted U. S. Patent No. 1445 on the "Haupt Improved Lattice Truss" and in 1844 commenced the preparation of a general textbook on civil engineering. The project was too vast. What emerged instead was a book, *The General Theory of Bridge Construction* (D. Appleton & Co, 1851), which was a standard text and handbook for more than twenty-five years. On the title page Haupt noted his association with Gettysburg College.

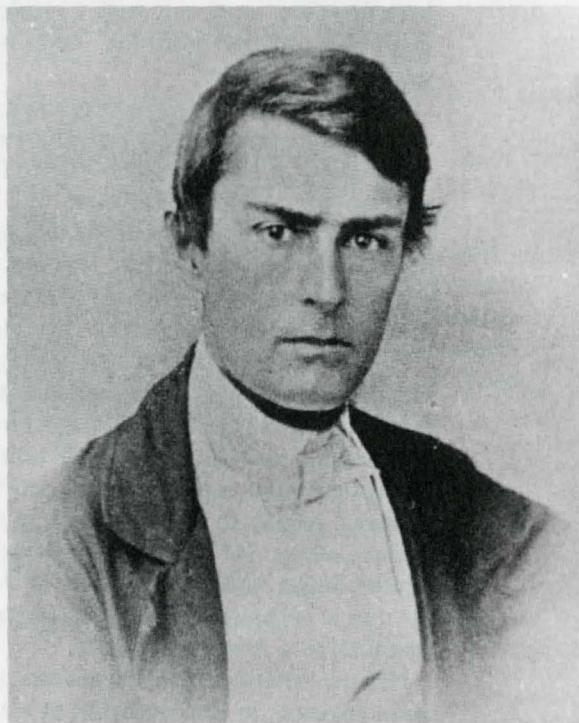
Haupt, together with the versatile Michael Jacobs, Professor of Mathematics, Chemistry, and Natural Philosophy, stimulated the student body with an exciting interest in applied science. In 1844 students and faculty joined in organizing the Linnaean Society "for the promotion of the cause of science among its members." A year later, the College Catalogue described the impact which the new group was having:

The spirit of enterprize, that arose among the students a year ago, has been steadily increasing in vigor, and has wrought much. The Campus has assumed an entirely new appearance, ornamented with avenues of thriving trees, substantial flower-girt paths, arbors, and beds of flowers. The Cabinet of the Linnaean Society has been growing rapidly, and its accumulating treasures have been arranged by scientific hands. Already it overflows the hall appropriated for its

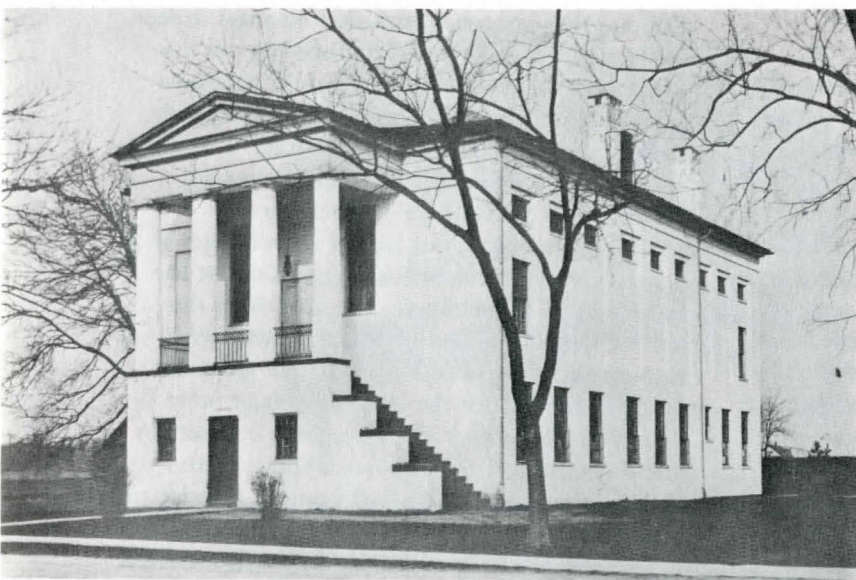
reception, and two-thirds of the necessary amount of money has already been secured for the erection of a building capacious and well suited for the purpose, the design for which has been prepared by Prof. Haupt. We hope the spirit of enterprize on the part of the students, and liberality on the part of our friends, may continue until our grounds and our Cabinet and our entire Institution may stand second to none in the land.²

Haupt's most spectacular contribution to the College was his architectural plan for Linnaean Hall, a natural history museum and constructed entirely by student labor. This imposing building with Ionian columns stood just west of Pennsylvania Hall from 1846 to 1942, at which time it was demolished.

² *Annual Catalogue of the Officers and Students in Pennsylvania College . . .* (1845), pp. 18-19.



Herman Haupt, age 34



The architectural plan for Linnaean Hall was the most spectacular contribution to the College by Professor Herman Haupt who was appointed Instructor of Civil Engineering and Architecture in 1837. The natural history museum was constructed entirely by student labor at a total cost of \$6,000.

Professor Haupt's growing national reputation — he was still less than thirty years of age — brought him tempting offers of employment. It was inevitable that some opportunity would entice him from the relatively quiet duties of a professorship. In 1847 The Pennsylvania Railroad secured the services of Herman Haupt as Chief Engineer to construct the main line from Harrisburg to Pittsburgh, including the Allegheny Tunnel and the famous Horseshoe Curve. Such a challenge was irresistible. Thereupon, Haupt moved his family briefly to Harrisburg and then to Philadelphia.

Haupt's subsequent restless career as a great railroad engineer is beyond the scope of our story. His distinguished service as chief of transportation of the Union Army earned him the rank of Brigadier General. His design and construction of the Hoosac Tunnel in western Massachusetts was one of the great technological feats of the nineteenth century. The Tidewater Oil Pipeline, The Northern Pacific Railroad, improvement of the Ohio River for navigation, and a score of other masterpieces of engineering attest to his versatile genius.

Gettysburg College awarded Herman Haupt a Master of Arts degree in 1839 and in 1859 elected him a trustee, a role in which he served until 1873.

While it would be fruitless to speculate on "what might have been," had Herman Haupt remained in Gettysburg, one comment is of

interest. He was dissatisfied with the prevailing education for both sexes at all levels, from preparatory school through college. He distrusted rote learning in a period when this was the accepted method of teaching. He believed education must be moral, intellectual, experimental, and practical, whether it be pre-professional or general, for a young man or woman in any vocation. His faith in "learning by doing" permeated all of his educational activities.

Gettysburg College's first venture in engineering education was thus strictly the accomplishment of one man. His brief service did not continue long enough to have had an enduring influence on its academic aspirations. Nevertheless, it demonstrated an open-mindedness of the faculty and administration to try novel ideas.

More than a half century passed before the College attempted a second venture in engineering. This time circumstances were very different. The nation had industrialized. Its cities had grown in numbers and complexity. The engineering profession had diversified, and engineers were participating in ever-increasing capacities in the industry and administration of the nation. Technical training under many guises had become an integral part of higher education.

Engineering Education

Between 1835 and 1875 engineering education had developed slowly from a narrow base in two or three special institutions, through the many land grant colleges, to the threshold of an explosive expansion. It was not intended to train geniuses or to develop creativity, although the Massachusetts Institute of Technology, founded in 1865, consciously sought to recognize and encourage both. Instead, it was an instrument to provide skilled practitioners who had some theoretical knowledge, as well as some limited experience with the materials and methods of the profession. It is little wonder then that most four-year colleges, pressured by alumni and employers, entered the engineering field, albeit cautiously, offering a few appropriate courses. For example, in 1894 the Department of Mathematics at Bucknell University introduced a course entitled "Surveying, City Surveying, and Civil Engineering." By 1902 the program had been expanded into a full four-year sequence leading to the degree of Bachelor of Science in Civil Engineering. The first degree was awarded in June 1907. Bucknell University followed with programs in electrical engineering in 1905, and chemical engineering and mechanical engineering in 1909.

At the turn of the century nearly a hundred colleges offered engineering programs of divergent types. In reaction to this surge of activity without well-defined objectives, standards were being proposed by the Society for the Promotion of Engineering Education and by a commission to investigate the teaching of engineering organized by the Carnegie Foundation for the Advancement of Teaching. Such standards were accepted gradually, often grudgingly.

The strictly engineering schools, such as the Massachusetts Institute of Technology, Rensselaer, and the Rose Institute of Technology, had adopted laboratory instruction and shop practice to acquaint the beginning student with the practical aspects of the profession. Some schools used a different approach, cooperative studies under which the student observed industrial establishments and, in some instances, was employed in enterprises available in the community or nearby cities. The student thus was participating in the practice of engineering.

Still another approach included business aspects of the operational side of engineering, on the assumption that the engineer would negotiate contracts, write specifications, and be involved with the economics of his profession.

Obviously, technological breadth was not feasible in a typical four-year college. A considerable number of liberal arts colleges with engineering departments kept them under the tight control of the faculty. In such cases the normal course graduation requirements were not waived and the number of available electives made it difficult for the student to take more than a small number of engineering courses. In many institutions the applied laboratory and shop experience were looked upon as inferior to academic studies or grudgingly accepted as supplementary courses with little credit toward a degree. In some, the student was given what was presumed to be a thorough basic training in the fundamental sciences and mathematics. Only after obtaining a degree would the budding engineer receive his practical experience.

One solution to the complicated problem of what to teach an engineer was simply to control the length of time required for earning a degree. In the 1890's Yale University lengthened the time for the degree to six years, the student earning a Ph.B. at the end of four years and the full engineering degree at the end of six.

These alternative proposals led to the organization of the Society for the Promotion of Engineering Education following the Engineering Congress at the Columbian Exposition in Chicago in 1893. The need for early and continuing practical experience was recognized, and many efforts were made to encourage the liberal arts colleges, as well as many engineering schools, to revise the courses of instruction so as to include a generous measure of shop and other practical experience as an integral part of course work.

The system of accrediting engineering departments was not developed until the 1920's, although some universities had appointed visiting committees to examine curricula and facilities and make recommendations where such were desired.

In academic terms, two problems had to be faced by faculties. One was the selection of capable students for engineering training. In 1918, for instance, the Carnegie Foundation



Bridge-builder Haupt showed his graceful touch in designing the interior of Linnaean Hall. Construction began with a cornerstone laying July 23, 1846, and the hall was dedicated September 14, 1847.

reported that barely fifty percent of the students who entered engineering schools or departments completed the courses of instruction. Inadequate preparation or inaptitude in mathematics was the most common admitted cause of failure. Other able students found that the practical side of engineering held little challenge or interest for them and that they were simply unsuited for the profession. The second problem was designated "crowding," particularly in the liberal arts college, where the engineering student was required to fulfill all the usual requirements and, in addition, not only the academic engineering courses, but also whatever additional practical shops or experiences were expected of him. The resistance of faculties against any concessions to reduce requirements was one of the severest handicaps in bringing about improvements in engineering instruction.

Although Gettysburg College strongly supported the natural sciences, and although many of its professors were involved in applied science, there had been no attempt to resume engineering instruction after Haupt's departure. Several outstanding engineering colleges, notably Rensselaer and the Massachusetts Institute of Technology, were established before 1870, and it was inevitable that more limited programs in engineering training would be undertaken by other types of educational institutions. The land grant colleges developed strong engineering schools, particularly in the industrialized states, and were innovators in many types of applied engineering. Many small four-year colleges, while showing no general pattern, began offering engineering courses about the time of the Civil War. Some of these, like the Pardee School of Science of Lafayette College, merely expanded existing course work in the applied sciences. The demand for educated engineers was so great that shortcomings in some of the programs were ignored.

It is seldom realized how much the practice of engineering before 1875 depended upon accumulated experience rather than upon scientific knowledge. Wood-burning locomotives were only gradually being replaced by those consuming coal. The determination of the strength of materials and the preparation of joints in piping sufficiently strong to withstand the steam pressures necessary to drive a locomotive and string of loaded cars were

matters of rule of thumb rather than proven experimental data. No metallurgy was taught in an American university, nor indeed in any other part of the world. An adequate definition of steel was not yet established or agreed upon, even though steels of excellent quality could be manufactured quite reliably. Many of the great engineering feats of the nineteenth century were conceived and executed by daring men whose professional training had little to do with engineering but who were masters of getting things done. The prime attribute of such men was ingenuity, inventiveness, or creativity — all skills that defy precise definition.

In academic and professional circles, the engineer was still looked upon as a practitioner, some level below the intellectual or the scholar, no matter how much inventive or creative genius might be involved in his accomplishments. Even the federal government regarded engineers as artisans. Not until 1916 did the governmental agencies recognize engineering as a profession and only then because of the exigencies of preparation for war.

Many colleges and universities were debating the same question: was the engineer a craftsman or a scholar? It was not easy to realize he was at the same time neither but a blend of both.

The University of Cincinnati envisioned a cooperative plan to train “masters of materials who can humanize industry” and “who can express idealism in the mechanics of life rather than build ideals that are unrelated to human experience.” In spite of such aspirations, the scheme to blend shop experience with academic courses was scoffed at as “unworthy of a real university more likely to produce skilled boiler makers than professional engineers.”³

Despite vigorous debate in popular and semi-technical periodicals over the need for engineering education and the kinds of curricula needed, there was virtually no interest in engineering instruction at Gettysburg College throughout the latter half of the nineteenth century, nor even later.

The inauguration of Dr. William Anthony Granville in October 1910 was greeted with enthusiasm that promised large results for the material and intellectual progress of the College.

³ Charles Riborg Mann, *A Study of Engineering Education*, Carnegie Foundation for the Advancement of Teaching, Bulletin 11 (New York, 1918), p. 64.



Dr. William Anthony Granville

In his inaugural address President Granville stated the direction his administration would follow. Citing the increasing interest in the various fields of engineering and the growing demand for engineers, he proposed the introduction of engineering education.

Instead of simply posing the desirability of such action, President Granville suggested four specific options:

Offer four year courses in engineering to which students prepared in a first class high school shall be admitted . . .

Offer three year courses in engineering to which only college graduates having taken a scientific course shall be admitted . . .

Offer five or six year courses in engineering to which students prepared in a good high school shall be admitted . . .

Offer no engineering courses, but prepare the student for his engineering studies by giving him a college education in which mathematics and the sciences play important roles. The student is then to go to some technical school for his purely engineering education.

In summary, he said that "the question of engineering courses is before Pennsylvania College now and it requires a definite answer in the near future."⁴

The answer came quickly. President Granville had taken matters into his own hands and moved with dispatch. The faculty had no opportunity to debate or express its opinion on the issue. The minutes of the Board of Trustees at their regular winter meeting on December 27, 1910, record:

Resolved that courses in Civil Engineering and Municipal Engineering respectively, be established in Pennsylvania College, beginning with next fall.

Dr. Granville, having officially stated to the Board that the sum of \$20,000 was assured for the purpose, Burton F. Blough, having made the proffer of \$15,000, and George B. Kunkel and John F. Dapp, \$2,500 each, it was resolved that 'the Burton F. Blough professorship of Civil Engineering' be and is hereby constituted.

The contributors were trustees. Blough served from 1910 to 1928; Kunkel, from 1908 to 1936; and Dapp, from 1908 to 1932.

To fill the newly created position, President Granville sought his Yale colleague, Richard S. Kirby, of Port Chester, New York, a visionary teacher and experienced engineer. At its June 6, 1911, meeting the Board approved the appointment of Kirby as professor for the academic year 1911-1912 at a salary of \$1,200.

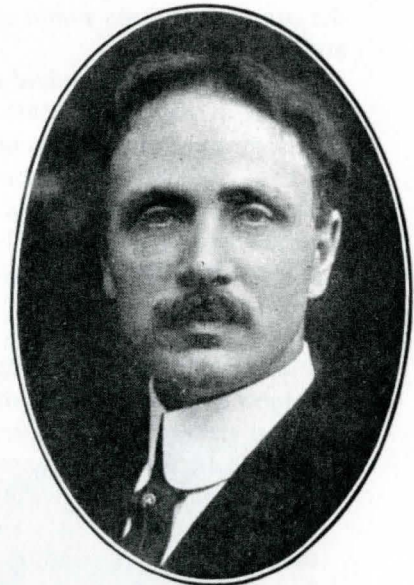
Professor Kirby had received his baccalaureate degree from Yale in 1896 and the Civil Engineering degree from Yale in 1898. Following graduation he practiced engineering until 1906 and then served as an instructor in Civil Engineering at Yale (1906-09). He had been a friend of Dr. Granville both as a student and colleague. Kirby returned to engineering practice

in 1910 but at the same time was a lecturer in the Yale Sheffield Scientific School. Among positions he held was that of City Engineer for Port Chester.

Thus Professor Kirby brought to teaching a combination of varied practical experience and strong academic background.

The Spectrum (1913, p. 22) noted:

Professor Kirby, elected to the newly established chair of Municipal Engineering, has been organizing the work in this wholly new department . . . which promises to meet a rapidly growing demand for college training in these practical lines.



Richard Shelton Kirby

⁴ Samuel Gring Hefelbower, *The History of Gettysburg College, 1832-1932* (Gettysburg, 1932), pp. 289-290.

It is of some significance that the professorship was officially designated "civil engineering," but the college community considered it "municipal engineering" as President Granville proposed.

The College Catalogue for 1912-1913 announced that "a complete course in Engineering is this year afforded for the first time." And what a program it was!

The four-year course led to the degree of "Bachelor of Science (Engineering)." A five-year course provided the option of a degree in Municipal Engineering, Civil Engineering, Electrical Engineering, or Mechanical Engineering. There was also a full six-year program which led to degrees in the same fields.

All students were required to take the same courses for the first two years. During the third year one would narrow the fields to either civil and municipal engineering or mechanical and electrical engineering. The fourth and, if elected, the subsequent years would concentrate on one area.

The basic courses required of all students included, in addition to Mathematics, Physics, and Chemistry, also Elementary Mechanical Drawing, Mechanics, Statistics and Dynamics, Hydraulics, Materials Testing, and Elements of Engineering. As early as 1911-1912, the Catalogue described the intent of the training as follows:

It is aimed to make the instruction in each subject as practical as is consistent with a broad view of the principles involved. A number of trips are arranged during the course for the inspection of engineering structures in the vicinity, etc. Reports of such visits are prepared by each student from his individual notes. A seminar for the discussion of current engineering topics is designed to afford the student training in the preparation and presentation of written papers and to stimulate his interest in matters pertaining to his chosen profession.⁵

⁵ *Pennsylvania College Bulletin*, Catalogue Number (1911-1912), p. 71.

Shops and laboratory rooms were located in the basement of Glatfelter Hall. Drafting classes were held on the top floor in Room 313, a large well-lighted facility, provided with ingenious drawing tables designed by Professor Kirby which, with shortened legs, are still today (1974) in use in the Biology Department.

Dr. Kirby was the sole member of the engineering faculty, a not unreasonable responsibility since only six students enrolled for the first year's instruction. In 1913 T. Darman Smith joined the department as an assistant whose duties were largely confined to drawing and surveying instruction. In 1914 a second professor was secured — Stephen Remington Wing — who taught electrical and mechanical engineering. A new assistant, William Henry Sandlas, the first engineering graduate (1914) replaced Mr. Smith, and he was also in charge of the summer course in surveying.

Inasmuch as several years would elapse before the full range of advanced courses could be offered, it was assumed that there was ample time to develop the laboratories and shops and procure equipment gradually.

One of the first facilities, announced with some pride, was the materials testing laboratory provided with a Riehle universal testing machine of 100,000 pounds capacity, with measuring instruments for determining properties of steel, wrought iron, cast iron, concrete, and timbers. A cement laboratory was equipped with instruments for performing standard tests on concrete, cement, mortars, and sand. Civil engineering thus received early emphasis.

Three shops provided practical experience — machine, pattern and foundry. The pattern shop was equipped "with speed lathes, an oil grinder, also numerous benches and hand tools, all of the most modern type."

Surveying, taught intermittently in the College since 1838, was amply supplied with a variety of transits, levels, sextants, planimeters, etc. The introductory course in surveying was usually offered for four or six weeks during the summer.

The electrical engineering laboratory was developed slowly, but by 1916 had facilities comparable to those in other colleges. According to the Catalogue for that year, the apparatus included "several direct current motors and generators, a rotary converter, a synchronous motor, several polyphase and single phase

induction motors, a number of transformers, and an assortment of direct and alternating current measuring instruments.”⁶

Professor Kirby envisioned an ambitious program for engineering instruction with minimum rather than substantial financial support. A staff of three instructors and an assistant, he believed, could offer a full range of courses. The small numbers of students in each course would allow for relatively individual instruction.

Professor Kirby took up residence at 143 Springs Avenue and actively participated in community affairs. He was head of the Gettysburg Choral Society and was largely responsible for bringing to the town well-known musical groups. His home was open to his

⁶ *Pennsylvania College Bulletin*, Catalogue Number (1915-1916), p. 116.

students. Along with all these activities, Kirby found time to revise *Laboratory Notes on Cement Testing*, the only textbook on the subject in the English language, and to engage in other writing.

He enjoyed giving popular lectures. On December 17, 1912, he presented the third in the Faculty Free Lecture Course, “The Water Supply Problem of New York City,” in which he dealt with population growth, future water needs, and a comparison with great historical water supply works, including those of ancient Rome.

Kirby maintained a lifelong interest in the history of engineering. At a College public lecture on January 3, 1914, he introduced the invited speaker, his friend Lewis M. Haupt, C.E., of Philadelphia, who spoke on “The Story of a Useful Life,” an account of the feats of Herman Haupt, his father. Herman Haupt, deceased in December 1905, had distinguished himself as one



Shops and Laboratory rooms for engineering students were located in the basement of Glatfelter Hall. Drafting classes were held on the top floor in Room 313, a large well-lighted facility. This aerial view of Glatfelter Hall, which appears in yearbooks in the early 1900's, was apparently taken from the cupola of Pennsylvania Hall. In the lower right of the photo is the pillared entrance to Linnaean Hall.

of the greatest and most versatile engineers of the nineteenth century.

Professor Kirby did not completely sever his connections with Yale University. Each year he returned to his alma mater to present a seminar course in engineering specifications to the senior class in civil engineering at the Sheffield Scientific School. In addition to this he presented other lectures to the engineering classes at Yale. It is little wonder, then, that after four impressive years at Gettysburg he returned to Yale to become head of the Department of Mechanical Drawing and Descriptive Geometry. The title of the Department is somewhat misleading in present day terms, because mechanical drawing included many other areas of engineering which today we would consider design rather than drawing.

When an announcement of Professor Kirby's resignation was circulated on the campus, the *Gettysburgian* noted: "Professor Kirby has been extremely successful as an instructor at Gettysburg and in addition to his duties and activities at college has found time to take a keen interest in matters in the Borough, particularly musical circles."

The *Gettysburgian* had made many mentions of Kirby's public lectures, receipt of new editions of his several books, and his frequent visits to other institutions, especially Yale. The void created by Kirby's resignation would not quickly be filled.

It is unfortunate that Kirby remained at Gettysburg for only four academic years. With his departure from Gettysburg one of the main objectives of the engineering program left with him. The other members of the faculty were more interested in conventional approaches to civil, mechanical and electrical engineering. The grand vision of training municipal engineers to work on the problems of our cities was soon forgotten, this work being left to the schools like the Massachusetts Institute of Technology, Yale, and Carnegie Institute of Technology.

The Engineering Faculty

The Engineering program at Gettysburg College now fell into the hands of Chester Allen, who had received his Bachelor of Science in Civil Engineering degree at Massachusetts Institute of Technology in 1905. Professor Allen, like Kirby, brought to his position a diversified career. He had served as a bridge inspector from 1905 to 1907, a resident engineer for the Cairo Division on the Big Four Railroad between Cincinnati and Chicago from 1908 to 1909, and a designer on the Monongahela Railroad from 1909 to 1910. At this point in his career he entered industrial engineering and was in charge of erecting a paper mill for the Crane Company in Pittsfield, Massachusetts. He was invited to Penn State in 1911 as Assistant Professor of Civil Engineering, where he served until 1915 when Gettysburg College appointed him Professor. Allen won the respect of his students and colleagues from the outset and was a devoted teacher. He had no enthusiasm for municipal engineering; and although courses in this area were taught for some years, this phase of the



Stephen Remington Wing

program received less and less support until it was dropped from the instruction.

Mechanical engineering was administered by Stephen Remington Wing, who had received his B.S. degree from Haverford in 1888 and a mechanical engineering degree in 1910. He had served as Assistant Professor of Physics and later of Mechanical Engineering at Cornell from 1909 to 1914, when he came to Gettysburg in the fall. Professor Wing had done some consulting and part-time engineering work but had not served full time as a practitioner.

Wing was succeeded by Rudolph Rosenstengel, who was appointed Professor of Electrical and Mechanical Engineering in 1918. Rosenstengel had received his degree in electrical engineering from the University of Wisconsin in 1894 and his M.M.E. degree from there in 1912. He was employed successively by the Milwaukee Electrical Light and Rail Company, in manufacturing industries, as instructor in mechanical engineering in Michigan State College (1905-1906), and as instructor in electrical engineering at Oklahoma Agricultural and Mechanical College in 1909 and 1910. He left teaching for a time and entered the employ of Westinghouse Manufacturing Company, taught briefly at Cornell (1911-1912), and headed the engineering department at Bryant and Stratton College in Buffalo from 1912 to 1917. He returned to the practice of engineering with the H. H. Stull Company of Buffalo but was there for less than a year, when Gettysburg College appointed him Professor of Engineering. Professor Rosenstengel remained with the Engineering Department of the College until 1932.

One of the most remarkable members of the engineering staff was Frank Hollinger Clutz, who had received B.A. degrees from Midland College in 1892 and from The Johns Hopkins University in 1902. As Professor of Civil Engineering, a position he accepted in 1918, he brought to Gettysburg a most impressive record of professional accomplishments. He had been employed by the American Bridge Company, the Bethlehem Steel Bridge Company, the Union Steel Company, and a number of other commercial enterprises and yet was a scholar interested in a wide range of humanities and fine arts. Upon retirement in 1941 he was granted the title Professor Emeritus of Civil Engineering.



Frank Hollinger Clutz

The Faculty of the Engineering Department

Richard S. Kirby, Professor, Civil Engineering, 1911-1915
T. Darman Smith, Assistant, 1913-1914
Paul S. Creager, Instructor, 1913-1918
Stephen R. Wing, Professor, Mechanical and Electrical Engineering, 1914-1918
William H. Sandlas, Assistant, 1914-1915
Chester Allen, Professor, Civil Engineering, 1915-1918
George L. Reinert, Assistant, 1915-1916
Robert N. Berryman, Assistant, 1916-1917
Frederick A. Faust, Assistant, 1917-1918
Frank H. Clutz, Professor, Civil Engineering, 1918-1941
Rudolf Rosenstengel, Professor, Mechanical and Electrical Engineering, 1918-1932
C. Gilbert Reen, Assistant Professor, Civil Engineering, 1920-1941
E. D. Menkee, Instructor, 1922-1923
Bertram H. Saltzer, Assistant Professor, Mechanical Engineering, 1923-1941
C. H. Kindig, Instructor, Civil Engineering, 1929-1930
Wilbur L. Plank, Instructor, 1932-1934
Willard A. Laning, Jr., Instructor, 1934-1938

The Engineering Instruction

The several courses of study leading to degrees in civil, municipal, mechanical, and electrical engineering have already been alluded to briefly. The original plan assumed that most students seeking the degree would continue for the full six-year program, or at least complete a fifth year of advanced work. Very few students elected this option. Not only were jobs awaiting graduates, but also superior students were encouraged by the faculty to continue graduate work at engineering colleges and earn a professional degree.

Meanwhile, quasi-officially the several sub-departments of Engineering at Gettysburg were referred to as "Departments," a situation that aroused some annoyance among the general faculty. Courses proliferated to accommodate the accelerating diversification of engineering. Degrees were awarded designating "Structural Engineering" (1919) and "Industrial Engineering" (1924).

In 1917 the College Catalogue announced that cooperative work involving actual employment and/or observation in local industries would be available to those students interested in gaining practical experience. Apparently no formal credit was granted, but some of the time spent on the job was considered equivalent to laboratory instruction.

No alumnus of the engineering department remembers participating in such a cooperative arrangement despite the fact that catalogues specifically mention manufacturing establishments, city sewage plants, and power plants. On the other hand, nearly all of the alumni contacted recall field trips in conjunction with course work to various manufacturing plants and machine shops, power and sanitation facilities, and other enterprises.

There was a continuing effort to adapt the engineering curriculum to meet the demands of changing times. A few of the courses may be selected as examples of the faculty's determination to train men in the newest areas of the professions. A brief characterization will suggest the scope and intent of each course.

Engineering 25, Sewage: "Plans for small sewer systems are made by each student. Modern methods for the purification and disposal of sewage and garbage. Visits are made to plants under construction and in use." This course introduced in 1912 suggests the highly practical nature of most of the courses offered in the upper two years of the student program.

By 1922 the increasing importance of radio was indicated by three new courses: Engineering 48, Wire Communication; 49, Electron Tubes; and 50, Radio Communication. In mechanical

engineering new courses demonstrated the importance of progress: Engineering 40, Automobiles; 41, Internal Combustion Engines; and 42, Refrigeration and Air Conditioning. The course on the internal combustion engine was "open to non-engineering students" but carried the additional note that "engineering students taking this course as an elective are required to do additional work."

The laboratory or shop for the courses in automobiles was based upon a Model-T Ford, set on blocks in the basement of Glatfelter Hall. It was periodically disassembled, reassembled, and operated in a variety of ways. It is fondly recalled by living alumni as "Lizzy" or "Tillie," the name depending upon the class.

Despite continuing attempts to keep the requirements and course offerings of the department as up to date as possible, there were increasing shortcomings, especially the inability of the College to provide new equipment, instruments, and the expanding needs of advanced instruction.

According to the 1914-1915 Catalogue, the department maintained a "library and reading room of reference books, periodicals, and technical reports." Students had access to these publications: "Engineering News," "Engineering Record," "Municipal Engineering," "Engineering Magazine," "Machinery," "American Machinist," "Power," "Electrical World," "General Electric Power," "Electric Journal," and the regular reports of the following societies: American Society of Mechanical Engineers, Connecticut Society of Civil Engineers, Ohio Engineering Society, Indiana Engineering Society, Michigan Engineering Society, Illinois Society of Engineers and Surveyors, Iowa Engineering Society, Engineering Association of the South.⁷

One may wonder how adequate these facilities ever really were. There is no simple answer. The development of fine engineering schools like the Massachusetts Institute of Technology, Carnegie Institute of Technology, Worcester Polytechnic Institute, and many others far outdistanced anything a liberal arts college could assemble. Some of the engineering schools had an electrical department housed in a building larger than Glatfelter Hall and with similar commodious

facilities for each department of engineering. In short, only the bare essentials for introductory training and experience were available at Gettysburg. Yet in looking backward from the time of the founding of the department up to World War I, the facilities would have been regarded in the profession as being thoroughly adequate for the objectives entertained. At the very time the College was developing an engineering program, a revolution was taking place, primarily not in engineering education but in the character of industry itself. Research and development became an integral part of every major industrial organization.

Considering the very limited size of the Engineering Department, it is surprising that by 1934 forty-eight courses of instruction were offered under the four programs — civil engineering, municipal engineering, mechanical engineering, and electrical engineering. What this really amounted to was that twelve courses in each area, a few of which were alternate options, were available to the students. It meant also that one instructor was teaching six different courses a semester — an impossible task under present day standards.

When the "major and minor" system was adopted, slight concession was extended to those majoring in engineering. Freshmen were obliged to take the required liberal arts courses in English, History, English Bible, and German. Sophomores enrolled in German and English. Juniors were required to take English Literature, Evidences of Christianity, and Philosophy (Ethics). In the senior year the single liberal requirement was Political Science.

The Engineering Students

The heavy course responsibilities of the engineering students, with the basic technical courses required of all students during the first two years, made it virtually necessary for the student to declare his engineering major upon matriculation. Many students switched to other departments at the end of the first year, fewer thereafter. A check of classes for the period 1920-1930 shows that the attrition was about thirty percent.

The students came from New York, New Jersey, Connecticut, Maine, Ohio, and Illinois, as well as from the usual constituency,

⁷ *Pennsylvania College Bulletin*, Catalogue Number (1914-1915), p. 95.

Pennsylvania, Maryland, Virginia, and the District of Columbia. One student, S. S. Matushita, gave his home as Tokyo, Japan. As individuals and as a group they participated in the social life of the College fraternities, literary societies, clubs and sports. In addition, they had several activities of their own. The summer camps in surveying were enjoyable as well as informative experiences.

An engineering club organized in 1917 or 1918 intermittently flourished and waned. During the periods of activity, meetings, held twice a month, were devoted to short student reports. There was a close association between students and teachers. Each faculty member of the department belonged to one or more professional societies that published journals. Since these supplemented the periodicals in the Library, they were shared with the students; and in some instances readings in them were assigned to upper classmen.

In 1924, students and faculty of the Physics and Engineering Departments established a radio station which was granted a license with call letters WDGB. E. G. Ports, Professor of Physics, was the prime instigator and largely responsible for initiating the project. Inasmuch as few people were experienced with this novel invention, George W. Baker, who operated a battery service on Baltimore Street in Gettysburg, and who was a brother of one of the engineering students, collaborated in the construction of the equipment and also in transmitting. The students broadcast to the community the results of the national presidential election of 1924 as the first major attempt at programming. A week later the Armistice Day celebration at Natural Springs Park near Gettysburg was broadcast. Acknowledgements of reception were posted from such distant points as Illinois, Michigan, and Arkansas.*

The enthusiasm shown among students led to the offering of two courses in radio, beginning with the 1925-26 academic year. One course was concerned with vacuum tubes and the other with receivers and transmitters. The courses were open

* In 1948 the present College radio station, "The Voice of the Campus," received a new set of call letters-WWGC-and began the regular broadcast of a variety of programs throughout the week. As a sign of progress it was, unlike its predecessor, fully equipped and organized like a professional transmitting station.

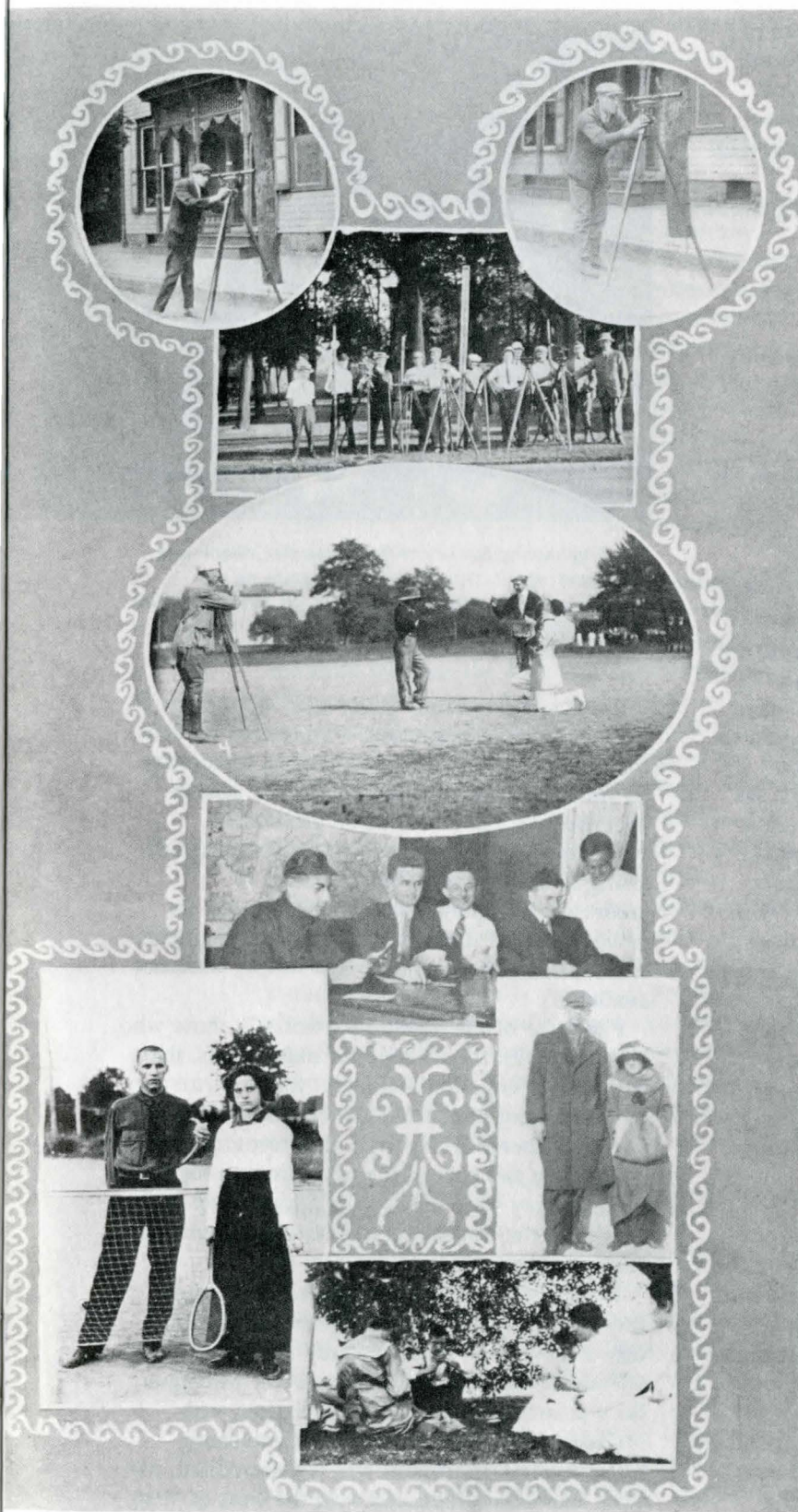
to all who were interested, but required previous preparation in physics and mathematics.

The first graduate of the Engineering Department was William H. Sandlas, C.E., in 1914 followed by Owen Lamont Fisher, C.E., and Wilfred Wenner Smith, E.E., in 1915. In 1916 four men graduated, of whom two received degrees in civil engineering and two in municipal engineering. In 1917 there were three, each with a separate degree — civil engineering, electrical engineering and structural engineering. Thereafter, despite the great depression years, the average class until 1935 was ten. By 1940 217 students had completed the programs and received technical training sufficient to equip them for positions in a wide range of business and industrial fields, as well as for advanced study in professional schools.

The distribution of graduates is shown in the following table:

1914.....	1	1928.....	11
1915.....	2	1929.....	7
1916.....	4	1930.....	8
1917.....	3	1931.....	10
1918.....	6	1932.....	15
1919.....	5	1933.....	8
1920.....	3	1934.....	11
1921.....	10	1935.....	10
1922.....	13	1936.....	3
1923.....	11	1937.....	4
1924.....	17	1938.....	6
1925.....	17	1939.....	4
1926.....	13	1940.....	5
1927.....	10		

A list of graduates, as complete as records allow, is appended to this account. The names are presented chronologically by classes and alphabetically under each class. The engineering degree is indicated by appropriate abbreviation. Their college yearbook, the *Spectrum*, from which much of the information had to be derived, did not follow a consistent procedure in sketching the college career of each graduating senior. Recently (October 1974) a tabulation of the students enrolled in the Engineering Department, 1913-1931, has been discovered among uncatalogued papers in the Gettysburgiana collection in Schmucker Library. This document has enabled us to present an essentially correct list of graduates.



The majority of graduates of the Engineering Department found employment in the engineering profession. Slightly more than half of those for whom records are available entered the employ of municipalities such as Harrisburg, York, Philadelphia, and Baltimore, or of heavy industry and railroads. Most of these graduates had received degrees in civil engineering or electrical engineering. Approximately twenty percent entered a variety of business occupations, many of them in the field of electrical equipment and supplies or in general business activities. Some became involved in such new fields as radio and the freezing of foods. The remainder scattered widely in architecture, chemical engineering, high school teaching of mathematics, physics and mechanical drawing, and in other activities unrelated to their engineering training. For approximately one-fifth of the class, no information concerning employment immediately after graduation is available.

When it is recalled that the common experience has been that nearly forty percent of men trained in colleges change their occupations substantially before reaching the age of forty, the record of engineering graduates is quite remarkable.

The number of alumni who entered professional engineering schools or other postgraduate instruction remained low until the 1930's when approximately one-fourth of the graduating seniors took one or more years of advanced work at universities and engineering schools. Somewhat paradoxically, the original plan to offer a fifth and sixth year of engineering courses at Gettysburg College attracted very few students. It appears that fewer than ten students during the nearly thirty years' existence of the department availed themselves of the opportunity. One explanation was the ready availability of jobs with only a four-year degree. Not only was this true of the years of World War I, when the earliest graduates entered their professional careers, but it also remained true throughout the 1920's. A second reason was the realization that in a very real sense additional

In a moment of diversion from rigorous academic studies engineering students "execute" their surveying skills as shown in this montage which appeared in the 1916 Spectrum.

courses at Gettysburg would be only "more of the same" and that only attendance at another institution would provide a different kind of experience. Insofar as it has been possible to determine, approximately ten percent of the total number of graduates of the Engineering Department continued for professional degrees in engineering.

Engineering Encounters Difficulties

Engineering at Gettysburg presented something of an anomaly. With three-quarters of a century's tradition in the liberal arts and a faculty reluctant to surrender any of its prerogatives, it had entered in 1911 into the establishment of the Engineering Department with little enthusiasm. The program of studies contemplated was a direct transplant of the recently developed program at Yale University, and the four, five, and six year options leading to an engineering degree were adopted at the outset. The academic faculty had not been consulted or given an opportunity to debate the merits of introducing engineering instruction. Once undertaken, the courses of instruction had to strike a difficult balance between the traditional liberal arts, the basic sciences, and more technical engineering courses. The faculty could and did see to that.

Fortunately Gettysburg, without exception, was able to engage the services of teachers with impressive practical experience in engineering. In this sense at least, Gettysburg was in a better position than many other colleges. In other respects severe limitations were inherent in the new department. The need for extensive shop instruction even in engineering schools was by no means universally agreed upon. At Gettysburg this was a deficiency but not as serious as might be surmised. Since the emphasis of the department was in civil and municipal engineering, the shop type experience was of relatively less importance during the early years. The students in these programs were required to do surveying, plane table mapping, and other field work; and for a time this work was offered during the summer so as to avoid inroads into the time of the regular school year.

Along with all segments of society, Gettysburg College experienced financial hardships during the Great Depression of the 1930's. Student enrollment declined somewhat, that of the



The Engineering Society of Pennsylvania College was organized about 1915. This photo, showing the members of the society, appeared in the 1917 Spectrum. Officers were George E. Scheffer, president, Statton L. Rice, secretary, and W. H. Patrick, Jr., treasurer.

Engineering Department less than the college in general. Some departments were rather envious but dismissed this circumstance as a temporary patronage of courses that might hold greater promise of employment upon graduation. Nevertheless, the Engineering Department was losing in another way. Obsolescence of laboratory equipment and a painful need for newly invented instruments in developing fields created demands for funds that simply were not available.

For some of the faculty, particularly those who had been with the College for many years, there had been a lingering feeling, at times bordering on resentment, that technical education had no part in a liberal arts college, that resources were diverted to this part of the educational program whereas they were needed for maintaining the quality of the traditional objectives and programs of the College.

Matters came to an unexpected head when Professor C. Gilbert Reen was encouraged to take a leave of absence to study toward an advanced degree at the University of Michigan. He was surprised that he was accepted with probationary status because the Gettysburg Engineering Department was not accredited. Mr. Reen had been graduated with the class of 1920 with grades of A in all his course work. His own

ability and his previous background were more than adequate to meet the requirements of the University of Michigan. Further, at the University of Michigan Professor Reen encountered a concept of engineering education quite different from that which he had experienced at Gettysburg. The changing nature of engineering, with its increasing complexity, growing dependence on sophisticated equipment and instruments, and the growing professionalism and specialization, had had little impact on the Engineering Department at Gettysburg. The same predicament faced other colleges. The disparity between a first rate engineering school properly provided for and the small isolated department, with the service courses offered by the usual undergraduate college procedures, placed the student in the latter at a tremendous disadvantage.

When Mr. Reen returned to active teaching, he informed Professor Clutz and President Henry W. A. Hanson that there was a grave question in his mind whether the college should continue to offer engineering instruction. Mr. Clutz was unconvinced, but President Hanson took matters under advisement. General knowledge of the problem soon spread through the college community — to students as well as faculty. Already many of the faculty had taken a position that engineering was not a function of an undergraduate liberal arts college. The younger members were particularly opposed to a continuation of the program. Others, pointing to a tradition barely twenty years old, argued that alumni had already distinguished themselves and demonstrated the potential and quality of the education given at Gettysburg. The engineering staff, consisting of only four members, was itself divided over the issue.

Discontinuance of the Engineering Department

To provide some competent judgment as a basis for action, the Engineering Council for Professional Development was invited to send a committee to inspect the Department and determine what steps would be necessary for accreditation.

On April 14, 1937, the committee, consisting of Joseph W. Barker, Dean of the School of Engineering of Columbia University; Dexter S. Kimball, Dean Emeritus of the College of

Engineering of Cornell University; and Albert B. Newman, Professor of Chemical Engineering at Cooper Union, arrived on campus to fulfill their charge. They met first with President Hanson, Dr. W. E. Tilberg, Dean of the College, and C.B. Stover, Registrar. Later they attended a luncheon with the engineering faculty and the heads of the departments.

The Committee considered the physical facilities, course content, faculty, and students. Two days were spent in meetings and examination of the department. Although no transcript of their formal report has been located, the recommendations are known in some detail. Dean Emeritus Tilberg recalls the discussions with the evaluating committee. Professor Reen, a principal in the affair, recollects many points of issue; and Professor John Zinn, who was at the time Chairman of the Curriculum Committee of the faculty, provided corroboration of them. The *Gettysburgian* reported both the visitation of the committee and subsequent actions.

First among the criticisms submitted by the accrediting committee was that the engineering faculty was too small and insufficiently specialized to provide the kind of instruction required. A second limitation was the curriculum, which had not undergone major revision since the founding of the department, even though numerous courses had been added to the offerings. Some courses were added and some dropped; but, by and large, the content and indeed the basic philosophy had remained substantially the same for two decades. The small number of students enrolled in the program was also considered a factor preventing major reorganization. There were forty students in a department offering forty courses.

On paper, the number of students compared quite favorably with those majoring in other departments, but one cannot equate classics or political science with engineering that purports to include mechanical, civil, electrical, and industrial, each with its special requirements. Finally, in some respects the most serious factor was the lack of up-to-date equipment. The visiting committee recommended the purchase of additional equipment, costing \$120,000, an increase in the number of staff, and the recruitment of additional students. The total cost would exceed \$200,000.

When the accrediting committee submitted its

evaluation to the College, it was referred to the Curriculum Committee of the faculty for action. The accrediting committee had held the professors in high regard. Both by academic training and by practical experience, they brought to their department more than adequate backgrounds. The most severe deficiency in the Engineering Department was the inadequacy of laboratory facilities and equipment. The cost of raising engineering instruction to a level that would meet full accreditation involved a sum of money greater than the total annual operating budget for the College. Faced with such a predicament, there was no alternative to phasing out the program. Thus on December 18, 1937, upon recommendation of the faculty and the President, the Board of Trustees formally terminated the Engineering Department. No new students were to be admitted, but those already enrolled were continued through graduation.

Four engineering students were graduated with the class of 1939, five in the final class of 1940. Professor Clutz retired and Professor Reen was transferred to the Physics Department. He subsequently accepted a position in the Engineering School at the Pennsylvania State University. Professor Saltzer was engaged by the Wright Aeronautical Corporation of Paterson, New Jersey, where for many years he was associated with its engineer training program.

The phasing out was so gradual that the close of the Engineering Department was not mentioned in the *Gettysburgian*.

When it is realized that the Engineering Department began with a modest gift of \$20,000 and men of remarkable stature had been brought to the College to organize and develop the program, the contrast between such small beginnings and the then-tremendous \$120,000 equipment need demonstrated the rapid expansion of technology. With this expansion there followed hand in hand the increasing complexity and sophistication of student training. Certainly Gettysburg College made the wise, if not the only possible, choice. Nevertheless, there were many disappointed alumni of the Engineering Department who felt that a vigorous program of solicitation would have yielded ample funds to modernize the department.

Aftermath

There was still a need for engineering training. During the period of World War II there was greater dependence upon technology than ever before. Aeronautic, communication and nuclear engineering demanded an ever-increasing supply of young sophisticated people with broad training in the basic sciences and the humanities.

On the one hand, society recognized the incredible benefits of technology, not only in the appurtenances of travel and communication, but also in public health and population. In 1900 the United States had 24.5 deaths per hundred thousand due to typhoid fever. With the recognition of the causative agent between 1884 and 1897, it took less than twenty years to develop uncontaminated public water supplies. In 1945 typhoid deaths were 0.2 per hundred thousand, a reduction of 99 percent.

On the other hand, industrial technology in the nineteenth and early twentieth centuries looked upon esthetics as frivolous, irrelevant, costly, and unprogressive. Ugly cities and factory towns tell only too well the consequences of this prevalent attitude.

Several universities sought a new approach to engineering education and a new way to accommodate the young man and woman who wished to precede technical training with the liberal arts. The span of time necessary to train an engineer could not be shortened. The five or six year program had proved its value. Out of these concerns there developed cooperative efforts between graduate schools of engineering and undergraduate liberal arts colleges.

The general plan was designed to accelerate the achievement of an advanced degree by admitting to a graduate professional school students who had completed three years of concentrated study in a liberal arts college. Upon successful completion of the two-year program, the student received his baccalaureate degree from his alma mater, and from the university an engineering degree in the appropriate field.

The Pennsylvania State University established such a program and invited Gettysburg College to participate. The faculty voted to establish the cooperative plan beginning with the fall term in 1954. President Walter Langsam strongly favored such cooperation and a similar program for graduate study in forestry was arranged with

Duke University Graduate School of Forestry. A cooperative program with the New York University School of Engineering was also established at Gettysburg. The Penn State and New York University plans were nearly identical. Following a three year undergraduate program, during which the student completed distribution requirements and basic courses in mathematics and the sciences, he was admitted to the graduate school of engineering. Students were eligible for any one of six specializations: aeronautical, civil, electrical, industrial, mechanical, or sanitary engineering.

The cooperative program functioned for more than ten years. It was discontinued in 1965 because many of the pre-engineering students preferred to complete four years at Gettysburg College and then, for various personal reasons, choose other graduate schools. The need for such cooperative education, however, remained unfilled. In the spring of 1973 the faculty voted to reactivate the program in cooperation with the Pennsylvania State University and Rensselaer Polytechnic Institute.

Retrospect

In retrospect the Engineering Department of Gettysburg College was a noble experiment in adapting liberal arts education to the social needs of the times. The avowed purpose of the undertaking was to educate young men to meet the demand for technically trained persons to solve the problems of our growing cities. Despite an auspicious beginning, there can be little question that the experiment was not a complete success. In part, limitations of size and cost prohibited the employment of a larger and more specialized faculty as the practice of engineering diversified. In fact, it would have been detrimental to the College as a whole to have done so. A college that graduated barely 150 students a year would have to question the wisdom of having one department tower over all of the others without damaging the unity of the institution.

In another sense the experiment was a satisfying success. Educational institutions, particularly liberal arts colleges, are resistant to

major change. The mechanisms for instituting new courses and revising curricula discourage rapid change. Yet, the college not only established a program and modified it periodically in the short thirty years of its existence, but was also wise enough to terminate the enterprise when the program could no longer fulfill its objectives.

Gettysburg College should be justly proud of the accomplishments of the Engineering Department and its graduates. Not all of them made careers in that profession, but a large majority did in the fields of civil, mechanical, electrical, sanitary, municipal, and even mining engineering. The names of many loyal and distinguished alumni will be recognized in the enumeration of graduates in the Appendix.

Bibliographic Notes

The official records of the College, particularly the Minutes of the Board of Trustees and Faculty, provide the chronological base for this history. Too often the terse entries deny us the opportunity to feel the motivation and debate involved in the decision process.

The various publications of the College augment detail. The annual Bulletin gives the courses of study, names of students, requirements, and bare descriptions of facilities, sometimes with a mildly boastful claim. The *Spectrum*, the student yearbook, is more newsy. With it we can reconstruct the activities of the College and place the individual students. Much of interest can be found in the pages of the *Gettysburgian*. In the absence of a copy of the recommendations of the accrediting committee, the 1938 volume is indispensable. The *Gettysburgian* reported fully the visit of the Committee.

Living faculty and alumni have been patient and generous. The Alumni Office provided the names and addresses of approximately fifty alumni. Meaningful information was obtained from half that number.

C. Gilbert Reen, a graduate of the Engineering Department (1920), who now resides in Harrisburg, joined its faculty upon graduation and continued to serve until its termination. His assistance is gratefully acknowledged. The help of Dean Emeritus Wilbur E. Tilberg and Professor Emeritus John B. Zinn is also appreciated. Together they have provided the faculty and administration viewpoint.

The many alumni who have responded with information, anecdotes, and photographs cannot be named individually, but three deserve special mention. Mr. Wilbur L. Plank (1926), who served also as an instructor in the engineering department, solicited information from his classmates and fellow alumni. Mrs. Ruth Kirkland Knisely (Mrs. J. Mahlon Knisely, 1929) communicated many details and snapshots of her husband's student days and of his career, including work in the refrigeration and freezing of foods. Regrettably, it has not been feasible to reproduce the photographs.

The material concerning Herman Haupt has been extracted from the Gettysburgiana Collection in the College Library supplemented by memorabilia in the possession of W. C. Darrah.

For the background of engineering education contemporary with that in Gettysburg College, the following sources have been most helpful: Russell H. Chittenden, *History of the Sheffield Scientific School of Yale University, 1846-1922* (2 vols.; New Haven, 1928); Palmer C. Ricketts, *History of the Rensselaer Polytechnic Institute, 1824-1894* (New York, 1895); and Charles Riborg Mann, *A Study of Engineering Education*, Carnegie Foundation for the Advancement of Teaching, Bulletin 11 (New York, 1918).

During the period of 1902-1906 many technical, scientific and semi-popular periodicals debated the changing role and education of the engineer. Attention is called to *Science* (n.s.) volumes 23 and 26 and *Popular Science Monthly*, volume 67.

More specifically relevant is the important *Journal of the Society for the Promotion of Engineering Education* (the entire series beginning with Volume 1, 1910).

Appendix

The Engineering Graduates

- | | | | |
|------|---------------------------------|-----------------------------|-----------------------------------|
| 1914 | William H. Sandlas, C.E. | James A. MacInnes, M.E. | Ronald G. Miles, I.E. |
| | | J. Henry McDonnell, C.E. | James M. Mitchell, E.E. |
| 1915 | Owen L. Fisher, C.E. | John A. McGaughy, M.E. | Robert G. Schubauer, C.E. |
| | Winfred W. Smith, E.E. | Paul F. Olinger, M.E. | Carl L. Slaybaugh, C.E. |
| | | Donald E. Rudisill, C.E. | George E. Smeltz, C.E. |
| 1916 | Charles B. McCollough, C.E. | Russell L. Sahm, C.E. | Harold L. Wink, E.E. |
| | William H. Patrick, Mun. Eng. | L. Ray Weaver, E.E. | |
| | Statton L. Rice, C.E. | LeRoy H. Winebrenner, M.E. | 1926 |
| | George E. Scheffer, Mun. Eng. | Edgar L. Wolfe, M.E. | Norman Asbury, C.E. |
| 1917 | James V. Cannen, C.E. | | Lynn W. Bortner, C.E. |
| | Leon R. Mead, E.E. | 1923 | Paul L. Dale, C.E. |
| | Paul E. Stermer, Struct. Eng. | L. LaVere Altland, E.E. | John R. Gaston, E.E. |
| | | Harold D. Briggs, E.E. | Rodgers O. Gerhardt, C.E. |
| 1918 | Chester M. Buffington, M.E. | Ralph A. Geiselman, E.E. | Charles Gruber, C.E. |
| | Lawson D. Matter, Struct. Eng. | James S. Matsushita, E.E. | Arthur Hendley, C.E. |
| | Edmund E. Power, C.E. | Harry LeRoy Mertz, E.E. | David J. Jones, I.E. |
| | Mark H. Secrist, M.E. | Earl G. Ports, E.E. | George W. Kurtz, E.E. |
| | Louis K. Scheffer, Struct. Eng. | Clarence E. Stoner, E.E. | William M. Mellor, E.E. |
| | Hibbert P. Wells, E.E. | Arthur F. Trumbore, E.E. | Wilbur L. Plank, E.E. |
| | | Luther B. Walter, C.E. | Ray C. Singley, I.E. |
| 1919 | Mahlon A. Hartley, E.E. | Spurgeon L. Wolf, E.E. | James B. Toombs, I.E. |
| | Carroll R. McDonnell, C.E. | David W. Woods, E.E. | |
| | John E. Plank, C.E. | | 1927 |
| | Fred M. Stambaugh, E.E. | 1924 | Irvin R. Baker, E.E. |
| | John C. Wohlfarth, Mun. Eng. | John J. Clutz, C.E. | Albert R. Eaches, E.E. |
| 1920 | Ernest G. Dieffenbach, C.E. | Gilbert Collinge, C.E. | Roland M. Fennimore, I.E. |
| | C. Gilbert Reen, C.E. | Edward H. Feldman, C.E. | Joseph H. Gilbert, M.E. |
| | Clayton M. Sherer, Mun. Eng. | Robert I. Frederick, E.E. | Marshall Hall, E.E. |
| 1921 | George L. Beers, E.E. | Henry F. Geisz, I.E. | James J. Hand, C.E. |
| | Lyll N. Crissman, C.E. | Earnest F. Grothe, M.E. | Walter H. Jones, E.E. |
| | D. Victor Emanuel, Mun. Eng. | Elton R. Lee, E.E. | Hamilton A. Nuss, M.E. |
| | Charles K. Miller, M.E. | Allen G. Macmillan, C.E. | William H. Tarman, C.E. |
| | J. Harold Mumper, M.E. | Harry F. Mickel, E.E. | Charles H. Thomas, C.E. |
| | Paul E. Noll, C.E. | Joseph T. Morris, E.E. | |
| | James S. Richards, M.E. | Carl W. Munshower, I.E. | 1928 |
| | Allen E. Starr, C.E. | Leon A. Phillips, M.E. | Frank Cubberly, Jr., C.E. |
| | Russell D. Stauffer, M.E. | Lewis H. Richter, M.E. | Richard H. Dietz, E.E. |
| | Joseph B. Stewart, C.E. | Harold T. Shearer, E.E. | Frank D. Harten, E.E. |
| 1922 | Donald G. Davis, M.E. | Fred H. Smith, E.E. | Earl W. Hassler, E.E. |
| | Lester E. Gingerich, C.E. | George H. Thrush, Jr., E.E. | Everett E. Hess, M.E. |
| | William A. Krebs, M.E. | Mark C. Wible, C.E. | Frederick C. Kronmeyer, Jr., C.E. |
| | John P. Leavy, C.E. | | Edward A. Schmertz, E.E. |
| | | 1925 | Arthur R. Shay, M.E. |
| | | John L. Barnes, M.E. | Walter R. Shultz, C.E. |
| | | Charles E. Bowman, C.E. | Earl R. Wert, I.E. |
| | | Parke Decker, C.E. | Harman E. Zinn, E.E. |
| | | George V. Doehne, C.E. | |
| | | Ned McCamant Fleming, C.E. | 1929 |
| | | Calvin R. Gilbert, E.E. | William S. Duttera, E.E. |
| | | John E. Hartman, C.E. | Walter H. Jones, E.E. |
| | | Melvin B. Henneberger, M.E. | Carl H. Kindig, C.E. |
| | | William R. Kitzmiller, M.E. | John M. Knisely, E.E. |
| | | Daniel B. Krieg, M.E. | Carl A. Lotz, E.E. |
| | | Franklin H. Markley, M.E. | Stanley C. Meyer, M.E. |
| | | | Henrie C. Shuler, C.E. |

- 1930
Edward N. Heltzel, E.E.
Eugene C. Holler, M.E.
Arthur L. Lind, M.E.
John E. Mumper, M.E.
J. Harold Rife, C.E.
Charles J. Starnier, E.E.
H. Porter Van Ormer, M.E.
Robert J. Waite, I.E.
- 1931
John D. Bert, I.E.
Norman H. Detweiler, C.E.
John W. Evans, I.E.
Carl W. Fuehrer, C.E.
Robert A. Klinger, I.E.
Ernest J. May, E.E.
Elvin W. Patterson, C.E.
John E. Reese, C.E.
Donald W. Stoner, E.E.
Edward B. Utz, E.E.
- 1932
Tom H. Baker, E.E.
Donald H. Diehl, M.E.
Wilmer D. Hamsher, C.E.
J. Richard Hershey, C.E.
Joseph D. Krout, C.E.
David F. Krug, E.E.
Lisle M. McCarl, C.E.
Henry A. Moller, M.E.
Francis W. Null, E.E.
Conrad G. A. Peters, C.E.
Joseph D. Schantz, E.E.
Lester C. Strausbaugh, M.E.
- Ralph E. Toombs, I.E.
Lester F. Wagner, E.E.
Willis L. Weikert, E.E.
- 1933
Lloyd L. Amspacher, M.E.
John W. Cowan, C.E.
Roy M. Crouthamel, C.E.
Austin E. Diehl, M.E.
Samuel F. Marchese, M.E.
Fred W. L. Mergard, E.E.
Charles H. Miller, C.E.
Robert H. Witters, I.E.
- 1934
Karl J. Bernhard, M.E.
Thomas E. Butterfield, M.E.
George A. Coupe, M.E.
Henry N. Derickson, E.E.
James A. Gillespie, E.E.
John G. Green, C.E.
Henry A. Hespenheide, C.E.
David W. Hetrick, I.E.
John C. Parker, M.E.
Lewis K. Polley, C.E.
Clinton E. Smith, Jr., C.E.
- 1935
Francis R. Hoke, E.E.
John W. Hough, E.E.
Paul T. Knorr, M.E.
Fred E. Larson, E.E.
David D. McCracken, M.E.
Blaine E. Nary, E.E.
William H. Nix, Jr., M.E.
- Edward J. Nowicki, C.E.
Knute Sahle, M.E.
Robert W. Smith, C.E.
- 1936
Ralph Hoover, M.E.
R. E. Koons, C.E.
Charles D. Ott, E.E.
- 1937
Howard F. Buhrman, M.E.
Fred H. Dallmeyer, M.E.
Robert W. Fitzsimmons, M.E.
J. George Schmid, M.E.
- 1938
Eugene M. Brubaker, M.E.
Carroll L. Burhman, M.E.
Walter A. Dubovick, C.E.
Martin E. Florence, E.E.
Harold S. Landau, M.E.
W. Edward McClure, E.E.
- 1939
Charles C. Custer, M.E.
Arthur S. Lewis, C.E.
James E. Peters, C.E.
Joseph T. Yarnall, M.E.
- 1940
Donato R. Acchione, C.E.
Ralph A. Berry, M.E.
John H. Connely, M.E.
W. Edward Downing, M.E.
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