The function of the fritz engineering laboratory: first draft for april meeting of alumni conference

Inge Lyse

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PRESENT ARRANGEMENT:

A. Undergraduate Instruction - At present undergraduate laboratory courses at the Fritz Engineering Laboratory are being conducted by the general staff of the civil engineering department. A special room has been set aside for instruction in strength of materials, soil mechanics, and concrete, and the hydraulic laboratory has been reserved almost entirely for undergraduate experimentation. This leaves the main portion of the laboratory and the so-called concrete room free for research work. While the department staff conducts all undergraduate instruction, the laboratory staff is responsible for the maintenance of equipment and for materials.

B. Graduate and Research Work - Graduate instruction has in the past been given primarily to one-half time Research Fellows and members of the departmental staff. The information regarding the half-time research fellows is given in Table I. The half-time Research Fellows are required to devote at least twenty-two hours a week to research work. At present three of the fellowships are supported by industrial organizations, namely, the American Welding Society, the American Institute of Steel Construction, and the Concrete Reinforcing Steel Institute. Two endowed fellowships, the Lawrence Calvin Brink and the Garrett Linderman Hoppes, provide for occasional appointments.
The laboratory staff consists at present of one Research Professor (Lyse), one Research Associate (Godfrey) and one janitor (Harpel). In addition it has been possible during the past five years to hire a mechanic on hourly basis, paid from commercial funds and research appropriations.

The duties of the staff are divided between:

(1) maintenance of the laboratory for undergraduate instruction and research investigations,

(2) graduate instruction,

(3) research investigations, including directing and assisting Research Fellows in their work,

(4) commercial testing.

The members of the staff are full time employees of the University and therefore receive no extra compensation for commercial testing or any other laboratory work.

Materials for research investigations have generally been donated by local manufacturers. This has been of great assistance for the research work, particularly the donation of steel by the Bethlehem Steel Company.

The laboratory staff and research fellows have carried out many experimental investigations, the results of which have been published in a number of research papers and technical articles. A list of the publications which have appeared since October 1, 1931 is given in Table II.
The Problem — It seems that the whole problem of the future function of the laboratory should be taken up for thorough study. In order to facilitate this study certain definite questions are listed. They are:

I:1. What should be the function of the Fritz Engineering Laboratory at Lehigh University?

Consider the following functions.

(a) to conduct research investigations for the advancement of engineering knowledge,

(b) to train research men in the fields of structural engineering and engineering materials,

(c) to offer graduate and undergraduate courses in engineering materials and to provide opportunity for research work in these courses,

(d) to carry out investigations and routine testing for industrial organizations.

I:2. Should the laboratory staff concentrate on graduate instruction or on research?

I:3. Should the laboratory staff take over any instruction of undergraduate courses conducted at the laboratory?

Advantages:

(a) Instructor thoroughly familiar with proper procedure and technique,

(b) Instructor more likely to see to it that equipment and materials are in good shape.
Disadvantages:
(a) Lack of time available for research and graduate instruction.
(b) Loss of contact between C.E. Department and Fritz Laboratory.

I:4. What types of research investigations are most desirable?

Consider the following items:
(a) Fundamental research of extensive nature or practical research of limited scope.
(b) Research in the field of structural engineering or in engineering materials.
(c) Investigations sponsored by the laboratory staff (Lehigh University), by industrial organizations on cooperative basis, or by strictly commercial concerns.

I:5. How can the present staff be used to the best advantage for the University?

Consider the problem of proper division of time between research, graduate, and undergraduate instruction, and commercial investigations.

II:1. Should the policy of securing industrial research fellowships be continued or should some more permanent arrangements be sought?

Advantages of industrial fellowships:
(a) Research carried out at small cost to University.
(b) Excellent training in research work provided by two years appointment.

(c) Research projects are generally of immediate practical importance.

(d) Close contact with industrial organizations.

Disadvantages:

(a) Renewal of contractual agreement every other year causes much uncertainty regarding number of fellowships available.

(b) The problem selected by the sponsoring organization might be of limited research value.

(c) Sponsoring organization may not agree to have results published, in which case "the prosecution of research work, without the publication thereof, represents an expenditure of funds and of efforts from which no adequate returns are secured."

II:2. Should graduate scholarships and teaching assistantships be given more prominent place in graduate instruction?

Advantages:

(a) More permanent arrangements of graduate students.

(b) No obligation to industrial organizations.
Disadvantages:
(a) Little or no training of research men.
(b) A considerable reduction in research activity of the laboratory.

III:1. How should research work be supported financially?

Research might be supported by:
(a) University funds.
(b) Endowments.
(c) Cooperating industrial organizations.
(d) Commercial testing and investigations.

III:2. How much consideration should be given to routine commercial tests and to commercial investigations?

IV:1. What immediate changes would be desirable in the organization and activities of the laboratory?

IV:2. What changes would be desirable if a new C.E. building with research facilities for hydraulic and sanitary engineering, and laboratory facilities for undergraduate instruction became a reality?
TABLE I - RESEARCH FELLOWS AT FRITZ ENGINEERING LABORATORY

<table>
<thead>
<tr>
<th>Period</th>
<th>No. and Names of Fellows</th>
<th>Supported by:</th>
</tr>
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<tbody>
<tr>
<td>1929-31</td>
<td>1 G. W. Parkinson</td>
<td>Hugh L. Cooper and Company</td>
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<tr>
<td>1930-32</td>
<td>1 C. L. Kreidler</td>
<td>Lehigh Institute of Research</td>
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<tr>
<td>1931-32</td>
<td>1 J. M. Holme</td>
<td>Lehigh Institute of Research</td>
</tr>
<tr>
<td>1931-33</td>
<td>1 H. J. Godfrey</td>
<td>Lehigh Institute of Research</td>
</tr>
<tr>
<td>1932-34</td>
<td>1 B. G. Johnston</td>
<td>Lawrence Calvin Brink</td>
</tr>
<tr>
<td>√1933-35</td>
<td>2 N. G. Schreiner</td>
<td>American Welding Society</td>
</tr>
<tr>
<td></td>
<td>D. M. Stewart</td>
<td>Garrett Linderman Hoppes</td>
</tr>
<tr>
<td>1934-36</td>
<td>2 I. E. Madsen</td>
<td>American Institute of Steel Construction</td>
</tr>
<tr>
<td></td>
<td>F. L. Ehasz</td>
<td>Lawrence Calvin Brink</td>
</tr>
<tr>
<td>√1935-37</td>
<td>3 G. J. Gibson</td>
<td>American Welding Society</td>
</tr>
<tr>
<td></td>
<td>G. W. Langmus</td>
<td>Portland Cement Association</td>
</tr>
<tr>
<td></td>
<td>G. R. Wernisch</td>
<td>Concrete Reinforcing Steel Institute</td>
</tr>
<tr>
<td>1936-38</td>
<td>2 W. E. Black</td>
<td>American Institute of Steel Construction</td>
</tr>
<tr>
<td></td>
<td>G. D. Mylchreest</td>
<td>Garrett Linderman Hoppes</td>
</tr>
<tr>
<td>1937-39</td>
<td>3 C. M. Antoni</td>
<td>Lawrence Calvin Brink</td>
</tr>
<tr>
<td></td>
<td>E. H. Mount</td>
<td>American Welding Society</td>
</tr>
<tr>
<td></td>
<td>K. C. Cox</td>
<td>Concrete Reinforcing Steel Institute</td>
</tr>
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TABLE II - FRITZ ENGINEERING LABORATORY PUBLICATIONS

Since October 1, 1931

<table>
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<tr>
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<tbody>
<tr>
<td></td>
<td>TESTS INDICATE EFFECT OF FINE CLAY IN CONCRETE</td>
</tr>
<tr>
<td>155</td>
<td>by Inge Lyse</td>
</tr>
<tr>
<td></td>
<td>Engineering News–Record</td>
</tr>
</tbody>
</table>

| 2. | Lehigh Institute of Research. |
|    | FOURTH PROGRESS REPORT ON COLUMN TESTS AT LEHIGH UNIVERSITY |
| 159 | by Inge Lyse and C. L. Kreidler |
|     | A. C. I. Journal  | January 1932 |

| 163 | SHEARING PROPERTIES AND POISSON'S RATIO OF STRUCTURAL AND ALLOY STEELS |
|     | by Inge Lyse and H. J. Godfrey |
|     | A. S. T. M. Proceedings  | 1933 |

| 1655 | A STUDY OF THE ANALYSIS OF FRESH CONCRETE WITH THE DUNAGAN BUOYANCY APPARATUS |
|      | by H. R. Nettles and J. M. Holme |
|      | A. S. T. M. Proceedings  | 1933 |

| 167 | DURABILITY OF CONCRETE AND AGGREGATES |
|     | by Inge Lyse and J. M. Holme |
|     | A. C. I. Journal  | November–December 1933 |

| 163D | INVESTIGATION OF WEB BUCKLING IN STEEL BEAMS |
|      | by Inge Lyse and H. J. Godfrey |
|      | A. S. C. E. Proceedings  | February 1934 |

| 3. | Lawrence Calvin Brink. |
|    | TORSION TESTING MACHINE OF 750,000 IN–LB. CAPACITY |
|    | by Bruce Johnston |
|    | Engineering News–Record  | February 28, 1935 |

|    | A PHOTOBLASTIC STUDY OF BENDING IN WELDED SEAT ANGLE CONNECTIONS |
|    | by Inge Lyse and D. M. Stewart |
|    | Journal, American Welding Society, February 1935 |

| 169A | BEHAVIOR OF STATIONARY WIRE ROPE S IN TENSION AND BENDING |
|      | by D. M. Stewart |
|      | A. S. C. E. Proceedings  | February 1936 |
   AN INVESTIGATION OF WELDED SEAT ANGLE CONNECTIONS
   BY Inge Lyse and N. G. Schreiner
   A. W. S. Journal February 1935

170A
   THE BEHAVIOR OF FILLET WELDS WHEN SUBJECT TO BENDING
   STRESSES by N. G. Schreiner
   A. W. S. Journal September 1935

ADVANTAGES OF WELDING IN CONTINUOUS STRUCTURES
by Inge Lyse Preprint of papers for the
Fall Meeting of the A. W. S. October 1935

179A
   WELDED BEAM-COLUMN CONNECTIONS
   by Inge Lyse and Glenn J. Gibson
   A. W. S. Journal October 1936

174A
   AN INVESTIGATION OF PLUG AND SLOT WELDS
   by Glenn J. Gibson
   A. W. S. Journal July 1937

EFFECT OF WELDED TOP ANGLES ON BEAM-COLUMN CONNECTIONS
by Inge Lyse and G. L. Gibson
A. W. S. Journal October 1937

6. American Institute of Steel Construction.
STRUCTURAL BEHAVIOR OF BATTLEDECK FLOOR SYSTEMS
by Inge Lyse and I. E. Madsen
Proceedings, A.S.E.C. January 1938

7. Concrete Reinforcing Steel Institute.
A STUDY OF REINFORCEMENT IN CONCRETE SLABS
by Inge Lyse and G. R. Wernisch
A. C. I. Journal September-October 1936

BOND STUDIES OF DIFFERENT TYPES OF REINFORCING BARS
by George Robert Wernisch
A. C. I. Journal November-December 1937
B - COOPERATIVE INVESTIGATIONS

1. With American Concrete Institute.
   THIRD PROGRESS REPORT ON COLUMN TESTS AT LEHIGH UNIVERSITY
   by W. A. Slater and Inge Lyse
   A. C. I. Journal October 1931

   FOURTH PROGRESS REPORT ON COLUMN TESTS AT LEHIGH UNIVERSITY
   by Inge Lyse and C. L. Kreidler
   A. C. I. Journal January 1932

   FIFTH REPORT ON COLUMN TESTS AT LEHIGH UNIVERSITY
   by Inge Lyse
   A. C. I. Proceedings 1933

2. With Lehigh Brick Company.
   REINFORCED BRICK COLUMNS TESTED AT LEHIGH UNIVERSITY
   by Inge Lyse
   Engineering News-Record March 16, 1933

   TESTING MACHINE CAPACITY DOUBLED BY SPECIAL LOADING RIG
   by Inge Lyse
   Engineering News-Record August 31, 1933

   TESTS OF REINFORCED BRICK COLUMNS
   by Inge Lyse
   Journal, American Ceramic Society, November 1933

   REINFORCED BRICK COLUMNS
   by Inge Lyse
   Engineering News-Record January 4, 1934

C - COMMERCIAL INVESTIGATIONS

DETECING CONCRETE FOR WEIGHT OF 271 POUNDS PER CUBIC FOOT
by C. C. Keyser
A. C. I. Journal April 1932

TESTING RIVETED JOINTS OF CROMAHISIL STEEL
by Inge Lyse
Engineering News-Record May 11, 1933

LIGHTWEIGHT SLAG CONCRETE
In Inge Lyse
A. C. I. Journal September-October 1934

TEST OF NEW SHEET METAL DOWEL FOR HIGHWAY JOINTS
by Inge Lyse
Concrete March 1938
P - LABORATORY STAFF INVESTIGATIONS

CEMENT-WATER RATIO BY WEIGHT PROPOSED FOR DESIGNING CONCRETE MIXES
by Inge Lyse
Engineering News-Record, November 5, 1931

SIMPLIFYING DESIGN AND CONTROL OF CONCRETE MIXES
by Inge Lyse
Engineering News-Record, February 18, 1932

VISUALIZING CONCRETE ECONOMY IN TERMS OF STRENGTH
by Inge Lyse
Engineering News-Record, July 28, 1932

TESTS ON CONSISTENCY AND STRENGTH OF CONCRETE HAVING CONSTANT WATER CONTENT
by Inge Lyse
A. S. T. M. Proceedings, 1932

RELATION BETWEEN QUALITY AND ECONOMY OF CONCRETE
by Inge Lyse
A. C. I. Proceedings, 1933

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by Inge Lyse
Civil Engineering, July 1935

EFFECT OF SIZE AND SHAPE OF TEST SPECIMEN UPON THE OBSERVED PHYSICAL PROPERTIES OF STRUCTURAL STEEL
by Inge Lyse and C. C. Keyser
A. S. T. M. Proceedings, 1934

EFFECT OF BRAND AND TYPE OF CEMENT ON STRENGTH AND DURABILITY OF CONCRETE
by Inge Lyse
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SHRINKAGE OF CONCRETE
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Zement (Germany), February 13, 1936

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by Inge Lyse
Journal, The Franklin Institute, April, May, June, July 1936 (Awarded the 1937 Levy Gold Medal)
E - GENERAL ARTICLES

RESEARCH NOTES - CURRENT WORK AT LEHIGH UNIVERSITY
by Inge Lyse
Engineering News-Record February 15, 1934

COMPRESSIVE STRENGTH OF CONCRETE
by Inge Lyse in REPORT ON SIGNIFICANCE OF TESTS
OF CONCRETE & CONCRETE AGGREGATES
A. S. T. M. Publication 1935

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by Inge Lyse
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CIVIL ENGINEERING RESEARCH
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Engineering News-Record February 4, 1937

DER BEIWERT n IM EISENBETONBAU
by Inge Lyse
Beton und Eisen (Germany) April 7, 1937

THE MODULAR RATIO - A NEW METHOD OF DESIGN OMITTING m
by Inge Lyse
Concrete and Constructional Engineering
(England) July 1937

PLASTISKE DEFORMASJONER I BETONG
by Inge Lyse
Teknisk Ukeblad (Norway) September 30, 1937