lations of displacement, several exercises in connection with the theory of shipbuilding, and, finally, the design and calculation of a number of parts of machinery.

The primary object of the course of instruction during the first two years is to give the student a general grounding on the broadest possible lines in mathematics and natural science subjects, and concurrently therewith to introduce him to the elements of his special subject, so that, after passing the preliminary examination, he may devote himself in a higher degree to the direct study of his profession during the last two years. In the course of these two years, then, the tutorials gradually take the place of the lectures, and the professional study proper is gone into in detail. The student of naval architecture is engaged in designing and working out the plans of merchant and war vessels, and in studying the arrangement and working of shipyards, while the marine engineering student is at work on marine boilers, reciprocating, turbine, and internal-combustion engines. In addition, auxiliary engines and propellers are thoroughly gone into. Students in each branch concern themselves with the other just so far that, in their respective parts of the work on one and the same vessel, they can completely understand one another, and give due consideration to each other's requirements. The domain of airship construction and aerial navigation, which is closely related to naval architecture, has been included in the province of the latter, and it may be of interest to mention that quite a number of the first designers and engineers who have specialized in airship construction were formerly students in the department of naval architecture.

A programme of the subjects taken during the two last years of the course is given in the syllabus of the final examination for the diploma. Among these are included:—

Shipbuilding.

(a) Mercantile Shipbuilding:—
- (i) Designing of ships' lines.
- (ii) Complete design for a merchant vessel.
- (iii) Outline plans for a merchant ship.

(b) Warship building:—
- (i) Design of a warship.
- (ii) Principal details in conection with the design.
- (iii) Design of a propeller with accompanying calculations.
- (iv) Questions relating to shipyard arrangements and work.

Marine Engineering.

- (i) Design for a marine reciprocating engine or for a steam-turbine, together with boiler installation for a merchant vessel or for a warship.
- (ii) Design for a marine gas-engine.
- (iii) Design for a ship's auxiliary engine.
- (iv) Outline plans for a merchant vessel.

The oral examination includes questions on:

Shipbuilding.

- (i) Theory of ship construction.
- (ii) Design and construction of ships.
- (iii) Lay out and working of shipyards.
- (iv) Construction and arrangement of warships.
- (v) Marine engine construction.
- (vi) Fundamental principles of law and administration.

Marine Engineering.

- (i) Power plants, machine-tools and machine construction.
- (ii) Marine engine construction (reciprocating, turbines, internal-combustion).
- (iii) Boiler construction, auxiliary engines and accessories.
- (iv) Shipbuilding (merchant vessels and warships).
- (v) Electricity as applied to ships.
- (vi) Administration and management of naval and private establishments.

One of the important aims of science as applied to naval architecture is directed to the keeping of the rules of the classification societies in general accordance with the latest advances in knowledge. This refers chiefly to the arrangement, scantlings, and riveting together of the structural parts of the hulls of vessels, and to the application of the laws of mechanics, statics and dynamics. A second aim is that the rules of these societies, which are gradually gaining in authority, shall be prevented from developing into crystallized and inelastic ordinances, which interfere with the scientific development of ship design. We should insist, in this as in every other branch of engineering, that each new structure shall be looked upon much more as a concrete entity than has hitherto been the case, and that any new ship's design shall be worked out in this spirit.

There is one other point to which I must here draw attention. Both for instructional purposes and for scientific research work, suitable laboratories are nowadays of the very greatest value. In all branches of engineering there are many questions the solution of which by pure analytical methods is impossible, and which therefore can only be dealt with by practical experiment. To what excellent use in this way have not the existing testing laboratories in almost all countries been put. At the Technical College in Charlottenburg the Mechanical Engineering Section in particular has established numerous laboratories, and they have been of the utmost value both from the educational and from the industrial point of view. The distribution of these laboratories among the different sections of the college is as follows:—

Section for	Architecture	1
"	Civil Engineering	1
"	Mechanical Engineering	9
"	Shipbuilding and Marine Engineering	—
"	Chemistry and Metallurgy	8
"	General Science	1

It will thus be seen that the Technical College at Charlottenburg now possesses twenty laboratories, which serve the purposes of the research work of the professors as well as those of instruction. A short time ago a project for the installation of a second laboratory for the civil engineering section for the investigation of hydraulic questions was unfortunately rejected by the Prussian House of Representatives. It is a remarkable circumstance that in the entire establishment the section for shipbuilding and engineering should be the only one which has no laboratory. It must be admitted that this is very much to be deplored, and that the course of instruction as well as the solution of engineering problems is immensely impeded thereby.

The Lake Shore & Michigan Southern Railway has just adopted the design of the Strauss Bascule Bridge Co., for a 125-foot single leaf double-track span bascule over Buffalo Creek.