The Future of the Young Engineer

By W. Reavell, M.I.M.E. M.I.N.A.

The following address, given recently by Mr. Reavell at the Portsmouth College, is of such interest to our readers, that permission was obtained to reprint it in the "M.M." Mr. Reavell is the Vice-President of the Institution of Mechanical Engineers and Managing Director of a large engineering firm in Ipswich. His long experience and wide knowledge of his subject, entitle him to speak with authority on the subject with which he deals.—*Editor.*

SOME of you are probably entering upon the last year of your College course and are, no doubt, looking toward the future with mingled feelings of youthful hope and confidence, yet with a certain trepidation due to the growing complexities of modern engineering. I hope, however, that you all have the assurance that you have each "a Marshal's baton in your knapsack," as Napoleon said.

The observations I propose to put before you have the merit of being based on a somewhat long experience, and, as such, I hope they will renew your confidence and strengthen your courage.

From time to time 'dismal Jimmies' in the Press tell us that Engineering in England is 'played out' and that instead of leading, we follow either Continental or American practice! It is also often stated that the same opportunities of success do not occur to-day as in the past for the hundreds of trained young Engineers turned out each year from our Colleges.

Now while it is natural that, with the growth of scientific knowledge and its application to Engineering problems all over the world, we cannot expect to be the sole authors of Engineering invention or development, I do not believe in these pessimistic views and would ask you not to accept them.

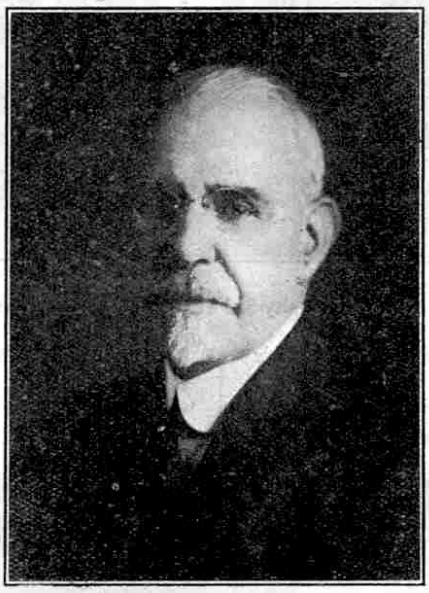
In dealing with this subject I do not propose to include the economic position —that is to discuss such things as the effect of lower rates of pay for skilled and unskilled labour on the Continent, the relative hours worked, or any kindred matters which have a bearing on the question of the disposal of our manufactured Engineering products abroad. I regard these questions, which would require an evening to themselves, as being outside the scope of my address to-night. I am only concerned with the nature and extent of the opportunities that lie before you.

Naturally Engineering development is full of difficulties—but at this fact I would ask you rather to rejoice, for it means that there will be opportunities to test your knowledge; and problems, the satisfactory solutions of which will not only redound to your own credit but be of benefit to your profession.

As you know, the fear of difficulties is not confined to this era. Epictetus wrote: "Difficulties are things that show what men are." This was true when that sentence was written, and it is true to-day.

I have a profound belief in the truth of that saying of Epictetus, and the history of Engineering in Great Britain is the history of difficulties patiently faced and surmounted by our forefathers, who were not technically equipped as you are, but who had the same British strain in them which will not admit of defeat.

Looking back on a fairly long life spent in the development of air compressing machinery of all kinds, I know of no greater feeling of satisfaction than that which comes from the solution of an unexpected difficulty by the application of intuitive knowledge and technical experience. Not infrequently it is by the solution of such difficulties that one is lead to actual improvements in design or construction.



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I would ask you to look at the opportunities that now lie before the trained Engineer. Probably in no era in our history has Engineering been required in so many walks of life as it is to-day, quite apart from its development in the normal branches of Engineering with which you are more or less familiar. Contrast the kitchen of our modern houses and hotels with the preparation of meals in feudal times. Trace the hand of the Engineer in the preparation of modern clothing from the growth of the raw material onwards. Notice the rebirth of interest in irrigation for the increase in the Empire of that most important product, cotton; in our modern transport; in our sports, and in countless other ways.

There probably never was a time when Engineering knowledge was so necessary to our race, and consequently a time in which the trained Engineer was so much needed. The last generation or two has not only seen enormous strides in the branches of Engineering then known and practised; but in that period the romances of Jules Verne have been made real by triumphs in shipbuilding and engineering under the sea, and by successes in the sphere of aerial navigation; in respect of which British Engineers have played a not unworthy part.

Referring to that branch which I have presumed may be regarded as your speciality here, namely, Marine Engineering, I have seen enormous strides made since the days of my apprenticeship to Marine Engineering, when the compound engine and the Scotch or Locomotive boiler was recognised practice. Its legitimate successor to-day is the geared turbine and the water-tube boiler. I need not remind you of the enormous changes obtained by the use of this modern machinery, in economy, and in weight and space occupied, and consequently in the speed of vessels. That same period has also seen the birth and growth of the internal combustion engine, especially the type designed to use heavy oil, on the principle commonly associated with Dr. Diesel—although it is fitting to point out here that British Engineers generally agree that the real credit for the inception of the principle involved in this engine is due to Ackroyd, a British Engineer.

The development of both of these competitive types of machines for marine propulsion is still continuing.

With the turbine and the water-tube boiler we shall witness continuing progress, both in the use of superheat and still higher boiler pressures.

The boiler problem will involve considerations as to whether we shall continue to use boiler plates to the usual specification for mild steel and increase the thickness for higher pressures—suitably re-designing the machinery for rolling, bending, flanging and rivetting these thicker plates—or whether researches will give us a much higher tensile steel, thus reducing thickness but probably involving increased knowledge and care in the heat treatment at each stage.

The problem of auxiliary machinery, with its considerable relative effect on the total fuel consumption of the vessel, will be re-examined, not only for full speeds but also at cruising speeds, for it is unwise to strain at a further slight percentage gain with the main machinery when a considerable loss, which can be remedied, is taking place elsewhere in the engine room.

So far as the internal combustion engine is concerned, the battle will continue between the two-stroke-cycle and the four-stroke-cycle. Meanwhile, the practical development of the two-stroke double-acting engine will proceed apace. The use of the supercharger, in which so far the Continent has been leading us, will also have a growing effect on our practice.

Naturally that will not be the end. Proposals have already been made by eminent designers for the use of the compound principle in the internal combustion engine with heavy oil. These proposals include the use of a much higher exhaust pressure in the reciprocating engine, and the passing of this higher