

The Knowledge Bank at The Ohio State University
Ohio State Engineer

Title: Fundamental Principles

Creators: Norman, C. A.

Issue Date: May-1919

Publisher: Ohio State University, College of Engineering

Citation: Ohio State Engineer, vol. 2, no. 1 (May, 1919), 13, 27-28.

URI: <http://hdl.handle.net/1811/33965>

Appears in Collections: [Ohio State Engineer: Volume 2, no. 1 \(May, 1919\)](#)

Fundamental Principles

By C. A. NORMAN,
Professor of Machine Design.

The Ohio State University, as most other colleges, puts a great deal of stress on the general sciences as fundamental principles of engineering, and justly so.

There are, however, certain other fundamental principles, on the knowledge of which the "well and woe" of the future engineer may depend even to a much greater extent in these days of re-adjustment and re-construction.

What are we really working for? What is humanity striving to? What are the fundamental principles of right and wrong in dealings between men?

There is one little principle that no engineer has, so far, been allowed to forget. That is, that all his work must ultimately show a profit. There must be dollars and cents gained as a result of the arrangements he makes, the machinery he installs, the wages he pays. No matter how brilliant his ideas may be, no matter how technically feasible, no matter how much they may be appreciated by the workingmen, if they result in a loss and not in a profit, they will have to go, and sometimes he with them.

Now, that has been irksome to very many of us. The writer has long been interested in the rigid dirigibles. Way back in 1913 these had in Germany carried several thousand passengers a total distance of close to a hundred thousand miles, without any mishap. Why should Germany get all the glory of this achievement? The writer tried to interest some men, with more money than they knew how to spend, in building some of these ships in America. But no, invariably the answer came back, the "profit was too uncertain."

Now the whole world is awake to the fact that these rigid dirigibles are to be taken very seriously indeed in connection with commercial trans-oceanic passenger travel. Great Britain is building them, not Germany alone. The United States government has had experts in Europe investigating their possibilities. These experts have returned enthusiastic. But the United States Congress has refused to appropriate money, and big business undertakings, which hope ultimately to reap great profits out of these developments, still sit back and declare down-heartedly that "profits are not certain just yet."

So then, great engineering achievements lie dormant because somebody cannot see certain profits in them.

But this is only a little thing. It has long been admitted that many of our industrial processes dwarf and stunt the workers physically and mentally. It is admitted that on account of over-

speeding of labor by piece work and bonus systems the working men in the shops age ten to fifteen years earlier than their managers or employers. Ten to fifteen of the best years are taken right out of the lives of these men in order that profits may be made secure. And the man that can speed up the workers most gets the highest salary. It was only when it was found that the labor turnover, the hiring and firing became too great that the eyes of the employers were opened to the fact that it might mean money in their pockets to speed up a little bit less and keep their workers more contented and happy, more willing to stay at their appointed tasks.

Now, let us say at once that a profit there must be. When you spend more than you earn you will become a bankrupt. If the workers consume more than they produce there will soon be want. The United States census for 1910 gives the average value added to the product by the workers in this country as about \$1113 per person employed in the industry. Higher than this the average income of person employed could not be. As a matter of fact it could be nowhere near as high as this. For even if no dividends were paid, no profits to employers allowed, yet all expenses for repairs, replacements, improvements and enlargements would have to come out of the value produced by the workers before the wages were paid. Such figures as these must be known. They will prevent the workers on the one hand from demanding the impossible, the owners on the other hand from maintaining that every wage increase must immediately be followed by a rise in price. The average income per employe in 1910 was about \$590. It would appear that an improvement of this wage would have been possible without price recuperation even with an ample allowance for improvement and enlargement charges, interest and profit. In some industries more, in some less. Where-as in many chemical industries the plant charges are huge compared with labor charges, the margin between wage paid and value produced must be great, and is great. In others, where the tools are simple and inexpensive, i. e., the plant charges low, the margin may be very much less.

Now these are things that the engineers ought to know. The writer as factory superintendent in a foreign country has had, officially, though certainly not privately, to stand up for a wage which meant that the workers were not properly fed. In that country there has been a revolution now and many engineers have suffered death for such a stand taken. The danger of a similar revolution

(Continued on Page 27)

FUNDAMENTAL PRINCIPLES

(Continued from Page 13)

in America does not seem overhanging just now. But a certain thing is, that if the workers in this country make up their minds that they are not getting a fair share of the values they produce, there is going to be trouble and while the trouble may take on very different forms from what it took in Russia, and while the ends aimed at may be very different, yet there is no need to assume that American workers will show any particular deference or love for superintendents, or managing engineers, who have on the surface of it done nothing else than enforce a system which the workers deem unjust.

In my opinion, whatever may have been the case in the past, the employers and managers can from now on do nothing better than lay their cards on the table, give the workers access to all accounts, show them exactly how much they produce and what part they are getting and let them agree on a fair share.

Every American is an inchoate business man, every American is prone to think in business terms. The sense of sportsmanship and fair play are the great moral assets of this country. I honestly believe that the American workingmen will be perfectly willing to give the factory owner a good big slice, if they feel that they, just the same, are getting their share.

There are firms, such as the White Company in Cleveland, which have, I am told, had the courage to act on this plan and with excellent results.

However these egoistic considerations, these simple considerations of caution and self protection, should not be the great fundamental principle of an engineer. An engineer is ideally a man who asks himself with the utmost clearness what a certain machine, or method is to produce, and then with supreme command of detail sets to work and designs his machine, arranges his method so that the end sought is attained. This should apply to his dealings with men in society and in the community no less than with men and machines in his shop.

An engineer should ask himself: To what goal is humanity moving; what is my nation's part in that movement; and what stand should I take to help my nation do its part?

These questions, in my opinion, find a clearer answer every day. The downfall of Germany after years of triumph seems to me to be the clearest indication that ultimately, in the long course of development, those simple principles, of right and justice will hold sway, that we have learned to believe in as children. Trodden in the dust, robbed of its constitution, soon threatened with the suppression of its language, that small nation among which I was born saw no other hope than to emigrate bodily and establish a new home across the seas. Yet, a political situation arose in which this nation of two million secured its rights against a government resting its power on two hundred million.

So then, God is just, God rules. God is not a shadow; an uncertain something on whose judgment we cannot rely. In and through our beings he is fighting a battle which ultimately, it is my firm belief, will lead to the establishment of a "kingdom of God" on earth. Just what this kingdom will be like, we may not be able to tell. To judge from appearances now it will be different in every nation. It will express itself in a hundred different ways, thereby gaining richness and brilliance. What is good for the strong, self-reliant Anglo-Saxon, may not necessarily be good for the dreamy Russian longing for human brotherhood. Every nation must express its soul in its own way. All we can do is honestly to strive for self-expression, in which we feel that all that is best within us has been developed to its highest pitch, and all that is base within us has been suppressed to its lowest level, not looking for self-aggrandizement by the suppression and oppression of others, but working so that through out self-expression, others may gain a fuller and more harmonious self-expression as well.

It is up to us to see that this nation becomes not only the greatest and most powerful nation on

earth, but that in this nation the longing for beauty, harmony and self-development is given full scope.

And to us as engineers, especially, the duty comes first, by becoming thinking men, educated men, civilized beings to see and recognize the great trends and necessities of humanity's onward movement, then to provide the material means without which humanity's great achievement cannot be carried out.
