

The Industrial Engineer, His Philosophy and the Scope of His Activities

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Résumé de l'article

L'époque dans laquelle nous vivons et connue sous le nom de « l'Ère du Machinisme » a débuté, il y a environ deux siècles, avec la découverte des machines et a reçu une véritable poussée sous le développement de la vapeur et de l'électricité et a accru sa force avec l'utilisation scientifique des outils et matériaux existants.

A chaque stage du développement industriel, savants, ingénieurs, chimistes, biologistes, botanistes et ingénieurs industriels ont leur rôle à jouer. En effet, chacun essaye de faire toujours épargner à l'homme plus d'effort et plus de temps. Aussi, il lui sera permis de consacrer ce temps et ces efforts inutiles à des sùvres plus valables. Toutefois, l'existence de l'ingénieur industriel ne peut être justifiée en autant qu'il contribue au bien commun. Mais en fait, quelle est au juste la sphère d'activités de l'ingénieur industriel?

Les opinions sont diverses et variées, mais le génie industriel est essentiellement une philosophie comportant un aspect matériel et un aspect humain. Tout d'abord l'aspect matériel qui est basé sur la conception suivante, à savoir que l'entreprise ne réussira que si elle rend un véritable service. Pour servir les gens, alors, l'industrie doit fabriquer des produits que ces gens peuvent acheter et à un bas prix. Pour atteindre ce bas prix, il s'agit d'en faire disparaître le principal obstacle qui est la perte: de temps, de matériel et d'énergie. Ceci s'explique par le fait que l'être humain laissé à lui-même, presque inévitablement utilisera la méthode la plus longue et la plus compliquée pour exécuter quoi que ce soit. Aussi pour réaliser son but qui est de sauver du temps, l'ingénieur industriel, emploie-t-il la méthode d'approche strictement objective comprenant deux éléments: Analyse et mesure qui ramènent les découvertes de l'imagination et de l'ingénuité à des termes rationnels.

Au moyen de l'analyse, un lot de phénomènes et de sources d'information sont découverts, étudiés et comparés et servent à l'élaboration de théories pouvant conduire à une solution pratique. Au moyen de mesure, les procédés sont évalués en terme de temps, ainsi le résultat final est-il exprimé par un nombre qui représente le temps normal pour compléter une tâche donnée.

A l'aide de ses techniques, l'ingénieur industriel aide à faire augmenter la production par individu-moyen. En se basant sur les chiffres disponibles, l'augmentation actuelle du taux de production s'élève à environ 3% par année. Toutefois, l'ingénieur industriel n'est pas vu du même œil dans tous les milieux. En effet, là où certaines tâches disparaissent à la suite de l'inauguration de nouvelle méthode de travail qu'il a proposée, l'atmosphère lui est antipathique. Mais en effet, sur qui pèse réellement le blâme? L'ingénieur industriel, son employeur ou un concurrent de son employeur? ou même l'union ouvrière désirant épargner du temps par ses demandes pour obtenir des semaines de travail plus courtes?

Il faut admettre que l'aspect matériel semble avoir reçu une plus grande attention que l'aspect humain quoique ces méthodes s'appliquent à l'être humain lequel est un facteur très complexe. Toutefois l'ingénieur industriel insiste aussi sur l'idée de justice. Les seuls mots: Évaluation des tâches, évaluation du mérite personnel, tests d'aptitudes, témoignent que cet aspect humain a été tout de même pris en considération au début.

On a tôt fait de réaliser que l'argent ou la paye hebdomadaire n'est pas la seule considération du travailleur. Il recherche une autre récompense, la satisfaction de son esprit, de son intelligence et de ses aspirations. De plus en plus, la fonction d'ingénieur industriel est comprise et acceptée: nos universités elles-mêmes le prouvent en établissant des départements de génie industriel comme tel ou comme partie de leur section de sciences sociales.

L'ingénieur industriel rend un service vital dont les aspects humains sont profonds et sans limite.

The Industrial Engineer, His Philosophy and the Scope of His Activities

Walter Delaney

Opinions concerning the industrial engineer are various. Everyone knows that engineers, chemists, biologists, botanists had their valuable contribution in the evolution of industrialism, but what is the Industrial Engineer's role? Does he work towards the same end? What is his philosophy and the scope of his activities? What methods and techniques does he use in order to bring progress in industry? There are all interesting questions to which the author gives an answer in this short article.

The period we are living in is known as the "Machine Age". It started with the invention of machines some two centuries ago, received its real impetus from the development of steam and electric power and has been gathering momentum with the scientific use of the tools and materials that exist.

At each stage, many arts and sciences take part and there is no reason to differentiate strongly among them. The Engineer and the Inventor have their big share; but the valuable contribution made by Chemists, Biologists, Botanists and such cannot be overlooked. They all work to the same end as the Industrial Engineer — towards the elimination of drudgery. They are all involved in man's constant striving to subjugate nature to his needs and desires. In this they also strive to achieve a given end with constantly diminishing human time and effort, so that he can use the residual time and effort in further conquests.

The Industrial Engineer's existence can only be justified inasmuch as he is contributing to the good of the whole. This is the long range purpose of his activities; but very few people really know what an Industrial Engineer is or what is the scope of his activities. Some think that the term refers exclusively to professional Engineers

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who advise in matters of road and bridge construction, of power plant layout and building, of machinery or other equipment installation, etc. — all those who live by the strictly engineering sciences. Others think immediately of the Efficiency Expert of yesterday whose sole object was to get the most out of each worker regardless of the effects. A scattered few, mostly Businessmen, are inclined to define the Industrial Engineer as “a person who charges you more for telling you how to run your business than you could possibly make by running it the right way instead of the way he told you”.

Well, the truth lies somewhere between these extremes. Industrial Engineering is essentially a philosophy with a materialistic and a human aspect.

The materialistic aspect which has been grossly overemphasized is based on the conception that business of enterprise can only succeed if it renders a real service. To serve people, then, industry must make products that people can buy. The only way a service or product can get wide distribution is by making its cost low. The main obstacle to low cost is waste — waste of time, of material, of energy.

It is a known fact that the human individual lives actually far within his limits. He possesses powers of various sorts which he habitually fails to use. Left to himself, he will almost invariably use the most complicated and time consuming method of doing anything. This explains why the basic aim of the Industrial Engineer is that of saving time. For this, he uses the strictly objective approach compounded of two elements which are ANALYSIS and MEASUREMENT respectively. Only by constant use of these two can progress be made. They bring imagination, discovery and ingenuity down to rational terms.

Through ANALYSIS, a vast lot of isolated and apparently unrelated pieces of information and phenomena are uncovered. These are brought together, sorted out and compared. Theories are evolved and further observations are made until some practical solution is found. Typical of the analytical phase are the several techniques of method study ranging from the flow process chart to the micro-motion study. Here, analysis is used to eliminate waste of time and effort. The job is simplified: back-tracking is avoided, unnecessary handling is eliminated, short cuts are taken, the design is changed to save material.

MEASUREMENT is Timestudy whereby procedures are evaluated in terms of time. Timestudy is industry's tool for measuring the productive capacity of its human and mechanical resources. It is the measurement of work and its end result is a number which expresses the time that should normally be taken to complete a given task. Timestudy is concerned with the question: "How long *should* it take?" and not "How long *does* it take?" That is a vastly different matter which calls for skill, judgment and careful training. Not only the time taken has to be recorded accurately but the effect of working pace on that time has to be appreciated. This is called "performance rating".

We might say that through his techniques, the Industrial Engineer creates time. The truth, of course, is that charity, legislation or the influence of pressure groups create nothing. They serve to rationalize a "fait accompli". In the present instance, the "fait accompli" is the steady increase in the productivity per individual in industry and elsewhere. It is safe to say, on the basis of all available data, that production per average individual is increasing at the rate of about 3% per year. It is what makes possible the shorter hours and higher wages. Where will it lead us, no one can foresee or dares to foretell. Yet, an article published in "Business Week" June 1952, is quite revealing. It deals with the astounding results and implications of farm mechanization. In the span of a generation, over two million men have been dropped from farm employment and, yet with almost no increase in tilled acreage, our (North America's) farm output has increased by 40% and our output per worker by 60%. Since 1920, the output per man-hour has doubled.

The principles the Industrial Engineer personifies are exemplified as well on the farm as in the factory and are supported by many who in no way regard themselves as Industrial Engineers.

There are quite a few to whom the whole idea is repulsive. They give little thought to the vital principle that underlies this continent's economy. The revolutionary effects of the steps taken are well illustrated by a pool run a few years ago by one of our business magazines and dealing with likes and dislikes of our factory workers. It revealed that their major dislikes were Nazis and Japs followed closely by a third — Industrial Engineers. Since then, we have all changed our minds about our one-time enemies. Maybe the same goes for the Industrial Engineer although he has not yet gained full acceptance. In some

quarters, suspicion and antipathy still persist. For instance, a big fuss is raised over the case of a man whose immediate job has disappeared because a new method has been devised by the Industrial Engineer. Yet, these quarters are most eager to take advantage of the principle and to use labour saving devices and feel no restraint to follow the vagaries of fashion which contribute to the loss of jobs and even to the destruction of industry. It may be well for these people to ponder over the situation and ask themselves who is really to blame: is it the Industrial Engineer, or his employer, or a competitor of his employer? Or is it the Labor Union stimulating time saving by its demands? The Industrial Engineer cannot afford to be over sentimental. He is looking for the good of the whole.

Admittedly, the materialistic aspect — the research of productivity seems to have received more attention or to have progressed more rapidly than the human aspect. While we have gone a long way perfecting our mechanical operations, we have not equally written into our equation whatever complex factor represents man, the human element. Great steps have been taken in this direction and true progress is being noted. For, no less than the legal profession does the Industrial Engineer support the ideas of justice. The mention of such things as Job Evaluation, Merit Rating, Aptitude Testing suggests that the human aspect has received early attention.

It was soon realized that take-home pay or monetary reward is not the worker's only consideration. He is looking for another reward, the satisfaction of his mind, of his intelligence, of his aspirations. If the complex problems of human relations receive as much direct attention and devotion as the technical aspects of industry, as much progress can be expected in the next ten years as we made during the past twenty-five years.

All this is not beyond the realms of possibility. The vast majority subscribes, unwittingly or not, to the principles of Industrial Engineering. The function is accepted and understood. For evidence of this understanding, we have only to look at the remarkable way in which our universities, once chary, have yielded in establishing departments of Industrial Engineering as such or as part of their Social Science Departments.

We are more and more concerned with the human aspects of Industrial Engineering. Industrial Engineers, more than any other group

are obsessed by the significance of time as an economic and consequently a human factor, life being made up of time. The Industrial Engineer is committed to the improvement of the economic status of the nation by following the simple rule that less time it takes to make it, the more people can have it.

This is not the birth of a new humanitarian. We may be certain the impulse always existed, and if not always expressed concretely, the reason should be clear. In order to fulfill one's charitable instincts, one must have the means — the money and the time. The principle that directs the Industrial Engineer has provided the money and the time.

It may be true that the materialistic aspect, being highly demonstrable, is overplayed at times, but the thoughtful person sees more in the principle than the mere extension of worldly satisfactions. Not so very long ago, the average working man had literally no time to himself. He started to work when he was a mere child, he worked until he could work no more. He worked at least twelve hours a day. His only vacation came when he lost his job. The working week has been gradually reduced from 72 hours to 60, then to 48, later to 40 — a rather jump rate of reduction, averaging an hour or more every four years.

This reduction in the weekly hours is not the only contribution that has been made to leisure. The school-leaving age has been increased several times. It has risen from nowhere to 16. There is talk of making it 18 soon.

At the other end of life we find a great increase in the use of pension plans with compulsory retirement at 65 or even 60. Nor should we omit mention of the rapid extension of vacations with pay. Almost everyone gets at least one week, the majority get two. All this adds up to the fact that a factory worker steadily employed through his life spends about half the time at work that his grandfather spent.

Today, the Industrial Engineer's skill and ability are needed to find ways of dealing with problems that are in turn the by-products of his skill and ingenuity. In the case of job losses through technology, the problem is settled in various ways according to the need of the employee, the personality of the management, the seniority of the employee, the financial status of the business, the competitive situation, the existence of job opportunities elsewhere, the pressure of the unions and so on.

People are more and more being directed to work for which their attitudes and temperament are suited. They are more effectively and rapidly trained, they are more intelligently promoted; working conditions become increasingly more pleasant, all of which mean higher earnings sooner plus obvious psychological satisfaction. The short week provides the extension of leisure. That these opportunities be so often unused or misused might well be the next major problem the Industrial Engineer will be asked to solve.

The Industrial Engineer performs a vital service, the human aspects of which are profound and limitless.

SOMMAIRE

L'INGENIEUR INDUSTRIEL, SA PHILOSOPHIE ET SES ACTIVITES

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