EXTRACTS FROM AN ENGINEER'S NOTE BOOK.

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The Engineering Shop Pupil's Note Book.

Those students who intend to take up manufacturing branches of engineering cannot begin too early to consider engineering as a business for making money. In addition to having had good theoretical trainings, men who know best how to estimate the amount of money which must be spent (in material, wages, power, depreciation, etc.) in order to bring in certain returns, are the men who nowadays are wanted for high positions in factories.

An apprenticeship in the shops is the opportunity to learn how to buy labor, and what it costs.

The engineering apprentice so soon grows accustomed to every-day shop work that, most likely, he treats it as too commonplace to note; and he rarely realizes, until too late, the great advantages he enjoys during the time he works in overalls with the mechanics. A pupil should look upon this time as some of the most privileged in his training, for it is then he has the opportunity—perhaps never to be experienced again to the same extent—for observing accurately the many causes which, taken together control the relation of time to output.

The shop pupil should never go to work without a note book, which he may label "Time Examples." Another note book, though it need not accompany him to work, should be kept, and labelled "Time Averages."

In the first should be entered, at all opportunities, actual examples of time taken to do work. Full descriptions of turning, screwing, boring, drilling, machine tapping, milling, gear cutting, planing, shaping, punching, machine riveting, etc.; in fact, all examples of machine work which come under observation; always giving with each example, size and material of job, make of machine tools, speeds and feeds, styles of cutting tools, and conditions as to lubrication. In conjunction with, but separate from each example, time spent in "marking off," or what supersedes this, setting up, or taking down work, grinding and regrinding tools, and other remarks (such as, if the operator is a boy or man) should be tabulated, and the date when the note is made must always accompany it.

Examples in fitting should occupy another portion of the book. Descriptions of fitting and erecting are extremely difficult to note concisely; but, with judgment, many valuable examples may be entered. Actual examples of hand-work, however, such as racket-drilling, tapping, studding, rivetting, scraping, etc., should be greedily collected, and full remarks as to general conditions attached to them. Notes on hand work are particularly valuable, because they are not likely to grow useless with age; thus, apart from pneumatic or electric hand drills, a man will take as long now to drill a hole by hand as his grandfather took to drill a similar hole. On the other hand, in machine work, higher powers and faster steels increase output every few years. This remark must not deter a pupil from collecting machinery data.

When a large number of actual examples have been noted the similar ones should be averaged, and reduced to simple form for entry in the "Time Averages" note book.

For instance, under "drilling cast iron" will appear approximate averages somewhat as follows:—

½ in. twist drill, 1 in. deep, time ½ minute.
1 " " " 1 " " " 1 "
1½ " " " 1 " " " 1½ "

Again, turning may be averaged for each diameter and per inch or foot in length, or at such a length per unit of time. Thus, under "mild steel shafting, 20 feet per minute, self-hardening cutters, finishing cutters flatnosed, lubricants, suds," a table may appear as follows:—

1½	in.	shaft,	roughing	1	ft. in	1¾	mins. or 32	ft. per hr.
1½	"	"	finishing	1	"	1	" 59	"
1½	"	"	total	1	"	2¾	" 21	"
2	"	"	roughing	1	"	2¾	" 21	"
2	"	"	finishing	1	"	1¾	" 38	"
2	"	"	total	1	"	4½	" 13	"
2½	"	"	roughing	1	"	3½	" 17	"
2	"	"	finishing	1	"	2	" 30	"
2	"	"	total	1	"	5½	" 11	"

and so on.

Planing may be averaged at so much time per square foot; gear-cutting at so much time per tooth of given pitch one inch wide. Other examples will arrange themselves according to circumstances. All such examples should be under a title of "Actual Machining, Approximate Averages;" they do not take into account time lost when the machines are not at work. This lost time will be averaged, and entered under another heading; it will vary according to class of work. To explain what is required here, the following hypothetical case may be of assistance:—

20 in. A type cylinder, lathe work.

Marking off and setting in lathe	50 minutes.
Resetting for piston valve-seats, etc	25 "
Grinding, altering, fixing tools, lathe at rest	30 "
Total	1¾ hours.
Lathe running	7 "
Grand total	8¾ "

Therefore unproductive time=20 per cent.

A number of similar castings should be treated in the same manner and their percentages averaged. A sketch showing the work will accompany the final average. Unproductive time averages should be found for as many classes of work as fall under observation, and sketches should explain each.

A book of time averages as suggested above should be carefully guarded by the student. As he advances in his profession it may become one of the most valuable of his assets.

To arrange each book is not so difficult as may at first appear; the collecting of the necessary data will cover the whole time spent in the shops, while the averages may be worked out in odd moments.

In conclusion, let me advise students to affix source of information and data to all notes. An old note, if it does not tell from whence it was obtained, is never convincing, and if dateless, is little better than useless.

"TECHNICS," ENGLAND.

THE METRIC SYSTEM IN THE COLONIES.

The secretary of the Decimal Association has received a letter from the General Council of Chambers of Commerce of the Commonwealth of Australia, stating that at a meeting of that body held in Sydney in June last the following resolution was passed:

> "That this General Council of the Chambers of Commerce of the Commonwealth of Australia views with satisfaction the increasing public interest in the metric system of weights and measures, and expresses the hope that it may very shortly be adopted for England and the Empire generally, and recommends that such legislation may now be framed in the Commonwealth as will enable us to at once follow the Home Country in this change."