TIME STUDY

By Dwight V. Merrick[1]

THE idea of time study is not new. Records show that a Frenchman sometime in the seventeenth century made time studies with a watch of that period, and no doubt, if the record of the Babylonian period were sufficiently complete, we might find reference to methods of measuring productive effort in building the tower of Babel.

It is certain that time study was never used to any extent in securing economies in productive effort until the time of Frederick W. Taylor, who conceived elementary time study and arrived at the time with the aid of a stop watch. Therefore time study dates back to 1881, when Mr. Taylor was foreman of the machine shop at the Midvale Steel Company, Philadelphia. In attempting to determine the proper time to be allowed for any job he recognized that, rather than to search through records of previous performance, it would be more accurate to take each element of the various kinds of work with a stop watch, find the reasonably quickest time in which the job could be done by summing up the total time of its component operations, and add a reasonable percentage of allowance for delays and fatigue. After experimenting with it for two years, he became convinced that this was the proper method of determination of standard times.

Mr. Taylor used time studies for fourteen years before he called it to the attention of manufacturers. In 1895 he presented before a Detroit meeting of the American Society of Mechanical Engineers a paper on time study and rate setting entitled "A Peace Rate System." His audience was not at all prepared for his ideas and methods, and in consequence the discussion following the reading of this paper centered entirely around the differential piece-rate system (which he was also developing) rather than around his methods of determining the time allowance for work by means of time studies. He tried to lead the discussion toward time study, but with little success. In 1903 Mr. Taylor again presented a paper before the A. S. M. E. entitled "Shop Management," which afterwards came out in book form. This book contained numerous references to time study and was virtually an appeal to manufacturers to give time study the attention that it merited. Since then the idea has spread rapidly.

At first many mistakes were made. For example, time studies were started without due consideration being given to standardization of methods and equipment, or to assuring a steady flow of material to the worker. Also, it was at first thought that time studies should be taken without the knowledge of the worker. Stop watches were concealed, sometimes in cases made to look like a book and sometimes in the observer's pocket, in which cases the time study man would have to go behind some object of concealment, in order to make a record of his observations. In another case, the observer sat in a glass cage near the worker and telephoned his readings to a man in the office. These methods were promptly discarded as unsatisfactory because, first, a continuous run cannot be obtained secretly, and second, they are underhanded and absolutely unnecessary when it is considered that without the cooperation of the worker time studies mean little to anyone.

After working at the machinist's trade for seven years, I started with Mr. Taylor in 1898 at the Bethlehem Steel Company on experimental work in developing high speed tools, the steel for which he had discovered. This association with Mr. Taylor led to time-study work on my part, started in 1905 at the Link Belt Company, Philadelphia. But it is of some of my later experiences I have been asked to speak.

Watertown Arsenal is a U. S. arsenal for making gun carriages, field pieces, projectiles, etc., and employed in 1911 about 700 persons. While the management is entirely in the hands of Army officers, the employees are civilians and consist of draftsmen, clerks, mechanics and laborers. We did time-study work there for two years, starting in May 1911 and ending May 1913. The development of time study covered these two years and resulted in an increase in the earnings of mechanics and laborers of about 30 per cent with about 100 per cent increase in production.

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From the first there were practically no objections to time study methods on the part of the men in the plant, although most of them were union men. They took to time study as a duck takes to water. At that time, in 1911, high-priced mechanics were paid about $3.70 a day. After the development of time study, their earnings ranged from $.90 to $1.25 a day more than before, depending upon the class of work performed. Therefore the union men in the arsenal were making from $.90 to $1.25 a day more than those outside. I was told by some of the men that they were buying new homes, and that the extra earnings helped considerably in paying off the mortgages.

However, in the fall of 1912 the leaders of the unions at Washington succeeded, in many cases, in having "riders" prohibiting time study or rate setting attached to appropriations made by the Congress for the purpose of building certain gun equipment. Therefore there were many instances of work going through the shops on day work, until finally about July, 1913, nearly all appropriations had this prohibitive clause attached. At the same time a bill was passed by the Congress prohibiting time study and rate setting in all government plants, much to the regret of a great many of the mechanics.

By the spring of 1914 all of the piece rated work had been done away with, that is, the appropriations covering all the work done carried the prohibitive clauses mentioned above. It was certainly a dead place. An interesting incident occurred while there; one of the men who had been vice-president of a union wanted to leave and take employment with me in order to learn time study work and rate setting.

The men, without the incentive of piece work based on time study, had got back to the old ways and production had decreased to its original rate, an operation taking about twice as long as it had taken under time study standards. If these methods had been retained and continued through the war, it would have resulted in about 100 per cent greater production at a cost of about 30 per cent more than the prevailing day rates.

This is in a few words illustrative of the history of time study efforts at the Watertown Arsenal.

The H. H. Franklin Manufacturing Company produces Franklin automobiles. In 1916 time study had been developed in the plant to a point where all rates were on a time basis with all branches of the work going smoothly. The call for men for war service practically glutted the Time Study Department. The scarcity of men made it impossible immediately to build the department up again, with the result that during the war rate setting was done in a make-shift way. Since 1920, however, time study and rate setting have been put back on an efficient basis.

The Winchester Repeating Arms Company manufactures rifles, shot-guns, cartridges and all kinds of sporting goods and during the war employed about 21,000 men. We had fifty-five time study men in the plant taking observations and setting rates and controlling about 150,000 different rates, all of which had been determined by time study and called for a standard production per hour. If in the performance of a job the production did not come up to standard, it was investigated, and, in case the standard proved to be an unfair production figure, it was corrected at once by new studies. On the other hand, if the operator was found to be at fault, he was instructed as to the proper method of performance. When the production figure is equaled or bettered, there is never any difficulty about earnings. The Winchester Company has proceeded further along time study lines than any other company of which I have knowledge.

The Bethlehem Ship Building Company employed about 90,000 men during the war. The work contracted for by this plant was on a cost-plus basis. If all of the ship-building rates had been based on time study with a definite production time for each rate, the building of our ships would not have cost the government what it did. Instead, rates were increased without regard to the time it took to perform the work. In many instances a man could earn as high as $25.00 on piece work in four or five hours without half trying. Nevertheless, orders would come out of Washington to raise the wage scale, and up these rates would go.

Time-study standardization was begun by the company in 1919, after the cost-plus jobs had about run out and rates were coming down. Time study and rate setting were introduced principally in their shipbuilding machine shop in San Francisco. In eight months time about 50 per cent of the man-hours of this shop were on time study rates, the men were earning about 30 per cent more, and production had been increased by 50 per cent. The importance of establishing a production time for every operation was impressed upon everyone. There were times when it was thought that the standard production time was exacting, but in all cases in question an investigation was made and a correction