most of the troubles have arisen; in the extreme cases this has been the cause of serious disagreements and strikes. Gradually the two sides have come to look upon one another as antagonists, and at times even as enemies—pulling apart and matching the strength of the one against the strength of the other.

The great revolution that takes place in the mental attitude of the two parties under scientific management is that both sides take their eyes off of the division of the surplus as the all-important matter, and together turn their attention toward increasing the size of the surplus until this surplus becomes so large that it is unnecessary to quarrel over how it shall be divided. They come to see that when they stop pulling against one another, and instead both turn and push shoulder to shoulder in the same direction, the size of the surplus created by their joint efforts is truly astounding. They both realize that when they substitute friendly cooperation and mutual helpfulness for antagonism and strife they are together able to make this surplus so enormously greater than it was in the past that there is ample room for a large increase in wages for the workmen and an equally great increase in profits for the manufacturer. This, gentlemen, is the beginning of the great mental revolution which constitutes the first step toward scientific management. It is along this line of complete change in the mental attitude of both sides; of the substitution of peace for war; the substitution of hearty brotherly cooperation for contention and strife; of both pulling hard in the same direction instead of pulling apart; of replacing suspicious watchfulness with mutual confidence; of becoming friends instead of enemies; it is along this line, I say, that scientific management must be developed.

The substitution of this new outlook—this new viewpoint—is of the very essence of scientific management, and scientific management exists nowhere until after this has become the central idea of both sides; until this new idea of cooperation and peace has been substituted for the old idea of discord and war.

This change in the mental attitude of both sides toward the "surplus" is only a part of the great mental revolution which occurs under scientific management. I will later point out other elements of this mental revolution. There is, however, one more change in viewpoint which is absolutely essential to the existence of scientific management. Both sides must recognize as essential the substitution of exact scientific investigation and knowledge for the old individual judgment or opinion, either of the workman or the boss, in all matters relating to the work done in the establishment. And this applies both as to the methods to be employed in doing the work and the time in which each job should be done.

Scientific management cannot be said to exist, then, in any establishment until after this change has taken place in the mental attitude of both the management and the men, both as to their duty to cooperate in producing the largest possible surplus and as to the necessity for substituting exact scientific knowledge for opinions or the old rule-of-thumb or individual knowledge.

These are the two absolutely essential elements of scientific management.

What has scientific management accomplished? It has been introduced in a great number and variety of industries in this country, to a greater or less degree, and in those companies which have come under scientific management it is, I think, safe and conservative to say that the output of the individual workman has been, on the average, doubled. This doubling of the output has enabled the manufacturer to earn a larger profit, because it has cheapened the cost of manufacture; and, in addition to enabling the manufacturer to earn a larger profit, it has in many cases—in fact, in most cases—resulted in a very material lowering of the selling price of the article. Through this lowering of the selling price the whole public, the buyer and user, of the joint product of the labor and machinery have profited by getting what they buy cheaper. This is the greatest interest that the general public has in scientific management—that in the end they will get more for their money than they are now getting—in other words, that scientific management will in the end enable us all to live better than we are now living. Through scientific management, then, the manufacturer has already profited, and the general public has also profited.



The greatest gain has come, however, in my judgment, to the workmen who have been working under scientific management. They have received from 30 to 100 per cent higher wages than they received in the past; and, in addition, I do not recall a single case in which they have ever worked longer hours than they did before, but I do recall many instances in which the hours of work were shortened. Perhaps the greatest gain, however,—and I say it without hesitation—is not the increase in wages received by the workmen, but the fact that those who are working under scientific management have come to look upon their employers as their best friends instead of their enemies. They have come to realize that friendship and cooperation are better than war.

Now, this, of course, is a mere assertion. By way of proving this fact, however, I wish to state that until this last year, during the 30 years that scientific management has been gradually developed—has been in process of evolution—there has never been a single strike of employees working under scientific management—never one in all the 30 years in which it has been used.

Scientific management has been introduced in competitive industries. Among their competitors, situated in many cases right alongside of them, who have not adopted scientific management, there have been repeated strikes. Yet even during the very difficult period of changing from the old type of management to the new, until last year, there has never been a strike among the men working under the principles of scientific management, while in corresponding establishments not working under scientific management there have been repeated strikes.

Thereupon, at 12 o'clock noon, the committee took a recess until 2 o'clock.

**After Recess.**

The committee reconvened 2.05 o'clock p. m., pursuant to taking a recess, Hon. William B. Wilson (chairman) presiding.

The Chairman. You may go ahead, Mr. Taylor.

Mr. Taylor. It must be realized that during the many years that scientific management has been in process of evolution that much of the mechanism—which has improperly come to be looked upon by many people as the essence of scientific management—has been adopted and used by those who were in no way engaged in working under the principles of scientific management. And that the false use, if I may speak of it in this way, of elements which have been associated with scientific management have led to strikes. I shall try to point out that many elements of what may be called the mechanism of scientific management are powerful when used by those on the management's side. These elements are powerful both for good and for bad, and it is impossible to be assured that even useful elements shall always be used in the right way. So that, in a number of cases, men who were out of sympathy with scientific management and yet who were using the elements which have been in the eyes of the public associated with scientific management have brought on strikes by using these elements entirely without any relation to the real, fundamental, and essential principles of scientific management. In order that the essential difference between the principles of scientific management and those of the older type of management may be made more clear, it seems to me desirable to first point out, or indicate, what I think you gentlemen will all recognize as representing the best of the older type of management.

If you have a company, say, employing from 500 to 1,000 men you will have among the employees of this company perhaps 15 or 20 different trades. Now, the men working at these different trades have probably learned all that they know, one may almost say, through tradition; that is, trades are now learned, not from books but just as they were 100 years ago; apprentices learn by watching and observing the way other men work, by imitating the best workmen, and by asking questions of those immediately around them. The apprentice learns by reading a little, by some teaching on the part of the foreman and superintendent, but