

shop use of the data developed in his "laboratory," he had to exercise in the shop the same control he had exercised in the laboratory. So now were thrust upon him further problems in standardization as compared with which those involved in determining best ways were simple.

First of all, he had to standardize all the shop conditions—bring them up to the same standard that had obtained in his "laboratory." This made it necessary for him to take the tool grinding and dressing out of the hands of the individual workmen; and as there must be not only standard cutting tools but also standard bolts, clamps, dogs, calipers, gages, scales, dividers, etc., and all these tools must be on hand when wanted so that the workmen would not lose time chasing them up or be forced to resort to tools other than standard, Taylor had to establish a tool room for their systematic care, storage, and issuance. And it also was necessary for him to develop standard practice for such things as caring for the belting and oiling the machines. Certainly it was not until all this standardization work was done that he could begin to make proper use of his metal-cutting and motion-study data.

But just how could he make use of these data? Plainly it involved getting the right materials and the right tools in the right condition to the right man at the right machine with the right instructions at the right time. All causes for delay must be guarded against. As far as possible, the flow of work must be continuous. Therefore, all the work of the shop had to be carefully planned in advance.

But there was the matter of the instructions. Just as Taylor had found that you cannot determine with accuracy the total time a job should take until you resolve it into its elementary operations and time these, so he now found that to get the job done in that time, he would have to list for the benefit of the workmen the elementary operations that were necessary and the time each should take; which is to say he found that he would have to give his men detailed instructions in writing.

It is well known to all executives that it is one thing to give employees instructions and quite another thing to get them to follow the instructions faithfully. And these instructions of Taylor's called for exceptional work—not only for greater continuity of effort but also for a higher order of attention and watchfulness. They ran counter to the average man's very human disposition to take things easy. They, in fact, called for a marked and permanent change in his habits. Could Taylor, then, have forced his men into following his in-

structions? The fact is that if only because his long fight with his men had taught him a sharp lesson in the limitations of force, he had no idea of attempting such a thing.

We have seen that when he selected workmen to participate in his motion study, he had to enlist their co-operation, their *good will*. Plainly the same principle held good when it came to getting men to work the way the motion study showed they should work. It was not so much a matter of getting them to work harder as of getting them to work *better*, to make all their motions tell.

Even, then, as Taylor had induced men to co-operate in his experiments by offering them an extra wage, so he now offered them an extra wage for following his detailed instructions for the doing of the everyday work of the shop. The principle was that of *exceptional or extra-ordinary wages for exceptional or extra-ordinary work*. If it was a straight engineering proposition, it also was a just one, and for this latter reason alone Taylor would have adopted it, old-fashioned righteousness being a noteworthy part of his heritage.

From the beginning, apparently, he had foreseen that, as he determined what his men ought to be able to do with their equipment and materials, he could pay them higher wages permanently. This indeed, was one of his principal objects. His instinctive belief all along had been that it was for him as a manager to see, not how little he could pay his men, but how much.

Now, as far back as Adam Smith's *Wealth of Nations* (1776) it had been felt that there is a fallacy in the idea that the less there is paid to labor, the less will the product cost; and while in the 1880's it still was far from common for managers to be far-sighted enough to grasp this, more and more were beginning to realize that workmen will not do an extra-ordinary day's work for an ordinary day's pay. However, all those who had been paying extra-ordinary wages had done so in accordance with the philosophy of "initiative and incentive," and it will be seen how different from this Taylor's action became; he paid extra-ordinary wages, ultimately to stimulate the workmen to do more or better work, but immediately to *give them an incentive for maintaining the standards of accomplishment determined by his scientific experiments*.

It now should be recognized that here, coming into being, was an entirely new thing in management, the "central idea" of which, as Taylor came to describe it was this:

(a). To give each workman each day in advance a definite task, with detailed written instructions, and an exact time allowance for each element of the work.

(b). To pay extraordinarily high wages to those who perform their tasks in the allotted time, and ordinary wages to those who take more than their time allowance.<sup>1</sup>

But this brings us to the fact that standards of accomplishment for employees will be set in vain, and every possible incentive for maintaining those standards will be given them in vain, unless at the same time there is maintained that standardization of methods, equipment, materials, and general working conditions upon which standards of accomplishment depend. And of all the problems in standardization which confronted Taylor, this one of maintenance was by far the most nicely designed to exhaust his high courage and his superb power of will. If things and persons, once put, only would stay put! If only they did not have that well-nigh universal tendency to sag, lapse, deteriorate, and get out of tune! However, it is unlikely that there ever was a person freer than Taylor from the weakness of repining that things and persons are what they are. He cheerfully adapted himself and his work to the world as he found it, and this, not by any surrender of his ideals, but by resorting to every device necessary to bring his ideals to pass. And it was just in this way that there was brought into existence that complex of methods and mechanisms of management which became known as the Taylor System.

It signifies not merely that standardization inevitably leads to systematization for the reason that without system standards cannot be maintained. It signifies also that *in proportion to the definiteness, determinateness, and high development of your standards must be the definiteness, determinateness, and high development of your system*.

### III. BETTER GREENS FOR GOLFERS<sup>2</sup>

THROUGH his enthusiasm for golf and to provide an outdoor sport for the family in general, Taylor converted a rough piece of lawn at Red Gate into an ordinary good putting green. Taking up his permanent residence at Boxly, he determined to have the best possible green, and one with unique features.

Fifty feet by forty, and situated in the garden at the front of the house, this latter green was laid out according to blue print so as to have a "rolling" surface, or

one of knolls and depressions. The idea, of course, was to create a greater scope for skill. Designed just for a putting game, the Boxly green has on its sides twelve disks marking the points from which you start to approach the cup with the ball. The cup is so situated away from the centre as to make the lines of approach vary in length, and cunningly calculated do you find the knolls and depressions to assist in making each line present a different problem. After many experiments it was decided to give the green a grade of three per cent.

Greens with rolling surfaces derived from the natural contour of the ground have, of course, long been in use; but our information is that, laid out in 1904, the Boxly green probably was the first one, at least in this country, to have a rolling surface specially planned. Since then Robert Bender has made rolling greens for new golf courses at Whitemarsh, near Philadelphia, at Pine Valley, New Jersey, and at Asheville, North Carolina; and so popular have they now become that on many old courses they have been substituted for flat greens.

When he started to grow grass on his Boxly green, Taylor again followed his principle of not attempting anything original until he had mastered what at the time was considered the best practice. He consulted the best grass experts available, and for no less than three years, while using a "good rich garden soil," followed their general methods.

Up to the time that the writer [Taylor] started his experiments in the making of a putting green, the best practice consisted in chemically analyzing the soil where the putting green was to be made, and attempting to supply it with the fertilizer and the manure or lime needed to put it in proper condition for growing grass. The soil was then plowed up, the green graded, so as to have the proper contour, and the grass was planted—just as grass had always been planted—carefully sprinkling the seeds over the surface of the ground and either gently raking them into the ground or covering them with a thin sprinkling of dry soil and rolling lightly so as to bring the seeds into close contact with the soil.<sup>3</sup>

It also was the practice to sow a variety of seeds to meet the varying conditions, not only on the different greens of a course, but on different parts of the same green. That is to say, the object was to plant a sufficient variety of seeds to make sure that all parts of the green would be covered with grass, whether the soil were "dense or open, moisture-holding or dry, deep or shallow, lean or well supplied with plant food"; one kind of grass flourishing under conditions that another kind finds insupportable. And Taylor added:

<sup>1</sup> On the Art of Cutting Metals, pars. 2-3.

<sup>2</sup> Chapter IV of Book VI, the general title of Book VI being "Serving the Public Without Pay."

<sup>3</sup> This quotation and others in this chapter are from Taylor's article "The Making of a Putting Green," published in five installments in 1915 in what was then *Country Life in America*.