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# The Pursuit of Productivity: A Marxist Analysis of How Frederick Winslow Taylor and Dr. W. Irving Clark Revolutionized the American Factory During the Early Twentieth Century

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The Pursuit of Productivity: A Marxist Analysis of How Frederick Winslow Taylor and Dr. W.  
Irving Clark Revolutionized the American Factory During the Early Twentieth Century

by  
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## Introduction

This essay began with research into the history of anticommunism among members of the American Medical Association (AMA). While scouring AMA journals around the time of the Bolshevik Revolution, I came across the work of Dr. W. Irving Clark, an AMA doctor who had been under the employ of a Massachusetts industrial firm, Norton Emery Co., since 1911. Prior to uncovering Clark's work, it was understood that one of the earliest examples of an industrial firm hiring a doctor directly to work toward maintaining the health of workers occurred in the 1930s under the direction of Henry Kaiser—one of the members of the Six Companies firm who undertook the construction of major infrastructure projects on the West Coast—and later implemented at the Kaiser shipyards and steel mills during World War II to serve workers and their families before being made available to the public under the control of Kaiser Permanente in 1945.<sup>1</sup>

The history of American industrial medicine has neglected to view Clark as a figure as significant as Alice Hamilton—the mother of American occupational medicine.<sup>2</sup> Hamilton's concern for worker safety and the mitigation of industrial accidents and illness were a significant step toward advancing the legal rights of workers on the factory floor. Though Clark and Hamilton were both concerned with changing the factory floor to be a safer place, Clark's end goal was one of increasing worker productivity and reducing absenteeism. Clark's absence from the historical record leaves the intention of occupational medicine only half explored. For over

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<sup>1</sup> For more information on the rise of Kaiser Permanente Healthcare see Rickey Hendricks, *A Model for National Health Care: The History of Kaiser Permanente* (New Brunswick: Rutgers University Press, 1993).

<sup>2</sup> For more information on Hamilton's work see *Exploring the Dangerous Trades: The Autobiography of Alice Hamilton M.D.* (Boston: Northeastern University Press 1985).

40 years, Clark worked for Norton and undertook the task of increasing efficiency, improving good-will between employees and the company, and reduced absenteeism. During those 40 years, Clark was hired by Harvard University—the same institution that hired Hamilton—and was approached by industrial organizations as an expert on industrial medicine. Clark’s work should be understood as an extension of the scientific management that Frederick Winslow Taylor championed during the turn of the twentieth century. The factory served as a laboratory for men like Clark and Taylor to create new methods for increasing productivity and overcome contradictions within the capitalist mode of production.

The early- and mid-twentieth-century American factory is synonymous with “Taylorism,”—the scientific management of workers named after its most prolific champion, Frederick Winslow Taylor. “It is impossible to underestimate the importance of the scientific management movement,” argues Harry Braverman, a revolutionary political economist of the twentieth century, “in the shaping of the modern corporation and indeed all institutions of capitalist society that carry on labor processes.”<sup>3</sup> Taylor believed that workers could be made more efficient by management meticulously controlling the way in which workers labored. Taylor was convinced that through his system, he would be “successful in forcing the men to do a fair day’s work.”<sup>4</sup> Taylor used his position as a “gang boss” and the Midvale Steel Works as a laboratory for his theories of scientific management as a means for overcoming what he referred to as “soldiering,”—the intentional slowing down of work in order to keep management in the dark over how quickly pieces could be finished; as well as intentional sabotage of machines by Midvale machinists who had, amongst themselves, established what they deemed a fair output of

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<sup>3</sup> Harry Braverman, *Labor and Monopoly Capital* (New York and London: Monthly Review Press, 1974), 86.

<sup>4</sup> Frederick Taylor quoted in Braverman, *Labor and Monopoly Capital*, 96.

finished products and refused to increase output knowing that an increase would cause the piece-rate to drop and result in more work for the same or less daily pay.<sup>5</sup>

The scientific management championed by Taylor, argues Eric Hobsbawm, “was the child of the Great Depression.”<sup>6</sup> What Taylor provided to the capitalist system was a new system for transferring the knowledge of the production process from workers to management. “Pressure on profits in the Depression,” notes Hobsbawm, “as well as the growing size and complexity of firms, suggested that the traditional empirical or rule-of-thumb methods of running business, and especially production, were no longer adequate.”<sup>7</sup> Taylor, according to Braverman, “pioneered a far greater revolution in the division of labor than any that had gone before.”<sup>8</sup> Utilizing research from his time in factories beginning in the 1880s, Taylor published, in 1911, his well-known manual for furthering capitalist control over the labor process, *The Principles of Scientific Management*. That same year, the Norton Emery Company of Worcester Massachusetts hired Dr. W. Irving Clark. In hiring Clark, the Norton Emery Company was attempting to eliminate, what they dubbed, “the man question.”<sup>9</sup> While constant capital—the cost of raw materials and the necessary means of production to carry out the productive process— can be accurately calculated a priori, “the weak spots of the human machinery,”<sup>10</sup>—a telling perspective held by Norton towards its employees—posed a problem in calculating variable capital—wages—for the company. By the time Norton hired Clark, the company had spent the last two decades investing in new technologies, grinding processes, and the implementation of a managerial structure designed around scientific management practices. In order to “increase efficiency of the employees,” and

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<sup>5</sup> Braverman, *Labor*, 92-97.

<sup>6</sup> Hobsbawm, *The Age of Empire 1875-1914* (London, Weidenfeld and Nicolson, 1987), 44.

<sup>7</sup> Hobsbawm, *Age of Empire*, 44.

<sup>8</sup> Braverman, *Labor*, 91.

<sup>9</sup> W. Irving Clark, “Norton Company's Medical Department,” *Grits and Grinds* III, no. 7, (November 1911): 3.

<sup>10</sup> Clark, “Norton Company's Medical Department,” 3.

“increase the already well-marked good feeling between the men and the company,” Norton looked to Clark to run their newly created medical department.<sup>11</sup> Norton believed “if we keep the health of our men in perfect condition, we have done much for them and naturally create a more productive and efficient force of operators.” Although Clark’s efforts did much to eliminate serious injuries—after five years almost entirely eliminating sepsis—Norton’s medical department marked a new development in corporate control of workers through medical surveillance. Essentially, what “the man question” posed for Norton, was how could the company make men as reliable as their machines? If Taylor gave management the tools to take control over the labor process from workers, Clark gave management the tools to take control of the health of workers. Though not as widely known as Frederick Winslow Taylor, Dr. W. Irving Clark was instrumental in furthering management’s control over workers through medicine and applying Taylorist ideology to the human body.

Through comparing the new developments within industrial production undertaken by Taylor and Clark, we are left with a firmer grasp of how the economic power of capitalism compels management, capitalists, and workers to implement new forms of surveillance and exploitation in order to maintain the necessary increase in capital that denotes the capitalist mode of production. Ultimately, both the capitalist and the proletariat are beholden to the economic power of capitalism. As Søren Mau has argued:

Capital’s mute compulsion is the result of their mutual mediation of each other: proletarians are subjected to capitalists by means of a set of mechanisms which simultaneously subjects everyone to the logic of the valorisation and vice versa. The ‘muteness’ of capital’s power thus reveals itself to be a result of a set of historically specific relations of production in which the human capacity to infuse materiality with relations of domination has been exploited to a degree never before seen in human history.<sup>12</sup>

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<sup>11</sup> Clark, “Norton Company’s Medical Department,” 3.

<sup>12</sup> Søren Mau, *Mute Compulsion: A Marxist Theory of the Economic Power of Capital* (London and New York, Verso, 2023), 322.

This thesis will serve, in part, as an historical study to supplement Mau's expansion of Marx's theory of the economic power of capital. A common hurdle faced by Marxist scholars is a dismissal of Marx's work as too economically deterministic—even by prominent Marxist theorists such as Jurgen Habermas or postmodern cultural critics such as Michel Foucault. For some scholars of capitalism, such as Milton Friedman, the market is viewed as a separate sphere that rational actors choose to participate in because it is beneficial.<sup>13</sup> When the market fails to achieve the platonic ideal of a free-market, many theorists dismiss this as anomalous. Marxist scholars, however, recognize the inherent contradictions within the capitalist mode of production and utilize materialist analysis to demonstrate how capitalism reinforces itself as a result of its power to “fracture, pulverize, split, and cleave in order to collect, connect, assemble, and reconfigure by weaving the valorization of value into the transcendental fabric of social reproduction.”<sup>14</sup> The following analysis of the efforts of Taylor and Clark is an attempt to demonstrate the economic power of capital that underpins the work of Mau and continues what Lenin called “the living soul of Marxism—a concrete analysis of a concrete situation.”<sup>15</sup> The technoscientific developments undertaken by Clark and Taylor revolutionized the factory floor and in doing so generated new forms of producing surplus value, thus continuing the teleological core of the capitalist mode of production—the constant expansion of capital itself.

This thesis, as well, provides an alternative to the orthodox history of Norton Abrasives. The most prolific historian of Norton Abrasives, Charles Cheape, espouses a widely-held economist's explanation of Norton's success. For Cheape, luck, in addition to “prudence,

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<sup>13</sup> See Milton Friedman, *Capitalism and Freedom* (Chicago: University of Chicago Press, 2002).

<sup>14</sup> Soren Mau, *Mute Compulsion*, 323.

<sup>15</sup> Vladimir Lenin, “Kommunismus” in, *Collected Works*, vol. 31 (Moscow: Progress Publishers, 1974) accessed digitally: <https://www.marxists.org/archive/lenin/works/1920/jun/12.htm>

diligence, and thrift contributed largely to Norton's success."<sup>16</sup> These character traits of the four founding members of Norton, concomitant with "owner-operation and ad hoc, centralized management," argues Cheape, "provided flexibility and held down costs. A paternalistic labor relations program and competitive wages promoted worker productivity and discouraged unions."<sup>17</sup> With the application of a Marxist conception of history and capitalist production, we can move beyond the limits of bourgeois ideology—that depends mostly upon character traits instead of material conditions—and lay bare a more accurate explanation as to the success of Norton.

This essay will also expand upon the work of Karl Marx to demonstrate how the technoscientific experimentation of Clark and Taylor are logical responses within the capitalist system to address contradictions within the process of industrial production. Despite claims from Clark and Taylor of improving working conditions for the betterment of workers themselves, ultimately, both men were merely responding to the defining foundation of the capitalist mode of production; the conversion of capital into more capital. At the time Marx published *Capital* in 1867, American medicine and industry were still in their infancy. The Norton Emery Wheel Company, when founded in 1885, was an unremarkable 560 sqft factory with 13 employees. By 1914, the factory floor had rapidly expanded to 455,000 sqft to accommodate 1,100 employees.<sup>18</sup> Before medical education was standardized in the United States during the early twentieth century, medical education was a cut-throat, for-profit industry that encouraged a race to the bottom among medical-degree mills. Prior to the Flexner Report of 1910, which shed light on the abysmal conditions of medical education in the United States, there were no medical licensing

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<sup>16</sup> Charles Cheape, *Family Firm to Modern Multinational: Norton Company, a New England Enterprise* (Cambridge, Harvard University Press, 1985), 54.

<sup>17</sup> Cheape, *Modern Multinational*, 56.

<sup>18</sup> Grits and Grinds Vol V No. 12 (April, 1914), 3.



examinations to determine the competency of the glut of trained doctors from the United States medical schools—161 schools in 1908.<sup>19</sup> For a comparison, the rest of the world had 174 medical schools. An official statistic from 1910 showed that 40,000 doctors in the United States were earning \$500 a year—less than proletarian wage.<sup>20</sup> Worcester mirrored this glut of physicians; 261 in 1907 in a city with a population of 128,135 in 1905.<sup>21</sup> During the beginning of the twentieth century, however, advances in medicine and industrial science had created conditions in which men like Clark and Taylor could implement and standardize new forms of control over workers to increase their ability to create surplus value. At Norton, under Clark's guidance, medical knowledge was centralized and managed by the company; at Midvale and Bethlehem, under Taylor, the knowledge of production was transferred from workers to management as a means of removing control over the productive process from employees and placing it within the complete control of management. Both methods were implemented toward the same end; an increase in the production of surplus value.

### **A Rough Synopsis of Marx's Conception of Capitalist Production**

An explanation of Marx's socio-political critique of capitalism will be necessary in order to provide—specifically for those readers unfamiliar with his work—a framework in which the work of Taylor and Clark as well as the growth and economic success of Norton become more clear. This framework will allow us to look beyond sentiments of good-will toward their fellow man or the possession of character traits that merited success in nineteenth-century American industry; a framework, as we have seen espoused by Cheape, used by some economic historians to remove the political from the economic. By understanding the structure of the process of

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<sup>19</sup> Peter Swenson, *Disorder: A History of Reform, Reaction, and Money in American Medicine* (New Haven, Yale University Press, 2021), 238.

<sup>20</sup> Swenson, *Disorder*, 239.

<sup>21</sup> *The Worcester Directory*, (1907): 17, 807-809.

production and the location in which profit is generated by workers for the capitalist, we are left with a better understanding of why Clark and Taylor's work was so important to furthering the interests that underpin capitalist production.

One facet of the growth of industrial medicine within the United States, during the early twentieth century, stemmed from economic pressures placed upon capitalists as a result of the underlying structure of the capitalist mode of production. The underlying pressures of the capitalist mode of production, defined most clearly by Marx's general formula for capital,  $M-C-M'$ <sup>22</sup> explains the stated—and unstated—reasoning behind The Norton Emery Company's decision to hire Clark in 1911 to run their newly-created medical department as well as Taylor's insistence on giving management complete knowledge over the productive process. Taylor's insistence on meticulously controlling all facets of production and Norton's decision to invest capital on the periphery of the productive process—Clark, after all, did not begin to toil away on a production grinder and enter into the production process directly—are two aspects of a growing trend among industrialists to further exploit their workers by increasing the surplus value these workers generated.

Within the capitalist mode of production, mechanization is a means to further increase the extraction of surplus value from the worker. New machinery replaces or enhances the labor power of human beings and thus shifts the brunt of necessary capital from worker's labor-power to the means of production. Because capitalists are in competition with one another, and value is socially-determined by the totality of labor-power within the capitalist system, the capitalist who produces more efficiently than their competition—through mechanization and 'speeding-up'—is in a position to generate more profits than those firms who have not implemented ways to extract

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<sup>22</sup> Marx, *Capital Volume 1: A Critical Analysis of Capitalist Production* (New York, International Publishers, 1975), 155.

more surplus value. Mechanization and speeding-up are only effective if workers are in a condition to keep up with the demands of the workplace. By establishing a medical department, Norton was responding to a contradiction within the factory between the machines whose output could be easily calculated, and the workers whose labor could not be as effectively anticipated or controlled.

Machinery is inseparable from modern industry. “The capitalistic application of machinery,” notes Marx, “...is intended to cheapen commodities, and, by shortening to portion of the working-day, in which the labourer [sic] works for himself, to lengthen the other portion that he gives without an equivalent, to the capitalist. In short, it is a means for producing surplus value.”<sup>23</sup> Since, posits Marx, “the value of labour [sic] must always be less than the value it produces, for the capitalist always makes labour-power [sic] work longer than is necessary for the reproduction of its own value.”<sup>24</sup> Then, the use of machinery allows for a reduction in necessary labor—the labor that reproduces itself by imbuing a commodity with labor power—and an increase in surplus labor—unpaid labor belonging to the capitalist. “Machinery becomes in the hands of capital,” argues Marx, “the objective means, systematically employed for squeezing out more labour [sic] in a given time.”<sup>25</sup> Scientific task management, championed by Taylor, is thus a logical continuation of the demands of capital within the internal structures of industrial capitalist production. Control over the productive process will ensure a decrease in necessary labor time and an increase in surplus labor time. Through the use of medical surveillance, Norton extended the work of task management as a means to ensure that workers would become more efficient, by staying healthier, thus being able to keep up with the output of machinery and thus increase the surplus value they generated in a working day.

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<sup>23</sup> Marx, *Capital*, 371.

<sup>24</sup> Marx, *Capital*, 539.

<sup>25</sup> Marx, *Capital*, 412.

Though human agency played a role in the story of twentieth-century industrial medicine, the larger economic reality of the capitalist mode of production, and the need of capitalists to increase profits year over year, better explains the actions of Clark and Taylor than altruism or a shared sense of humanity from employers toward employees. First, a definition of Marx's general formula for capital, M-C-M', will be necessary to provide a sufficient lens to view the efforts of Clark and Taylor beyond the bourgeois veil of improving the relationship between workers and the company. M represents money, which for Marx is best understood as, "the phenomenal form that must of necessity be assumed by that measure of value which is immanent in commodities, labour [sic] time."<sup>26</sup> C, commodities, is that which is exchanged for money within this formula. Of course, exchange can exist without money and the formula C-C is indicative of the exchange of two commodities, for example x amount of rice for z amount of corn. If x amount of rice is equal to z amount of corn then both would be equivalent to y amount of money. Money therefore, functions as the "universal measure of value" between commodities.<sup>27</sup> Marx explains two forms of simple exchange involving money and commodities: C-M-C and M-C-M.

C-M-C, for Marx, is, "the simplest form of the circulation of commodities," understood as exchanging a commodity one possesses for money—in order to exchange said money for a commodity based upon its use-value.<sup>28</sup> For example, a meal to be eaten to keep oneself alive, or a pair of shoes to keep one's feet protected from the elements. M-C-M, or buying in order to sell, is viewed by Marx as "absurd" if the intention was to "exchange by this means two equal sums of money."<sup>29</sup> Instead of exchanging money for an equal amount of money and therefore risking

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<sup>26</sup> Marx, *Capital*, 94.

<sup>27</sup> Marx, *Capital*, 94.

<sup>28</sup> Marx, *Capital*, 146.

<sup>29</sup> Marx, *Capital*, 147.

loss within the market as opposed to holding onto one's capital, what a capitalist—which Marx saw as “capital personified and endowed with a consciousness and a will”—is motivated by, is the “never-ending process of profit-making alone.”<sup>30</sup> Therefore, within the capitalist mode of production, M-C-M is, in actuality, M-C-M'—or, “money which begets money” imbued with surplus-value or, more simply put, money “reconverted into more money.”<sup>31</sup> This can be understood as merchants' capital, or buying dear to sell dearer. But, for Marx, industrial capital too is defined by the general equation M-C-M'.

The capitalist system relies on the production of surplus value. The industrial capitalist, argues Marx, “has two objects in view:”

...he wants to produce a use-value that has a value in exchange, that is to say, an article destined to be sold, a commodity; and secondly, he desires to produce a commodity whose value shall be greater than the sum of the values of the commodities used in its production, that is, of the means of production and labour-power [sic], that he has purchased with his good money in the open market. His aim is to produce not only use-use value, but a commodity also; not only use-value, but value; not only value, but at the same time surplus value.<sup>32</sup>

In order to understand how Taylor and Clark revolutionized the production process, we first must understand how surplus value is created within the production process. Taylor and Clark, first and foremost, were providing new tools for increasing the production of surplus value by controlling the labor power of workers by transferring medical and production knowledge to management.

Within the capitalist mode of production, expanded from M-C-M' to M-C(MP+LP)-M', the underlying economic pressures to increase profitability at industrial firms like Norton, Bethlehem, and Midvale—where Taylor worked—become more apparent. An industrial capitalist

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<sup>30</sup> Marx, *Capital*, 152.

<sup>31</sup> Marx, *Capital*, 155. M', or, 'M prime' is thus differentiated from the initial money put forth by the industrial capitalist that has not yet been imbued with surplus-value through the process of production.

<sup>32</sup> Karl Marx, *Capital*, 186.

uses their capital, M, to purchase the means of production (MP) and labor power (LP) as commodities (C) from the market. The means of production are understood as the buildings, materials, machines, and commodities that are utilized in the production process in order to create new commodities that are then sold on the market for more money than they cost to produce. The means of production and labor power themselves represent two forms taken by capital within the production process. Fixed capital and variable capital. Marx defines constant capital as:

That part of capital which is represented by the means of production, by the raw material, auxiliary materials and the instruments of labour [sic], [that] does not, in the process of production, undergo any quantitative alteration of value.<sup>33</sup>

Variable capital, on the other hand, represents the purchased labor-power, and, unlike constant capital, undergoes “an alteration of value” in which “it both reproduces the equivalent of its own value, and also produces an excess, a surplus-value, which may itself vary, may be more or less according to circumstances.”<sup>34</sup> These circumstances, to paraphrase Marx, stem from the worker imbuing the commodity with their labor-power. The capitalist purchases from the laborer his labor-power in exchange for a wage.

This wage is socially determined by the cost of reproducing labor-power—the necessary cost of maintaining the “wear and tear” of the worker.<sup>35</sup> During the labor process, the worker’s “useful labor” is imbued within the commodity.<sup>36</sup> Since the means of production and the labor-power belong to the capitalist who purchased them, the value generated by the worker belongs solely to the capitalist. The longer the worker labors, the more value they generate. Marx splits the working day into two parts, “necessary labour [sic]” and “surplus-labour [sic].”

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<sup>33</sup> Marx, *Capital*, 209.

<sup>34</sup> Marx, *Capital*, 209.

<sup>35</sup> Marx, *Capital*, 564.

<sup>36</sup> Marx, *Capital*, 540.

Necessary labor is the labor it takes to generate value equal to the wage of the worker. Though a day rate makes it easier to understand necessary- and surplus-labor, an hourly wage can be conceived as a day rate when you multiply the hourly wage by the hours worked. Therefore, if a worker's wage for the day is \$90 but during the entire working day they produced \$180 of value, they have created a 100 percent relative increase in what Marx deemed the "rate of surplus-value."<sup>37</sup> In understanding the two forms of capital that comprise the labor-process and the means through which surplus-value is produced, the motivations behind Taylor's new form of scientific labor management at Bethlehem Steel and Midvale Steel Works and Norton's creation of a medical department become more clear. Both were intended as a means of improving worker efficiency and morale; Taylor relied on the illusion of an increase in pay; Norton believed good-will towards management would increase as a result of the company keeping workers healthier. If efficiency and morale increased, workers would generate more surplus-value, therefore increasing the profitability of the company.

### **Taylorism: The Science of Increasing the Rate of Surplus Value**

How scientific management increased the rate of surplus value is clearly demonstrated by an anecdote shared by Taylor of his time at Bethlehem Steel in Pennsylvania. During the Spanish-American War of 1898, the price of pig iron skyrocketed, incentivizing Bethlehem to sell the 80,000 tons of pig iron they had been storing when prices were too low to turn a profit. Prior to Taylor's implementation of scientific management within the pig-iron-loading process, workers loaded an average of twelve and a half tons of pig iron onto rail cars for which they were paid \$1.15 a day. Taylor believed that the workers, with proper supervision and

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<sup>37</sup> Marx, *Capital*, 246.

management of the labor process, could load 47 tons of pig iron a day. Taylor's first step involved isolating potential workmen he deemed capable of fulfilling the anticipated 47 tons of pig iron. In a little, "mentally sluggish" Pennsylvania Dutchman named Schmidt, Taylor, found his test subject.<sup>38</sup> At the promise of an increase in pay from \$1.15 to \$1.85, Schmidt agreed to follow the instructions of a man appointed by Taylor to tell Schmidt when to work and when to rest. At the end of the first day of Taylor's new system of scientifically managed and supervised labor, Schmidt had loaded forty-seven and a half tons of pig iron by half-past five in the afternoon; an approximate increase in wages of 60 percent compared to a 280 percent increase in loaded pig iron.<sup>39</sup> Taylor found that controlling the method in which pig iron was loaded onto rail cars was only effective if the workman was properly suited to the type of work being presented to him—a method that was consistently utilized two decades later at Norton under Clark's medical supervision. According to Taylor, one of the very first requirements for a man who is fit to handle pig iron as a regular occupation

Is that he shall be so stupid and so phlegmatic that he more nearly resembles in his mental make-up the ox than any other type. The man who is mentally alert and intelligent is for this reason entirely unsuited to what would, for him, be the grinding monotony of work of this character. Therefore the workman who is best suited to handling pig iron is unable to understand the real science of doing this class of work. He is so stupid that the word 'percentage' has no meaning to him and he must consequently be trained by a man more intelligent than himself into the habit of working in accordance with the laws of this science before he can be successful.<sup>40</sup>

Despite the fact that Schmidt built his own home on a piece of land he had bought, to Taylor, he was too "stupid" to be able to determine for himself what a fair day's work was, and had to be constantly told how to work by a "more intelligent" supervisor who was acquainted with the "laws" of scientific management. As we have seen above, in working at the pace demanded by

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<sup>38</sup> Frederick Winslow Taylor, *The Principles of Scientific Management* (New York and London, W. W. Norton & Company, 1967), 46.

<sup>39</sup> Taylor, *The Principles of Scientific Management*, 40-47

<sup>40</sup> Taylor, *The Principles of Scientific Management*, 59.



Taylor, Schmidt was effectively dropping the piece rate of each piece of pig iron. In receiving only a 60 percent increase in his wage for a 280 percent increase of pig iron loaded, Schmidt was in fact not making more money when we utilize Marx's conception of labor power, but generating more surplus value—profits—for the company by increasing the rate of surplus value beyond his increase in his rate of pay through a process of speeding-up. A decrease in the piece rate that workers at Bethlehem and Midvale fought so hard to resist. For Taylor, this was fair day's work for a fair day's wage, but by demystifying the working day into necessary labor and surplus labor, we see that Schmidt was earning less money than he had prior to Taylor implementing his scientific system and generating more profits for the company. Perhaps Schmidt's mental sluggishness was desired by Taylor because he might not have been in a position to recognize that he was only exploiting himself further by accepting the slight—perhaps illusory increase—in pay for his participation within a sped-up system of pig iron loading.

The scientific management of pig iron handling was one facet of Taylor's attempt to obtain "the best initiative of every workman."<sup>41</sup> Initiative, as defined by Taylor, included the "hard work," "good-will" and ingenuity of the workmen. According to Taylor, it was:

Well within the mark to state that in the nineteen out of twenty industrial establishments the workmen believe it to be directly against their interests to give their employers their best initiative, and that instead of working hard to do the largest possible amount of work and the best quality of work for their employers, they deliberately work as slowly as they dare while they at the same time try to make those over them believe that they are working fast.<sup>42</sup>

The wage system utilized in factories across the United States at the time, including Norton, Midvale, and Bethlehem Steel, was based upon piece work. In the piece-work system, an increase in the production of each piece does not denote an increase in wages because at factories

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<sup>41</sup> Taylor, *The Principles of Scientific Management*, 33.

<sup>42</sup> Taylor, *The Principles of Scientific Management*, 33.

like Midvale, management would reduce the piece-work price so that harder work resulted in the same wage as a “soldiering” day of work had before. According to Taylor, at Midvale, “the workers together had carefully planned just how fast each job should be done, and they had set a pace for each machine throughout the shop, which was limited to about one-third of a good day’s work.”<sup>43</sup> In Taylor’s mind, there were two ways that management could achieve a fair day’s work: the management of initiative and incentive or task management. Taylor’s incentive system utilized the promise of promotion, higher wages through increased piece-work prices or bonuses, shortened working hours, and improved working conditions. Taylor believed the incentive system would result in slight gains, but could not be adequately relied upon to guarantee a fair day’s work because it allowed workers to maintain complete control over the knowledge of production.

Prior to the rise of scientific management, the old system of factory management, referred to by Taylor as “rule-of-thumb” management, was one in which workers on the factory floor held complete control over the necessary skills and knowledge of the productive process. Foremen and supervisors, often promoted from the most productive on the factory floor, had knowledge of production, but still relied on the workers collective conception of what was possible to produce during the day. A lack of uniformity within the process of production, argues Taylor, led to “fifty or a hundred different ways of doing each element of work” as a result of the word of mouth transference of knowledge from experienced factory workers to new hires.<sup>44</sup> One aspect of this transference of knowledge, as we have seen, was the collectively agreed upon maximum amount of work the workmen were willing to exercise within the working day. A fair day’s work was within reach, believed Taylor, if “managers assume[d]...the burden of gathering

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<sup>43</sup> Taylor, *The Principles of Scientific Management*, 49.

<sup>44</sup> Taylor, *The Principles of Scientific Management*, 31.

together all of the traditional knowledge which in the past had been possessed by the workmen and then of classifying, tabulating, and reducing this knowledge to rules, laws, and formulae which are immensely helpful to the workmen in their daily work.”<sup>45</sup> What Taylor was effectively doing was systematically dispossessing workers of control over their labor power, one of the few bargaining tools made available to them in the negotiation of wages between workers and management.

When Taylor became a gang-boss at Midvale, he broke with the tradition of rule-of-thumb management and used the factory floor as his laboratory. Taylor’s promotion and his subsequent pursuit of a fair day’s work from the machinists under him resulted in serious conflict on the factory floor. In order to overcome the rampant soldiering he had been witnessing from his first days as a laborer, and the unwillingness of the workmen around him to show initiative, Taylor began “discharging or lowering the wages of the more stubborn workmen who refused to make any improvement,” lowered the piecework price, and hired “green men” whom he personally taught how to work in exchange for their promise of doing a fair day’s work once they were trained. As a result of Taylor, “war” broke out on the factory floor against Taylor’s attempts to increase output. According to Taylor, the men working under him threatened to throw him over the fence and intentionally broke their machines. Taylor prevented future machine sabotage by getting management approval to take the cost of repairs out of the mutual benefit association fund that handled the expenses for illness and funeral expenses of the workers at Midvale. It took three years of consistent struggle between Taylor and the machinists, but eventually output “had been materially increased, in many cases doubled.” As a result of the

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<sup>45</sup> Taylor, *The Principles of Scientific Management*, 36.

successful implementation of an early form of scientific management, Taylor was transferred from one gang-boss-ship to another until he eventually became the shop foreman.<sup>46</sup>

At the heart of Taylor's efforts was a conviction that he could overcome antagonisms between workers and management. Taylor was convinced that prosperity could be achieved for both workers and management if both parties recognized "that the greatest prosperity can exist only as the result of the greatest possible productivity of the men and machines of the establishment—that is, when each man and each machine are turning out the largest possible output."<sup>47</sup> By utilizing scientific management principles to take the burden of knowledge from workers and place it within the control of management, a fair day's work would be accomplished and management would be capable of increasing pay as a result of their establishment's output outpacing the output of other establishments. "Scientific management," argued Taylor, had:

for its very foundation the firm conviction that the true interests of the two are one and the same; that prosperity for the employer cannot exist through a long term for years unless it is accompanied by prosperity for the employee, and *vice versa*; and that it is possible to give the workman what he most wants—high wages— and the employer what he wants—a low labor cost—for his manufactures.<sup>48</sup>

From the demystified labor process of Marx, we can recognize the limits placed upon Taylor by the mute compulsion that underpins the capitalist mode of production.

For Taylor, as long as the firm utilized the principles of scientific management, prosperity would continue and both management and labor, therefore eliminating class antagonisms and staving off depressions. When we move beyond Taylor's conception of free market capitalism—and apply a Marxist lens—we see that the capitalist mode of production is shaped by the underlying structure of capital itself—the increase in capital through the process of production. Taylor obfuscates the antagonistic relationship between capitalist and proletariat because he does

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<sup>46</sup> Taylor, *The Principles of Scientific Management*, 49-52.

<sup>47</sup> Taylor, *The Principles of Scientific Management*, 12.

<sup>48</sup> Taylor, *The Principles of Scientific Management*, 10.

not have a grasp of how surplus value operates within capitalist society. Taylor's system, on the contrary, furthered the antagonisms between capitalist and proletariat by further exploiting the labor power of workers, increasing the reserve army of labor, and embedding the control capital has over the process of production through the transference of knowledge from worker to manager. The bargaining power that labor holds is reduced and is replaced by a system of increased surveillance over the process of production—a system of surveillance that utilizes rules and processes to eliminate the need for direct supervision and instead establishes a priori what should be accomplished by the workers. Because the capitalist purchases the entire labor power of each worker, it is his to expend as he sees fit, Taylorism was, simply, the scientific study of how labor power can be most effectively utilized, and calculated a priori. In being able to both calculate a priori the labor time imbued within each product by controlling the rules and steps of the labor process, firms like Midvale and Bethlehem—and Norton, as we shall see later—were able to more effectively determine how profitable each department, worker, and commodity were for the company.

### **The Growth of Norton**

Like Taylorism, Norton Emery Wheel Company was a child of the depression of 1873 to 1896. The factory from which Norton Emery Wheel Company developed was F.B. Norton and Co., a production pottery factory founded in Worcester Massachusetts in 1858, which carried on a family tradition of potting dating back to the eighteenth century with founder Frank Norton's grandfather. The Norton Emery Wheel Company emerged from an attempt to generate additional income for the company as the depression began to hurt pottery sales. The first emery wheel was

made by Norton potter Swen Pulson in 1873. Early experiments in the production of emery grinding wheels were, initially, not well funded at Norton, and Pulson's early wheels suffered from a success rate of around 33 percent. As the depression continued, and pottery sales continued to suffer, Norton patented Pulson's wheel in 1877 and began commercial production in 1878. Pulson had left Norton by the time commercial production had begun, leading Norton to hire John Jeppson in 1879, another Swedish potter and future co-founder and superintendent of production at Norton Emery Co.—a position that placed unique production knowledge not just within the grasp of management, but ownership as well. In 1880, Walter Messer became the general sales agent at Norton and established a significant distribution network across the midwest and northeast to sell emery wheels to industrial firms that dotted these regions. As the firm grew, Norton hired Charles Allen in 1881 to manage office work that exceeded the capabilities of Frank Norton. According to Cheape, the foundation of Norton Emery Co. as a separate firm can be attributed to “the Jeppson-Allen-Messer triumvirate [growing] increasingly impatient with Norton's methods.”<sup>49</sup> Frank Norton management was indicative of the old “rule-of-thumb” management that Taylor hoped to overcome at Midvale and Bethlehem. Allen, reportedly, viewed Norton's management as “‘lax’...[allowing] up to an hour's break in the morning for pipe, beer, and yarns.”<sup>50</sup> In 1884, the “triumvirate” offered to purchase the wheel manufacturing sector of the company from Frank Norton. Norton agreed to sell the entire wheel manufacturing operation for \$10,000. After finding four additional partners to generate the necessary capital to purchase and initially operate the wheel firm, the Norton Emery Wheel Company was founded in May of 1885.

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<sup>49</sup> Cheape, *Modern Multinational*. 27.

<sup>50</sup> Cheape, *Modern Multinational*. 27.

As Norton grew, the company further mechanized and standardized their production of emery abrasives. From 1890 to 1910, Norton replaced hand mixing with a variable-speed electric mixer, installed electric lighting and dust collector that reclaimed an average of 50 tons of emery annually per year.<sup>51</sup> Beyond technological changes, the company undertook bureaucratic restructuring that expanded management and placed more control over production in their hands. During this new bureaucratic restructuring, Norton hired Henry Duckworth to operate a cost department. According to Cheape, “Duckworth began [...] allocating overhead costs based on his reading of the new cost-accounting literature by Frederick W. Taylor and other promoters of scientific management.”<sup>52</sup> Duckworth continued to implement the ideas of Taylor and, as we shall later see, established a system for calculating fixed and variable capital in order to maximize productivity. The move toward mechanization and scientific management at Norton, better explains why the company became the leading abrasives firm by 1900. Cheape’s reliance upon character traits, obfuscates the material conditions that better explains how Norton’s sales “doubled, redoubled, and doubled once more to \$423,000” by 1900.<sup>53</sup> This rapid increase in sales generated the necessary capital for Norton to expand their “oversized” plant in 1893, 1896, and 1897—building a two-story office building, abrasives plant, and power plant.<sup>54</sup>

The efforts to revolutionize the structure of the factory at Norton and the scientific management of Taylor demonstrate the mute compulsion of the underlying structure of the capitalist mode of production. Those familiar with the Marxist analysis of the capitalist system will be familiar with what Frederick Engels calls the “vicious circle” of the capitalist mode of production.<sup>55</sup> A combination of mechanization concomitant with productivity outpacing

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<sup>51</sup> Cheape, *Modern Multinational*, 35.

<sup>52</sup> Cheape, *Modern Multinational*, 39.

<sup>53</sup> Cheape, *Modern Multinational*, 52.

<sup>54</sup> Cheape, *Modern Multinational*, 53.

<sup>55</sup> Frederick Engels, *Socialism: Utopian and Scientific*, in *Karl Marx and Frederick Engels Selected Works* (New York, International Publishers, 1977), 425.

consumption results in a dramatic decrease in economic activity resulting in recessions and depressions. 1825, argues Engels, marked the “first general crisis” within the global capitalist system. From 1825 until 1877, notes Engels, six economic crises occurred.<sup>56</sup> The 1880 publication of Engels’ *Socialism: Utopian and Scientific* places his analysis of the capitalist system in the midst of what Eric Hobsbawm has referred to as a Great Depression from 1873 to 1896.<sup>57</sup> “...the trade cycle which forms the basic rhythm of a capitalist economy,” notes Hobsbawm, “certainly generated some very acute depressions in the period from 1873 to the mid-1890s.”<sup>58</sup> Though iron and steel output increased five- and twenty-fold respectively in five main producing countries, the contradictions within the world economy during the end of the nineteenth century stemmed not from issues of productive capacity, but profitability—during this period the price of wheat fell 40 percent while the price of iron fell 50 percent.<sup>59</sup> Low profits, concomitant with a “fluctuating and unpredictable” fall in silver prices and gold exchange rates kept large industrial firms from investing in new technologies to replace their “obsolete” equipment.<sup>60</sup> Norton, initially spurred on by this depression to diversify its production beyond ceramics and into emery grinding wheels, remained profitable from its foundation throughout the depression. According to Cheape:

The company turned a profit every year, including 1893, the year of a disastrous panic and depression, and paid dividends annually except 1886 when the firm built its firm plant in Barbers Crossing. By 1893 the firm had returned over 750 percent of the original \$20,000 investment and paid almost one third of the return (240 percent or \$48,000) in dividends. In 1894 Norton declared a 400 percent stock dividend at par, increasing the stock to \$102,000, and in the next five years it paid out an additional 105 percent of the new capitalization. In 1900 another stock dividend tripled the capital to \$306,000.<sup>61</sup>

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<sup>56</sup> Ibid, 425.

<sup>57</sup> Eric Hobsbawm, *The Age of Capital: 1848-1875* (London, Weidenfeld & Nicolson, 1997), 46.

<sup>58</sup> Eric Hobsbawm, *The Age of Empire 1875-1914*, 35.

<sup>59</sup> Hobsbawm, *Age of Empire*, 35-37.

<sup>60</sup> Hobsbawm, *Age of Empire*, 38.

<sup>61</sup> Cheape, *Modern Multinational*, 52-53.



Taken in tandem with Hobsbawm's analysis of the Great Depression, it is clear that Norton benefited greatly from the massive increase of steel and iron production during the last decade and a half of the nineteenth century. These industries' use of emery wheels allowed Norton to utilize their newfound market power to further mechanize, standardize and increase their productive capacity.

In 1900, the Norton Grinding Company was established by four founding members of Norton Emery Company along with Charles H. Norton—no relation. The burgeoning automobile industry and the proliferation of scientific management spurred on demand for less labor intensive precision work. Trying to meet this demand, Charles H. Norton designed a production grinder which, according to Cheape, “reflected broadly the principles of scientific management, mechanization, and economies of speed so popular among factory managers in the late nineteenth and early twentieth centuries.”<sup>62</sup> Charles Norton saw his production grinder as a means to “utilize more power during a shorter period of time...in order to secure the product in a shorter time for labor.”<sup>63</sup> Charles Norton's grinder succeeded in reducing the standard industry tolerance from .001” to .00025” and reduced the cutting time of locomotive pistons from five to six hours to merely an hour and a half. Charles Norton continued to innovate his production grinders with automatic feeds, automatic steady rests, and automatic wheel balance which, argues Cheape, “reduced operators from skilled machinists to semiskilled machine tenders.”<sup>64</sup> The increased mechanization and automation of labor processes, as we have seen, is an inherent part of the capitalist mode of production and lay at the foundation of Taylor and other's conception of scientific management.

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<sup>62</sup> Cheape, *Modern Multinational*, 63.

<sup>63</sup> Charles H. Norton, quoted in *Modern Multinational*, 63.

<sup>64</sup> Cheape, *Modern Multinational*, 69.

Norton Grinding was fully purchased and integrated into the Norton Emery Company in 1907. By this time, the automobile industry was one of Norton's most significant customers. Although Norton had only sold 16 grinders in 1901, the automobile boom of pre-WWI America saw a massive increase in demand for grinding services and machines. Norton sold production grinders directly to automobile manufacturers—Henry Ford purchased 35 grinders in 1914—as well as ground automobile parts—particularly camshafts—in house for most major automobile companies. During WWI, Charles Norton retooled his production grinders to be utilized in the manufacturing of munitions. Between the automobile and wartime booms, Norton quadrupled 1913 sales to \$3.7 million and saw an average of 1,500 grinders being sold annually between 1915 and 1918.<sup>65</sup> In 1914, to manage the rapid growth of the company, Norton hired three scientific management experts from Western Electric to oversee the production and planning processes in the emery wheel and grinding machine departments.<sup>66</sup> Norton Grinding's production grinders were supplying new machines to generate surplus value through speeding-up and deskilling on their own factory floor and in factories across the world.

Keeping pace with Norton's rapid growth and expansion into the grinder manufacturing and automobile part finishing industries was Duckworth's cost accounting. According to Cheape,

by 1907, [Duckworth] had built an extensive, up-to-date cost accounting program. His department accurately tracked each item's direct costs, which reflected labor, materials, and department overhead, and also recorded and allocated general overhead, which it divided into plant expenses and sales and administration costs. Based on careful data gathering, Duckworth determined formulas to measure quickly departmental and factory expense as a percentage of more easily determined direct labor expense.<sup>67</sup>

Duckworth's meticulous cost tracking would have been essential in implementing effective scientific management principles. By understanding the cost of the fixed capital—materials and

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<sup>65</sup> Cheape, *Modern Multinational*, 70-72.

<sup>66</sup> Cheape, *Modern Multinational*, 121.

<sup>67</sup> Cheape, *Modern Multinational*, 113.

department overhead—as a separate quantity from labor, Duckworth was in a position to recognize how worker efficiency affected overall production costs and keep track of worker efficiency based on the cost of producing each individual product. As we have seen, Duckworth was already aware of Taylor’s work and implemented his ideas into the process of production at Norton.<sup>68</sup> This cost tracking system which included labor, materials, and overhead, utilized the transfer of knowledge from worker to manager that Taylor himself championed. In utilizing mathematical calculations of what each individual product contained in labor time, materials, and overhead, Norton understood their total productive capacity. As long as labor functioned as efficiently and consistently as anticipated in Duckworth’s calculation, the company would be able to maintain profitability with greater ease than if they did not rely on scientific management.

In addition to the use of scientific management, Norton maintained profitability as a result of the effective suppression of unions. “In the United States in 1910,” argues one historian, “the alarm of employers, politicians, and community leaders at the growth of domestic political radicalism and labor militancy and violence made them particularly receptive to programs and proposals that promised to mitigate class strife.”<sup>69</sup> Those familiar with Marx will understand that class strife results from the contradictions within the capitalist mode of production. The capitalist class purchases the labor power of the worker on the market. The same forces that keep prices down for other commodities are equally at play within the labor-power market. Capitalists have been well aware of these market forces and, as Malm has demonstrated, the desire for “bountiful supplies of labour [sic]” explains the transition from waterpower to steam—and rural environs to urban centers—in nineteenth-century English cotton mills.<sup>70</sup> Wages and working conditions

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<sup>68</sup> Cheape, *Modern Multinational*, 39.

<sup>69</sup> Robert Asher, “Business and Workers’ Welfare in the Progressive Era: Workmen’s Compensation Reform in Massachusetts, 1880-1911,” *The Business History Review*, Volume 43, no. 4 (1969), 463-4.

<sup>70</sup> Andreas Malm, “The Origins of Fossil Capital: From Water to Steam in the British Cotton Industry\*,” *Historical Materialism* 21, no. 1 (2013): 33.

become the focus of labor strife as a result of the capitalist's desire to keep wages suppressed while increasing the length of the working day.<sup>71</sup>

Wages, working conditions, and/or the length of the working day were the focus of labor unrest at Norton in 1901 and between 1915 to 1917. After labor agitation in 1901 when the Worcester Central Labor Union attempted to establish a union at Norton on the grounds of shortening the working day from the current 10 to 11 hour day—an act over which Norton condemned the union and fired several employees for pro-union activity<sup>72</sup>—the most significant moment of labor organizing at Norton began in the fall of 1915. Workers at Norton Grinding, aligned with the International Association of Machinists along with workers from Prentice Bros., Reed and Prentice Co., The Whitcomb-Blaisdell Machine Tool Co., and the Leland-Gifford Co. demanded a 48 hour work week, a 5 cent hourly wage increase, time and a half overtime pay, and double time for Sundays and holidays.<sup>73</sup> Initially, 320 of Norton Grinding's 565 employees participated in a months-long strike of over 3000 Worcester workers. Norton rode out the strike by hiring external laborers to replace those who had walked out and were able to maintain their standard ten hour working day. In 1916 and 1917, labor unrest occurred in the abrasive side of Norton over dangerous, dusty working conditions and inflation. Norton responded to this unrest by briefly hiring labor spies to weed out agitators.<sup>74</sup>

For more than a decade after its founding, Norton was able to suppress labor union activity by relying upon a workforce composed of mostly Swedish immigrants and the utilization of a paternalistic relationship established within the Swedish community through Swedish superintendent John Jeppson. In 1899, 152 of the 208 employees at Norton were Swedish.

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<sup>71</sup> Marx, *Capital*, 186-198, 231-303.

<sup>72</sup> Cheape, *Modern Multinational*, 44.

<sup>73</sup> "Worcester Strikers Making Grand Fight for Eight Hours" in *The Labor Advocate*, Vol. 4 No. 2, October 9, 1915, 2.

<sup>74</sup> Cheape, *Modern Multinational*, 127-130.

Jeppson, along with fellow company founder Charles Allen established a mutual benefit society that insured workers against illness, injury, and covered funeral expenses. Jeppson also helped his fellow Swedes attain citizenship and, according to Cheape, “his testimony was all the character witness any judge required.”<sup>75</sup> Norton paid for an annual picnic, bought each employee a christmas turkey, and maintained a company band to perform at the event.<sup>76</sup> The company-provided benefits were a paternalistic attempt to quell labor unrest and ease tensions over 10 hour working days. Without union representation, in 1900, factory employees worked 10 hours—Monday through Friday and a half-day on Saturday—for a daily income of \$1.50 to \$2.25.<sup>77</sup> With Jeppson’s connections within a rapidly growing Swedish population—between 1876 and 1910 the population skyrocketed from 200 to 2000—Norton was able to keep unionization at bay and, in turn, control wages and working conditions within the factory.<sup>78</sup>

WWI was a time of near full employment in Worcester and as Norton grew rapidly in size and profitability it was in competition with other industrial firms in the city for labor. This decade also marked a decrease in immigration, especially from Sweden, a country that had supplied most of Norton’s factory workers since the founding of the company. By 1917, only 24 percent of the workforce at Norton was Swedish.<sup>79</sup> Norton’s earlier reliance on an insular, ethnically homogenous workforce from a community in which the company was well established culturally, was probably enough to keep labor strife at bay. However, as immigration slowed, Norton had to look beyond the Swedish community for employees. With the sense of familial relations between company and workforce—that had defined the first decade of Norton Emery Co—decreasing as non-Swedish employees were hired at Norton, combined with lucrative wages

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<sup>75</sup> Cheape, *Modern Multinational*, 41.

<sup>76</sup> Cheape, *Modern Multinational*, 42-43.

<sup>77</sup> Cheape, *Modern Multinational*, 43.

<sup>78</sup> Cheape, *Modern Multinational*, 41.

<sup>79</sup> Cheape, *Modern Multinational*, 125.

available at nearby industrial firms, workers were in a position to strike for better wages and conditions.

So, concerns over past labor unrest and the aim of maintaining “good-will” between employees and the company as a means to prevent future unrest explain part of the reason why, prior to the passage and enactment of the Massachusetts Workmen’s Compensation Act of 1911,<sup>80</sup> The Norton Emery Company established its own company medical department for the express purpose of addressing worker efficiency and employee attitudes towards the company itself. However, this medical department, a unique development for its time, is best understood as a means of furthering the ability of the company to exploit its workers by reducing the necessary variable capital within the production process, therefore increasing the surplus-value generated by each employee. Though initially an attempt to further exploit their workforce, Norton’s medical department did improve the health of employees by addressing accidents early enough to almost entirely eliminate cases of infection, and giving employees daily access to a doctor in order to mitigate infectious diseases—Clark successfully handled cases of measles, mumps, and smallpox occurred at Norton—that were seen as barriers to worker efficiency.<sup>81</sup>

### **Dr. Clark Comes to Norton**

As we have seen through the diligent cost-tracking of Duckworth, the measurement of constant and variable capital were at the heart of Norton’s pursuit of efficiency. Clark was correct in espousing, “in the consideration of production in any given department, practically every mechanical item can be accurately estimated. It would be possible to figure the exact cost and

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<sup>80</sup> Norton’s medical department was established in May of 1911; The Massachusetts Workers Compensation Act was voted into law in July of 1911 but was not enacted until July of the following year.

<sup>81</sup> W. Irving Clark, *Health Service in Industry* (New York, The MacMillan Company, 1922), 99.

output of any department, provided that all the work in that department, even to the minutest detail, were done by machinery.”<sup>82</sup> Labor posed the biggest stumbling block to Norton calculating a priori what their return on investment would be. The only way to overcome this hurdle was to increase the efficiency of their workers by refusing to hire those deemed as “absolutely unfit for work,” increasing the capacity of those partially unfit through medicine, “slight changes in work,” the elimination of disease and dangerous conditions, and a reduction in accident recovery time.<sup>83</sup>

By utilizing medical knowledge to create an environment where workers were healthy enough to continue producing on the factory floor—through being beholden to medical surveillance by the company—Clark, like Taylor, was altering who held knowledge within the factory as a means of shifting control over the labor process from the workers themselves to management. This transference of knowledge was accomplished through Norton’s peripheral investment into Clark’s medical department. This medical department, for the time, was quite well equipped; containing an examination room and an operating room. Clark was in attendance for three hours a day while a “skilled attendant capable of minor injuries” was available at all hours.<sup>84</sup> In addition to the shop hospital, the foremen at Norton were trained by Clark on the subjects of “sprains, fractures, dislocations, abrasions, contusions, lacerations, hemorrhages, burns, and electrical shock.”<sup>85</sup> Every department at Norton was given a first aid jar with the necessary supplies and related instructions on how the foreman could treat non-severe injuries that did not warrant transfer to the company hospital. In the event of a severe injury, the injured worker was transferred to the company hospital, Clark notified, and the injury assessed on

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<sup>82</sup> Clark, “Norton Company’s Medical Department,” 3.

<sup>83</sup> Clark, “Norton Company’s Medical Department,” 3.

<sup>84</sup> “Norton Administrative Facilities,” in *Grits and Grinds Vol V No. 1* (May 1913), 10.

<sup>85</sup> Clark, “First Aid,” in *Grits and Grinds Vol. 4 No. 7* (November 1912), 5.

whether outside medical treatment was necessary. According to Clark, most of the accidents were not serious enough to warrant transfer to an outside medical facility—or the notification of Clark if he were not already on the premises—and were merely treated by the foreman or the attendant nurse before the worker returned to work.<sup>86</sup> This injury would be noted alongside the worker's records of pre-employment and continual medical examinations. These injury reports and medical examinations allowed Norton to determine if an injury was sustained on the job and warranted compensation, or if an injury was preexisting or occurred outside the job, in which case a worker was not entitled to compensation. This form of injury reporting incentivized workers to report every and all injuries, no matter how minor. Following an injury, treatment of the injury including examinations and new wound dressings were undertaken at the company hospital. In the event that a worker had to stay home following an injury, Clark would personally visit them to handle their medical care. According to Clark, “no injury now occurs in which the patient does not seek the hospital before going home or continuing work.”<sup>87</sup> This change in how injuries were treated at Norton was beneficial for the workers who did not have injuries go untreated thus risking further complications, and the company who benefitted from accurate injury tracking which prevented unnecessary absenteeism or worker's compensation payouts.

The medical department was a significant departure from how illness was treated at Norton prior to 1911. If an employee claimed to be unable to work, he was simply sent home. With the medical department in place, workers then had to request from their foreman to be sent to the company hospital for an evaluation by Clark. If Clark found the employee unable to be treated from the company dispensary and sent back to work, the employee would then be sent home and his personal physician notified. In tandem with this new process, “sick slips” were to

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<sup>86</sup> Clark, “First Aid,” 5.

<sup>87</sup> Clark, “First Aid,” 7.



be filled out which were meant to keep track of time lost. If a worker left the factory without seeking approval from Clark, someone from the company would send for him in order to determine the cause of his absence so that it could be noted on a sick slip.<sup>88</sup> Absenteeism, long seen as a barrier to productivity, could thus be reined in by the use of medical surveillance. Clark, like Taylor, recognized that by placing knowledge—in this case medical—in the hands of management, workers would lose power over the productive process and, thus, the use of their labor-power could be better planned and controlled within the productive process. Since, prior to Clark being hired by the company, workers themselves determined if they were too sick to work, the workers held sway over how much labor-power they provided to the company. After Clark was hired and placed in charge of confirming illness, control over health shifted from the workers themselves and toward management.

At Norton, there was a stark contrast between how Clark viewed the health of workers on the factory floor and company executives. Though both were subjected to medical examinations, the examinations and the stated purpose of the examinations demonstrate a stark division between workers and management. All new workers at Norton had to be examined by Clark so as to ensure “the placing of subnormal workers at work for which they are physically fitted.”<sup>89</sup> Following a medical examination, workers were categorized as “standard” or “sub-standard.” The physical examination cards of the “sub-standard” employee would be color-coded to denote a worker’s defect. Then, the “sub-standard” worker would be re-examined every three months to determine if any changes should be made in their placement within the factory. This determination of physical fitness to match the employee to the correct placement in the factory can be viewed as a continuation of Taylor’s principles of scientific management. Taylor—not a

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<sup>88</sup> Clark, “Norton Company’s Medical Department,” 8.

<sup>89</sup> Clark, *Health Service in Industry*, 7.

trained doctor—saw character traits and intelligence as a means of determining what task each worker would be best suited. Schmidt was the ideal pig iron handler because he was “stupid.” At Norton, Clark, through the use of extensive medical knowledge not available to Taylor, might have determined Schmidt to be “sub-standard” and, therefore, subject to continual medical surveillance in order to determine if he was properly suited to the work presented to him. By 1913, Clark’s method for determining medical fitness of Norton employees and controlling absenteeism was showing results. According to a company periodical, the percentage of time workers at Norton were absent from work was reduced from 3 percent to one and a half percent and averaged 19.2 hours less lost time than workers who did not receive treatment from the company hospital.<sup>90</sup>

In stark, although not surprising, contrast to how Clark viewed workers on the factory floor, Clark maintained:

In any factory the higher executives are the guiding hands which control the success of the business. If these men can be kept in good physical condition their work will always be the best they can turn out. If one or more is laboring under a physical handicap, work when kept up produces a nervous strain which eventually requires a prolonged rest. Each member of the executive force should have a physical examination. This should be much more searching and complete than that given to the workmen.<sup>91</sup>

These executives thus belonged to a separate category and their health was more important than those of the workers in the factory. If they are absent, it is not absenteeism as in the case of the factory workers, but prolonged rest stemming from their ceaseless laboring under an unaddressed, physical handicap in order to make the business succeed. If an important executive had a disease, and it could be caught early enough by the company's industrial physician, argued Clark, the value of the cure would thus far outweigh the cost of the medical department.<sup>92</sup> So, it

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<sup>90</sup> “Norton Administrative Facilities,” 10.

<sup>91</sup> Clark, *Health Service in Industry*, 127.

<sup>92</sup> Clark, *Health Service in Industry*, 155.

was not only worker control offered by the medical department, but a promise of health and longevity to corporate executives. While workers in the factory presented “disturbing elements” and functioned as subjects for medical research, the lives of executives were meant to be prolonged for as long as possible to ensure that the company remained in their “guiding hands” which would ensure company success in the future.

Though Clark shared many of the desires of the company in reigning in absenteeism and preventing labor unrest through the implementation of the medical department, he saw the medical department as a place to conduct research into the development, treatment, and prevention of industrial disease. “The industrial physician.” argues Clark:

is placed in a unique position. He has the opportunity as afforded nowhere else in medicine to study the effect of work upon the human organism, and to observe the very beginning of disease. Workmen will avail themselves freely of a well-conducted medical service consulting the doctor for a multitude of small ailments. As each visit to the factory dispensary and as at least one physical examination is recorded, the development of numerous diseases can be watched and an effort made to check them in their early stages. There is also an opportunity to observe chronic disease conditions over periods of years, and the study of groups of similar conditions can be readily made. The amount of material and the ease with which this can be gathered together at any time is a thing yet unappreciated by the majority of the [medical] profession. Thus, if the chief physician wishes to investigate the effects of work on hearts having a mitral systolic murmur, he can have the entire group sent to the dispensary at ten minutes notice. If he wishes to find out the result in a series of fractures it is equally easy.<sup>93</sup>

With his placement amongst a consistent group of workers, Clark saw an opportunity to conduct research that would not be easily pursued outside of the factory. The factory, in turn, took on the role of a research hospital for the study of industrial medicine. This research must have been instrumental in Harvard university hiring Clark as one of the first professors in the university’s newly established department of industrial medicine in 1919.

Three years after his start at Harvard, Clark published his first book on industrial medicine—based largely upon his lectures at the university—*Health Service in Industry*. Designed

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<sup>93</sup> Clark, *Health Service In Industry*, 134.

to serve as booster literature for the type of medical department Clark created at Norton, *Health Service in Industry* lays out a health department model to be emulated in factories across the United States at any scale. Like Taylor, Clark uses language to appeal to capitalists and economists who might be wary of the upfront and operational costs of introducing a medical department within their factories. “The ideal of production is a continuous output which can be raised or lowered at will to meet demand and which will at all times be of uniform quality. If all machines were automatic,” laments Clark, “such an ideal could be accomplished but there are many disturbing elements all due to the necessity of employing men and women to run the machines.”<sup>94</sup> The “man question,” posed by Norton and addressed by Clark rears its head once again and demonstrates the frustrations of the industrial capitalists at the time. The accurate measurement of necessary constant capital runs up against the need for a human workforce to work as extensions of the machines and generate the necessary surplus value to make the capitalist venture profitable. These disturbing elements, according to Clark, are the result of workers failing to follow “simple hygienic measures” both at work and at home, partaking in frequent absenteeism, and striking or causing labor disturbances.<sup>95</sup> If factories implement a medical department similar to the one he had built at Norton, Clark believed they could reduce absenteeism due to “exaggerated or imaginary illness” by 25 to 50 percent—a reduction Clark achieved at Norton—and “inspire confidence among the workers and content with their surroundings” thus reducing the likelihood of strikes occurring in the factory.<sup>96</sup>

Despite the benefits to medical research, a medical department still needed to be demonstrated as economically beneficial to a factory. Clark sold the medical department as a means to combat illness and absenteeism that kept workers away from their machines or left

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<sup>94</sup> Clark, *Health Service in Industry*, 3-4.

<sup>95</sup> Clark, *Health Service in Industry*, 101, 154-155.

<sup>96</sup> Clark, *Health Service in Industry*, 155.

them inefficient when working on the factory floor. Though Clark stated that few of the advantages created by a medical department could be translated into monetary value. Upon closer inspection, however, these advantages can be understood as valuable to the overall process of capitalist production. The reduction of absenteeism, the prevention of strikes and accidents, and increased “good will” of workers for the company, translates into a steady flow of labor-power on the factory floor which, as we have seen, is necessary for the extraction of surplus-value.<sup>97</sup>

Clark continued championing the implementation of medical departments in industry throughout the mid twentieth century and his name and plans for medical departments appears in scholarship on the subject of industrial medicine as well.<sup>98</sup> In 1938, Clark was chosen to head a committee established by the National Association of Manufacturers to “extend the health benefits developed for workers in large manufacturing establishments to smaller plants which have not had the time or money to install them.”<sup>99</sup> In just over two decades, Clark went from experimenting on how to design one of the earliest health departments in the country for a single abrasives and grinding company in Worcester Massachusetts to teaching his methods through university lectures and monographs, before finally heading a committee designed to proliferate the number of medical departments in the United States. At the heart of Clark’s efforts to provide medical treatment and health prevention was the stated goal—like Taylor before him—of increasing efficiency.

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<sup>97</sup> Clark, *Health Service in Industry*, 155.

<sup>98</sup> J.D. Hackett’s *Health Maintenance in Industry* (1925) utilizes Clark’s research on employee rejection due to medical defects and his analysis of the cost of running a medical department. Hackett served as both a lecturer on labor and employment management at New York University and the manager of the medical department of the Nichols copper company.

<sup>99</sup> “Industry To Widen Plant Health Aids” in *The New York Times* (Feb 28, 1938) Historical Newspapers, 3.

## Conclusion

The capitalist mode of production depends upon the creation of surplus value. This reliance also comprises its most significant contradiction. Clark and Taylor, believed they could overcome the inherent contradictions of capitalism through science and medicine. The great depression which began in 1873 placed concerns over the stability of the economic system front and center in the minds of capitalists. Taylorism, as we have seen, was an attempt to overcome antagonisms between workers and capitalists—antagonisms that socialists at the time such as Marx and Engels knew could not be addressed within the capitalist system. In the minds of the champions of scientific management, productivity was the key to mutual prosperity between workers and capitalists and the continuation of the existing mode of production—capitalism. As the machines at Norton became more productive, the firm looked toward Clark for an answer that would continue the goal of scientific management—the maintained growth of productivity. If absenteeism could be prevented, and workers kept healthy, they could always be counted on to be as productive as their machines. The inherent contradictions that Marx recognized within the capitalist mode of production were merely obfuscated, not addressed by Clark and Taylor. Scientific management and medical departments furthered the mute compulsion of capital by establishing new systems of domination over both worker's labor power and their health. A system of domination designed around expanding the valorization of capital by generating new forms of extracting surplus value.

Though the implementation of scientific management was resisted for years, the placement of the knowledge of production within the control of management is a defining factor of the modern U.S. economy. The capitalist system is still haunted by the ghosts of Clark and

Taylor. For example, Oregon law allows employers to ask for a doctor's note if an employee takes "more than three consecutively scheduled workdays of sick time" or if an employer suspects their employee is "abusing sick time, including engaging in a pattern of absenteeism."<sup>100</sup> The same absenteeism that Clark was convinced he could reduce by up to 50%. Additionally, In 2022, Starbucks implemented their "Siren System." "Typically," notes the official announcement from Starbucks, "it takes a barista 87 seconds and 16 steps to make a beverage. But this one [a Grande Mocha Frappuccino] took only 36 seconds and 13 steps."<sup>101</sup> As if possessed by the spirit of Taylor, himself, the announcement concludes that this system, "[means] the same, great-tasting beverage can be delivered faster to a customer while also providing a smoother experience for the barista."<sup>102</sup> The worker's labor-power will be further exploited and they will enjoy it, just as Taylor envisioned. By controlling the totality of the labor process and surveilling worker health through medicine, corporations can more consistently and more effectively extract surplus value from their workers.

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<sup>100</sup> "Sick Time" <https://www.oregon.gov/boli/workers/pages/sick-time.aspx>

<sup>101</sup> "Recipe for reinvention: Starbucks unveils innovations for better customer, barista experiences" <https://stories.starbucks.com/stories/2022/recipe-for-reinvention-starbucks-unveils-innovations-for-better-customer-barista-experiences/>

<sup>102</sup> Ibid.

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