THE TERROR OF THE MACHINE by Henry Ford
An extract from his book “My Life And Work.”

Repetitive labour--the doing of one thing over and over again and always in the same way--is a terrifying prospect to a certain kind of mind. It is terrifying to me. I could not possibly do the same thing day in and day out, but to other minds, perhaps I might say to the majority of minds, repetitive operations hold no terrors. In fact, to some types of mind thought is absolutely appalling. To them the ideal job is one where the creative instinct need not be expressed. The jobs where it is necessary to put in mind as well as muscle have very few takers--we always need men who like a job because it is difficult. The average worker, I am sorry to say, wants a job in which he does not have to put forth much physical exertion--above all, he wants a job in which he does not have to think. Those who have what might be called the creative type of mind and who thoroughly abhor monotony are apt to imagine that all other minds are similarly restless and therefore to extend quite unwanted sympathy to the labouring man who day in and day out performs almost exactly the same operation.

When you come right down to it, most jobs are repetitive. A business man has a routine that he follows with great exactness; the work of a bank president is nearly all routine; the work of under officers and clerks in a bank is purely routine. Indeed, for most purposes and most people, it is necessary to establish something in the way of a routine and to make most motions purely repetitive--otherwise the individual will not get enough done to be able to live off his own exertions. There is no reason why any one with a creative mind should be at a monotonous job, for everywhere the need for creative men is pressing. There will never be a dearth of places for skilled people, but we have to recognize that the will to be skilled is not general. And even if the will be present, then the courage to go through with the training is absent. One cannot become skilled by mere wishing.

There are far too many assumptions about what human nature ought to be and not enough research into what it is. Take the assumption that

creative work can be undertaken only in the realm of vision. We speak of creative "artists" in music, painting, and the other arts. We seemingly limit the creative functions to productions that may be hung on gallery walls, or played in concert halls, or otherwise displayed where idle and fastidious people gather to admire each other's culture. But if a man wants a field for vital creative work, let him come where he is dealing with higher laws than those of sound, or line, or colour; let him come where he may deal with the laws of personality. We want artists in industrial relationship. We want masters in industrial method--both from the standpoint of the producer and the product. We want those who can mould the political, social, industrial, and moral mass into a sound and shapely whole. We have limited the creative faculty too much and have used it for too trivial ends. We want men who can create the working design for all that is right and good and desirable in our life. Good intentions plus well-thought-out working designs can be put into practice and can be made to succeed. It is possible to increase the well-being of the workingman--not by having him do less work, but by aiding him to do more. If the world will give its attention and interest and energy to the making of plans that will profit the other fellow as he is, then such plans can be established on a practical working basis. Such plans will endure--and they will be far the most profitable both in human and financial values. What this generation needs is a deep faith, a profound conviction in the practicability of righteousness, justice, and humanity in industry. If we cannot have these qualities, then we were better off without industry. Indeed, if we cannot get those qualities, the days of industry are numbered. But we can get them. We are getting them.

If a man cannot earn his keep without the aid of machinery, is it benefiting him to withhold that machinery because attendance upon it may be monotonous? And let him starve? Or is it better to put him in the way of a good living? Is a man the happier for starving? If he is the happier for using a machine to less than its capacity, is he happier for producing less than he might and consequently getting less than his share of the world's goods in exchange?

I have not been able to discover that repetitive labour injures a man in

any way. I have been told by parlour experts that repetitive labour is soul--as well as body--destroying, but that has not been the result of our investigations. There was one case of a man who all day long did little but step on a treadle release. He thought that the motion was making him one-sided; the medical examination did not show that he had been affected but, of course, he was changed to another job that used a different set of muscles. In a few weeks he asked for his old job again. It would seem reasonable to imagine that going through the same set of motions daily for eight hours would produce an abnormal body, but we have never had a case of it. We shift men whenever they ask to be shifted and we should like regularly to change them--that would be entirely feasible if only the men would have it that way. They do not like changes which they do not themselves suggest. Some of the operations are undoubtedly monotonous--so monotonous that it seems scarcely possible that any man would care to continue long at the same job. Probably the most monotonous task in the whole factory is one in which a man picks up a gear with a steel hook, shakes it in a vat of oil, then turns it into a basket. The motion never varies. The gears come to him always in exactly the same place, he gives each one the same number of shakes, and he drops it into a basket which is always in the same place. No muscular energy is required, no intelligence is required. He does little more than wave his hands gently to and fro--the steel rod is so light. Yet the man on that job has been doing it for eight solid years. He has saved and invested his money until now he has about forty thousand dollars--and he stubbornly resists every attempt to force him into a better job!

The most thorough research has not brought out a single case of a man's mind being twisted or deadened by the work. The kind of mind that does not like repetitive work does not have to stay in it. The work in each department is classified according to its desirability and skill into Classes "A," "B," and "C," each class having anywhere from ten to thirty different operations. A man comes directly from the employment office to "Class C." As he gets better he goes into "Class B," and so on into "Class A," and out of "Class A" into tool making or some supervisory capacity. It is up to him to place himself. If he stays in production it is because he likes it.

In a previous chapter I noted that no one applying for work is refused on account of physical condition. This policy went into effect on January 12, 1914, at the time of setting the minimum wage at five dollars a day and the working day at eight hours. It carried with it the further condition that no one should be discharged on account of physical condition, except, of course, in the case of contagious disease. I think that if an industrial institution is to fill its whole role, it ought to be possible for a cross-section of its employees to show about the same proportions as a cross-section of a society in general. We have always with us the maimed and the halt. There is a most generous disposition to regard all of these people who are physically incapacitated for labour as a charge on society and to support them by charity. There are cases where I imagine that the support must be by charity--as, for instance, an idiot. But those cases are extraordinarily rare, and we have found it possible, among the great number of different tasks that must be performed somewhere in the company, to find an opening for almost any one and on the basis of production. The blind man or cripple can, in the particular place to which he is assigned, perform just as much work and receive exactly the same pay as a wholly able-bodied man would. We do not prefer cripples--but we have demonstrated that they can earn full wages.

It would be quite outside the spirit of what we are trying to do, to take on men because they were crippled, pay them a lower wage, and be content with a lower output. That might be directly helping the men but it would not be helping them in the best way. The best way is always the way by which they can be put on a productive par with able-bodied men. I believe that there is very little occasion for charity in this world--that is, charity in the sense of making gifts. Most certainly business and charity cannot be combined; the purpose of a factory is to produce, and it ill serves the community in general unless it does produce to the utmost of its capacity. We are too ready to assume without investigation that the full possession of faculties is a condition requisite to the best performance of all jobs. To discover just what was the real situation, I had all of the different jobs in the factory classified to the kind of machine and work--whether the physical

labour involved was light, medium, or heavy; whether it were a wet or a dry job, and if not, with what kind of fluid; whether it were clean or dirty; near an oven or a furnace; the condition of the air; whether one or both hands had to be used; whether the employee stood or sat down at his work; whether it was noisy or quiet; whether it required accuracy; whether the light was natural or artificial; the number of pieces that had to be handled per hour; the weight of the material handled; and the description of the strain upon the worker. It turned out at the time of the inquiry that there were then 7,882 different jobs in the factory. Of these, 949 were classified as heavy work requiring strong, able-bodied, and practically physically perfect men; 3,338 required men of ordinary physical development and strength. The remaining 3,595 jobs were disclosed as requiring no physical exertion and could be performed by the slightest, weakest sort of men. In fact, most of them could be satisfactorily filled by women or older children. The lightest jobs were again classified to discover how many of them required the use of full faculties, and we found that 670 could be filled by legless men, 2,637 by one-legged men, 2 by armless men, 715 by one-armed men, and 10 by blind men. Therefore, out of 7,882 kinds of jobs, 4,034--although some of them required strength--did not require full physical capacity. That is, developed industry can provide wage work for a higher average of standard men than are ordinarily included in any normal community. If the jobs in any one industry or, say, any one factory, were analyzed as ours have been analyzed, the proportion might be very different, yet I am quite sure that if work is sufficiently subdivided--subdivided to the point of highest economy--there will be no dearth of places in which the physically incapacitated can do a man's job and get a man's wage. It is economically most wasteful to accept crippled men as charges and then to teach them trivial tasks like the weaving of baskets or some other form of unremunerative hand labour, in the hope, not of aiding them to make a living, but of preventing despondency.

When a man is taken on by the Employment Department, the theory is to put him into a job suited to his condition. If he is already at work and he does not seem able to perform the work, or if he does not like his work, he is given a transfer card, which he takes up to the transfer department, and after an examination he is tried out in some other work

more suited to his condition or disposition. Those who are below the ordinary physical standards are just as good workers, rightly placed, as those who are above. For instance, a blind man was assigned to the stock department to count bolts and nuts for shipment to branch establishments. Two other able-bodied men were already employed on this work. In two days the foreman sent a note to the transfer department releasing the able-bodied men because the blind man was able to do not only his own work but also the work that had formerly been done by the sound men.

This salvage can be carried further. It is usually taken for granted that when a man is injured he is simply out of the running and should be paid an allowance. But there is always a period of convalescence, especially in fracture cases, where the man is strong enough to work, and, indeed, by that time usually anxious to work, for the largest possible accident allowance can never be as great as a man's wage. If it were, then a business would simply have an additional tax put upon it, and that tax would show up in the cost of the product. There would be less buying of the product and therefore less work for somebody. That is an inevitable sequence that must always be borne in mind.

We have experimented with bedridden men--men who were able to sit up. We put black oilcloth covers or aprons over the beds and set the men to work screwing nuts on small bolts. This is a job that has to be done by hand and on which fifteen or twenty men are kept busy in the Magneto Department. The men in the hospital could do it just as well as the men in the shop and they were able to receive their regular wages. In fact, their production was about 20 per cent., I believe, above the usual shop production. No man had to do the work unless he wanted to. But they all wanted to. It kept time from hanging on their hands. They slept and ate better and recovered more rapidly.

No particular consideration has to be given to deaf-and-dumb employees. They do their work one hundred per cent. The tubercular employees--and there are usually about a thousand of them--mostly work in the material salvage department. Those cases which are considered contagious work together in an especially constructed shed. The work of all of them is

largely out of doors.

At the time of the last analysis of employed, there were 9,563 sub-standard men. Of these, 123 had crippled or amputated arms, forearms, or hands. One had both hands off. There were 4 totally blind men, 207 blind in one eye, 253 with one eye nearly blind, 37 deaf and dumb, 60 epileptics, 4 with both legs or feet missing, 234 with one foot or leg missing. The others had minor impediments.

The length of time required to become proficient in the various occupations is about as follows: 43 per cent. of all the jobs require not over one day of training; 36 per cent. require from one day to one week; 6 per cent. require from one to two weeks; 14 per cent. require from one month to one year; one per cent. require from one to six years. The last jobs require great skill--as in tool making and die sinking.

The discipline throughout the plant is rigid. There are no petty rules, and no rules the justice of which can reasonably be disputed. The injustice of arbitrary discharge is avoided by confining the right of discharge to the employment manager, and he rarely exercises it. The year 1919 is the last on which statistics were kept. In that year 30,155 changes occurred. Of those 10,334 were absent more than ten days without notice and therefore dropped. Because they refused the job assigned or, without giving cause, demanded a transfer, 3,702 were let go. A refusal to learn English in the school provided accounted for 38 more; 108 enlisted; about 3,000 were transferred to other plants. Going home, going into farming or business accounted for about the same number. Eighty-two women were discharged because their husbands were working--we
do not employ married women whose husbands have jobs. Out of the whole lot only 80 were flatly discharged and the causes were: Misrepresentation, 56; by order of Educational Department, 20; and undesirable, 4.

We expect the men to do what they are told. The organization is so highly specialized and one part is so dependent upon another that we could not for a moment consider allowing men to have their own way.

Without the most rigid discipline we would have the utmost confusion. I think it should not be otherwise in industry. The men are there to get the greatest possible amount of work done and to receive the highest possible pay. If each man were permitted to act in his own way, production would suffer and therefore pay would suffer. Any one who does not like to work in our way may always leave. The company's conduct toward the men is meant to be exact and impartial. It is naturally to the interest both of the foremen and of the department heads that the releases from their departments should be few. The workman has a full chance to tell his story if he has been unjustly treated--he has full recourse. Of course, it is inevitable that injustices occur. Men are not always fair with their fellow workmen. Defective human nature obstructs our good intentions now and then. The foreman does not always get the idea, or misapplies it--but the company's intentions are as I have stated, and we use every means to have them understood.

It is necessary to be most insistent in the matter of absences. A man may not come or go as he pleases; he may always apply for leave to the foreman, but if he leaves without notice, then, on his return, the reasons for his absence are carefully investigated and are sometimes referred to the Medical Department. If his reasons are good, he is permitted to resume work. If they are not good he may be discharged. In hiring a man the only data taken concerns his name, his address, his age, whether he is married or single, the number of his dependents, whether he has ever worked for the Ford Motor Company, and the condition of his sight and his hearing. No questions are asked concerning what the man has previously done, but we have what we call the "Better Advantage Notice," by which a man who has had a trade before he came to us files a notice with the employment department stating what the trade was. In this way, when we need specialists of any kind, we can get them right out of production. This is also one of the avenues by which tool makers and moulders quickly reach the higher positions. I once wanted a Swiss watch maker. The cards turned one up--he was running a drill press. The Heat Treat department wanted a skilled firebrick layer. He also was found on a drill press--he is now a general inspector.

There is not much personal contact--the men do their work and go home--a

factory is not a drawing room. But we try to have justice and, while there may be little in the way of hand shaking--we have no professional hand shakers--also we try to prevent opportunity for petty personalities. We have so many departments that the place is almost a world in itself--every kind of man can find a place somewhere in it. Take fighting between men. Men will fight, and usually fighting is a cause for discharge on the spot. We find that does not help the fighters--it merely gets them out of our sight. So the foremen have become rather ingenious in devising punishments that will not take anything away from the man's family and which require no time at all to administer.

One point that is absolutely essential to high capacity, as well as to humane production, is a clean, well-lighted and well-ventilated factory. Our machines are placed very close together--every foot of floor space in the factory carries, of course, the same overhead charge. The consumer must pay the extra overhead and the extra transportation involved in having machines even six inches farther apart than they have to be. We measure on each job the exact amount of room that a man needs; he must not be cramped--that would be waste. But if he and his machine occupy more space than is required, that also is waste. This brings our machines closer together than in probably any other factory in the world. To a stranger they may seem piled right on top of one another, but they are scientifically arranged, not only in the sequence of operations, but to give every man and every machine every square inch that he requires and, if possible, not a square inch, and certainly not a square foot, more than he requires. Our factory buildings are not intended to be used as parks. The close placing requires a maximum of safeguards and ventilation.

Machine safeguarding is a subject all of itself. We do not consider any machine--no matter how efficiently it may turn out its work--as a proper machine unless it is absolutely safe. We have no machines that we consider unsafe, but even at that a few accidents will happen. Every accident, no matter how trivial, is traced back by a skilled man employed solely for that purpose, and a study is made of the machine to make that same accident in the future impossible.

When we put up the older buildings, we did not understand so much about ventilation as we do to-day. In all the later buildings, the supporting columns are made hollow and through them the bad air is pumped out and the good air introduced. A nearly even temperature is kept everywhere the year round and, during daylight, there is nowhere the necessity for artificial light. Something like seven hundred men are detailed exclusively to keeping the shops clean, the windows washed, and all of the paint fresh. The dark corners which invite expectoration are painted white. One cannot have morale without cleanliness. We tolerate makeshift cleanliness no more than makeshift methods.

No reason exists why factory work should be dangerous. If a man has worked too hard or through too long hours he gets into a mental state that invites accidents. Part of the work of preventing accidents is to avoid this mental state; part is to prevent carelessness, and part is to make machinery absolutely fool-proof. The principal causes of accidents as they are grouped by the experts are:

(1) Defective structures; (2) defective machines; (3) insufficient room; (4) absence of safeguards; (5) unclean conditions; (6) bad lights; (7) bad air; (8) unsuitable clothing; (9) carelessness; (10) ignorance; (11) mental condition; (12) lack of cooperation.

The questions of defective structures, defective machinery, insufficient room, unclean conditions, bad light, bad air, the wrong mental condition, and the lack of cooperation are easily disposed of. None of the men work too hard. The wages settle nine tenths of the mental problems and construction gets rid of the others. We have then to guard against unsuitable clothing, carelessness, and ignorance, and to make everything we have fool-proof. This is more difficult where we have belts. In all of our new construction, each machine has its individual electric motor, but in the older construction we had to use belts. Every belt is guarded. Over the automatic conveyors are placed bridges so that no man has to cross at a dangerous point. Wherever there is a possibility of flying metal, the workman is required to wear goggles and the chances are further reduced by surrounding the machine with netting.

Around hot furnaces we have railings. There is nowhere an open part of a machine in which clothing can be caught. All the aisles are kept clear. The starting switches of draw presses are protected by big red tags which have to be removed before the switch can be turned--this prevents the machine being started thoughtlessly. Workmen will wear unsuitable clothing--ties that may be caught in a pulley, flowing sleeves, and all manner of unsuitable articles. The bosses have to watch for that, and they catch most of the offenders. New machines are tested in every way before they are permitted to be installed. As a result we have practically no serious accidents.

Industry needs not exact a human toll.