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The Institution of Mechanical Engineers.

THE EMPLOYMENT OF WOMEN IN MUNITION FACTORIES.

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Introduction—At the outset the Author wishes to acknowledge the compliment accorded to her by this Institution of being asked to give her views on the employment of Women in Engineering Works. Her appreciation is increased in so far as the request preceded the passage through Parliament of the measure giving the franchise to women.

At the beginning of the war it was an exceptional thing for women to be employed as general machinists and fitters in engineering shops, but the demand for a greatly increased supply of labour of all kinds for munitions production, and at the same time the necessity for conserving the man-power of the country to the fullest extent, made it necessary for the Government to turn to the largest source of supply of unskilled labour, namely, women. The successful employment of women in engineering works depends not only on the unskilled woman, but in an almost equal degree on the skilled man, and the employer.

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The Employer.—The successful employer of women labour faces the question of dilution squarely, and recognizes at the outset that the psychology of the woman worker is different from that of the man. Next he fixes on work suitable for his new type of employee, and then determines the quickest and easiest way to train her in the work. He assures himself of the extent to which the men will co-operate, and is always careful to provide suitable shop conditions and plant, etc. Having made these preliminary arrangements, he realizes the necessity for carefully choosing the right class of labour, and his next step is to appoint a woman of experience to engage and look after the women, and to select as their technical overseer a foreman who he knows is sympathetic with his new venture.

The Skilled Man.—The skilled men have to do the technical training, and have to use all their brains and skill in order to train inexperienced women. They have to sectionalize work, adapt machinery, and simplify operations so as to make it possible to employ women. In their hands is largely the power to oppose and retard all progress by women on skilled work, because at the outset hardly a single woman is in a position to know when obstacles are being placed in her way. She perforce has to rely entirely on their generosity, and her position in engineering shops to-day shows that she has not relied in vain.

On the other hand, it must be remembered that every man does not make a teacher, and that every teacher of men is not necessarily a suitable teacher of women. Thus the unequal success of women in different shops is due in a measure to this cause as well as to antagonism on the part of the men.

The Unskilled Woman.—The successful woman-worker in an engineering works has a great deal to learn, because in addition to learning her work she has to acquire correct work habits, and face obstacles both necessary and unnecessary which are constantly put in the way of her becoming efficient.

There are, however, three grades of unskilled women who must be taken into account:—

- (1) The educated type.
- (2) The domestic type.
- (3) The ordinary factory type.

The educated type come with trained brains; they know how to learn and how to apply their knowledge. They probably have mathematical training and can be taught in a very short time how to use a slide-rule, a micrometer, and other gauges. Fine limits present no difficulty to them, and in a sense they may be regarded as already half educated for the better class of engineering work.

The second type, namely, the domestic type, drawn mostly from the daughters of small tradesmen, generally have a good deal of sound common sense, are reliable, and enjoy, and so aim at securing, some position of authority. Such people train quite readily into good charge-hands and forewomen.

The factory type are different from either of the other two—they are mainly concerned with making as much money as they can, and preferably on piece-work. For the most part they resent being put on to a new operation because, every time they learn anything fresh, it means a temporary set-back in wages. It has therefore been found best to employ such workers on purely unskilled work of a repetition nature.

But no matter what the type of unskilled women, it must always be borne in mind that their success depends largely on the judgment of the management in selecting a good class of women labour. At the present moment there are, roughly speaking, close on 1,000,000 women employed on the production of munitions of war.

The introduction of all these women into engineering shops meant that a great many difficulties had to be overcome. These may be briefly summarized as follows:—

- (1) A very large proportion of the women employed not being accustomed to factory life and discipline.
- (2) The majority of works managers and foremen not being accustomed to managing women workers.
- (3) The shop conditions for the most part planned with a view to the employment of men,

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(4) The use of the machinery to which women have hitherto been unaccustomed.

(5) The difficulties of maintaining discipline in a mixed shop and in entirely female shops staffed by women of no previous factory experience.

(6) The long hours.

(7) The question of physical strength.

Many of these difficulties have been overcome by careful selection of suitable work, a careful choice of labour, proper shop organization, conforming to definite welfare standards, installing or adapting plant suitable to women's use, supplying proper training facilities, sub-dividing skilled work and adapting the hours of employment in accordance with the class of work done.

How Women have Reached their Present Skill.—At the stage which women have reached at the present moment in engineering, nothing but harm can be done by praising their powers too highly, but there are many individual cases where women have shown very great ability, and have acquired a knowledge of a certain branch of engineering work in excess of what would have been learnt by an apprentice in the same period under pre-war conditions. This state of affairs may be attributed very largely to three causes:—(1) Women have been definitely taught, whereas the apprentices had to pick up their trade. (2) Women have, for the most part, been intensively taught everything in the shop itself under production conditions rather than in the school. (3) The conditions of the time have actuated and spurred on everybody to greater effort, from patriotic motives.

Training of Women Workers.—There is little doubt that the advantage of getting their training under production conditions has been very largely instrumental in considerably speeding up women's training, and the Author would like now to consider some of the methods in use for training women workers.

Women Trained in Works in a Separate Shop.—It is extremely

difficult to start women in the same shop with men, unless the latter are in sympathy with the movement, and experience has proved that the only satisfactory way is to start women in a shop by themselves under a sympathetic foreman until they have proved themselves. In illustration of this the Author can quote a firm who, up to last April, had no women bench-fitters on aircraft work. They have adopted the above plan, and there are now 200 women fitters in the shop controlled by women charge-hands, all doing exceedingly well.

Overcoming of incredulity on part of Management.—Another type of case which should be mentioned is that of firms who cannot believe that women can do anything but purely repetition work, and regard a woman fitter, tool-turner, or tool-setter as an impossibility. It therefore is no use telling them that they must upgrade their women on to better work; they have to be shown that women are available in numbers who can do such work. In such case the Ministry often sends to the firm an expert woman demonstrator. She will first of all do the job herself in the shop to prove its practicability, and she will then continue to assist the firm by training some of their best operators or helping them to select others who are suitable. There are many firms which, having been assisted in this way, have become some of the most successfully worked shops in the country, not only from the point of view of percentage of women labour but of record output as well.

Other successful methods of training Women Workers.—It would take up too much time to go through at length all the various methods which have had to be adopted in order to make women efficient in the shortest possible time. Government training schools have done much by supplying a nucleus of semi-trained labour to shops desiring either to make a start with women labour or to introduce women on to some new class of work. Just a few large firms have done the ideal thing and set up their own training schools, from which they have a continual flow of semi-trained labour always ready to draw upon.

Characteristics of Women.—All consideration of women's work must be accompanied by a careful appreciation of the mental and physical characteristics of women. They have shown great adaptability and natural skill in successfully undertaking work of an entirely new character, but the varying degrees of success points to the necessity for thoroughly understanding their peculiar temperament if the best results are to be obtained.

Shop Organization.—Firms, who with male labour have been thoroughly successful, have failed when forced to employ women labour, thus proving that they did not understand their new employees. Other managers have not recognized their own failings clearly, and numerous cases can be quoted where the want of success of women labour has been traced to defective shop organization. By this term is meant the question of supervision and direction of the work in the factory—work usually performed by foremen and male charge hands. A foreman may be an admirable foreman of men, and at the same time an unsuitable foreman for women, apart from the question of his technical ability. There is no doubt that women do need special management, and it is folly to disregard the human element, as some do, by asserting that if women are to be employed on men's work, they must be treated the same as men. In one sense this is true. Discipline and strict adherence to work should be expected from women just as much as from men. As a rule men are either too lenient or too stern in their treatment of women, or too busy to study their peculiarities, and experience has shown that women should be controlled and organized by their own sex if the best results are to be obtained.

Shop organization, however, even when performed by women, may be quite unsuccessful if proper judgment is not used when selecting people for this work, and this brings up the general question of the choice of woman labour.

Choice of Labour.—There is no doubt that generally speaking a woman is a better judge of a woman than a man, and successful

firms have realized this and have appointed an experienced woman supervisor, to be responsible for engaging all their women labour. Very recently a case came to the Author's notice of a factory where one side of the labour was chosen by a woman and the rest by a man. There was great complaint of the efficiency of the latter, but none of the former. Investigation showed the cause that those women who were "turned down" by the woman supervisor were generally engaged by the man.

Ordinary Labour.—In the choice of ordinary operatives, stability of character and suitable physique must be the main considerations, but different characteristics must be taken into account when choosing forewomen and charge-hands. It is most essential that such people should have shop experience coupled with a certain amount of technical knowledge, and a thorough knowledge of how to manage women, and ability to hold their own in the shop. Women taking up this work must have tact and discretion, and the necessary power to enable them to work in harmony with the shop manager, whose authority should not be interfered with. Generally speaking, the most successful forewomen and charge-hands have been drawn from the more educated classes. For it must be remembered that women as a whole have been introduced very quickly, in very large numbers, without proper training or proper discipline, and it needs someone with powers of leadership and organization to get the women labour going on a proper footing.

Welfare.—Placing in factories in such large numbers women, many of whom have never been accustomed to factory life or conditions, has also called for special consideration of welfare conditions on the part of the employers. In considering this question two points of view must be taken in account: (1) Effect of Welfare on Production; and (2) Effect of Welfare on the Race.

Effect of Welfare on Production.—Employers have now for the most part fully realized that to give their women good welfare conditions is a sound business proposition. Without such provision

they cannot get a good class of labour. The unwonted heavy muscular effort and constant strain through which they are working makes it essential that their off times should be restful, if good work is to be done after the break. Good canteen accommodation also is most important, and there have been cases where managers have found that to provide one good meal a day free of cost has been more than repaid to them in output.

Welfare on the Race.—But quite apart from the effect of welfare on production is the effect of welfare on the race. From the national point of view this is the most important aspect to consider. For this reason the Health of Mmunition Workers' Committee was formed, whose special care was to safeguard any deterioration of the race which might perhaps accrue from women being compelled to work in all great industries. They have considered carefully (1) the hours of work; (2) rest periods and provision for meals; (3) sanitary conditions of the factory; (4) physical condition of women workers; (5) questions of management and supervision.

Hours of Work.—With regard to hours of work, experience has shown that a reasonably short shift is the most successful, producing less industrial fatigue as shown by few accidents, better timekeeping, and undiminished capacity of the worker towards the end of the shift so that a better average output is maintained. Another point in favour of shorter hours is the fact that a better class of labour is tempted to join the ranks of munition workers.

The other problems the Committee have considered in full detail, and the result of their investigation has shown that the nation is under a definite obligation to consider women's health and comfort in the factories if they are to protect and safeguard their position as the mothers of the race. Experience has shown that wherever there has been proper consideration for women's welfare in factories that there has been not only no decrease in healthy physical development, but a decided increase in mental capacity. It has been an enormous advantage for women to have had this opening into a wider field

of skilled and semi-skilled work, and the country has benefited by a tremendous increase of industrial efficiency.

It must be remembered that a woman's work is not ended when she leaves the factory. On her largely depends the life and happiness of the nation in creating and developing a happy healthy family life, and it is her privilege to care for the physical and spiritual welfare of the race. Added industrial efficiency therefore at the expense of women fulfilling their primary duties in their homes and to their children cannot result in anything but national disaster, and it is a sacred duty of the State to ensure that women are only used as wealth producers in so far as it does not affect the healthy development of the race.