WORKSHOP HINTS FOR MUNITION WORKERS

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Workshop Hints for Munition Workers by Bernard E. Jones

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PREFACE

In this handbook is made an attempt to familiarise the reader with certain processes and tools likely to be used by him in his capacity as a munitions worker in an engineering factory. The book has been compiled largely from articles contributed to "Work" by Messrs. Fred Horner, J. R. Maidens, A. E. Riggs, and others, but it contains a proportion of both text and illustrations especially prepared for it.

To Messrs. Alfred Herbert, Ltd., of Coventry, for illustrations and for technical information on shell manufacture placed at my disposal, and to Messrs. Pollock and Macnab, Ltd., of Bredbury, Stockport, for the loan of blocks illustrating shell-turning lathes, my hearty thanks are tendered.

B. E. J.

WORKSHOP HINTS FOR MUNITION WORKERS

MUNITION, frequently used in the plural form "munitions," is a term embracing war material of every kind except men and money. Cartridges, tents, shells, saddlery, uniforms, guns, motor-wagons, and scores and hundreds of other things—all are "munitions." At a glance, then, it will be obvious that this handbook cannot cover more than a fraction of the ground. Indeed, all that will be here attempted is to provide notes and memoranda, descriptions of certain tools, explanations of mechanical processes and operations, and other miscellaneous information designed to assist an unskilled person in arriving at some slight understanding of the materials, tools, and operations common to the work of any engineering munitions factory in which he may find employment. The desire is to make this handbook generally useful, and for that reason space is taken up with matters of interest in all engineering workshops rather than with highly specialised operations which, peculiar to certain parts of shells, bombs, cartridges, etc., have been reduced by science to a series of semi-automatic operations in which the human element plays an altogether subsidiary part. Much or nearly all of the repetition work in an engineering munitions factory is done on costly

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machine tools set and adjusted by highly skilled labour to produce work of a certain size and shape, but watched and tended by labour that has only recently been imported into this particular industry But the more intelligent that unskilled labour is, the better for everybody and everything concerned; and the new-comer to the engineering workshop who has studied this handbook will master his job the sooner and take the greater pleasure in it.

Degrees of Finish.—There are several different ways in which metal-work may be finished, and the particular style adopted depends largely on the nature of the mechanism or part being done. There is a great deal of latitude permissible in this direction, because it is not imperative to finish some portions well; that is, the working of the mechanism is not affected. The various kinds of surface finish may be classified as follow: Black, rough-filed, smooth-filed, scraped, rough-polished, finish-polished, burnished, case-hardened, hardened, painted, lacquered, plated.

Black finish means that the natural skin of a casting or forging or piece of rod or bar is left untouched. This is satisfactory for some parts, including those that do not show, and is the only way in many cases, because of the difficulty of using a file or other tool on the awkward-shaped surfaces. If paint is applied subsequently there is no need to touch the metal except to give it a scrub with a wire brush; or if slight lumps are present, rub these down with a file.

A rough-filed surface is left after parts have been reduced to approximate dimensions and there is no neces-

sity to highly finish the faces, on account of their being concealed.

A smooth-filed surface is produced when the preceding mode of finishing is too coarse, either from the point of view of good appearance, or because parts cannot be fitted accurately together unless smooth-filing is done.

Scraping is adopted to obtain the highest degree of accuracy ; it is possible to scrape without ensuring accuracy, and as a rule it is not in good taste to scrape surfaces unless they are done so as to make good contact. The exceptions occur in some kinds of scientific instruments, where brasswork is scraped in mottled fashion, or with crossing diagonal lines to improve the appearance.

A rough-polish is done with emery cloth or on a revolving buff, and results in a surface more highly finished than can be done with a fine file ; but it does not have a mirror-like gloss, because the lines produced by the grains of abrasive are clearly seen in the shape of fine scratches.

A finish-polish is effected with the finest grade of emery cloth or on a buff, or with polishing paste used on a cloth, and if done well, following the absolute removal of file scratches with suitable grades of emery cloth equals plating in appearance, though it becomes dulled rapidly. Care must always be taken in the case of flat surfaces to control the polishing medium in such a fashion that true planes are produced ; if the surfaces are permitted to become rounding the effect looks bad. The careless rubbing off of corners which should finish keenly and sharply is also very unsightly.

Burnishing is performed by rubbing the surface of the

metal with a hard-steel tool, lubricated with soapy water. The pressure consolidates the surface of the metal, and gives it a highly burnished finish, which may be followed by lacquering.

Case-hardening gives a thin film of hardened steel to wrought-iron or mild steel, and is adopted both to enable faces to resist wear and for good appearance. Certain parts or fittings are case-hardened, often with a special mottled finish, only for pleasing appearance. Or sometimes a high polish is put on after case-hardening, only sufficient material being polished off to eliminate the surface markings which the case-hardening makes.

Hardening is done to tool steel, either to enable it to cut or for the purpose of resisting wear, and the hardening occurs right through the piece. The work may be polished afterwards, or the temper may be drawn, leaving a light or a dark straw colour, or a blue, which has a pleasing appearance sometimes by contrast with the other fittings.

Painting may be done either for appearance or as a protection against atmospheric influences in the case of iron or steel parts. It does not look well unless the surfaces are fairly smooth and free from excrescences; if such are present on a casting or forging it should be filed neatly before applying the paint. But deep file scratches must be avoided, because these mar the appearance very much, and soon cause the paint to rub off and give an untidy appearance to an otherwise well-finished job.

Lacquering is only required on highly polished surfaces. It affords a protective coating against atmospheric influences and enables work to retain its pristine brightness