

PLANNING AND LAYING-OUT A DOCKYARD ENGINEERING WORKSHOP

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This account describes a reorganization of M.E.D. workshops carried out at Rosyth during the period late 1944 to end 1946.

Bringing the Yard into Service

As is well known, Rosyth Yard was reduced to care and maintenance during the period between the two wars, a large proportion of the original machinery and equipment being removed and despatched elsewhere.

When the Yard was brought into service prior to the Second World War, the Engineering workshops contained a small number of heavy machines and travellers but very little else. The need to bring the shops into action was urgent; machinery and labour were arranged for and re-equipping was stepped-up as much as possible. To reduce damage to batteries of similar machine tools in event of bombing attacks, the question of "dispersal" had to be borne in mind by the small group of officers responsible for bringing the Yard speedily into service.

As a result of these factors the shop organization developed on the lines of separate sections each controlling its own group of machine tools and equipment. This arrangement proved unsatisfactory and resulted in overlapping of duties, duplication, loss of items, with much traffic within the shops of work, materials and workpeople.

First Steps in Reorganization

During 1944, when the labour force and work load were at their peaks, it was obvious that reorganization of the Engineering workshops was necessary. Towards the end of 1944 instructions were given to arrange as follows:—

- (a) Responsibility for all machine tools, the Tool Room and Tool Stores to be undertaken by one subordinate officer.
- (b) The shop bench fitting parties to be arranged in sections to correspond with the existing Afloat, Yard Machinery and Gun Mounting Sections, responsibility being divided between two subordinate officers.
- (c) An improved system of requisitioning and labelling of work taken in hand in workshops to be put into operation.

In spite of the fact that these new arrangements were unpopular, particularly with chargemen, they proved effective and resulted in considerable improvement in controlling shop work. It was evident, however, that traffic within the shop still caused heavy loss of productive effort. The problem was discussed and it was finally decided that little could be done without a large-scale reorganization of the whole shop.

Difficulties of Original Lay-out

From figure 1 showing the lay-out prior to reorganization, it is obvious why administration and supervision difficulties were encountered. Machines were scattered and grouped among benches causing much inter-shop transport and lifting. Gangways were narrow and congested. There were far too many internal buildings, with attendant fire risks and opportunities for idling. Work entered and was despatched by the nearest door, making it well-nigh impossible to keep a satisfactory check of work passing in and out of shops. As a result of chargemen controlling their own group of machines as well as bench fitters, many machine tools were not fully or efficiently employed. Under the circumstances described, chargemen tended to keep capacity "up their sleeves" just in case an unexpected rush job was received. Whilst, for a repair shop, this is a good plan on a small scale, it becomes a serious source of loss if adopted by a large number of supervisors within one organization. Obviously, too, chargemen controlling fitters, as well as machines, will progress their own work first on the machines for which they are responsible. As a result, priorities were not maintained when key machines were heavily loaded. The possibility of relieving heavily-loaded machines by carrying out operations on alternatives was generally overlooked and material wastage resulted from inadequate machine experience of "fitter-cum-machine" chargemen.

Planning the New Lay-out

Towards the end of the war in Europe, the volume of work reduced considerably, and further diminished when the Japanese capitulated. The Yard employees became unsettled and restless as the future of Rosyth Dockyard was uncertain. In consequence, numbers fell rapidly and those who remained were far from happy as regards their future prospects.

The replanning of Engineering Bays was, therefore, reconsidered and it was decided to put the work in hand with the object of improving repair facilities and also the morale of the employees.

At this particular time, full financial control was not in force, labour was available in the Electrical and Works Departments, numbers of modern machine tools ex cancelled orders were available for dockyards, and the Admiralty had authorized a moderate amount of re-grouping of machinery. This was, therefore, the ideal time to start the scheme.

The first step was to survey existing machinery, earmarking belt-driven and defective equipment for replacement as modern motor-driven machines became available. The next step was to consider major shop facilities such as sizes of bays, travellers, very heavy machinery, floor space, lighting, etc.

Bay 17 was the obvious choice for heavy machinery, being the highest, widest, provided with the heaviest travellers, and sufficient floor space for heavy machinery and for handling heavy jobs. It is interesting to note that the bed of a heavy face plate lathe originally intended for work on large L.P. turbine rotors was reduced to one-third of its original length to accommodate more useful machinery.

It was decided that the centre Bay 15 with a light traveller was the most convenient for the lighter machining tools. The remaining small war-time built Bay 14 was very well situated for a tool room, precision machine and material testing shop. Unfortunately, natural lighting was poor, but this was largely overcome by fitting modern artificial illumination.

Having settled the broad lay-out, details were tackled.

Detailed Operation of Shops

Figure 2 illustrates the shop lay-out as it is at present arranged. All work and material, with the exception of the few very heavy items, pass in and out of the shops via the receipt, despatch and transport compound situated at the south entrance of Bay 16. It is checked against requisitions and passed to the bench section which will deal with the job. Heavy items go direct into Bay 17 and are easily noted. The arrangement described has eliminated losses and time spent in searching for mislaid items. It also ensures that main doors are not opened unnecessarily during cold weather, thus assisting in maintaining bays at a reasonable temperature. (*Note:* The prevailing wind is from the south-west.) A draught screen was erected between the bench and transport areas and was arranged to deflect the cold air and protect personnel employed near the main door.

Within the fitting section jobs are examined and castings ordered, machine work put in hand, using standard labels and requisitions to progress items through the various stages and operations and, eventually, return completed items to the original fitting benches for assembly, tests, etc. New work to be manufactured from drawings is put in hand by the fitting inspector (it was eventually possible to reduce to one fitter inspector).

It will be noted that the Tool Room is conveniently situated adjacent to the light machines which require most service from the tool room organization. The Material and Tool Store were placed together at the north end of Bay 16. When this change was made opportunity was taken to introduce a double check system of tool issues and to arrange for continuous survey of tools. Later, it is proposed to site the carbide tool grinder and operator within the Tool Store, to achieve better control over the use of carbide tools.

The main work of reorganization, removing cabins, resiting machines, rearranging stores, benches and chargemen's accommodation was completed in approximately nine months, during which period the whole of the machines, with the exception of seven or eight of the largest, were re-sited. All line shafting was removed and the shops whitewashed. A very satisfactory feature of the job was the great interest displayed by all employees, who were kept informed of the objects and reasons for making the changes. Valuable and prompt assistance was given by the Superintending Civil Engineer and Electrical Engineer Manager on foundations and power and lighting supplies.

Amenities

In a large shop there can be much friction between workers and management regarding "amenities". Opportunity was, therefore, taken to improve them by providing better hot water supplies for tea and washing facilities, and arrangements were made for section labourers to "service" the productive workers with tea in advance of meal breaks. Later the scheme was extended to the distribution of Canteen pies, cakes, etc., supplied from a small shop situated at the south end of Bay 16. This service is popular and works smoothly.

Further Thoughts

In a repair shop it is difficult to gauge the effect of the reorganization on production. It is considered, however, that output has improved, supervision of staff and control of work is more satisfactory and reductions have been made in the numbers of oncost workers, including chargemen. The cost and time required for swarf collection and disposal has also been reduced and there is, generally, much less "lost motion". It is appreciated that a number of improvements are still possible and these are being borne in mind for action at a later date when money and labour become available. For example,

material racks and saws should be positioned at the south end of Bay 15 near the section which uses the material. An extension at the north and south end of Bay 14 is being sought for the purpose of accommodating Heat Treatment equipment and Spring and Tool Smiths and for rearranging precision machines and offices. The space made available at the north end of Bay 15 will then be available for siting further grinding machines, including the odd Cylindrical Grinders in Bay 15.

Obviously the testing section would be more appropriately sited at the north end of Bay 16, but as the Bottle and Pipe testing section in the Copper-shop uses the equipment in addition to the Fitting Shop, the existing position must be accepted.

Conclusion

It is generally accepted that repair work can only be "planned" at very high cost and, in many organizations, no attempt is made to do so. On the other hand, production work is easily "planned". Dockyard workshops undertake both classes of work concurrently in common shops using the resources available to best advantage. Repair and production work do not fit in well in one shop, there are frequent clashes of priorities especially machine work and, generally, production work must give way to repair jobs, causing loss of time and effort in restarting jobs deferred for more important items. Possibly this unknown factor partly explains varying costs of similar work occasionally experienced between various Yards.

It would seem to be desirable, therefore, to keep repair and production work entirely separate and to arrange Dockyard workshops on this basis, where possible, in lieu of the present "all-in" arrangements, if maximum efficiency is to be achieved for both classes of work.