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## Locomotive Maintenance and Repairs.

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Repairing and maintaining running repairs on locomotives are two of the great problems with which railways have to deal. On account of the abnormal conditions and the vast amount of freight waiting to be moved, it is essential that railways keep their locomotives in constant service, which means a special effort must be made by shop forces to complete repair work as quickly as possible. Due to the demand for locomotives in the allied countries, our locomotive builders cannot supply sufficient new ones for export and for home use, therefore it has been deemed advisable to ship a large part of the output abroad, using our present power to its capacity. By so doing we must expect the outlay for repairs will be in excess of that of former years. The wages paid today are high, and in the majority of repair shops, railways are forced to employ mechanics inexperienced in regard to railway work, which necessarily follows repairs take longer and the work requires closer supervision. For the past few years the Government has exercised considerable authority over the railways in regard to the building and maintenance of power, having made rules and regulations concerning standards, defects, etc., and having assigned inspectors to certain districts to see that rules are observed. While these laws added considerable extra work to most roads it has, no doubt, been the means of improving the power and prolonging the life as well. As previously stated, one of the great trials of all railways is to keep up the repairs on their motive power. To accomplish this, we must provide facilities for repairing and handling, at locomotive houses and general repair shops.

**Locomotive Houses.**—It is difficult to do quick work at terminals unless we provide proper facilities, such as suitable locomotive houses and equipment. The key to the power handling situation of the locomotive houses is the ashpit, therefore we must provide large pits, equipped with a sure and quick means of handling the accumulation of cinders. Ample room must be provided on both sides of the pit, so that in rush hours fires can be cleaned or dumped and locomotives moved along out of the way to await their turn on the turntable. If this space is not provided, and after a locomotive or two has been dumped, it means the work on the locomotives following is at a standstill until those ahead have been moved. Conditions of this kind cause ashpits to be idle and at a busy terminal a large waiting list is the result.

In close relation to the ashpit is the turntable and shop leads. The former should be of rigid construction and power operated. The leads should be of sufficient length to accommodate outgoing locomotives, and provided with suitable crossovers and water cranes to facilitate the dispatching of power.

A valuable addition to any roundhouse is good machinery. A great mistake sometimes made by railways is filling up locomotive house machine shops with anti-

quated tools. When a machine job is required in a back shop it is usually a rush order, therefore speed and accuracy is required. If modern tools are used, you get what is desired without delay. All our terminals of importance have been equipped with portable oxy-acetylene welding and cutting outfits, and needless to say they have proved invaluable.

Organization is another valuable asset to the shop. One may have a splendid layout, good tools, etc., but without sys-

may mention an important item that contributes to shop efficiency, but which is sometimes treated lightly, and that is, cleanliness. We have found by experience, that in keeping our premises clean and tidy, better work is produced and time saved, as spare material can be quickly located. Accidents due to employees falling over old material are reduced to a minimum. In addition to these beneficial results, it looks well and gives one the impression that the foreman in charge is master of the situation.

During the busy season, when locomotives are at a premium, the cripples at roundhouses accumulate quickly, unless a close check is kept on the shipment of repair parts. We have a system of checking up and forwarding repair parts to out stations that has proved very satisfactory, and has been the means of keeping our locomotives in service during the past severe winter. Foremen at each station send a joint message to the road and shop master mechanics as soon as he finds he requires repair parts. In addition to this, he sends in a daily report of locomotives undergoing repairs which will take over 24 hours, stating when locomotive was taken out of service, what material is required and on whom ordered. This gives the master mechanic an excellent opportunity of keeping in close touch with the situation on his division. To ensure requisitions being filled promptly, and to avoid delays in shipment, or at transfer points, a material man is appointed by the road master mechanic. His duties are to check requisitions, receive telegrams for material, consult shop master mechanics and subordinates, as to when material can be secured, see that there is no delay in handling, also advise out stations on what train material is going forward so that he can be prepared to have it removed promptly on arrival.

**General repair shops** should be of sufficient size to care for the power assigned to the division and centrally located. When a locomotive is to be shopped and the nature of repairs is mainly controlled by the road master mechanic, any unusual repairs are decided upon, after a boiler inspection and hydrostatic test has been applied. After the locomotive has been stripped, the shop inspector makes out a final report and repairs are made accordingly. Accompanying each locomotive to the shop is the locomotive foreman's report of repairs, which forms the basis from which the shop master mechanic works.

There is approximately 10% of our power under repairs at all times, this is necessary to keep our locomotives in good condition, and also provides sufficient work in advance for the shop staff, who work entirely on the bonus system. Our output and bonus system are so closely related that in speaking of one it is necessary to mention the other. The subject of this paper being repairs, the bonus system will only be mentioned when necessary to show why we handle certain operations in certain ways.



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tem, efficiency is reduced. We have found by arranging our locomotive house staff in special gangs good results have been obtained. These gangs are grouped as follows: passenger, freight and switch, air brake, spring and brake gear, rod and box packing, lighting up, and, last but not least, the boiler gang. The different gangs are controlled by chargemen, who report to the shop foreman.

Locomotive men upon arrival book the necessary work in a book provided for the purpose. A competent inspector also makes an examination of the locomotive and records defects found. The work is then copied by a man assigned to this work, who distributes the slips to the respective charge hands. When the work is completed, a notation is made in the report book on the opposite page to the one in which the engineer placed his report.

In dealing with locomotive houses, I