as compared with its possible replacement by a later or newer model. This the factory-managers are obviously alive to, and finance considerations become finally the determining factor in the situation.

The introduction of new machines is undoubtedly one reason for the condition of existing layouts. Unless complete planning is done, the true situation is never apparent. It is obvious that new machines have been located with more regard to the nearest correct space available than to the exact location preventing any back-tracking of shoe-racks. It will be realized that a few alterations from the original plans can have a large effect in material movements.

Items (1) and (2) are factors considered in the revising of layouts; item (3) concerns costing processes dealt with in the cost section of this report; item (4) is dealt with under labour classification; and item (5) concerns general conditions of efficiency.

Material Movements.

Further study of the methods employed in the movement of all materials leads me to the conclusion that savings are to be made in this direction. Under this heading is to be considered all handling operations in the factory, from the arrival of raw materials to the delivery of the finished product. I am aware that the majority of handling operations are very small indeed; but small items are of great importance in this industry when it is considered that a reduction of 6d. per pair in manufacturing-cost is more than equivalent in money to an additional 5 per cent. to the protective-tariff duty. For instance, if a factory turning out, say, 700 pairs per week could save one second on each handling operation (taking 100 as the number of handling operations, which figure is very conservative) the saving made is more than ½d. per pair.

My deduction is that there is a considerable loss that can be prevented in the movement of materials in shoe-factories. I estimate that from 1d. to 2d. per pair can be saved by cutting down this source of loss. The material movements where this loss is apparent may be stated principally as:—

(1) Moving material from one operation to the next. In considering this each manager needs to consider—Who does it? What rate is paid for doing it? Is it necessary to pay that rate? Could it be done as well or better by some one especially assigned to moving only? and so on.

(2) The distances of material from the user, or in other cases the distance the position of one operation from the next, is often too far. This is a layout matter; but a point to be watched here is that adequate passage-ways, where perhaps certain movements only take place, require equal attention as the operation itself does, to prevent intricate routes being made.

(3) The practice in New Zealand of having each operator move his own materials or rack forward to the next operation or of having each operator find his own next job is a loss to production. It means that tradesmen's rate is being paid to move material, and is obviously uneconomical if it takes any appreciable time. Only if the factory layout is in a continuous sequence could the method be justified. If any back-tracking takes place, or if there are intricate distances between operations, or if the operator is concerned in finding urgent orders it is costly.

(4) The tools and appliances at certain operations where subsidiary operations are performed may be improved. By this is meant that at such places where solutioning is done, where lasts are removed, where lasts are put in, and so on, the bench may be in such a position that extra steps are necessary, that time getting going is unnecessarily lost. By study, a smaller bench located close to the machine, by moving a pipe-line over, and so on, savings are to be made.

(5) Facilities for storage of detail parts and getting them to the place required are sources for savings also. The use of petrol-cases is a common practice in New Zealand for heel-storage for temporary transport and other purposes; likewise for grinding and findings. Is this method of storage and distribution a source of waste time? Can it be improved? Do operators lose time finding or getting what they require? I consider they do, and that without any considerable expense these items can be located better, transported more simply by a study of each position.

(6) The movement of materials from department to department may be capable of improvement. Is it carried by hand? Would a wheeled trolly be better? Could a conveyer be used? Would a gravity chute assist movements? Consider each interdepartmental series of moves separately: What time is taken at assembly-benches? Can it be improved by a rack, basket, independent sticker stand, or other means? These are questions that will prove sources of savings if analytically studied.

(7) Associated with the reaching by the operator for his next job and the placing of the completed work down is to be considered the question of the position of the operator. In New Zealand the majority of seated operators sit on hard seats with no back-rests. Maximum output is bound up to some extent in the question of fatigue. Fatigue can be relieved by suitable specially-designed seats which are to be seen in New Zealand in some few factories. This item is commended for study, as effecting further economies in the operator's time per pair finished.

The above merely represents the scope of the study commended to those desirous of reducing manufacturing-costs. They are not complete. I realize that no one system can be laid down as a standard, because no two factories make the same class of goods. The improvement of each factory is a matter of individual study in design.

Tracing Orders in the Factory and scheduling or planning Method recommended.

As a result of the preliminary tour of inspection of the factories in the main cities it became obvious that planning or scheduling in the production or service sense was not carried out.

Every factory of any size has its system of recording the progress of each order through the factory by departments. This is done by issuing to the clicking department, in the first place, the work order, containing all particulars of the order, and this order is usually a long tag, which accompanies the work