

BUYING NEW EQUIPMENT?

This article will help you to decide the right additions to your machines this Spring

THE IMPORTANCE OF DESIGN

By J. R. Escritt, M.Sc.

Assistant Director,

The Sports Turf Research Institute

THE design of management equipment for sports and ornamental turf and for porous playing surfaces poses a problem for engineers, calling for precision results with a minimum of working components subject to wear and adjustment and to damage by use, weather, etc. These overall requirements can be met successfully and commercially only by simple principles, by robust construction without undue weight, and by adequate controls necessitating correctly proportioned components throughout.

Equipment, which includes both hand tools and machines and power operated implements, is now available in immense variety and price range and the problem of the prospective user is to make a correct selection from this range. The object of these notes is to suggest certain key factors which should receive attention at the time of selection.

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The first need is to be entirely clear on what is required of any item of equipment. Thus, is it principally for fine turf, general sports field turf or merely a rough turf area? Will it be required to deal with any other condition such as an artificial playing area? Often, even in the smaller sports club, school or other recreational establish-

ment, the several types of surface all occur and call for regular mechanical management in some form or other. When buying new tackle it is worth preparing a written specification of requirements and comparing this with facilities offered by the products considered, especially if considerable expenditure is contemplated.

If the capital available dictates a compromise it is first necessary to decide which is the most important or desired function and to ensure that the selection will deal adequately with this. It is almost invariably unsatisfactory to expect one basic tool, implement or machine to be capable of meeting several requirements. The wisest way of providing for all-round requirements is most probably to plan adequate expenditure over a longer period and to purchase the most suitable items in order of priority of need or revenue reward.

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Following the financial decisions and definition of conditions and their needs the problem of selection becomes technical and calls for experience. The purchaser may find it wise to choose an independent adviser with personal practical knowledge to assist in making the selection, but points to watch include:

Simplicity of principle. If this is inherent the article will itself at once appear simple. The method by which it achieves its declared function will be easily apparent even to those who do not necessarily have specialised technical knowledge or experience. The inclusion of diversionary devices not contributing to or even interfering with the main function will have been reduced to the minimum both by the designer and by the production engineer. The number of moving parts, especially those which are exposed, will have been ruthlessly

minimised. There will be relatively few lubricating points and these will have been made easily accessible. A sound, simple principle which has been carried to its logical conclusion will result in a complete product which will perform adequately without the need for supplementary parts or extra components. If the equipment is constructed on the outfit principle the various implements will be quickly and simply interchangeable with little or no use of tools as, for example, in the case of a tractor with three-point hydraulic linkage.

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Robust construction. This will again be apparent but will not make the article appear clumsy or bulky. Weight will be built in only where it is necessary, i.e., to produce durability and to assist the function or the control. If it does not assist in these ways there is a fault in the principle or in the detail of design and the article will be unnecessarily costly, or if cheap will be unable to achieve the required results.

The progress of motor mower design whereby machines have become successively lighter in recent years and have yet become both more efficient in cutting and easier in control is an example of this development of design principle. There was at one time a risk of this feature being carried beyond the optimum. An excessive reduction in weight in any unit of equipment will show itself in a lack of rigidity in construction resulting not in easier but in more difficult handling. This feature became apparent in some types of cultivator now mainly obsolete.

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For long life and good service robustness should show in the proportioning of bearings, especially where these accommodate components which are in constant movement when the machine is in use. Such bearings should be easily and quickly replaceable if maintenance service costs are to be kept in check. It might be said that the bearings are a guide to the soundness of character of the designs.

Cost in relation to working life. It is important to consider at the time of selection what is required to be the working life of the equipment. Only where a definitely short period is certain should mere cheapness be a main consideration. In all other time considerations the relative value of the equipment and that of the operator's wages should be thriftily related. Time spent using equipment in its proper function is productive whereas time necessitated in adjustments, service, or other attention is unproductive. Satisfactory machinery maintenance is one thing—constant adjustment and repair is another. All this is true even though the equipment may be only in seasonal use.

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Ease of control. Given a sound and simple functional design the next most vital aspect affecting efficiency of use is physical ease of control. In recent years this necessity has come to receive much closer attention. It is still not unusual, however, to find that what looks in the showroom to be an attractive tool or machine is rapidly found by the unfortunate operator, who is often not the purchaser, to be mankiller. More often than not this critically unsatisfactory feature is due to the neglect of the designer or maker to allow prototypes to pass through sufficiently protracted trials before handing them over to the production engineer. An enthusiasm for novelty on the part of the purchaser or of the designer should not be allowed to override the absolute necessity of ensuring that the more essential needs of functional design have been met.

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Three important components related to ease of physical control are handles, ground wheels, and remote controls.

It is worth remembering that both the former are fundamentally levers and must be adequately proportioned or mechanically assisted to allow the normal exertions of an operator to raise, lower, or propel the implement. Handle controls are sometimes, though not always, easy to check even in the showroom but the wheels and tyres should be carefully considered in relation to relatively soft

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ground conditions, or for use on other types of surfaces. The degree of their intended use for transportation, perhaps over uneven surfaces such as golf fairways, should be provided for.

Adequacy of design for these facilities in regard to heavier items of equipment may call for quite elaborate additions to a unit but their omission may be fatal to the success of the job. An example is the development of tractor hydraulic controls for otherwise unmanageable implements.

The greater the diameter and the broader the rim surface of the ground or driving wheels, the easier it will be to propel or control a travelling chassis. This simple rule is often neglected in the interests of initial economy, but the result is loss of time and even undue wear and damage to transmissions or other mechanisms.

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Handles also are often reasonably adequate for ground use but may be found inconvenient or fatiguing when it is required to use them for transportation of the machine.

Remote controls should be located conveniently and in correct relation to one another.

Most well designed equipment is capable of certain necessary adjustments and these fall into two main categories—take-up adjustments for wear, and change over adjustments for facilitating variations in the functional results obtained. These should be carefully studied by the prospective buyer. It is generally unsatisfactory to attempt to design one adjustment mechanism for both the above purposes. It is important to note also that any adjusting mechanism should be so located as to avoid having any adverse effect on the rigidity of construction or on the working components of the equipment. Adjustment mechanism should provide positive means of setting components so that having once been correctly related they will remain so when the item is put to work. Adjustments may also be necessary to suit varying heights of operators, but this feature is now rarely omitted.

Safety of operator. One further requirement, especially of machines with power driven components, is safety of operator. This is a most difficult aspect of design and is generally met by covering in or guarding moving parts (except where it is better that these should be under continual observation), by safety cut-out controls and by the use of the "dead man's handle" principle. This latter is a most effective and efficient way of reducing risks to man and machine and also to fine turf surfaces.

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Demonstrations. The practical opinion of an operator is invaluable in the selection of equipment, especially hand tools and machines, but he should be given a budget for expenditure. There is little doubt that control features are normally the most difficult for purchasers to access and in this respect the value of practical demonstrations under working conditions is inestimable. The operator himself, however, should be the final arbiter and should take the opportunity to make the demonstrator pass on to him the know-how of handling. At the same time, in the event of purchase, the printed working instructions should be requested and perused. The demonstrator can be asked to point out important parts of the instructions. These will have been prepared with the intention of keeping down faults and misunderstandings and attention to them will be amply repaid. As much or more of the designer's intentions may appear in well drafted instructions as in the sales publicity for a product.

As a general rule simultaneous competitive demonstrations should not be arranged as this may merely prove embarrassing for all concerned and will not necessarily improve the presentation of the products.

It should be understood that good work is not produced so much by a tool, implement or machine as by the operator. Equipment should not be expected to think for itself. The handling of it, however, should always be sufficiently simple and physically un-fatiguing as to leave the operator freedom of thought and attention to the work in hand.

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