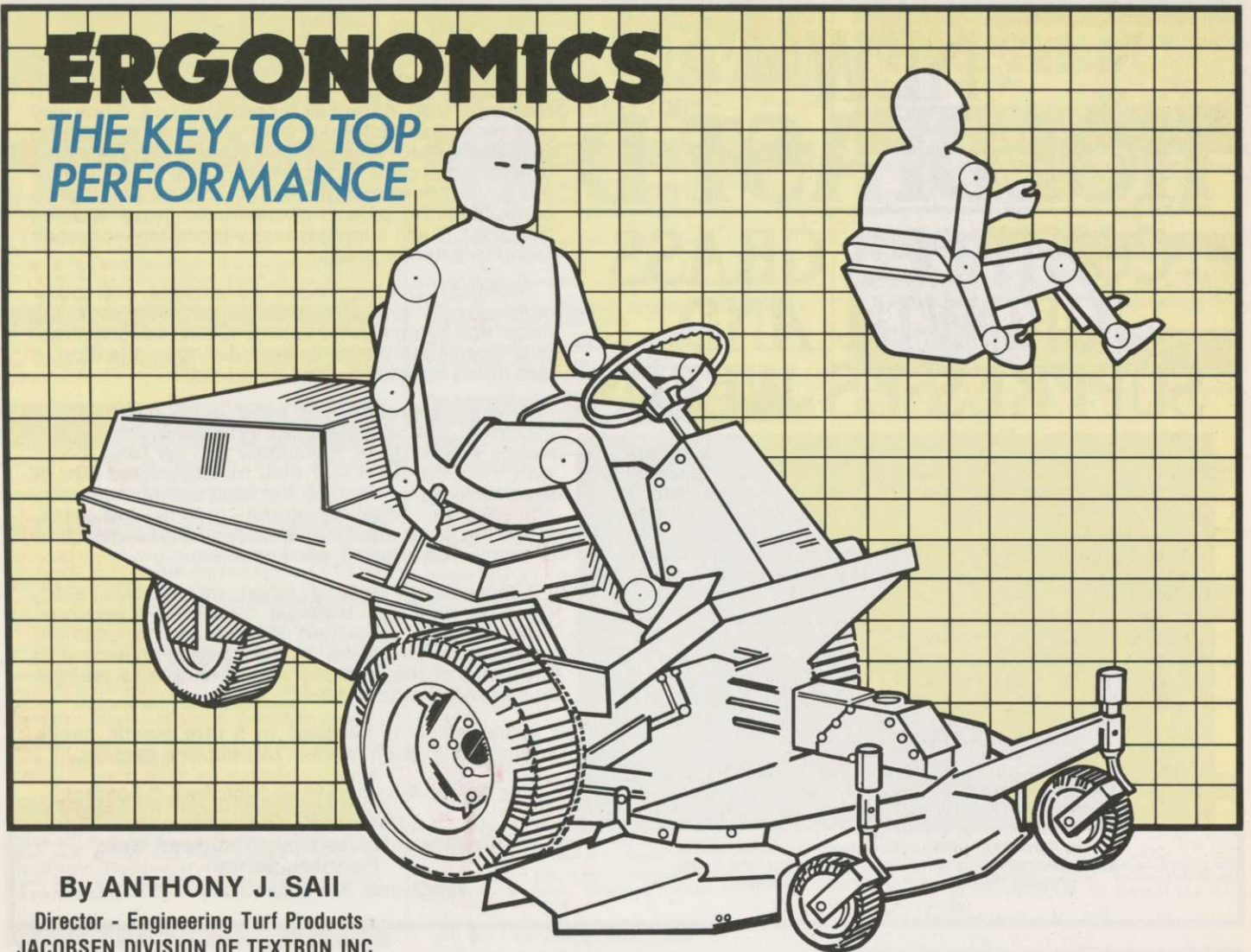


ERGONOMICS

THE KEY TO TOP PERFORMANCE



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It's called ergonomics, human engineering, biotechnology, life science engineering but what it boils down to is fitting a machine to man. At first glance this might sound like the obvious thing to do but that's not always been the case.

Human engineering at too many firms was a matter of making certain the chief engineer or sales manager was comfortably operating the machine, be it an auto, truck or tractor. That he may have been 6ft 4in. tall and weighed in at 18 stones made little difference. Obviously, the operator at the other end of the physical scale was in for trouble when assigned to that piece of equipment.

The impetus for human engineering came during the twenties and thirties when designers began improving the appearance and configuration of mass produced items to increase sales. That's the period when industrial design became a profession dedicated to incorporating usefulness, comfort, safety, ease of maintenance, sales appeal and good looks in a finished product.

This approach was honed into a science during the 1940's by the armed services with the evolution of a new class of machine that required close integration with man's total abilities. That's when anthropologists, behavioral psychologists, biologists, related an environment to man's size, strength, endurance and reactions.

Since then there was a brief setback of sorts in the fifties and sixties when occasionally too much emphasis was placed on styling. In one such instance an engine couldn't be fitted into the stylist's creation! And, of course, there were still plenty of engineering-oriented firms that designed machines first, then fit operators to them.

COMFORT ISN'T CODDLING

In the agricultural field during the mid-sixties, manufacturers began to realise they were selling to rural industrialists rather than to farmers. The number of small farms had dwindled while larger operations had become commonplace. These firms re-defined their market and saw the importance of areas they had neglected - comfort and how it relates to performance.

The same evolution had been taking place in the turf maintenance equipment industry. Apart from the simple fact that there is no reason for a machine to be uncomfortable or hard to use, there was (and is) increasing emphasis on the users' bottom line - productivity (and safety). Efficient performance, the ability to mow for eight continuous hours, called for a design approach interfacing man and machine. In other words, the design started with two known quantities: the operator and the machine's primary function. Between the two lay considerable human engineering.

Going by the form-follows-function rule, at Jacobsen we do everything to maximise operator efficiencies and machine productivity. This is no simple task as it calls for interrelating a variety of human engineering and other design factors. Productive comfort and safety head the list closely followed by serviceability, manufacturability and rationality (sometimes called product commonality). Once these design criteria are served, we pay attention to appearance, making it look good. In all, some 20,000 pieces of scientific information have been distilled into the system used to scale a design to fit the ideal range of human size, reach and the like.

Examples of our attention to human engineering are easy to see in Jacobsen equipment such as Turfcats riding rotaries and HF-5 and HF-15 mowing tractors.

COMFORT/CONVENIENCE

Take comfort and convenience which combine a multitude of consideration. All three of these machines feature front-mounted cutter units to make it easy for the operator to see where he's trimming. The Turfcats and HF-5 mowing tractor use hydrostatic transmissions to eliminate shifting and clutching, allowing the operator to focus on mowing. To optimise manoeuvrability, each features rear wheel steering, and on the HF-15 the reels turn in the direction of the machine.



Another convenience of the HF-15 is that its reels are hydraulically powered making the cutting frequency pre-set by the operator independent of the unit's speed. The operator's seat is fully padded and adjustable and controls are situated to keep a person safe in a seated position. Levers for raising and lowering cutter decks and reels are within easy reach. Cabs available for the Turfcats and the HF-15 have positive ventilation systems to keep dust out.

To enhance comfort by reducing fatigue, engines have been isolated, minimising vibration and reducing temperature. Sound is controlled by muffler systems and special ducting. Even colour plays a role, with the bright company orange contributing to alertness and making the units easy to see.

SAFETY

Safety, comfort and convenience often overlap. For example, colour contributes to safety, as does good control and careful placement of the operator relative to moving parts. Stability is important, too. A wider track and lower centre of gravity also enhance the kind of sure footedness needed for mowing along the sides of slopes.

SERVICE AND GEOGRAPHICS

While not directly related to operating machines, serviceability certainly becomes a human engineering consideration for routine maintenance and occasional repairs. Obviously, areas for attention like the battery, oil dip stick, plugs, points, lubrication, belts and so forth should be readily accessible and easy to work on. So engine shrouds and other panneling open fully to expose areas that need to be looked after periodically, as is the very functional approach to their controls. In bigger machines and other tractors we have even positioned the battery on the outside of the machine where it's easy to check. Other components are not enclosed if they don't require it. That is, merely to serve the cosmetic side of product design.

OTHER CONSIDERATIONS

Geographics enter the human engineering equation, too, since the machines must be operated under varying conditions ranging from the sunbelt to the snowbelt.

Manufacturability and rationality also play roles. That the design must be manufacturable is self evident but rationalisation is often misunderstood. The ability to rationalise certain components, making them interchangeable from model to model, means a whole lot more than keeping prices competitive, as important as that objective may be. Other primary goals are creating a familiarity of controls from one machine to another, the convenience of stocking fewer spares, and the ease of maintenance when machines are similar.

So the human engineering side of product design is quite complex with a multitude of factors to be considered from the outset before a prototype is built.

And even when working models have been constructed, human engineering remains a key consideration in the thousands of hours of field testing, with many modifications made relating to a wide variety of actual operating conditions.

So next time you ease into the seat of a new turf machine and feel comfortable with the controls, can see the cutter decks without bending and so forth, give a silent thanks for the progress in human engineering. And, if you're of average height, a thanks that the machine wasn't designed to fit a 6ft. 4in. overweight chief engineer of days gone by.

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