RESEARCHES ON THE AGRICULTURAL MACHINES OPERATOR PERFORMANCES

CERCETĂRI PRIVIND PERFORMANȚELE OPERATORULUI DE MAŞINI AGRICOLE

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Abstract: *The purpose of the paper is to emphasize the fact that operator performance is one of the most important components of economic performance of a machine system. A manager must consider the type, amount and value of required operator labour when planning for mechanized agricultural production. In the paper are presented the changes appeared in our days in operator labour at modern tractors or other agricultural machines: automatic machine control, the global positioning system and others. The methods used for obtaining the diagrams are those of direct measurement made on tractors and agricultural machines. The degree of originality of the paper consists in the fact that few researches studied the importance of human operator in the performance of a machine.*

Rezumat: *Scopul lucrării este să evidenţieze faptul ca performanţele operatorului reprezintăuna dintre cele mai importantecomponente ale performanţelor economice ale sistemului maşină. Un manager trebuie să ia în considerare tipul, cantitatea şi valoarea muncii cerute operatorului atunci când işi planifică producţia agricolă mecanizată. În lucrare sunt prezentate schimbările apărute în zilele noastre în munca operatorului la tractoarele moderne sau la alte maşini agricole: controlul automat al maşinii, sistemul de poziţionare globală şi altele. O bună performanţă se defineşte la minim 65 % din capacitatea potenţială, fiind prezentate difetite performanţe ale operatorilor pe maşini ca vindrovere şi maşini de balotat. Metodele utilizate pentru obţinerea diagramelor sunt cele ale măsurătorilor directe făcute pe tractoare şi maşini agricole.Gradul de originalitate al lucrării constă în faptul că puţine lucrări au studiat importanţa operatorului uman în performanţete unei maşini.*

Key words: *operator performance, automatic control, global positioning system*
Cuvinte cheie: *performanţa operatorului, control automat, siatem de poziţionare globală*

INTRODUCTION

The third component of economic performance of a machine system is operator performance. A manager of equipment may be quite knowledgeable about machine and power performance, but unless the machine operator performance also is high, the total system performance may be low.

A manager must consider the type, amount and value of operator labour required when planning for mechanized agricultural production.

The operation of farm machinery is not physically strenuous, but is fatiguing, because of the need for continual alertness. The need for alertness increases with the size and complexity of machines. Small, simple machines may require only steering activities from an operator. On the other hand, complex machines require only a little more attention to steering, but much more activity in monitoring the machine operation. In cultivating with a 2-row machine it is rather easy to observe the effectiveness of the 10-12 shovels or sweeps, but with a 12- row cultivator, there will be 60 till 72 different points to watch, many of which are far from the operator and difficult to see. In some critical operations, such as seeding, where

malfunction can mean unsowed areas, producing no income, the cost of inattention can be substantial.

Operator labour has changed from an outdoor to an indoor labor. Comfort and protection of an operator from noise, wind, dust and temperature of the field environment is not only thought to be humane, but economically worthwhile. An operator under the stress of physical discomfort is not expected to be as effective as one who is working in a comfortable cab.

However, the cab may often interfere with the operator monitoring efficiency. The field of vision may be reduced and the worker is isolated from noises that indicate the operation of a machine. Equipment manufacturers appreciate the importance of improving the monitoring functions of a cab and have made several remote indicating systems available.

MATERIAL AND METHOD

Using of electronics in agricultural machines functioning

Electronics are used to give status information and assurance that remote mechanisms are operating. Microprocessors and display panels are mounted in the cab for operator use in monitoring the machine actions. A tractor driver can tap lightly on a pressure-sensitive switch panel and obtain a display of engine speed, oil pressure, cooling temperature, turbocharger temperature, battery voltage, fuel level, wheel speed and others. A warning beeper and a message display are used to alert the operator to impending problems from low fuel, low oil pressure, excessive temperatures and engine overload. In the case of unattended engine operation, the messages can be made to shut off the engine.

The sensing of wheel speed shows the microprocessor to compute the area processed.

The operator enters the effective width of the implement into the memory of the microprocessor, which incorporates time and distance travelled to produce the instantaneous area performance rate. The accumulated area processed and the accumulated hours of operation are also available from the memory, even if the engine is stopped.

More use of sensors and electronic control of farm machines can be expected. It is unlikely that operators will be replaced by computers in the near future, but it is likely that much routine control and adjustment of tractors and implements will be done by microprocessors. Steering sensors guided by furrows, crop rows, windrowers, or the edges of unprocessed areas should relieve the operator of constant attention to guidance in much the same way as the automatic pilot helps the airplane pilot.

Global position systems (GPS) have the potential for sensing the position of the machine in a field and for causing appropriate adjustments in seeding rate, fertilizer application and even tillage treatment. GPS may be precise enough to produce very accurate steering and thus eliminating overlapping and missed strips. The operator main duty would be to take command of the machine in situation that judgement or are outside the control program instructions. The quality of machine performance is expected to rise as the untiring vigilance of electronics surpasses that of the people.

Experimental performances on different machines

In fig. 1, 2 and 3 are presented the variation of operator-machine performances.

The points in the curves are to be read as percent of total time in which the machine was operating at the given percent of potential capacity. The areas under the curves represent total time and are equal to each other. The operators differ from one another by age, experience on that machine, general farm background, etc.

Good performance was defined as operating at 65 % of potential capacity or higher. In fig.3, operator H was classified as the superior operator, because he was able to load bales so fast that he wasted a considerable amount of time waiting for more bales from the baler,

another illustration of the need for a system to approach to machinery management analysis. In general, this analysis tends to penalize operators who drove at faster field speeds. High field speeds reduce theoretical field or operating time relative to total time. The determination of an optimal field speed is one of the real challenges for the machinery manager and machine operator.

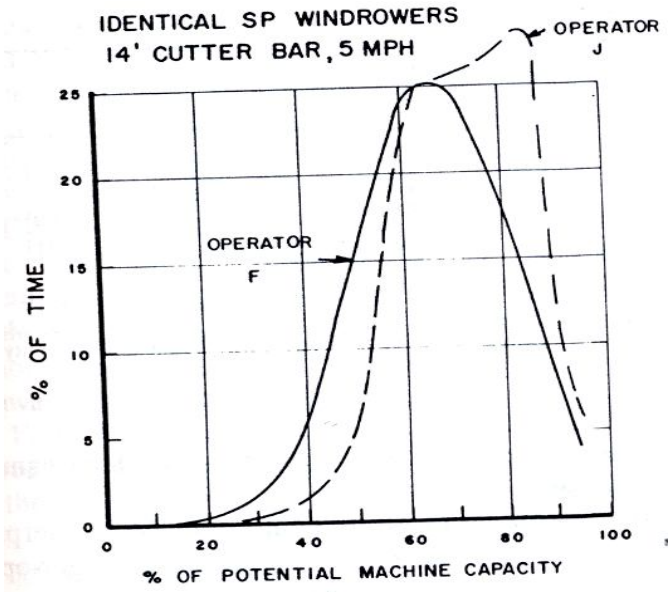

Figura 1. - Operator-machine performance at windrowers

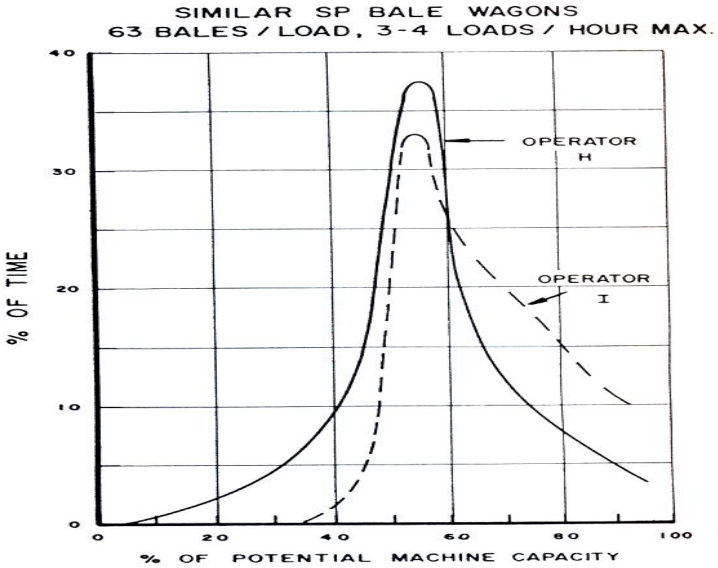

Figure 2. Operator-machine performance at baler

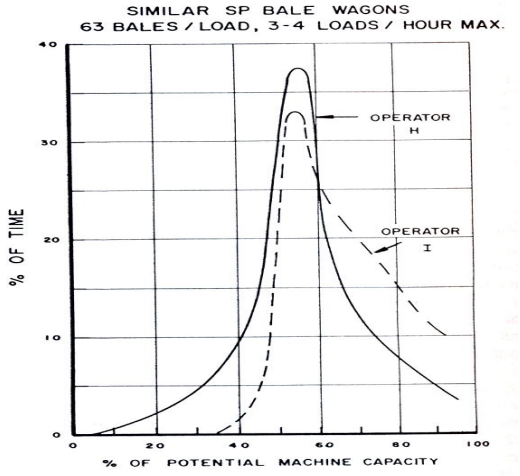

Figure 3. - Operator-machine performance at bale wagons

RESULTS AND DISCUSIONS

In modern agriculture, in order to obtain good results, a manager must consider beside the machines needed for a certain job, the operator performance, which completes the machine performances. On the other hand, the operators of the modern agricultural machines from our days must have skills to operate them and to use all the modern equipments which a machine has in order to achieve the task with optimal results.

The operator in our days must be used with using and understanding electronics in the machine functioning, the using of GPS and other modern equipments.

CONCLUSIONS

The experiments presented in the paper demonstrate the machine operator must gather many qualities and knowledge's for obtaining the best result in his work.

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