

## **ANALYSIS mode and ZAVATAZHENOSTI ENGINES Propelled forest machines**

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*The article analyzes the modes and load engines propelled forest machines to determine*

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*feasibility of the method of adjusting engine power of these machines disconnecting individual workflows to improve their economic and environmental performance.*

**Self forest machines, tractors, engine, diesel mode, loading, fuel economy, idle.**

**Problem.** One of stocks improve operational fuel efficiency and reduce emissions bahatotsylindrovyh engines is to use the method of adjustment disconnecting power cylinders and cycles. The feasibility of this method for bahatotsylindrovyh automobile engines already proven. These leading automobile company in the world, as Mercedes-Bens, Toyota, Honda, Volkswagen, Audi and others used system shutdown cylinders on production cars with gasoline engines, and the last two - even for 4 cylinder engines of small volume.

**Analysis of recent research.** In the period from 1980 to 2010 was made a number of dissertation research, which was proved the feasibility of this method and automotive diesel engines (fuel economy was improving operational within 3 to 20% while improving environmental performance depending on the ways and means of implementation).

In the forestry sector use is known propelled forestry machines (SLM), equipped usually bahatotsylindrovymy powerful diesel engines. Based on the fact that most of the time working on SLM modes partial load and idling (MM), the authors [1] We hypothesized about the feasibility of the method of disabling the cylinder and cycles to improve economic and environmental performance of diesel engines. Clearly, this assumption requires confirmation. Judging from the analysis of the literature, the issue is virtually unexplored. Therefore, it is urgent and requires further study.

Study the dynamics of logging machinery devoted a significant amount of published works [3-4 and others.]. At the same time, degree of congestion and structure of the mode of the engine SLM studied not enough (known to date scientific works almost exclusively in the [2] data are available for analysis).

Another way to improve the operational efficiency of diesel fuel propelled forest machines may be the use of devices to optimize engine performance - the so-called load detectors that inform the operator about the current engine load [5 and others.]. For this area, this study is also relevant.

At this stage of the research necessary to perform an in-depth analysis of the modes of the SLM and load their engines, concentrating the focus on the structure of time machines in some modes.

**The purpose Research** an analysis modes and load engines SLM to confirm the usefulness of the method of power control cylinder engine shutdown cycles and to improve their economic and environmental performance.

**Results.** It is known that almost all SLM including and *odnooperatsiyni* (Knuckleboom, timber skidding, zvalyuvalni, koruvalni, rozkryazhuvalni, shredding, suchkozrizuvalni) and *multioperationa* (Zvalyuvalno-baling, zvalyuvalno and skidding, zvalyuvalno-transport-abundant, zvalyuvalno-shredding, zvalyuvalno-suchkozrizuvalni, suchkozrizuvalno-baling, suchkozrizuvalno-rozkryazhuvalni, name-onshore-suchkozrizuvalno-baling, suchkozrizuvalno-rozkryazhuvalno-baling, звалювальньо-сучкозрізувальньо-розкряжувальньо-пакету-вальні, звалювальньо-сучкозрізувальньо-розкряжувальньо-транспортуваль-ні) working conditions are often variable speed and especially stress regimes of the engine. This feature appears as when performing manufacturing operations, and in the process moving the mobile forest machines and is characteristic of the entire range of possible loads (the mode XX and small loads to deep short-term overload ).

To quantify the most used mode of SLM and analyzing workload turn their engines to work [2].

As you know, within each technology used their types and brands of machines, work operations, etc. Field studies presented in the [2]Performed with the following types, names and number (given in brackets) SLM.

*Harvesters.* During the field work were studied five models of harvesters, namely: John Deere 1070D (2), John Deere 1270D (2), Valmet 901.3 (1), Valmet 911.31 (1), Volvo EC210BLC (1).

Observations on the duty cycle Harvesters, its video timing and further showed that the working hours of harvesters distributed by major operations as presented in the diagram in Fig. 1. Determination of the proportion of time per each transaction, it is necessary because some factors and determining working conditions vary from operation to operation. For example, such an operation as guidance zahvatuvalno-rizivalnoho device tree to be accompanied by the engine modes small

loads close to the twentieth, which is favorable for the use of the method of power control cylinder diesel engine shutdown and individual workflows and to use signaling load of the engine.



Fig. 1. Distribution of time within the working cycle harvesters.

*Zvalyuvaino-bunchers.* In the course of this work were investigated zvalyuvaino-bunchers only one model: Timberjack 850. According to measurements (see. Fig. 2), presented as a chart for time distribution operations, we can conclude auspiciousness for the application of methods and devices described above for this type of machine. This conclusion is based on the fact that the regime XX for this machine is 27%, and operations such as pruning twigs and bucking, which is also characterized by the engine partial regimes together account for more than half (53%) of the total running time.

*Forwarders.* During the field test was investigated forwarders four models, namely: John Deere (1) Timberjack 1010 (3), Timberjack 1110D (3), John Deere 1410D (2), Valmet 840.3 (1).

Average time on operations for forwarders shown in Fig. 3.

According timing Forwarder, compared with zvalyuvaino-bunchers, on the twentieth mode is significantly less time (3%). But other times, it performs the following manufacturing operations as: move without load (8%), the movement of cargo (16%) and load (73%). Obviously, when performing these operations, the engine through a number of objective reasons and can not work at full capacity.

*Forestry tractor.* Among the logging machines studied two models of crawler tractors production logging Omega Tractor Plant (Russia): TLT-100 (2), TDT55A (3).

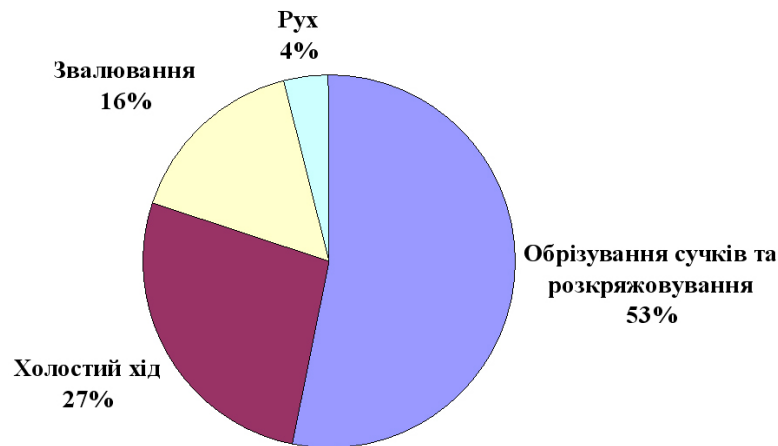


Fig. 2. Distribution of time within the working cycle zvalyvalno-bunchers.

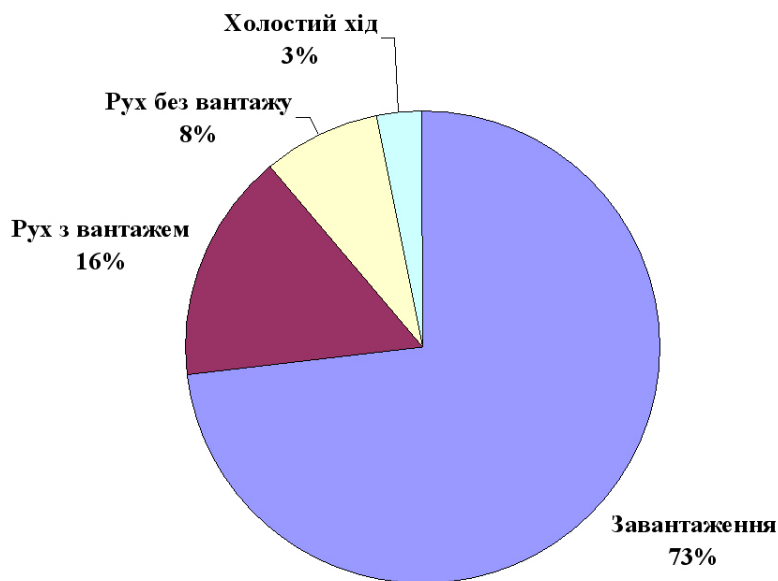


Fig. 3. Distribution of time within the working cycle forward trench.

According timing was built in time for distribution operations (see. Fig. 4), and determined that the mode XX is 19%, and manufacturing operations such as movement without load - 38% movement of cargo - 28% and navantazhennya- trucks - 15%. In such circumstances, as in the previous case, the engine can not run at full capacity all the time. Therefore, for logging tractors use of methods and devices described above also has the potential to contribute to the improvement of operational fuel economy and lower emissions of exhaust gases into the atmosphere.

*Skidery.* Was considered only one model of wheel skideriv pachkovym clamp, namely skider Timberjack 460D (3). Options duty cycle shown in Fig. 5.

Feature Technology Wheel skidera of pachkovym clip is that the share of manufacturing operations execution time for it distributed as follows: mode XX - 4% movement without load - 39% movement of cargo

- 45%, and handling - 12% . Similar structures have a forestry tractor (see. Fig. 4), as a conclusion to skideriv relative usefulness of methods and devices that are discussed in this paper - analohyyny.

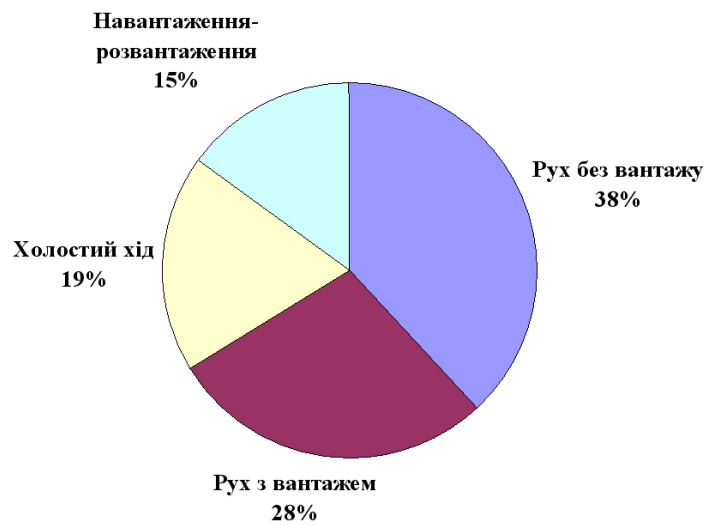


Fig. 4. Distribution time within the working cycle logging tractors.

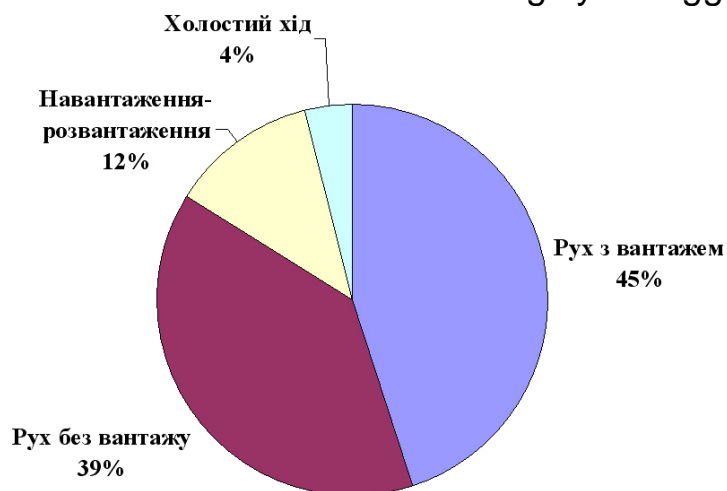


Fig. 5. Distribution of time within the working cycle skideriv.

For ease of synthesis and drawing conclusions present the results of timing investigated propelled forest machines in a table (see. Table. 1).

Table 1 shows that for all vehicles (except for name-onshore-baling) when performing manufacturing operations are characterized by such a regime as XX, whose share ranges from 3 to 27%. All other modes SLM through a number of objective (and sometimes subjective) reasons are characterized as those at which the engine operates with SLM rated load is not a significant fraction of the time. Besides these regimes almost always are transient (unsteady).

### **1. Average time within the duty cycle for different SLM.**

Modes of SLM	Types of SLM				
	Harvesters	Zvalyvalno-bunchers	Forwarders	Forestry tractor	Skidery
Idling	27	0	3	19	4
Motion	4	33	24	66	84
<i>incl .:</i>					
- <i>With load</i>	-	-	16	38	45
- <i>Unladen</i>	-	-	8	28	39
Fulling	16	9	-	-	-
Loading and unloading	-	-	-	15	12
Downloads	-	-	73	-	-
Crop knots and rozkryazhovuvannya	53	-	-	-	-
Putting zahvatuvalno-zrizuvalnoho device on the tree and packing	-	58	-	-	-

Among all studied types of machines would be best to apply the proposed method and device for harvesters.

**Conclusion.** Thus, the analysis made it possible to confirm the hypothesis put forward in the [1]About the potential of the method to disconnect cycles bahatotsylindrovyyh diesel propelled forestry machines. Research performed in the work [2]Confirmed that considerable time engines propelled forest machines operating at partial loads and modes XX, which is favorable for the implementation of the method of disconnecting individual workflows and for use signaling load of the engine.

### References

1. *Beshun OA* Justification feasibility of regulating engine power mobile forest machines by turning off duty cycles / *OA Beshun* // Herald KNTUA them. P. Vasilenko. - Kharkiv, 2012. - Vol. 123. - P. 129-134.
2. *Comparison* lesosechnyyh technology works in the Republic of Karelia lesozahotovitelnyh Company / *Syunëv VS Sokolov AP, AP Konovalov, Katarov VK Selyverstov A.A., Gerasimov Yu, Karvynen S., E. Vyalkkyu* - Vammala: NII Forests Finland METLA, 2008. - 126 p. Access: <http://www.lesinfo.fi>.
3. *VA Aleksandrov* Dynamic Effect nahruzok for a job engine / *VA Aleksandrov, IG Moseevo, AY Perelman* // Problems mashynovedenyia and mashinostroeniya. Mezhevuz. Sat. scientific. tr. - Vol. 24 - S.-Pb .: SZTU, 2001. - S. 98-103.
4. *Snopok DN* Nahruzhennost sylovoy installation feller-suchkorezno-raskryazhevochnyyh in the process of cleaning machines from boughs of trees: Author. Thesis. ... Candidate. Sc. Sciences: 05.21.01 / *DN Snopok*. - Ukhta, 2008. - 23 p.
5. *YA Tarnovo* Increase of the effectiveness Using machine-traktornyyh agregatov Improvement of control regimes s work: Dis. ... Dr. Sc. Sciences: 05.20.01, 05.20.03 /

YA Tarnovo. - Tambov, 2001. - 33 p.

*Article posvyaschena analysis work and loading regimes engines samohodnyh lesnyh machines with tselyu method of application definitions tselesoobraznosty regulation-power engines etyh machines otklyucheniyem ot delnyh workers cycles for Improvement s Ekonomicheskie and ecologically indicators.*

**Tractor, engines, diesel mode, Downloads, toplyvnaya ekonomychnost, holostoy Hod.**

*The paper presents the analysis of operation modes and load of mobile forest machines engines. It is done with purpose of determination of suitability of application of method of power regulation multicylinder diesel engines of these machines by means of separate working cycles swiching-off for improvement of their economic and ecological indicators.*

**Mobile forest machine, tractor, engine, diesel, mode, loading factor, fuel efficiency, idling.**

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## **MAIN AREAS OF IMPROVEMENT vehicle maintenance in agriculture**

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*The analysis of measures to reduce transport costs for cooperative maintenance of vehicles in agriculture and improvement of the basic principles of cooperative forms of vehicle maintenance in agriculture Ukraine.*

**Car, maintenance, repair, garage nekompleksnyy, transport costs.**

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**Problem.** It is known that the most effective form of maintenance (MOT) cars cooperative enterprises is a form of participation of regional stations and vehicle maintenance (STOA). Increased centralization of operations and repair of rolling agricultural sector allows, on the one hand, reduce the total cost of material and technical basis, wage costs, spare parts, materials, energy and other resources, to reduce the