larger than the angular velocity of the disk. The use of such a model wheels eliminates the possibility of error.

It is possible model and use the wheel as a monolithic solid state, but it should be taken into account only the rolling radius.

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Эlastychnoe wheel impossible rassmatryvat a video monolytnoho zatverdevsheho PE Interaction with kotorogo opornoy poverhnostyu happening on the shoulder, anyway Dynamic radius. His sleduet rassmatryvat a video of two of solid bodies, articulated soedynennыh Between you - trailers and rыchaha drive, Whatnot rotation velocity kotorogo neskolko more, something disc.

Эlastychnoe wheel, Dynamic radius, radius rolling.

The elastic wheel can not be considered as hardened monolithic body equilibrium equations of which are made with the use of loaded radius. It should be presented in form of two solids pivotally interconnected -web of wheel and lever angular, velocity of which is slightly larger than the same of web of wheel.

Elastic wheel, loaded radius, rolling radius.

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ANALYSIS Bandwidth harvesting and transport complex for cereals

***SG Fryshev, Dr. NAU*for**

The method of analysis bandwidth machine-transport complex for crops and improving its parameters in the application of handling technology.

Throughput, combine harvesters, trailers, conveyors, vehicles, analysis, methodology, process parameters.

Problem. Improving the processes of collecting and transporting grain due to the increasing power Harvesters-transport sector, the performance of individual units which should provide the threading process by selecting appropriate operating parameters of machines. In these circumstances, the only full use of the power of individual units ensures effective performance.

Analysis of recent research. The technique, which is used for determination of harvesting and transport complex (ZTK) for cereals when making handling technology, not fully considers the choice alternatyvkilkisnoho composition of vehicles during transportation of grain [1,2].

The main criterion for selecting options ZTK in existing methods is the performance of its vehicles, the value of which is limited to their bandwidth. Analysis of the restriction is a source of potential change machine parameters to assess the possibility of reducing the quantitative composition of vehicles (ATZ).

The purpose of research. Pidvyschyty economic efficiency harvesting and transport process through reduce the number of vehicles.

Research results.When you make a transshipment options assembly-transportnoyitehnolohiyi for cereals work is performed processing chain "field - Combine (HCC) - trailers-conveyors (PP) - ATZ", where there are three types of mobile interaction points in Links "box - HCC", "LC - PE" and "PE - ATZ ".

A necessary condition for the efficient operation of assembly-transport sector performance is a situation in yakomune inhibited the capacity of first-level "field - HCC" by the second and not hampered the work of the third side of the second link that displays the following expressions:

$$N_1 \le N_2, \quad (1)$$

$$N_2 \le N_3 \quad , \quad (2)$$

where N_1 - The capacity of first-level "field - LC";

N_2 - The capacity of the second link "HCC - PE";

N_3 - Capacity of third-level "PP - ATZ".

At the same time the capacity of the third level can be significantly bilshoyui in this case partially unused. Carrying capacity - a resource that in this case completely unused and this determines ZTK reduce economic efficiency as a whole. A significant difference in the capacity of a link from the previous - is a difference, the removal of which reduces the number of machines ZTK by changing certain parameters of rational processes.

Basic steps andstitutionalism bandwidth - the definition ofpusknoyi ability of all links ZTK, comparison ofpusknoyi ability of third ZTK link bandwidth druhoyidlya identify significant differences between them, and the calculation and analysis of alternatives parametrivdlya eliminate significant difference. These steps can be formulated as follows:

1) calculate the composition ZTK for specific conditions, to determine the capacity of the individual units and compare their values to verify the absence of inhibition processes;

2) reveal the presence of significant differences between the values of the bandwidth of the second and third units, which will reduce the amount of ATZ;

3) to address significant difference to calculate the parameters of the third alternative links.

Using Think zalezhnosteyvykonayeMO calculations, analysis and comparison of the capacity of individual links for perevantazhuvalnoyitehnolohiyi processing chain. Throughput capacity ZTK is the first link "field - LC" circuit. Given a deterministic approach is the largest number of bins of grain harvesters, which can be harvested and transported to assembly-transport complex machines for the billing cycle time changes [3,4]. The capacity of the first link ZTK defined as

$$N_1 = \frac{m_K T_P}{\mathrm{t}_Ц} = \frac{m_K T_P}{\mathrm{t}_Б + t_X} = \frac{m_K T_P \varphi W_{KP}}{\omega_K \cdot d_B}, \text{ Bunka. / MR.} \quad (3)$$

where m_K - Quantity (units) combines required for harvesting of certain areas of the field;

TR - The estimated cycle time changes h .;

$\mathrm{t}_Ц$ - The duration of the operating cycle HCC, h .;

TB - the proportion of variable time ZKna filling grain silos on duty cycle, h .;

tX - the share of variable time of HCC pursuant idle moves on povorotahza duty cycle;

φ - Coefficient of working strokes HCC;

WKR - performance LC 1 hour clean (mostly) work, t / h .;

ωK - volume hopper combine m3;

dB - grain bulk density, t / m3.

According bandwidth of the second link "HCC - PE" is defined as

$$N_2 = \frac{n_П T_P \rho_П}{t_{ЦППП}}, \text{ Bunka. / Chg.} \quad (4)$$

where $\rho_П$ - the number of bins of grain, which is loaded into a private one for his Haulage;

Nn- number of PP in ZTK;

$t_{ЦППП}$ - The duration of the operating cycle (turnover) PE, h.

The capacity of third-level "PP - ATZ" is as

$$N_3 = \frac{n_A T_P \rho_П}{t_{АП}} = \frac{n_A T_P (\rho_П - 0,36)}{K_P \frac{\rho_П \cdot \omega_K \mathrm{d_B}}{\mathrm{W_{ШП}}} + \frac{2l_{ij}}{v_T} + t_{PA}}$$,Bunka. / Chg. (5)

where $t_{АП}$ - The duration of the operating cycle (turnover) ATZ;

Na - ATZ number (units) or groups ATZ for grain, each for carrying capacity equal to or exceeds the carrying capacity of PP;

v_T - Average technical speed car on the way from the field to the floor and back km / h;

lij - distance transport grain from the field (points to) the receiving point (j), km;

WSHP - performance screw vygruznogo device PE, t / h .;

t_{PA} - The duration of the discharge products ATZ in the receiving point, h.

Kr - coefficient taking into account the extra time to maneuver PE during unloading grain body ATZ.

The capacity of the second link is determined by a rational number in a private link to the specified number of ICA is a

$$n_П = CEILING \frac{m_K}{\rho_П}$$ units., (6)

where $CEILING$ - A function that returns the nearest integer.

Number HCC working in ZTK must be a multiple of size $\rho_П$ and is defined as

$$m_K = n_P \rho_П \quad (7)$$

Consider the option when the capacity of the third component "PE - ATZ" significantly exceeds the capacity of the second link and analyze alternative transportation to the decrease in ATZ to nA1 (1 unit.) With a simultaneous decrease in time tAP - turnover duration (duty cycle) avtomobilyado tAP1 way.

To analyze accept the terms of limiting bandwidth for the third level as

$$N_3^{'} = N_2, \quad (8)$$

where $N_3^{'}$ - The capacity of the third level of reduction in ATZ to nA1 and a corresponding reduction in the length of cyclic time to $t_{АП1}^{'}$.

Given the importance of (2) we obtain

$$\frac{n_П T_P \rho_П}{t_{ЦППП}} = \frac{n_{A1} T_P \rho_П}{t_{АП1}},$$

from here

$$t_{АП1} = \frac{n_{A1} T_P \rho_П}{N_2} = \frac{n_П T_P \rho_П}{t_{ЦППП}} = \frac{n_{A1}(K_P \frac{\rho_П \cdot \omega_K \mathrm{d_B}}{\mathrm{W_{ШП}}} + 0,08 + 0,12\rho_П)}{n_П} \quad (9)$$

It is necessary to reduce the length defined as turnover ATZ

$$\Delta t = \frac{\rho_{П}}{\rho_{П} - 0,36}(K_{P}\frac{\rho_{П}\cdot\omega_{K}\mathrm{d_B}}{\mathrm{W_{ШП}}} + \frac{2l_{ij}}{v_{T}} + t_{PA}) - \frac{n_{A1}}{n_{П}}(K_{P}\frac{\rho_{П}\cdot\omega_{K}\mathrm{d_B}}{\mathrm{W_{ШП}}} + 0,08 + 0,12\rho_{П}) \quad (10)$$

On the other hand the decrease may be seen as

$$\Delta t = t_{АП} - t_{АП1} = \frac{\rho_{П}}{\rho_{П} - 0,36}(\frac{2l_{ij}}{v_{T}} - \frac{2l_{ij}}{v_{T1}} + t_{PA} - t_{PA1}), \quad (11)$$

where t_{PA1} - Duration unloading grain at collection points to reduce the number of ATZ option to nA1.

Hence we see that reducing the length of ATZ turnover can be done by increasing the speed of its technical and reducing the time of discharge, achieved in improving both road conditions and efficient handling of a reception center.

The value of technical speed ATZ, which provides the necessary reduction of time determined from (11), if accepted condition $t_{PA} = t_{PA1}$:

$$v_{T1} = \frac{1}{\frac{1}{v_{T}} - \frac{\Delta t(\rho_{П} - 0,36)}{2l_{ij}\rho_{П}}} \quad (12)$$

Increased productivity growth ATZ by its technical speed fewer ATZ will provide the necessary bandwidth and third level by reducing the number of ATZ get some economic benefit.

Consider the prykladianaliz the calculated capacity of individual units processing chain using analytical relations .

Example. To analyze the capacity of individual parts of the process chain, which mistyt1) combines with technical and operational parameters: WKR = 15.3 t / hr. $\omega_{K} = 10$ m3 WSHK = 300 t / hr., the rate of change of cyclic time $\delta_{ЗМ}$ = 0.9; 2) Tractor PP; 3) ATZ.Umovy of: corn field 1800 hectare, yield 5 t / ha, dB = 0,75 t / m3, grain transport distance lij = 8 km, vm = 40 km / hr., The change $T_{ЗМ}$ = 8 h., $K_{ЗМ}$ = 1.5, ahrotermin collection DR = 12 days.

Decision.

1. The capacity of the first link "field - LC" is defined as

$$N_{1} = \frac{m_{K}T_{P}\varphi W_{KP}}{\omega_{K}\cdot d_{B}} = \frac{6\cdot 10,8\cdot 0,85\cdot 15,3}{7,5} = 112 \text{ Bunka. / MR.}$$

Quantity (units) combines required for harvesting, is given by:

$$m_{K} = CEILING\frac{S\cdot U}{W_{K}T_{ЗМ}K_{ЗМ}Д_{P}} = \frac{1800\cdot 5}{11,7\cdot 8\cdot 1,5\cdot 12} = 6 \text{ units.,}$$

where $W_{K} = W_{KP}\delta_{ЗМ}\varphi = 15,3\cdot 0,9\cdot 0,85 = 11,7$ t / h. - Productivity per hour LC variable time.

2. The capacity of the second link "HCC - PE" is as

$$N_2 = \frac{n_П T_P \rho_П}{t_{ЦПП}} = \frac{2 \cdot 10,8 \cdot 3}{0,53} = 122 \text{ Bunka. / Chg.}$$

where $\rho_П$ - the number of bins of grain, which is loaded into a private one its turnover anddetermined as:

$$\rho_П = INT \frac{\omega_K d_B (\frac{1}{W_{KP}\varphi} + \frac{1}{W_{ШК}}) - 0,08}{0,12 + \frac{K_P \omega_K d_B}{W_{ШП}}} 3 = \text{Bunka.},$$

where *INT* - function that returns the nearest integer less.

Number of PE, serving HCC group for a given quantity, defined as

$$n_П = CEILING \frac{m_K}{\rho_П} = CEILING \frac{6}{3} = 2 \text{ units.},$$

where $CEILING$ - function that returns the nearest integer.

The required capacity of 30 m3 and 22.5 tons capacity corresponds private brand cilantro 850, which has a discharge auger performance WSHP = 360 t / h.

Duration turnover PP - TTsPP is the following equation

$$t_{ЦПП} = 0,08 + 0,12\rho_П + \frac{K_P \omega_K d_B \rho_П}{W_{ШП}} = 0,53 \text{ h.},$$

3.The capacity of third-level "PP - ATZ" is equal to

$$N_3 = \frac{n_A T_P (\rho_П - 0,36)}{K_P \frac{\rho_П \cdot \omega_K \mathrm{d_B}}{\mathrm{W_{ШП}}} + \frac{2l_{ij}}{v_T} + t_{PA}} = \frac{3 \cdot 10,8 \cdot 2,64}{0,63} = 136 \text{ Bunka. / Chg.}$$

where Na - ATZ number (units) or groups ATZ for grain, each (a) of which the carrying capacity equal to or greater than the capacity of emergency, the equation is:

$$\mathrm{n}_A = CEILING \frac{\mathrm{m_K}\varphi(\frac{K_P \omega_K \mathrm{d_B} \rho_П}{\mathrm{W_{ШП}}} + \frac{2l_{ij}}{v_T} + t_{PA})}{(\rho_П - 0,36)t_Б} =$$

$$CEILING \frac{6 \cdot 0,85(\frac{1,5 \cdot 7,5 \cdot 3}{360} + \frac{2 \cdot 8}{40} + 0,1)}{0,5(3 - 0,36)} = \quad 3 \text{ units.}$$

These data suggest that ZTK provides maximum bandwidth the first link "field - LC" as aidsutnye inhibition of the side of the second and third parts:

$N_1 = 112 \le N_2 = 122$ Bunka. / Chg. $N_2 = 122 \le N_3 = 136$ Bunka. / MR.

Assume that the bandwidth of the third component "PE - ATZ" significantly exceeds the capacity of the second link and analyze

alternative transportation to the decrease in ATZ to nA1 = 2 units. with a simultaneous decrease in turnover duration (duty cycle) car dotAP1 - shlyahom such as increasing the speed of the ATZ.

It is necessary to reduce the duration of turnover ATZ determined from (10) as

$$\Delta t = \frac{\rho_{П}}{\rho_{П} - 0,36}(K_P \frac{\rho_{П} \cdot \omega_K \mathrm{d_B}}{\mathrm{W_{ШП}}} + \frac{2l_{ij}}{v_T} + t_{PA}) - \frac{n_{A1}}{n_{П}}(K_P \frac{\rho_{П} \cdot \omega_K \mathrm{d_B}}{\mathrm{W_{ШП}}} + 0,08 + 0,12\rho_{П}) = 0,14 \quad \text{h.}$$

The length of time after ATZ turnover of reduction is:

$$t_{АП1} = \frac{n_{A1}(K_P \frac{\rho_{П} \cdot \omega_K \mathrm{d_B}}{\mathrm{W_{ШП}}} + 0,08 + 0,12\rho_{П})}{n_{П}} = 0.53 \text{ h.}$$

The value of technical speed ATZ, which provides the necessary reduction of time determined from (12):

$$v_{T1} = \frac{1}{\frac{1}{v_T} - \frac{\Delta t(\rho_{П} - 0,36)}{2l_{ij}\rho_{П}}} = 57.4 \text{ km / h.}$$

Because this speed is achieved in economic conditions in the relevant improvement of road conditions, it may be argued that the difference in the values of the capacity of the third and second parts essential.

It is necessary to increase productivity ATZ possible due to technical growth rate of 40 to 57.4 km / h. This will allow fewer ATZ (2 units. Instead of 3 units.) Will provide the necessary bandwidth third-level "PP - ATZ". Rational ZTK contains 6 units. HCC, 2 tractor PP and 2 ATZ. The economic effect with a value equal to the ATZ.

Thus analysis assembly-bandwidth transport sector for cerealsshows ways to reduce the number of transport vehicles in the technology sector for specific economic efficiency.

Conclusion. The technique of analysis parameters harvesting and transport complex for cereals in the application handling technology that shows ways to reduce the number of transport vehicles in the technology sector and obtain relevant economic efficiency.

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Predlahaetsya method of analysis bandwidth abilities of machinery and transport complex for grain crops and Improvement ego parameters in Application perehruzochnoy technology.

Ability Propusknaya, zernouborochnые kombaynы, perehruzhately-trailers, vans, analysis, methods, parameters of processes.

The technique of analysis bandwidth machine-transport complex for crops and improvement of its parameters in application of technology overload.

Trackcapacity, combineharvesters, trailers-unloaders, cars, theanalysis, technique, parametresofprocesses.

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Analysis of numerical method for interchange PROBLEMS Applied Physics (in agriculture)

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The above analysis of numerical methods for solving the problem of Applied Physics (processes in agriculture), which accelerates and increases the effectiveness of the solution of the latter.

Numerical methods, applied physics, finite differences, finite element method, discrete element method.

Problem. Now the solution of differential and integral equations arising in the solution of problems of applied physics, by means of numerical methods on a personal computer. Application of the latter makes it possible to simplify the process of resolution and increases the reliability of the results, and the use of computer software packages provides complete automation of the process [1]. Therefore, analysis of numerical methods for solving the problem of Applied Physics (processes in agriculture) is relevant. Finite differences (ICC) - commonly known (simple) interpolation method [2]. Its essence is to replace the differential coefficients in the equation for the coefficients of the difference that allows to reduce solving the differential equation to solve