

# JOURNAL OF TRANSPORT



ISSUE 2, 2024 Vol. 1  
ISSN: 2181-2438



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**TOSHKENT DAVLAT  
TRANSPORT UNIVERSITETI**

Tashkent state  
transport university



**JOURNAL OF TRANSPORT**

RESEARCH, INNOVATION, RESULTS

**ISSN 2181-2438**

**VOLUME 1, ISSUE 2**

**JUNE, 2024**



[jot.tstu.uz](http://jot.tstu.uz)

# TASHKENT STATE TRANSPORT UNIVERSITY

## JOURNAL OF TRANSPORT

SCIENTIFIC-TECHNICAL AND SCIENTIFIC INNOVATION JOURNAL

VOLUME 1, ISSUE 2 JUNE, 2024

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Founder of the scientific and technical journal “Journal of Transport” – Tashkent State Transport University, 100167, Republic of Uzbekistan, Tashkent, Temiryo‘lchilar str., 1, office: 465, e-mail: [publication@tstu.uz](mailto:publication@tstu.uz).

The “Journal of Transport” publishes the most significant results of scientific and applied research carried out in universities of transport profile, as well as other higher educational institutions, research institutes, and centers of the Republic of Uzbekistan and foreign countries.

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Tashkent State Transport University had the opportunity to publish the scientific-technical and scientific innovation publication “Journal of Transport” based on the Certificate No. 1150 of the Information and Mass Communications Agency under the Administration of the President of the Republic of Uzbekistan. Articles in the journal are published in Uzbek, Russian and English languages.

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## The method of selecting the spreading disc of combined road machines (MAN CLA 18.280 4x2 BB CS45) by calculating the parameters

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**Abstract:** In this article, in order to increase efficiency and ensure traffic safety when it is widely used to eliminate slippage on the road surface in the winter season, the size of the wheel radius of the special road machine (MAN CLA 18.280 4x2 BB CS45), the height of the wheel installation, the rotation speed and how far the spray has been studied. Technological material spreaders are equipment that is permanently installed on car chassis or trailers or can be quickly separated, spreader disk, the forces acting on the particle of technological material (salt-sand) during the rotation of the spreader disk are considered.

**Keywords:** road, disc radius, disc height, distance, rotational speed, spread and sprinkle, angular velocity, sowing width.

## Kombinatsiyalangan yo‘l mashinalarining (MAN CLA 18.280 4x2 BB CS45) yoyib sepish diski parametrlarni hisoblab tanlash usuli

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**Annotatsiya** Ushbu maqolada qish mavsumida yo‘l qoplamasida sirpanchilikni bartaraf etishda keng foydalanilayotganda samaradorlikni oshirish hamda harakat xavfsizligini ta‘minlash uchun maxsus yo‘l mashinasi (MAN CLA 18.280 4x2 BB CS45) inchi disk radiusi o‘lchamining, disk o‘rnatilish balandligi, aylanish tezligi va qancha masofaga sepish o‘rganib chiqilgan. Texnologik material yoyib sepish moslamalari avtomobil shassilari yoki tirkamalariga doimiy ravishda o‘rnatiladigan yoki tez ajraladigan uskunalar, yoyib sepish diski, yoyib sepish diskining aylanishida texnologik material (tuz-qum) zarrachasiga ta‘sir qiluvchi kuchlar ko‘rib chiqilgan.

**Keywords:** yo‘l, disk radiusi, disk balandligi, masofa, aylanma tezlik, yoyib sepish, burchak tezligi, sepish kengligi.

### 1. Kirish

Shaharlar, ularning hududlari va aholisining o‘shishi transport oqimlari ko‘payishi va tarmoqlarining takomillashtirilishiga olib keladi. Shu sababli, zamonaviy yirik shaharning hayotiy faoliyati ko‘p jihatdan turli mavsumiy davrlarda transport aloqasini na‘minlashda yo‘l qoplamasining sifati va holatiga bog‘liq bo‘ladi.

Yo‘llarni saqlash va tozalov-qarov ishlari bo‘yicha asosiy va eng ko‘p mehnat talab qiladigan ishlar qish mavsumida qor o‘z xususiyatini qisqa vaqt ichida o‘zgartirishi bilan bog‘liq bo‘lib, sirpanchiq yoki yaxmalakka aylanishi, bu transport vositalari va piyodalarning harakatiga xavf tug‘diradi.

Barcha mamlakatlarda yo‘l xizmatlari qor va muzlamani yo‘l qatnov qismidan bartaraf qilish uchun texnologik materiallardan (qum-tuz aralashmasi) foydalanadi. Texnologik materiallardan foydalanish nisbatan qisqa vaqt ichida yo‘l qoplamasidan muz va qorni bartaraf etish hamda


tezlikni kamaytirish, baxtsiz hodisalardan hamda iqtisodiy jihatdan yo‘qotishlarni kamaytirish imkonini beradi.

### 2. Tadqiqot metodikasi

Texnologik materiallarni sepish uchun maxsus mashinalar qo‘llaniladi: texnologik material yoyib sepish moslamalari avtomobil shassilari yoki tirkamalariga doimiy ravishda o‘rnatiladigan yoki tez ajraladigan uskunalariga ega. Texnologik materiallarning samarali taqsimlanib sepilishini amalga oshiruvchi o‘rganlarning parametrlari va ish rejimlarini to‘g‘ri tanlashga bog‘liq bo‘lib, bu juda dolzarb vazifadir.

Qish mavsumida yo‘l qoplamasida sirpanchilikni bartaraf etishda keng foydalanilayotganda samaradorlikni oshirish hamda harakat xavfsizligini ta‘minlash uchun KYM yoki MYM (MAN CLA 18.280 4x2 BB CS45) ihchi o‘rganlarining ya‘ni disk radiusi o‘lchamining, disk o‘rnatilish balandligi, aylanish tezligi va qancha masofaga sepish ko‘satkichlarining o‘zaro bog‘liqlik qonuniyatini

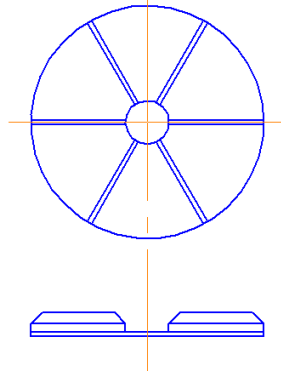
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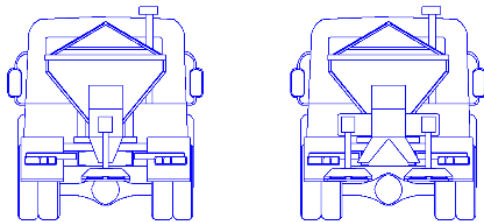
bilish kerak, ushbu masalani echish bo'yicha diskni o'natilishi sepish kengligiga bog'liqligini o'rganish hisoblash va talriba tayyiqotlari olib borildi. Turli xil etkazib berish usullari bilan material vertikal o'qda gorizontaal aylanadigan metallardan yasalgan yoyib sepadigan diskka tushadi. Diskning yuqori ishchi yuzasida radial qovurg'alar payvandlanadi (1-rasm). [9-15]



1-rasm Yoyib sepish disk

Texnologik materiallar ma'lum bir burchak tezligida aylanayotgan yoyib sepish diskning markazidan markazdan qochma kuch ta'sirida disk yuzasida qarshilikni engib, qovurg'alar bo'ylab tashqi chetiga o'tadi va ma'lum masofaga etib borib qatnov qism yuzasiga tushadi. Turli xil mashinalarda diskning diametrlari 0,60 dan 0,70 metrgacha, aylanish tezligi esa 200 dan 600 ayl/min gacha o'zgarishi mumkin.

Materiallarni yo'l yuzasi bo'ylab yoyib sepish uchun ham yakka disk, hamda juft diskardan foydalaniladi (2-rasm).



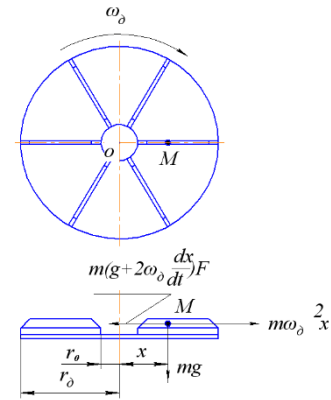
2-rasm Yakka va juft yoyib sepish diskleri

Bir xil gorizontaal tekislikda joylashgan juft yoyib sepish diskleri bir sepib o'tganda jyo'l yuzasida materiallarning sepilish maydoni hamda miqdorini oshirishga imkon beradi.

Parametrlarni hisoblash uchun biz quyidagi qiymatlarni qabul qilamiz: qiymatlar bo'yicha parametrlarni minimaldan maksimalgacha tanlash:

- disk diametri  $\varnothing$  0,5 dan 0,7 metrgacha yoki radius  $r_0$  0,25 dan 0,35 metrgacha;
- disk tezligi 200 dan 400 ayl/min gacha, yoki diskning burchak tezligi  $\omega_0$  20,94 dan 41,86 1/sek gacha;
- yo'l qoplamasidan diskning balandligi  $H_0$  0,2 dan 0,6 metrgacha;
- mashinaning tezligi  $V_M$  5 dan 15 km/s gacha yoki 1,38 dan 4,16 m/sek gacha.

Asosiy hisob-kitoblarini boshlash uchun texnologik materiallarni yoyib sepish diskining parametrlarini ko'rib chiqamiz (2.1.3. rasm). [15 adabiyot]



3-rasm Yoyib sepish diskning aylanishida texnologik material(tuz-qum) zarrachasiga ta'sir qiluvchi kuchlar chizmasi.

Aylanadigan diskda joylashgan  $M$  materialning zarrachasiga quyidagi kuchlar ta'sir qiladi:

og'irlik kuchi  $mg$ ;

markazdan qochma inertsia kuchi  $m\omega_0^2 x$ ;

Koriolis inertsia kuchi  $2m\omega_0 \frac{dx}{dt}$ ;

og'irlik kuchi ta'sirida disk yuzasida ishqalanish kuchi

$Fmg$

va Koriolis inertsia kuchi  $2Fm\omega_0^2 \frac{dx}{dt}$ ,

bu yerda  $m$  zarracha massasi **kg-sek<sup>2</sup>/m**;

$x$  – ko'rilyotgan nuqtadan disk markazigacha bo'lgan masofa  $m$ ;

$\omega_0$  – diskning burchak tezligi 1/sek;

$t$  – vaqt, sek;

$g$  – erkin tushish tezlanishi, 9,81 m/sek<sup>2</sup>;

$F$  – qumning ishqalanish koeffitsienti.

Zarrachaning og'irligi boshqa kuchlarga nisbatan juda kichik, shuning uchun odatda  $mg=0$  sifatida qabul qilinadi. [9]

$M$  zarrachaning  $L$  uzoqligacha uchib borish diapazonini topish uchun zarrachaning  $V_r$  disk radiusi bo'ylab nisbiy tezligini topish kerak.

$$V_r = r_0(n - F)\omega_0 \text{ m/sek}, \quad (1)$$

bu yerda  $r_0$  – yoyib sepish diskining radiusi;

$\omega_0$  – yoyib sepish diskining burchak tezligi 1/sek;

$F$  – qumning metallga ishqalanish koeffitsienti 0,5;

$n$  – kirish koeffitsienti  $n = \sqrt{1 + F^2} = 1,2$ .

Aylanma tezlik  $V_a$  ga teng

$$V_a = r_0\omega_0 \text{ m/sek}, \quad (2)$$

Disk chetidagi nuqtaning to'liq tezligi  $V_N$ ,

$$V_N = \sqrt{V_r^2 + V_a^2} \text{ m/sek}, \quad (3)$$

$M$  zarracha diskdan chiqib, havoda vertikal tekislikda harakatlana boshlagan paytdagi tezligi mashinaning uzunlamasiga to'g'ri keladigan  $V_N$  va  $V_M$  tezliklarining algebraik yig'indisiga teng.

$$V = V_N + V_M \text{ m/sek}, \quad (4)$$

bu yerda  $V_M$  - mashinaning tezligi m/sek. [15]

Vertikal tekislikda harakatlanayotgan zarrachaning tezligi mashinaning uzunlamasiga to'g'ri kelganligi sababli, sepish kengligini aniqlash uchun mashinaning  $V_M$  qiymatini  $V_M=0$  deb hisoblaymiz.

$M$  zarrachaning  $L$  uzoqligacha uchib borish diapazoni masofasini quyidagi formula yordamida topish mumkin

$$L = VT \cos \alpha \text{ m}, \quad (5)$$



bu yerda zarrachaning uchish T vaqti m/sek,  
M zarrachaning uchish vaqti T quyidagi formula bo'yicha topiladi,

$$H_{\partial} = \frac{gT^2}{2} - V T \sin \alpha \text{ m}, \quad (6)$$

bu erda  $H_{\partial}$  - balandlik m.

$\alpha=0$  bo'lgani uchun formula quyidagi ko'rinishga ega bo'ladi,

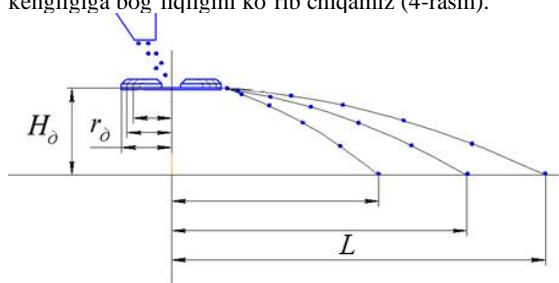
$$H_{\partial} = \frac{gT^2}{2} \text{ m}, \quad H_{\partial} = 4,9 T^2 \text{ m}, \quad (7)$$

endi, zarrachaning uchish vaqtini T topamiz, [22]

$$T = \sqrt{\frac{H_{\partial}}{4,9}} \text{ sek}, \quad (8)$$

Yoyib sepish disk parametrlarini tanlash uchun biz qiymatlarni o'zgarib kiritamiz va ularning sepish kengligiga ta'sirini ko'rib chiqamiz.

Birinchi holda, yoyib sepish diskning radiusi  $r_{\partial}$  o'zgaruvchan, diskning  $H_{\partial} = \text{const}$  balandligi va diskning o'zgarmas  $\omega_{\partial} = \text{const}$  burchak tezligi o'zgarmas bo'lganida M zarrachaning L uchish diapazoni qiymati ya'ni sepish kengligiga bog'liqligini ko'rib chiqamiz (4-rasm).



4-rasm. Yoyib sepish disk aylanish tezligi, diskning  $r_{\partial}$  radiusi va  $H_{\partial}$  disk balandligi M zarrachaning L uchish masofasiga ta'siri.

Bunda, disk radiusi  $r_{\partial}$  o'zgaruvchan, disk balandligi  $H_{\partial} = \text{const}$  va burchak tezligi qiymati o'zgarmas  $\omega_{\partial} = \text{const}$  bo'lganida. (1-jadval).

1-jadval

| № | Parametr nomi                 |                                  |  |
|---|-------------------------------|----------------------------------|--|
|   | Disk radiusi $r_{\partial}$ m | Disk balandligi $H_{\partial}$ m | Diskning burchak tezligi $\omega_{\partial}$ 1/sek |
| 1 | 0,25                          | 0,20                             | 41,86  |
| 2 | 0,30                          |                                  |  |
| 3 | 0,35                          |                                  |  |

Ikkinchi holda, yoyib sepish diskning burchak tezligi  $\omega_{\partial}$  o'zgaruvchan, diskning  $H_{\partial} = \text{const}$  balandligi va diskning radiusi  $r_{\partial} = \text{const}$  o'zgarmas bo'lganida M zarrachaning L uchish diapazoni qiymati ya'ni sepish kengligiga bog'liqligini ko'rib chiqamiz. Bunda diskning burchak tezligi  $\omega_{\partial}$  o'zgaruvchan, disk radiusi  $r_{\partial} = \text{const}$  va disk balandligi  $H_{\partial} = \text{const}$  qiymati o'zgarmas bo'lganida. (2-jadval).

2-jadval

| № | Parametrlar nomi                                   |                               |                                  |
|---|--|-------------------------------|----------------------------------|
|   | Diskning burchak tezligi $\omega_{\partial}$ 1/sek | Disk radiusi $r_{\partial}$ m | Disk balandligi $H_{\partial}$ m |
| 1 | 20,94  | 0,25                          | 0,6                              |
| 2 | 31,40  |                               |                                  |

|   |       |  |  |
|---|-------|--|--|
| 3 | 41,86 |  |  |
|---|-------|--|--|

Uchinchi holda, yoyib sepish diskning balandligi bo'lganida  $H_{\partial}$  o'zgaruvchan, diskning burchak tezligi  $\omega_{\partial} = \text{const}$  va sepish diskning radiusi  $r_{\partial} = \text{const}$  o'zgarmas bo'lganida M zarrachaning L uchish masofasi bo'yicha bog'liqligi. Bunday holda, disk balandligi  $H_{\partial}$  o'zgaruvchan, diskning burchak tezligi  $\omega_{\partial} = \text{const}$  va disk radiusi  $r_{\partial} = \text{const}$  o'zgarmas bo'lganida. (3-jadval).

3-jadval

| № | Parametrlar nomi                 |  |                               |
|---|----------------------------------|--|-------------------------------|
|   | Disk balandligi $H_{\partial}$ m | Diskning burchak tezligi $\omega_{\partial}$ 1/sek | Disk radiusi $r_{\partial}$ m |
| 1 | 0,20                             | 20,94  | 0,35                          |
| 2 | 0,40                             |  |                               |
| 3 | 0,60                             |  |                               |

### 3. Xulosa

Sepish kengligi va zichligiga ta'sir qiluvchi texnologik materiallarni yoyib sepish moslamasi(uzeli) parametrlarini tanlash usuli amalga oshirildi. Shunday qilib, yo'l yuzasiga nisbatan sepish kengligiga quyidagilar ta'sir qiladi: sepadigan diskning burchak tezligi; sepadigan diskning diametri va sepadigan diskning yo'l yuzasiga nisbatan balandligi; sepishning yo'l yuzasidagi zichligiga, esa o'z navbatida asosiy mashinaning tezligi, materiallarni etkazish tezligi va diskning burchak tezligi ta'sir qiladi.

Yoyib sepish diskning parametrlarini tanlash metodologiyasi ishlab chiqilgan bo'lib, u turli konstruktiv parametrlarini o'z ichiga oladi: disk diametri, disk balandligi, diskning burchak tezligi. Yoyib sepish diskning har bir parametrini o'zgartirilganda, zarrachaning uchish oralig'iga ta'sir qiladigan ko'rsatkichlar aniqlandi.

Shunday qilib, hisobga olingan parametrlardan birining minimal qiymatlari bilan zarrachaning uchish masofasi(1,5-4,3 m) ya'ni sepish kengligi minimal 3 dan maksimal 8,6 metrgacha qiymatgacha bo'lganligini yuqorida berilgan grafiklardagi bog'liqliklarga asoslanib aytishimiz mumkin.

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