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Technical control of gas ballon car service processes

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Abstract: This article presents the results of an analysis on improving technical supervision during the maintenance of gas cylindrical vehicles. The study identified technical maintenance issues related to vehicle safety, energy efficiency, and compliance with environmental requirements. In particular, the importance of technical regulations for checking the condition of gas cylinders, controlling pressure levels, timely identification of damaged components and their replacement is indicated. It was also noted that the implementation of technical maintenance using modern equipment and automated systems will increase efficiency. The results of this study serve as the basis for the development of proposals and recommendations aimed at ensuring safe and stable operation of gas cylindrical vehicles.
Keywords: Gas cylinder cars, maintenance, diagnostics, pressure, component testing

Gaz ballonli avtomobillarni texnik xizmat jarayonining texnik nazorati

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Annotatsiya: Mazkur maqolada gaz ballonli avtomobillarga texnik xizmat ko‘rsatish jarayonida texnik nazoratni takomillashtirish bo‘yicha tahlil natijalari keltirilgan. Tadqiqot davomida avtomobillarning xavfsizligi, energiya samaradorligi va ekologik talablarga mosligi bilan bog‘liq texnik xizmat ko‘rsatish muammolari aniqlangan. Xususan, gaz ballonlarining holatini tekshirish, bosim darajasini nazorat qilish, shikastlangan komponentlarni o‘z vaqtida aniqlash va ularni almashtirish bo‘yicha texnik reglamentlarning ahamiyati ko‘rsatib o‘tilgan. Shuningdek, texnik xizmatning zamonaviy asbob-uskunalar va avtomatlashtirilgan tizimlar yordamida amalga oshirilishi samaradorlikni oshirishi qayd etilgan. Ushbu tadqiqot natijalari gaz ballonli avtomobillarning xavfsiz va barqaror ekspluatatsiyasini ta'minlashga qaratilgan taklif va tavsiyalar ishlab chiqishda asos bo‘lib xizmat qiladi.
Kalit so‘zlar: Gaz ballonli avtomobillar, texnik nazorat, diagnostika, bosim, komponentlarni tekshirish

1. Kirish

Gaz ballonli avtomobillar atrof-muhit himoyasida an’anaviy benzin va dizel yoqilg‘isi bilan ishlaydigan avtomobillarga qaraganda ekologik jihatdan toza hisoblanadi. Ular chiqindi gazlar va atmosferaga chiqariladigan zararli moddalarni kamaytiradi. Texnologiyani takomillashtirish orqali bu jarayonni yanada xavfsizroq va samaraliroq qilish mumkin.

Gaz ballonli avtomobillarda xavfsizlik bo‘yicha tizimlar noto‘g‘ri ishlatilsa yoki texnologik nuqsonlar mavjud bo‘lsa, avariya xavfi yuqori bo‘lishi mumkin. Ayniqsa, gazning portlash xavfi yoki zaharlanish xavfi ko‘payadi. Shuning uchun gaz tizimlarini nazorat qilish va avtomobillarning texnik holatini muntazam tekshirish texnologiyalarini takomillashtirish haydovchilar va yo‘lovchilar xavfsizligini oshiradi.

Gaz ballonli avtomobillarda iqtisodiy samaradorlik, yonilg‘i tejamkorligi va iqtisodiy jihatdan qulayligi bilan ham ajralib turadi. Texnologiyani takomillashtirish va nazorat tizimlarini rivojlantirish orqali bu iqtisodiy afzalliklarni saqlab qolishi hattoki oshirishi ham mumkin.

Avtomobillarning gaz ballonlari va ularning ishlash tizimlarini doimiy monitoring qilish va nazorat texnologiyalarini takomillashtirish tizimlarning xizmat muddatini uzaytirishga yordam beradi. Shuningdek, avtotransport vositalarining samarali ishlashi va texnik xizmat ko‘rsatishning osonlashishi bilan foydalanuvchilar uchun qulaylik yaratadi va bu tizim ishonchliligini tashkil etadi.

Global tendensiyalariga dunyo ekologik va xavfsizlik talablari tobora oshib borayotgani sababli gaz ballonli avtomobillarni yanada xavfsiz va ishonchli qilish dolzarb masalalardan biri bo‘lib qolmoqda. Shu bois texnologik yangiliklar, avtomatlashtirilgan monitoring va boshqaruv tizimlarini joriy etish talab qilinadi.

Ushbu sabablar gaz ballonli avtomobillar xavfsizligini oshirish va nazorat qilish texnologiyasini takomillashtirish zarurligini ko‘rsatib beradi

Jahonda avtotransport vositalarini ekologik toza yoqilg‘i turlari, shu jumladan siqilgan tabiiy gaz bilan ta’minlash borasida qator tadbirlar amalga oshirilmoqda, avtomobillarni gaz bilan to‘ldirish kompressor stansiyalarining soni 670 taga yetdi va avtotransport

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vositalarining 50 foizdan ortig‘i muqobil yoqilg‘i sifatida siqilgan tabiiy gazdan foydalanmoqda.

Gaz ballonli avtomobillarning yagona nazorat tizimini yaratish va shu bilan bir qatorda gaz ballonli avtomobillarga tehnik xizmat ko‘rsatish jarayonida texnik nazoratini kuchaytirish bilan ishlab chiqarish samaradorligini oshirish xavfsizlikni ta’minlashdan iborat.

Ushbu sohada xavfsizlik masalalarini tartibga solish uchun O‘zbekiston Respublikasi Vazirlar Mahkamasining “Gaz ballonli avtomobillarni nazorat qilish texnologiyasini takomillashtirish bilan uning xavfsizligini orttirish qo‘shimcha chora-tadbirlari to‘g‘risida” 2017 yil 11 oktyabrdagi 815-son qarori va “Transport vositalarini majburiy texnik ko‘rikdan o‘tkazish tartibini takomillashtirishga doir qo‘shimcha chora-tadbirlari to‘g‘risidagi” 2017 yil 22 dekabrdagi 1010-son qarori qabul qilindi. Shu bilan birga avtomobillarni gaz bilan to‘ldirish va ularni nazorat qilish texnologiyasini yoki metodlarini takomillashtirish bilan xavfsizligini orttirish, shuningdek, eskirgan gaz ballonlardan foydalanish oqibatida belgilangan talab va tartiblarni buzish holatlari uchramoqda. [1].

2. Tadqiqot metodologiyasi

Ushbu tadqiqotlar avtomobillarning xavfsizligi, yoqilg‘i samaradorligi, ekologik tozaligi va texnologik taraqqiyotini ko‘zlab o‘tkaziladi. Quyida gaz ballonli avtomobillarni nazorat qilish bo‘yicha tadqiqotlar olib borgan asosiy tashkilotlar va olimlarni sanab o‘tish mumkin:

Fawzi M. Al-Naima , Mohannad M. Hasan Ushbu ikki olim dissertatsiya ishida RFID texnologiyasiga asoslangan yoqilg‘i tarqatish tizimini taqdim etadi. Tizim yoqilg‘i quyish jarayonini yaxshilashi mumkin. Buni ancha oson, xavfsiz va ishonchli qilish uchun. Ma’lum miqdordagi yoqilg‘i miqdorini belgilash orqali ruxsatsiz yoqilg‘i quyishning oldini oladi. [2]

Tomas B. Reed va Randell L. Perry: Ushbu ikki olim gaz ballonli transport vositalari uchun alternativ yoqilg‘i texnologiyalari bo‘yicha chuqur tadqiqotlar olib borgan. Ularning ishlari gaz ballonlarida saqlanadigan tabiiy gaz va vodorod kabi yoqilg‘ilarni samarali boshqarish bo‘yicha muhim amaliy tajribaga ega. [3]

Argonne National Laboratory (AQSh): Bu laboratoriyada avtomobil dvigatellari va gaz ballon texnologiyalari bo‘yicha keng qamrovli tadqiqotlar olib boriladi. Ular gaz ballonli avtomobillarning energiya samaradorligi va chiqindilarni kamaytirish bo‘yicha ishlanmalar yaratgan. [4]

German Aerospace Center (DLR): Germaniya aviatsiya va kosmonavtika markazi (DLR) gaz ballonli avtomobillarni tadqiq qilishda yuqori darajada faol bo‘lib, ular gaz yoqilg‘isi tizimlarini optimallashtirish, energiya tejash va uglerod chiqindilarini kamaytirishga qaratilgan nazariy va amaliy tadqiqotlar olib borgan. [5]

European Alternative Fuels Observatory (EAFO): EAFO Yevropada gaz ballonli transport vositalarini rivojlantirish va nazorat qilish bo‘yicha ma'lumotlar to‘plash va tahlil qilishda yetakchi markazlardan biri hisoblanadi. Ular gaz ballonli avtomobillar va boshqa alternativ yoqilg‘i tizimlari bo‘yicha tadqiqotlarni faol olib boradi. [6]

Ushbu tashkilotlar va olimlar gaz ballonli transport vositalarini yanada xavfsiz, samarali va ekologik jihatdan toza qilish yo‘lida katta hissaga ega.

Bugungi kunda olimlar gaz ballonli avtomobillar xavfsizligini oshirish uchun turli texnologiyalar va tadqiqotlarni amalga oshirmoqda. Quyida ular qilayotgan asosiy ishlarga qisqacha to‘xtalib o‘tamiz:

Yuqori mustahkamlikdagi materiallarga ega bo‘lishlik, bunda gaz ballonlarining asosiy xavfi portlash xavfi bo‘lib, bu ko‘pincha ballonning sifati yoki dizaynidan kelib chiqadi. Shuning uchun olimlar yuqori bosimga chidamli, yengil va uzoq muddat xizmat qiladigan yangi kompozit materiallar ishlab chiqmoqda. Hozirgi kunda ballonlarning ko‘p qatlamli dizaynlaridan foydalanilmoqda. Ular ballon ichidagi gazning sızishidan himoya qiladi va strukturaviy mustahkamlikni oshiradi [7]. Datchiklar tizimida gaz ballonlarining harorati va bosimi muntazam ravishda monitoring qilinadi. Yangi datchik texnologiyalari ballon ichidagi gazning bosimi yoki haroratini nazorat qilish va favqulodda holatlarda avtomatik ogohlantirish yoki gaz chiqarish tizimini ishga tushirish imkonini beradi. Internet texnologiyalar tizimlari orqali real vaqtda avtomobillarning gaz ballonlarini uzoqdan kuzatish mumkin. Bu tizim nosozliklarni oldindan aniqlash va ta’mir yoki xavfsizlik choralarini vaqtida ko‘rish imkonini beradi. [8]

Avtomatik xavfsizlik tizimlari. favqulodda gaz chiqarish ya’ni ba’zi tizimlar ballonlarda bosim yoki harorat kritik darajaga yetganda avtomatik ravishda ortiqcha gazni chiqarib yuboruvchi tizimlar bilan jihozlangan. Bu portlashning oldini oladi va xavfsizlikni oshiradi. Yong‘in va portlashga qarshi tizimlarda ko‘plab yangi dizaynlar yong‘inga chidamli bo‘lib, ballon ichidagi gazni xavfsiz tarzda chiqarib yuborish imkonini beradi. [9]

Kompyuter modellashtirish va simulyatsiya qilish. Bunda modellashtirish vositalari orqali olimlar ballonlar xavfsizligini o‘rganishda kompyuter modellashtirish va simulyatsiya vositalaridan foydalanadi. Bu orqali gaz ballonlarining ekstremal sharoitlarda qanday tutishini oldindan ko‘rish va dizaynni takomillashtirish imkonini beradi. [10]

Simulyatsiya qilish: Gaz ballonli transport vositalarining turli vaziyatlardagi simulyatsiyasi real hayotda yuz berishi mumkin bo‘lgan hodisalarni model qilib, xavfsizlik choralari ko‘riladi. [11]

Qonunchilik va yangi xavfsizlik standartlari. Olimlar va mutaxassislar xalqaro xavfsizlik standartlarini yangilash va kuchaytirish bo‘yicha ishlamoqda. Yangi talablar va texnologiyalar yordamida ishlab chiqaruvchilar xavfsizlikni yaxshilashga majbur bo‘lmoqda. [12]

Bu yo‘nalishlar bo‘yicha olib borilayotgan tadqiqotlar va yangi texnologiyalar gaz ballonli avtomobillarning xavfsizligini oshirishda muhim qadam hisoblanadi.

3. Natija va muhokamalar

Ilmiy tadqiqot ishini olib borish jarayonida gaz ballonli avtomobillarni texnik xizmat jarayonining texnik nazorati bo‘yicha materiallarni sifati va chidamliligi quyidagicha turlarga bo‘lib ko‘rib chiqamiz. Kompozit ballonlar chelik ballonlarga qaraganda 30% bardoshli va engil bo‘lib, lazer texnologiyasiga asoslangan datchiklar gaz sizib chiqishini aniqlashda 90% aniqlikka ega bo‘ladi.

Ilmiy tadqiqotlar natijasida gaz ballon tizimlarining nosozlik sabablarini aniqlash va ularga qarshi chora-tadbirlar ishlab chiqishga qaratilgan.

Nosozliklarning tasnifi: Bular quyidagicha tasniflanadi;

35% texnik xizmatning yetishmasligi sababli.

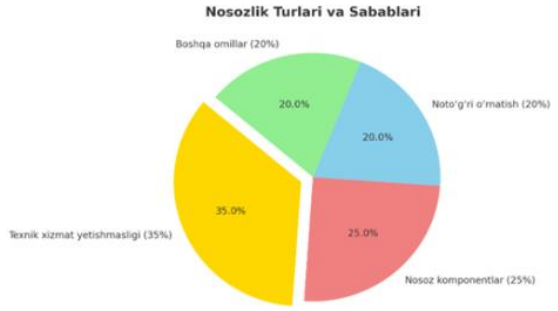
25% nosoz komponentlar tufayli.

20% noto‘g‘ri o‘rnatish natijasida yuzaga keladi.

Sinov natijalaridan asosiy maqsad gaz ballonli avtomobillarni texnik holatini aniqlash va ularga ko‘rsatiladigan texnik hizmat ko‘rsatish jarayonini yana ham takomillashtirishdan iborat va bu o‘z navbatida xavfsizlik talabini ortishiga hizmat qiladi.

Sun’iy intellekt asosidagi monitoring tizimlari diagnostika jarayonlarini 60% tezlashtirdi.

Kompozit ballonlar va avtomatlashtirilgan xavfsizlik tizimlari portlash xavfini 50% ga kamaytirdi(1-rasm).



1-rasm. Nosozlik turlari va sabablari

Yuqoridagi diagramma gaz ballon tizimlarining nosozlik turlari va ularning sabablarini ko‘rsatadi. Natijalar quyidagicha:

- Texnik xizmat yetishmasligi - Nosozliklarning eng katta qismi (35%) texnik xizmat ko‘rsatishning yetarli darajada amalga oshirilmaganligi sababli yuzaga keladi.
- Nosoz komponentlar - 25% holatlarda texnologik jihatdan sifatsiz yoki nosoz komponentlardan foydalanish muammoga sabab bo‘ladi.
- Noto‘g‘ri o‘rnatish - 20% nosozliklar montaj jarayonidagi xatoliklarga bog‘liq.
- Boshqa omillar - Qolgan 20% boshqa omillar, masalan, eskirgan materiallar va ekstremal sharoitlar bilan bog‘liq.

Gaz ballondagi metan gazi silindrlarining texnik tavsiflari keltirilgan, bu erda o‘rtacha mukammallik koeffitsienti (massa va hajm nisbati) = 0,65, ya’ni. 100 litrli silindrning og‘irligi taxminan 65 kg bo‘ladi. Biz tajriba sinovlarimiz davomida quyidagicha jadvalga ega bo‘ldik.

1-jadval

Gaz ballondagi metan gazi silindrlarining texnik tavsiflari

Hajmi, l	**Gaz quvvati, m^3**	**Tashqi diametri, mm**	**Uzunlik, mm**	**Og‘irligi, kg**	**Maks. ishbosimi, MPa**	**Sinovbosimi, MPa**
47	11,75	326	860	33,6	20	30
50	12,5	326	900	35,2	20	30
67	16,75	326	1140	44,6	20	30
80	20	326	1360	53,2	20	30
100	**25**	**326**	**1660**	**65**	**20**	**30**
123	30,75	326	2000	78,4	20	30
67	16,75	398	840	45,6	20	30
80	20	398	965	52,3	20	30
85	21,25	398	1015	55	20	30
96	24	398	1125	61,1	20	30
100	25	398	1165	63,5	20	30
132	33	398	1485	80,5	20	30
160	40	398	1765	99,5	20	30
185	46,25	398	2005	108,5	20	30

4. Xulosa

Gaz ballonli avtomobillarni texnik xizmat jarayonlarining texnik nazorati samarali va tizimli boshqaruvni talab qiladi. Tadqiqot natijalari shuni ko‘rsatadiki, gaz ballonli transport vositalarining xavfsizligi va samaradorligini ta’minlashda texnik xizmat ko‘rsatish bosqichlarining muvofiqligi muhim ahamiyatga ega. Asosiy e’tibor ballonlarning holati, ularning foydalanish muddati va yaroqliligi, gaz o‘tkazish tizimlarining xavfsizligi va ularga xizmat ko‘rsatish qoidalariga rioya qilinishiga qaratilishi lozim.

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CONTEXT / MUNDARIJA