Hansatic

TEXNIK OQ QOG‘OZ

Neyro-simvolik yuk rejalashtirish

Yuk rejalashtirish mexanizmi va sakkizta yetakchi AI modeli haqiqiy mijoz yuklarida

Noyabr 2026 yil

hansatic.com/uz/neuro-symbolic-load-planning

Hamroh sahifa, har bir reja 3D ko‘rinishda: hansatic.com/uz/neuro-symbolic-load-planning

Xulosa

Biz deterministik yuklash dvigatelini generativ AI bilan birlashtirmoqdamiz. Ularni birlashtirishdan oldin, har bir qismini alohida o‘lchadik.

- **Ma’lumotlar:** 20 ta real mijoz yuk rejalashtirish holati, 26 ta baholangan sinov. Ular dengiz konteynerlari, *curtainsider*lar, 53 ft (16.2 m) quruq furgon, AKE havo konteyneri va bir-biriga bog‘langan pallet qurilishini qamraydi.
- **Ishtirokchilar:** Hansaticning ishlab chiqarishdagi yuklash dvigateli va sakkizta yetakchi LLM. Har bir model har bir buyum uchun bitta JSON javobida joylashuv va orientatsiyani ko‘rsatishi kerak, vositalarsiz.
- **Hakam:** bitta deterministik validator har bir ishtirokchini bir xil usulda baholaydi. U quyidagilarni tekshiradi:
  - geometriya;
  - 95% asosli qo‘llab-quvvatlash;
  - ustma-ust qo‘yish va mo‘rtlik chegaralari;
  - orientatsiya belgilari;
  - ingichka ustunlar;
  - yuk va o‘q yuklari;
  - uzunlamasiga og‘irlik markazi diapazoni.

Natijalar:

- **Dvigatel** 26 ta sinovning 26 tasida qonuniy. Har bir sinovda eng yaxshi qonuniy model javobiga nisbatan, u 18 ta sinovda oldinda (13 tasida aniq, 5 tasida ozgina) va 8 tasida durang. Hech qaysi sinovda orqada emas.
- **Eng kuchli model,** GPT-5.5, 26 ta sinovning 25 tasida qonuniy, shu jumladan, 253 ta buyumgacha bo‘lgan yuklar ro‘yxatida.
- **Sakkizta modeldan to‘rttasi** sinovlarning uchdan biridan kamrog‘ida qonuniy.
- **Modellar nima yaxshi bajaradi.** Eng yaxshi model javoblari dvigatelda bo‘lmagan ikkita tartib strategiyasidan foydalandi. Ikkalasi ham endi deterministik dvigatel strategiyalari hisoblanadi.

Bizning xulosamiz: dvigatel bugungi kunda yaxshiroq rejalashtiruvchi bo‘lib, model ijodkorligi saqlanishga arziydi. Buning uchun arxitekturamiz neyro-simvolik:

- modellar strategiyalarni taklif qiladi;
- dvigatel har bir rejani quradi;
- validator faqat qonuniy yaxshilanishlarni saqlaydi.

Biz holatlar, validator, so‘rovlar va baholash kodini e’lon qilamiz.

1. Baholash dizayni

1.1 Holatlar

Har bir holat Hansatic ilovasidan olingan haqiqiy mijoz yuki bo‘lib, o‘lchamlar, og‘irliklar, miqdorlar, belgilar va transport vositasi 1:1 nusxalangan. Yuklar identifikatorlari almashtirilgan, yuk nomlari olib tashlangan.

Toifa	Holatlar	Sinovlar	Transport vositalari	Yuklar soni
Standart (H01-H12)	12	16	bitta 20' konteyner, ikkita 40' quruq konteyner, to‘rtta 40' High Cube (HC), bitta 45' HC, to‘rtta 13.6 m (44.6 ft) parda yonli yuk mashinasi	14-83
Katta (BV1-BV6)	6	8	uchta 40' HC, bitta 40' quruq konteyner, bitta 13.6 m (44.6 ft) parda yonli yuk mashinasi, bitta 53 ft (16.2 m) quruq furgon	103-253
Maxsus (U01, P01)	2	2	AKE (LD3) qiya devorli; 1200 × 1000 mm (47 × 39 dyuym) pallet	50 va 40

Sinovlar va maqsadlar:

- **Yuk mashinalari** ikki marta baholanadi: yuk uzunligi (LDM) va pallet joylari bo‘yicha. Bu 12 standart holatdan 16 ta va 6 katta holatdan 8 ta sinovni tashkil qiladi.
- **BV5 va BV6** to‘liq sig‘maydi. Ularda ko‘proq yuk joylashtirish asosiy maqsad hisoblanadi.
- **U01 va P01** har birida ma’lum optimal natija mavjud:
  - U01: 50 kubdan 24 tasi, chunki qiya devor boshqa joylashuvga imkon bermaydi;
  - P01: 40 xaltadan 40 tasi 100% bir-biriga bog‘langan holda.

Hollardagi cheklovlar:

- ustma-ust qo‘yilmaydigan va faqat ustki qismiga qo‘yiladigan (mo‘rt) yuklar;
- har bir yuk uchun ustma-ust qo‘yish og‘irligi chegarasi;
- "ushbu tomoni yuqoriga" va "egilmasin" belgilari;
- uzun sterjenlar (BV1, konteyner uzunligigacha);
- bitta og‘ir yuk (H02);
- aralash pallet va quti yuklari (BV3).

1.2 Tasdiqlovchi

Tasdiqlovchi (v2.3.0) har bir rejani bir xil tarzda tekshiradi. Reja faqat barcha qat’iy tekshiruvlar o‘tgan taqdirdagina qonuniy hisoblanadi.

Tekshiruv	Qoida
Chegaralar	har bir yuk yuk maydonida, shu jumladan AKE qiyaligi ichida joylashgan bo‘lishi kerak
Qoplanish	hech qanday ikki yuk hajmini bo‘lishmasligi kerak
Tayanch	har bir yukning kamida 95% taglik qismi polga yoki pastdagi yuklarga tayanishi kerak
Ustma-ust qo‘yish	ustma-ust qo‘yilmaydigan yuklar hech narsani ko‘tarmasligi kerak; faqat ustki qismiga qo‘yiladigan yuklar hech narsani ko‘tarmasligi va ustki qismida joylashishi kerak; har bir yuk uchun ustma-ust qo‘yish og‘irligi chegarasi saqlanishi kerak
Orientatsiya	"ushbu tomoni yuqoriga" va "egilmasin" belgilari hurmat qilinishi kerak
Nozik ustunlar	mustaqil ustunlarning balandlik va taglik nisbati chegarasi
Yuk og‘irligi	umumiy massa transport vositasi chegarasidan oshmasligi kerak
O‘q yuki (yuk mashinalari)	old va orqa o‘q yuklari chegaralaridan oshmasligi kerak, yuklarning og‘irlik markazlaridan hisoblanadi
Og‘irlik markazi (konteynerlar)	bo‘ylama og‘irlik markazi (CoG) ruxsat etilgan diapazonda bo‘lishi kerak
Ko‘p bekatli yuk	bekatlar bo‘yicha oxirgi yuk birinchi bo‘lib tushirilishi kerak, agar holatda bekatlar mavjud bo‘lsa

Ag‘darilish xavfi hisoblanadi va hisobot qilinadi, lekin baholanmaydi.

1.3 Reyting

Har bir sinov uchun qo‘llaniladi:

1. Qonuniy reja qonuniy bo‘lmagan rejadan ustun keladi.
2. Joylashtirilgan yuklar soni ko‘proq bo‘lsa, g‘alaba qozonadi.
3. Sinovning maqsadi hal qiladi:
   - qisqaroq yuk uzunligi (LDM);
   - yoki kamroq pallet joylari;
   - yoki P01 uchun yuqoriroq bir-biriga bog‘lanish ulushi, keyin esa pastroq balandlik.
4. Pallet joylari bo‘yicha durang bo‘lsa, LDM bo‘yicha hal qilinadi.

Har bir ishtirokchi uchun pallet joylari bitta hisoblagich bilan hisoblanadi: Hansaticning ishlab chiqarish hisoblagichi.

Farqlar. G‘alabani quyidagicha ataymiz:

- **aniq** – agar LDM bo‘yicha kamida 2%, kamida bitta pallet joyi yoki kamida bitta ko‘proq yuk joylashtirilgan bo‘lsa;
- **nozik** – aks holda.

Mexanizm vaqt chegarasida ishlaydi, shuning uchun 2% dan kam farq bitta sinovdagi o‘zgarish bo‘lishi mumkin (6.2-bo‘lim).

1.4 Ishtirokchilar

Modellar. Sakkizta laboratoriyaning har birining yetakchi modeli:

- GPT-5.5 (OpenAI)
- Claude Opus 5.5 (Anthropic)
- Grok 4.7 (xAI)
- Gemini 4 Argon (Google)
- Kimi K3.1 Pro (Moonshot AI)
- DeepSeek V4 Pro (DeepSeek)
- Qwen3p8 (Alibaba)
- Magistral Medium (Mistral AI)

Sozlamalar:

- **Sinovlar:** har bir holat uchun bittadan.
- **Chiqish chegarasi:** 64k token yoki provayderning pastroq maksimal chegarasi (Gemini: 32k).
- **Guruhlash:** provayderlar taklif qilgan guruhlash APIlaridan foydalanilgan.
- **Javoblar to‘plangan sana:** 2026-11-11.
- **Umumiy xarajat:** taxminan $64.

Mexanizm. Hansaticning ishlab chiqarish yuklagichi, 2026-11-20 versiyasi (commit 9f66537c). Sozlamalar:

- ishlab chiqarish konfiguratsiyasi: 4 ishchi va ishlab chiqarish vaqt chegarasi, bitta CPU yadrosiga mahkamlangan;
- har bir holat uchun bittadan sinov, eng yaxshi natija emas;
- o‘zining 60% tayanch qoidasiga ko‘ra yuklaydi va 95% bo‘yicha boshqa modellardek baholanadi.

1.5 So‘rovlar

- Har bir transport turi uchun bitta so‘rov: konteyner, yuk mashinasi, ULD va pallet.
- Har bir so‘rovda tegishli tur uchun tasdiqlovchi qo‘llaydigan aniq qoidalari, maqsadi va chiqish sxemasi (yuk identifikatori, joylashuvi, orientatsiyasi) ko‘rsatilgan.
- Hal qilingan tartiblar namunalar sifatida berilmagan.

To‘liq shablonlar **Ilova A**da keltirilgan.

2. Natijalar

2.1 Har bir model bo‘yicha, barcha 26 ta sinov

Model	Qonuniy	Dvigatel bilan durang	Dvigatelga yutqazdi
GPT-5.5	25	4	22
Opus 5.5	20	6	20
Grok 4.7	20	4	22
Kimi K3.1 Pro	12	5	21
DeepSeek V4 Pro	7	3	23
Gemini 4 Argon	5	2	24
Qwen3p8	4	3	23
Magistral Medium	2	0	26

Hech bir model birorta sinovda dvigatelni yenga olmadi.

Standart to‘plam (16 ta sinov).

Model	Qonuniy	Durang	Yutqazdi
GPT-5.5	15	3	13
Opus 5.5	13	4	12
Grok 4.7	10	2	14
Kimi K3.1 Pro	8	3	13
DeepSeek V4 Pro	4	2	14
Gemini 4 Argon	4	1	15
Qwen3p8	2	1	15
Magistral Medium	1	0	16

Katta to‘plam (8 ta sinov). Hech bir model katta sinovlarda dvigatel bilan durang o‘ynamadi.

Model	Qonuniy
GPT-5.5	8
Grok 4.7	8
Opus 5.5	5

Model	Qonuniy
Kimi K3.1 Pro	2
DeepSeek V4 Pro	1
Magistral Medium	1
Gemini 4 Argon	0
Qwen3p8	0

Maxsus to‘plam (2 ta sinov).

Model	Qonuniy	Optimalga yetdi
Opus 5.5	2	2
Grok 4.7	2	2
Kimi K3.1 Pro	2	2
Qwen3p8	2	2
GPT-5.5	2	1
DeepSeek V4 Pro	2	1
Gemini 4 Argon	1	1
Magistral Medium	0	0

2.2 Dvigatel eng yaxshi qonuniy model javobi bilan solishtirildi

To‘plam	Aniq ustun	Ozgina ustun	Durang	Yutqazdi
Standart (16)	7	3	6	0
Katta (8)	6	2	0	0
Maxsus (2)	0	0	2	0
Jami (26)	**13**	**5**	**8**	**0**

Standart to‘plam. Har bir katakda joylashtirilgan buyumlar soni, keyin yuk uzunligi yoki pallet joylari ko‘rsatilgan.

Sinov	Dvigatel	Eng yaxshi qonuniy model	Farq
H01	26/27, 11.69 m (38.4 ft)	Opus 26, 11.74 m (38.5 ft)	ozgina (0.4%)
H02	24/29, 5.78 m (19.0 ft)	GPT 18, 5.76 m (18.9 ft)	aniq (+6 joylashtirildi)
H03	31/32, 10.51 m (34.5 ft)	qonuniy javob yo‘q	aniq
H04	39, 10.44 m (34.3 ft)	Opus 39, 10.44 m (34.3 ft)	durang

Sinov	Dvigatel	Eng yaxshi qonuniy model	Farq
H05	49, 12.40 m (40.7 ft)	Opus 49, 12.40 m (40.7 ft)	durang
H06	83, 10.65 m (35.0 ft)	Grok 83, 11.41 m (37.4 ft)	aniq (6.6%)
H07	45, 9.60 m (31.5 ft)	GPT 45, 9.60 m (31.5 ft)	durang
H08	52, 5.92 m (19.4 ft)	Kimi 52, 6.12 m (20.1 ft)	aniq (3.3%)
H09 LDM	29/30, 13.36 m (43.8 ft)	GPT 29, 13.56 m (44.5 ft)	ozgina (1.5%)
H09 palletlar	29/30, 29 joy	GPT 29, 29 joy	ozgina (LDM hal qiluvchi)
H10 LDM	26, 12.20 m (40.0 ft)	DeepSeek, bir xil	durang
H10 palletlar	26, 31 joy	DeepSeek, bir xil	durang
H11 LDM	23, 12.00 m (39.4 ft)	Opus 23, 12.20 m (40.0 ft)	ozgina (1.6%)
H11 palletlar	23, 30 joy	Kimi 23, 32 joy	aniq (2 joy)
H12 LDM	13/14, 11.00 m (36.1 ft)	Gemini 13, 11.00 m (36.1 ft)	durang
H12 palletlar	13/14, 25 joy	Kimi 13, 28 joy	aniq (3 joy)

Katta to‘plam.

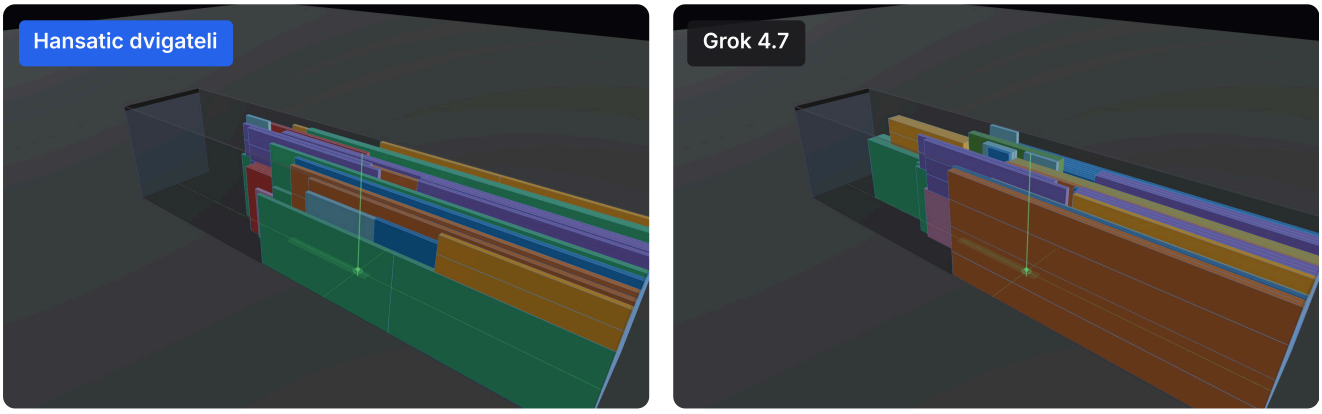
Sinov	Dvigatel	Eng yaxshi qonuniy model	Farq
BV1 (40' HC, 103 ta bar)	103, 9.17 m (30.1 ft)	Grok 103, 10.66 m (35.0 ft)	aniq (14.0%)
BV2 LDM (parda yonli, 153)	153, 11.52 m (37.8 ft)	Opus 153, 11.78 m (38.6 ft)	aniq (2.2%)
BV2 palletlar	153, 29 joy	Opus 153, 29 joy	ozgina (LDM hal qiluvchi)
BV3 LDM (53 ft furgon, 119)	119, 6.83 m (22.4 ft)	Opus 119, 6.99 m (22.9 ft)	aniq (2.2%)
BV3 palletlar	119, 17 joy	Opus 119, 18 joy	aniq (1 joy)
BV4 (145, faqat yuqori qism mo‘rt)	145, 8.57 m (28.1 ft)	Grok 145, 8.85 m (29.0 ft)	aniq (3.1%)
BV5 (136, faqat tik turuvchi)	127, 12.00 m (39.4 ft)	Opus 124, 11.77 m (38.6 ft)	aniq (+3 joylashtirildi)
BV6 (253, hajmning 95%)	244, 11.98 m (39.3 ft)	GPT 238, 11.97 m (39.3 ft)	aniq (+6 joylashtirildi)

Maxsus to‘plam.

Sinov	Dvigatel	Modellar
U01 (AKE)	24/50, optimal	Opus, Grok, Kimi, Qwen va Gemini ham 24 ga yetdi; GPT va DeepSeek 18 ga yetdi
P01 (pallet)	40/40, 100% bir-biriga bog‘langan, optimal	har bir qonuniy model javobi 40/40 ga optimalda yetdi

2.3 Farqlar haqiqiy yukda nimani anglatadi

- **BV1:** 1.49 m (4.9 ft) qisqaroq, 40' konteyner uzunligining taxminan 12%.
- **H12 palletlar:** 3 ta kamroq pallet joyi, 13.6 m (44.6 ft) parda yonli yuk mashinasining pallet maydonining taxminan 9%.
- **BV6:** to‘liq sig‘maydigan yukda 6 ta ko‘proq buyum joylashtirildi, shuning uchun yana bir transport vositasiga 6 ta kamroq buyum qoldi.



BV1: Hansatic dvigateli 9.17 m (30.1 ft), chapda; eng yaxshi qonuniy model javobi (Grok 4.7) 10.66 m (35.0 ft), o‘ngda.

2.4 Narx va vaqt

	Dvigatel	Modellar
Har bir reja uchun vaqt	ahamiyatsiz	solishtirilmagan: partiyali APIlar so‘rovlarni navbatda turadi
Har bir reja uchun narx	ahamiyatsiz	$0.10-0.80

3. Muvaffaqiyatsizlik tahlili

208 model sinovi (8 model x 26) davomida 95 ta reja qonuniy bo‘ldi. Qolgan 113 tasi uch xil yo‘l bilan muvaffaqiyatsizlikka uchradi.

Model	Qonuniy	Javob yo‘q (chiqish chegarasi)	Provayder xatosi	Reja qoidalarni buzadi
GPT-5.5	25	1	0	0
Opus 5.5	20	6	0	0
Grok 4.7	20	0	4	2
Kimi K3.1 Pro	12	14	0	0
DeepSeek V4 Pro	7	19	0	0
Gemini 4 Argon	5	2	0	19
Qwen3p8	4	22	0	0
Magistral Medium	2	1	0	23
Jami	**95**	**65**	**4**	**44**

3.1 Javob yo‘q: model fikrlash uchun joy yetmaydi

65 ta sinovda model fikrlashni chiqish chegarasiga yetib, hech qanday rejani yozmadi. Yana bir javob (Magistral, H03) odatda tugadi, lekin haqiqiy JSON emas edi; u shu yerda hisoblangan.

- Bu eng keng tarqalgan muvaffaqiyatsizlik bo‘lib, sakkiz modeldan oltitasiga ta’sir qiladi.
- Kimi, DeepSeek va Qwen o‘zlarining ko‘p sinovlarini shu yo‘l bilan yo‘qotadi. Ularning qonuniy rejalari asosan kichikroq yuklarda.
- Opus 6 ta sinovni shu yo‘l bilan yo‘qotdi, jumladan BV1, BV4 va BV6 — eng katta yuk ro‘yxatlari.

Ishlab chiqarish rejachisi uchun javob yo‘qligi noqonuniy rejadek muvaffaqiyatsizlikdir: dok hali ham rejaga muhtoj.

3.2 Provayder xatolari

Grok 4 ta sinovda HTTP 403 qaytardi, chunki provayderning xarajat chegarasi yetib bordi. Bu sinovlar qayta yuborilmadi va muvaffaqiyatsizlik deb baholandi.

3.3 Qoidalarni buzuvchi rejalar

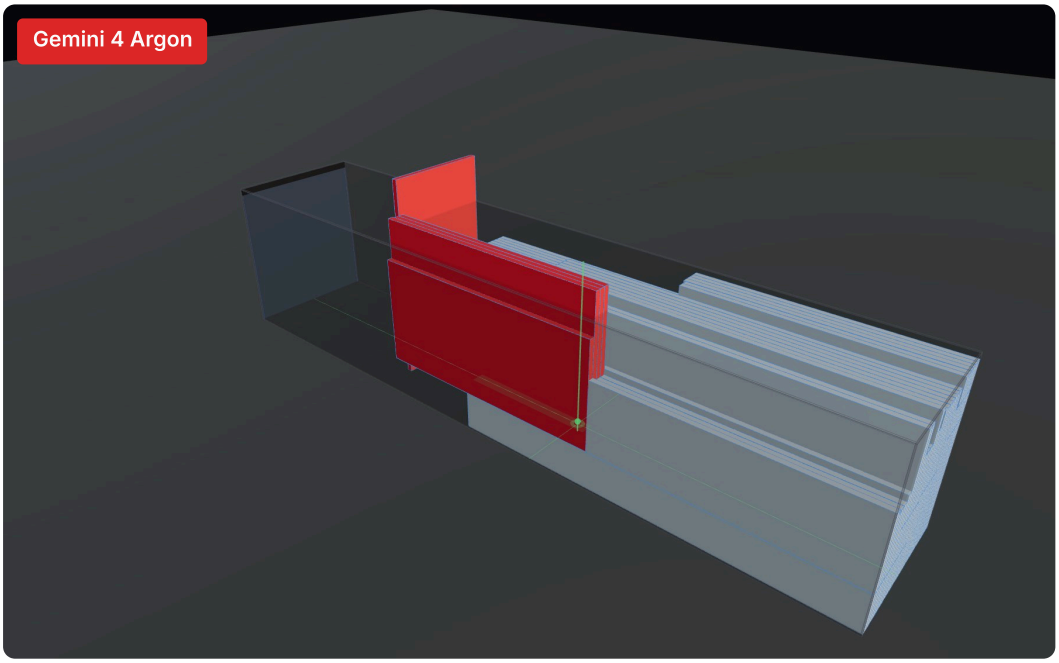
44 ta javob to‘liq rejalar bo‘lib, kamida bitta qattiq qoidadan chiqib ketadi. Deyarli barchasi ikkita modeldan: Gemini (19) va Magistral (23). Grokda 2 ta.

Bu 44 reja orasida har bir turdagi buzilishlar soni:

Buzilgan qoida	Rejalar
Yuk tashish maydonidan tashqarida joylashgan yuk	27
Bir-biriga yopishgan yuklar	27
Suzuvchi yuklar (95% dan kam qo‘llab-quvvatlash)	21
Ruxsat etilgan orientatsiyaga mos kelmaydigan yuk o‘lchamlari	17
O‘ralmas yoki mo‘rt yuklarga yuklash yoki ustun chegarasidan oshib ketish	10
Tom ustiga yuklash	9
Og‘irlik markazi chizig‘idan tashqarida	7
O‘q yuki oshib ketishi	4
Qiya qo‘yilmasligi kerak bo‘lgan yukning qiyalishi	1
AKE konturidan tashqarida	1

Grokning ikkita noqonuniy rejasi har biri bitta qoidadan chiqib ketdi: bitta sinovda ezilgan yuk, ikkinchisida og‘irlik markazi.

Bu rejalar 3D ko‘rinishda ishonchli ko‘rinadi. Xatolar ko‘pincha bir nechta yuklarda, santimetrlar bilan suzuvchi yoki bir-biriga yopishgan bo‘ladi. Faqat to‘liq geometrik tekshiruv ularni aniqlaydi.



BV1, Gemini 4 Argon: 103 ta yukdan 77 tasi joylashtirilgan. Belgilangan: suzuvchi, bir-biriga yopishgan yoki yuk tashish maydonidan chiqib ketgan yuklar.

3.4 Qonuniy, lekin orqada

- **To‘liq emas.** BV5 va BV6 da eng yaxshi qonuniy model javoblari dvigatelnikiga qaraganda 3 va 6 ta kamroq yukni joylashtirdi.

- **Uzoqroq.** Barcha yuklar sig‘adigan sinovlarda eng yaxshi qonuniy model javobi dvigatelnikiga qaraganda 24 ta yuk mashinasi va konteyner sinovidan 13 tasida uzunroq bo‘ldi. Eng katta farqlar:
  - 1.49 m (4.9 ft) BV1 da;
  - 0.76 m (2.5 ft) H06 da.

3.5 Modellar yaxshi bajaradigan ishlar

Eng kuchli javoblar tajribali ekipaj ishlatadigan strategiyalarni qo‘llaydi:

- **Og‘ir yuklarni old devorga yaqin joylashtirish.**
- **O‘ralmas yuklar ustida balandlikdan foydalanish.** BV3 da Opus kartonlarni 559 mm (22 dyuym) balandlikda yon tomonga yotqizib, ustiga 19 ta o‘ralmas jihozlarni tik qo‘ydi.

Dvigatelda bu strategiyalarning hech biri yo‘q edi. Ikkalasi ham endi deterministik dvigatel strategiyalari. Bu neyro-simvolik halqa ushlab qolishi kerak bo‘lgan ijodkorlik (5-bo‘lim).

4. Vosita quroli

Ikkinchi qurol orqali model `pack_cargo` vositasini chaqirib, har qanday rejaga javob berishi mumkin.

Ko‘pchilik modellarning ro‘yxatni vosita chaqiruviga nusxalab, dvigatel rejalarini o‘zgartirmay qaytarishi kuzatildi. Xatolar nusxalashda sodir bo‘ldi:

- Magistral 100 ta yukning o‘lchamlari yoki belgilarini noto‘g‘ri yubordi;
- Kimi H10 yukida noto‘g‘ri chaqiruv qildi;
- Qwen 4 ta yukda ishlamadi.

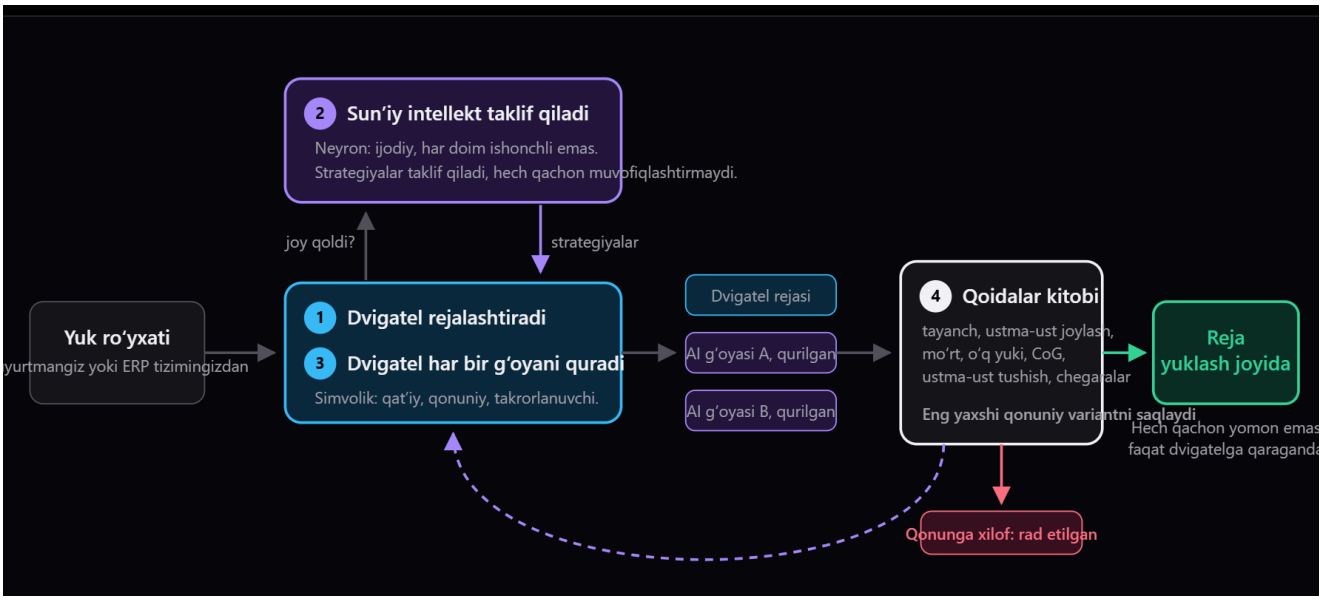
Xulosa: har qanday birlashtirilgan tizimda dvigatel ro‘yxatni to‘g‘ridan-to‘g‘ri manba tizimidan o‘qishi kerak, hech qachon model orqali emas.

5. Neyro-simvolik arxitektura

5.1 Ikki turdagi aql

	Yuklash mexanizmi (simvolik)	Generativ AI (neyron)
Qoidalar	har safar kodlangan har bir qoidadan foydalanadi	berilgan qoidalardan chetlanadi
Takrorlanuvchanlik	bir xil yuk, bir xil reja	bir xil yuk turli rejalarni olishi mumkin
Audit	har bir joylashtirish sabablangan	audit qilish qiyin
Diapazon	faqat mavjud strategiyalar bilan cheklangan	yangi strategiyalarni topadi
Masshtab	253 dona yukni boshqaradi	ko‘p modellarda katta yuk ro‘yxatlariga javob yo‘q

5.2 Halqa



1. **Asosiy reja.** Mexanizm manbadan to‘g‘ridan-to‘g‘ri olingan yuk ro‘yxati asosida rejalashtiradi.
2. **Trigger.** Model faqat asosiy rejada joy qolganida chaqiriladi: joylashmagan yuklar, past to‘ldirish darajasi yoki belgilangan bo‘shliq maqsadi bajarilmaganda.
3. **Taklif.** Model hech qachon koordinatalarni qaytarmaydi, faqat strategik parametrlarni:
   - zonalar;
   - tartiblar;
   - orientatsiya afzalliklari;
   - pol va qopqoq tuzilmalari.
4. **Bajarish.** Mexanizm har bir taklif uchun bitta reja tuzadi.

5. **Baholash.** Validator eng yaxshi qonuniy rejani saqlaydi. Asosiy reja har doim nomzod sifatida qoladi.
6. **Distillash.** Takroriy g‘alaba qozongan taklif mexanizm strategiyasi sifatida doimiy saqlanadi, masalan, old devor va karton pol strategiyalari shunday paydo bo‘ldi.

5.3 Konstruktiv xususiyatlar

- **Mexanizm yolg‘iziga qaraganda hech qachon yomonroq emas,** chunki asosiy reja har doim nomzod sifatida qoladi.
- **Noqonuniy reja dokka yetmaydi,** chunki validator har bir nomzodni baholaydi.
- **Transkripsiya xavfi yo‘q,** chunki model hech qachon yuk ro‘yxati yoki koordinatalarga tegmaydi (4-bo‘lim).
- **Modelning chiqish chegarasi tufayli muvaffaqiyatsizlik yo‘q,** chunki taklif bir necha parametrdan iborat, 253 dona yuk rejasidan emas (3.1-bo‘lim).
- **AI xarajatlari chegaralangan,** chunki model faqat triggerda ishga tushiriladi.

Biz hozirda ushbu halqani qurmoqdamiz. U keyingi nashrda alohida ishtirokchi sifatida baholanadi, reja uchun xarajat va vaqt bilan.

6. Doira va cheklovlar

6.1 Validator doirasi

Qonuniy deganda, v2.3.0 versiyasidagi kodlangan qoidalar bo‘yicha qonuniy. Validator ko‘p bekatli yuklashda oxirgi kirgan, birinchi chiqadi (LIFO) tartibidan tashqari yuklash ketma-ketligini tekshirmaydi.

6.2 O‘zgaruvchanlik

Har bir ishtirokchi har bir holat bo‘yicha bir marta ishga tushiriladi.

- **Dvigatel** vaqt chegarasi ichida strategiyalarni sinovdan o‘tkazadi, shuning uchun mashina yuki qaysi strategiya birinchi tugatishini o‘zgartirishi mumkin. H02 holatida turli sinovlarda 5.63-5.79 m (18.5-19.0 ft) o‘lchandi.
- **Modellar** bir marta namunalanadi.

Bir martalik farqlar 2% dan kam bo‘lsa, tor deb hisoblanadi.

6.3 Model darajasi va chiqish chegarasi

- Har bir laboratoriya asosiy chegara modeli sinovdan o‘tkazildi. Premium darajalar (Anthropic Fable, OpenAI GPT-6 Astra) sinovdan o‘tkazilmadi.
- Kattaroq chiqish chegarasi ba’zi javobsiz sinovlarni (3.1-bo‘lim) rejalarga aylantirishi mumkin.

6.4 Holat manbai

Barcha holatlar bitta platformaning foydalanuvchilaridan olingan. Boshqa yuklovchilarning yuk aralashmasi farq qilishi mumkin.

7. Keyingi qadamlar

7.1 Amaliy qoidalari

Keyingi ikki amaliy qoida dvigatel va validator v3 ga kiritiladi:

- **Tom bo‘shligi:** tom ostida kamida 50 mm (2.0 dyuym) yoki 25 kg (55 funt) dan ortiq ustma-ust qo‘yilgan yuk ustida 100 mm (3.9 dyuym) bo‘shliq.
- Har bir **vilkali yuklagich qatori** uchun yon bo‘shliq.

Tom qoidasi bo‘yicha barcha ishtirokchilar qayta baholandi. Egilishi mumkin bo‘lmagan va tomdan 50 mm (2.0 dyuym) balandlikda joylashgan pol yuklari istisno qilinadi, chunki holat ularni majbur qiladi.

- **Dvigatel** bu qoidadan 16 ta standart yukning 9 tasida va 8 ta katta yukning 1 tasida foydalanadi.

- **6 ta yukda model javobi** dvigatelnikiga yaqin rejada bu qoidadan foydalanadi. Bular dvigatelning birinchi maqsadlari:
  - H02 (GPT);
  - H06 (Grok, 11.41 m / 37.4 ft);
  - H12 LDM (Gemini, 11.00 m / 36.1 ft);
  - H12 palletlar (Kimi, 28 pozitsiya);
  - BV3 LDM (GPT, 9.14 m / 30.0 ft);
  - BV5 (Opus, 124 ta joylashtirilgan).
- **8 ta yukda hech bir ishtirokchi** bu qoidadan foydalanmaydi: H01, H03, H08, BV1, ikkala BV2 yuki, BV3 palletlar, BV6.

7.2 Navbatdagi nashr

- Validator v3, tom bo‘shligi, yon bo‘shliq va yuklash ketma-ketligini tekshirish funksiyalari bilan har bir ishtirokchiga qo‘llaniladi.
- Yangi haqiqiy mijoz yuklari.
- Har bir laboratoriyaning eng qobiliyatli modellari, jumladan, premium toifalar, har bir model uchun bir nechta sinovlar va o‘zgaruvchanlik hisoboti bilan.
- Neyro-simvolik halqa ishtirokchi sifatida.

8. Nashr

E’lon qilingan:

- har bir holat to‘liq holda;
- validator;
- promptlar;
- ball berish va reytinglash kodi;
- har bir sinov uchun: yuborilgan so‘rov, provayderning o‘zgartirilmagan javobi va qayta ishlangan rejasi.

Ko‘rish vositasi: har bir ishtirokchining har bir rejasi, 3D formatda prompt va xom javob bilan birga: hansatic.com/uz/neuro-symbolic-load-planning.

Yopiq:

- pallet pozitsiyasi hisoblagichi (Hansaticning ishlab chiqarishdagi hisoblagichi, barcha ishtirokchilarga bir xil usulda qo‘llanilgan);
- dvigatel;
- manba rejalarining identifikatorlari.

Ilova A. So‘rov shablonlari

Har bir transport turi uchun bitta tizim so‘rovi yuborilgan. Foydalanuvchi xabari maqsadni, keyin esa JSON formatidagi holatni o‘z ichiga oladi; buyumlar ro‘yxati qisqartirilgan. So‘rovlar ingliz tilida ko‘rsatilgan – modellar ushbu tilda qabul qilgan.

Dengiz konteyneri (BV1, 40' High Cube)

Tizim xabari

```
You are an expert load planner. You will be given a sea container and a cargo manifest. Produce a complete,
physically legal loading plan.

Coordinates are millimetres. The origin is the front-left floor corner of the container.
x runs along the length from the front wall (x = 0) to the doors (x = interior length).
y runs across the width from the left wall. z runs up from the floor.
All contact and overlap tests allow 1 mm of tolerance.

Hard rules (a layout that breaks any of them is illegal):
1. Every placed item lies fully inside the cargo space: x ⩾ 0, y ⩾ 0, z ⩾ 0, x + dx ⩽ length, y + dy ⩽
width, z + dz ⩽ height.
2. No two items overlap in 3D.
3. dx, dy, dz are the item's extents along x, y, z after you orient it, and must be a permutation of its length,
width and height. Each item id appears at most once.
4. If tiltable is false the item stays upright: dz must equal its height_mm (it may only turn about the vertical
axis).
5. Support: an item with z > 0 must rest with at least 95% of its base area on the tops of items whose top is
exactly at its z.
6. Nothing may rest on an item with stackable = false, nor on a fragile item that has no max_stack_kg above 0.
7. If an item has max_stack_kg, the total weight of everything at or above its top that overlaps its footprint
(at any height) must not exceed it.
8. Total weight of placed items must not exceed max_payload_kg.
9. Balance. Skipped for a light load: total manifest weight below 15% of max_payload_kg, total manifest volume
below 25% of the cargo space, and no item of 500 kg or more (all three). Otherwise the centre of gravity of
placed cargo plus tare_kg (tare acts at the middle of the floor) must satisfy:
   a. across the width: between 40% and 60% of the width from the left wall;
   b. along the length: between 35% and 65% of the length.
10. Slender piles: an item standing on another item's top, together with the comparable items directly below it,
may be at most 5 times as tall as its narrowest braced width. An item's braced width is the narrower side of the
block it stands in: the items at the same z that touch it side to side (gap at most 10 mm), each at least half as
tall as its neighbour, chained; walls do not count, and a lone item's braced width is its own narrower side. The
pile's narrowest braced width is the smallest over its items. The pile ends at the floor or at an item whose
narrower side is more than 1.5 times the top item's narrower side; a pile that reaches the floor, and a single
item on such a wider base, are not limited.

Loading practice, on the items standing on the floor (reported as a separate verdict, not part of legality):
- They form at most two blocks: a gap longer than 300 mm along x between them starts a new block.
- Items at least 85% of the width wide that share a footprint line up at the same y.

Also reported, never scored: floor load per item against max_floor_load_kg_m2, how far the floor block stands
from the nearest end wall (more than 150 mm), more than 3 gaps over 60 mm across the width in one cross-section,
items that could tip over in transport.

Place as many items as you legally can. Any item you cannot place goes in "unplaced".

Answer with one JSON object and nothing else after it, in this exact shape:
{"placements":[{"id":"I01","x":0,"y":0,"z":0,"dx":1200,"dy":800,"dz":1000}],"unplaced":["I07"]}
```

Foydalanuvchi xabari (buyumlar ro‘yxati qisqartirilgan)

```
Objective: Minimize loading meters: the occupied length, from the frontmost to the rearmost face of any cargo
along x. Fewer meters is better.
```

```
{
 "vehicle": {
  "code": "40HC",
  "type": "container",
  "interior_mm": {
   "length": 12032,
   "width": 2352,
   "height": 2698
  },
  "max_payload_kg": 26580,
  "tare_kg": 3900,
  "max_floor_load_kg_m2": 5400
 },
 "objective": "ldm",
 "items": [
  {
   "id": "I001",
   "length_mm": 6344,
   "width_mm": 90,
   "height_mm": 638,
   "weight_kg": 31.34,
   "stackable": true,
   "max_stack_kg": 1000,
   "fragile": false,
   "tiltable": true
  },
  {
   "id": "I002",
   "length_mm": 2706,
   "width_mm": 90,
   "height_mm": 354,
   "weight_kg": 12.72,
   "stackable": true,
   "max_stack_kg": 1000,
   "fragile": false,
   "tiltable": true
  },
  "... 101 more items"
 ]
}
```


Yuk mashinasi (H09, 13.6 m (44.6 ft) pardali yuk mashinasi)

Tizim xabari

```
You are an expert load planner. You will be given a truck and a cargo manifest. Produce a complete, physically
legal loading plan.

Coordinates are millimetres. The origin is the front-left floor corner of the cargo space.
x runs along the length from the front wall (x = 0) to the doors (x = interior length).
y runs across the width from the left wall. z runs up from the floor.
All contact and overlap tests allow 1 mm of tolerance.

Hard rules (a layout that breaks any of them is illegal):
1. Every placed item lies fully inside the cargo space: x ⩾ 0, y ⩾ 0, z ⩾ 0, x + dx ⩽ length, y + dy ⩽
width, z + dz ⩽ height.
2. No two items overlap in 3D.
3. dx, dy, dz are the item's extents along x, y, z after you orient it, and must be a permutation of its length,
width and height. Each item id appears at most once.
4. If tiltable is false the item stays upright: dz must equal its height_mm (it may only turn about the vertical
axis).
5. Support: an item with z > 0 must rest with at least 95% of its base area on the tops of items whose top is
exactly at its z.
6. Nothing may rest on an item with stackable = false, nor on a fragile item that has no max_stack_kg above 0.
7. If an item has max_stack_kg, the total weight of everything at or above its top that overlaps its footprint
(at any height) must not exceed it.
8. Total weight of placed items must not exceed max_payload_kg.
9. Balance. Skipped for a light load: total manifest weight below 15% of max_payload_kg, total manifest volume
below 25% of the cargo space, and no item of 500 kg or more (all three). Otherwise the centre of gravity of
placed cargo plus tare_kg (tare acts at the middle of the floor) must satisfy:
```

```
   a. across the width: between 40% and 60% of the width from the left wall;
   b. the total weight (cargo + tare) splits between kingpin and bogie like a beam on two supports at
kingpin_from_front_mm and bogie_from_front_mm; neither may exceed its max (not checked when the total is within
both limits).
10. Slender piles: an item standing on another item's top, together with the comparable items directly below it,
may be at most 5 times as tall as its narrowest braced width. An item's braced width is the narrower side of the
block it stands in: the items at the same z that touch it side to side (gap at most 10 mm), each at least half as
tall as its neighbour, chained; walls do not count, and a lone item's braced width is its own narrower side. The
pile's narrowest braced width is the smallest over its items. The pile ends at the floor or at an item whose
narrower side is more than 1.5 times the top item's narrower side; a pile that reaches the floor, and a single
item on such a wider base, are not limited.

Loading practice, on the items standing on the floor (reported as a separate verdict, not part of legality):
- They form one block: a gap longer than 300 mm along x between them starts a new block.
- Items at least 85% of the width wide that share a footprint line up at the same y.

Also reported, never scored: floor load per item against max_floor_load_kg_m2, how far the floor block stands
from the nearest end wall (more than 150 mm), more than 3 gaps over 60 mm across the width in one cross-section,
items that could tip over in transport.

Place as many items as you legally can. Any item you cannot place goes in "unplaced".

Answer with one JSON object and nothing else after it, in this exact shape:
{"placements":[{"id":"I01","x":0,"y":0,"z":0,"dx":1200,"dy":800,"dz":1000}],"unplaced":["I07"]}
```

Foydalanuvchi xabari (buyumlar ro‘yxati qisqartirilgan)

```
Objective: Minimize loading meters: the occupied length, from the frontmost to the rearmost face of any cargo
along x. Fewer meters is better.

{
 "vehicle": {
  "code": "CURTAINSIDER_136",
  "type": "truck",
  "interior_mm": {
   "length": 13620,
   "width": 2480,
   "height": 2700
  },
  "max_payload_kg": 24000,
  "tare_kg": 7200,
  "max_floor_load_kg_m2": 5000,
  "kingpin_from_front_mm": 840,
  "max_kingpin_kg": 12000,
  "bogie_from_front_mm": 12200,
  "max_bogie_kg": 21000
 },
 "objective": "ldm",
 "items": [
  {
   "id": "I01",
   "length_mm": 1000,
   "width_mm": 600,
   "height_mm": 800,
   "weight_kg": 100,
   "stackable": true,
   "max_stack_kg": 1000,
   "fragile": true,
   "tiltable": false
  },
  {
   "id": "I02",
   "length_mm": 3800,
   "width_mm": 1300,
   "height_mm": 1600,
   "weight_kg": 1000,
   "stackable": true,
   "max_stack_kg": 1000,
   "fragile": false,
   "tiltable": false
  },
  "... 28 more items"
```

```
 ]
}
```

Havo konteyneri (U01, AKE qiya devorli)

Tizim xabari

```
You are an expert load planner. You will be given an air container (ULD) and a cargo manifest. Produce a
complete, physically legal loading plan.

Coordinates are millimetres. The origin is the front-left floor corner of the container.
x runs along the length from the front wall (x = 0) to the doors (x = interior length).
y runs across the width from the left wall. z runs up from the floor.
All contact and overlap tests allow 1 mm of tolerance.

Hard rules (a layout that breaks any of them is illegal):
1. Every placed item lies fully inside the cargo space: x ⩾ 0, y ⩾ 0, z ⩾ 0, x + dx ⩽ length, y + dy ⩽
width, z + dz ⩽ height.
   Sloped sides: a sloped side {side, overhang_mm, height_mm} rises from the edge of the flat floor, overhang_mm
in from that wall, to height_mm up at the wall ("y+" is the wall at y = width, "y-" the wall at y = 0). An item
whose bottom is at z may come no closer to that wall than overhang_mm x (1 - z / height_mm); above height_mm the
full width is free.
2. No two items overlap in 3D.
3. dx, dy, dz are the item's extents along x, y, z after you orient it, and must be a permutation of its length,
width and height. Each item id appears at most once.
4. If tiltable is false the item stays upright: dz must equal its height_mm (it may only turn about the vertical
axis).
5. Support: an item with z > 0 must rest with at least 95% of its base area on the tops of items whose top is
exactly at its z.
   Exception for sloped sides: an item may instead lean on the slope with its outer bottom edge, nothing under
it, at z equal to the slope's height under that edge (height_mm x reach / overhang_mm, where reach is how far the
item extends past the edge of the flat floor; within 1.5 mm), provided that z is at most 15% of dy and at least
60% of dy, and the item's centre, lie over the flat floor.
6. Nothing may rest on an item with stackable = false, nor on a fragile item that has no max_stack_kg above 0.
7. If an item has max_stack_kg, the total weight of everything at or above its top that overlaps its footprint
(at any height) must not exceed it.
8. Total weight of placed items must not exceed max_payload_kg.
9. Balance. Skipped for a light load: total manifest weight below 15% of max_payload_kg, total manifest volume
below 25% of the cargo space, and no item of 500 kg or more (all three). Otherwise the centre of gravity of
placed cargo plus tare_kg (tare acts at the middle of the floor) must satisfy:
   a. across the width: between 40% and 60% of the width from the left wall;
   b. along the length: between 35% and 65% of the length.
10. Slender piles: an item standing on another item's top, together with the comparable items directly below it,
may be at most 5 times as tall as its narrowest braced width. An item's braced width is the narrower side of the
block it stands in: the items at the same z that touch it side to side (gap at most 10 mm), each at least half as
tall as its neighbour, chained; walls do not count, and a lone item's braced width is its own narrower side. The
pile's narrowest braced width is the smallest over its items. The pile ends at the floor or at an item whose
narrower side is more than 1.5 times the top item's narrower side; a pile that reaches the floor, and a single
item on such a wider base, are not limited.

Loading practice, on the items standing on the floor (reported as a separate verdict, not part of legality):
- They form at most two blocks: a gap longer than 300 mm along x between them starts a new block.
- Items at least 85% of the width wide that share a footprint line up at the same y.

Also reported, never scored: floor load per item against max_floor_load_kg_m2, how far the floor block stands
from the nearest end wall (more than 150 mm), more than 3 gaps over 60 mm across the width in one cross-section,
items that could tip over in transport.

Place as many items as you legally can. Any item you cannot place goes in "unplaced".

Answer with one JSON object and nothing else after it, in this exact shape:
{"placements":[{"id":"I01","x":0,"y":0,"z":0,"dx":1200,"dy":800,"dz":1000}],"unplaced":["I07"]}
```

Foydalanuvchi xabari (buyumlar ro‘yxati qisqartirilgan)

```
Objective: Place as many items as you legally can. Only the number of legally placed items is ranked.

{
```

```
 "vehicle": {
  "code": "AKE",
  "type": "uld",
  "interior_mm": {
   "length": 1500,
   "width": 1905,
   "height": 1550
  },
  "max_payload_kg": 1506,
  "tare_kg": 82,
  "max_floor_load_kg_m2": 976,
  "sloped_sides": [
   {
    "side": "y+",
    "overhang_mm": 445,
    "height_mm": 610
   }
  ]
 },
 "objective": "count",
 "items": [
  {
   "id": "I01",
   "length_mm": 500,
   "width_mm": 500,
   "height_mm": 500,
   "weight_kg": 1,
   "stackable": true,
   "max_stack_kg": 1000,
   "fragile": false,
   "tiltable": true
  },
  {
   "id": "I02",
   "length_mm": 500,
   "width_mm": 500,
   "height_mm": 500,
   "weight_kg": 1,
   "stackable": true,
   "max_stack_kg": 1000,
   "fragile": false,
   "tiltable": true
  },
  "... 48 more items"
 ]
}
```


Pallet (P01, 1200 × 1000 mm (47 × 39 dyuym))

Tizim xabari

```
You are an expert load planner. You will be given a pallet and a cargo manifest. Produce a complete, physically
legal loading plan.

Coordinates are millimetres. The origin is one corner of the pallet deck, on its top surface.
x runs along the deck length, y across the deck width, z up from the top of the deck.
All contact and overlap tests allow 1 mm of tolerance.

Hard rules (a layout that breaks any of them is illegal):
1. Every placed item stays on the deck: cargo may hang past each deck edge by at most 25 mm, so -25 ⩽ x, x + dx
⩽ length + 25, -25 ⩽ y, y + dy ⩽ width + 25. And z ⩾ 0, z + dz ⩽ max_cargo_height_mm.
2. No two items overlap in 3D.
3. dx, dy, dz are the item's extents along x, y, z after you orient it, and must be a permutation of its length,
width and height. Each item id appears at most once.
4. If tiltable is false the item stays upright: dz must equal its height_mm (it may only turn about the vertical
axis).
5. Support: an item with z > 0 must rest with at least 95% of its base area on the tops of items whose top is
exactly at its z.
6. Nothing may rest on an item with stackable = false, nor on a fragile item that has no max_stack_kg above 0.
7. If an item has max_stack_kg, the total weight of everything at or above its top that overlaps its footprint
```

```
(at any height) must not exceed it.
8. Total weight of placed items must not exceed max_payload_kg.
9. Balance. Skipped for a light load: total manifest weight below 15% of max_payload_kg, total manifest volume
below 25% of deck length x deck width x max_cargo_height_mm, and no item of 500 kg or more (all three). Otherwise
the centre of gravity of placed cargo plus tare_kg (tare acts at the middle of the deck) must satisfy:
   a. across the width: between 40% and 60% of the deck width;
   b. along the length: between 35% and 65% of the deck length.
10. Slender piles: an item standing on another item's top, together with the comparable items directly below it,
may be at most 5 times as tall as its narrowest braced width. An item's braced width is the narrower side of the
block it stands in: the items at the same z that touch it side to side (gap at most 10 mm), each at least half as
tall as its neighbour, chained; nothing outside the load counts, and a lone item's braced width is its own
narrower side. The pile's narrowest braced width is the smallest over its items. The pile ends at the deck or at
an item whose narrower side is more than 1.5 times the top item's narrower side; a pile that reaches the deck,
and a single item on such a wider base, are not limited.

Loading practice, on the bottom layer (items at z = 0) (reported as a separate verdict, not part of legality):
- They form one block: a gap longer than 300 mm along x between them starts a new block.
- Items at least 85% of the deck width wide that share a footprint line up at the same y.

Also reported, never scored: how far the bottom layer stands from the nearer deck end (more than 150 mm), more
than 3 gaps over 60 mm across the width in one cross-section, items that could tip over in transport.

Place as many items as you legally can. Any item you cannot place goes in "unplaced".

Answer with one JSON object and nothing else after it, in this exact shape:
{"placements":[{"id":"I01","x":0,"y":0,"z":0,"dx":1200,"dy":800,"dz":1000}],"unplaced":["I07"]}
```

Foydalanuvchi xabari (buyumlar ro‘yxati qisqartirilgan)

```
Objective: Build a stable interlocked pallet. After the number of placed items, the interlock share is ranked:
the share of items above the bottom layer that each rest on at least two different items directly below
(overlapping each by more than 10 mm in both x and y). Higher is better; a column stack scores 0 %. Ties are
broken by the lower build height.

{
 "vehicle": {
  "code": "IND",
  "type": "pallet",
  "deck_mm": {
   "length": 1200,
   "width": 1000
  },
  "max_cargo_height_mm": 1250,
  "max_payload_kg": 1500,
  "tare_kg": 30,
  "preferred_pattern": "interlocked"
 },
 "objective": "interlock",
 "items": [
  {
   "id": "I01",
   "length_mm": 600,
   "width_mm": 400,
   "height_mm": 120,
   "weight_kg": 25,
   "stackable": true,
   "max_stack_kg": 1000,
   "fragile": false,
   "tiltable": false
  },
  {
   "id": "I02",
   "length_mm": 600,
   "width_mm": 400,
   "height_mm": 120,
   "weight_kg": 25,
   "stackable": true,
   "max_stack_kg": 1000,
   "fragile": false,
   "tiltable": false
  },
  "... 38 more items"
```

```
  ]
}
```

Ilova B. Barcha 26 ta sinov

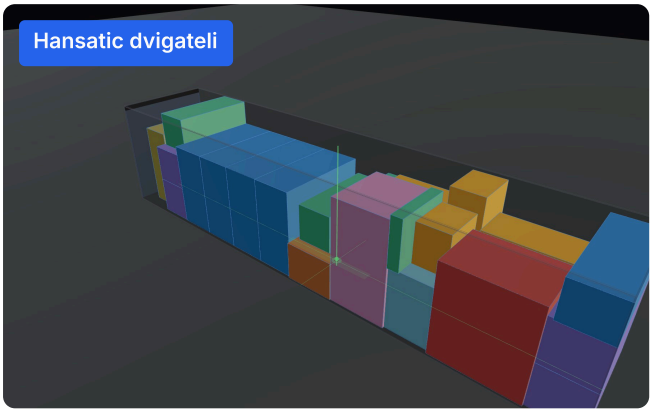
Har bir sinov uchun bir sahifa: yuk, dvigatel rejasi eng yaxshi qonuniy model javobi bilan birga va har bir ishtirokchining natijasi.

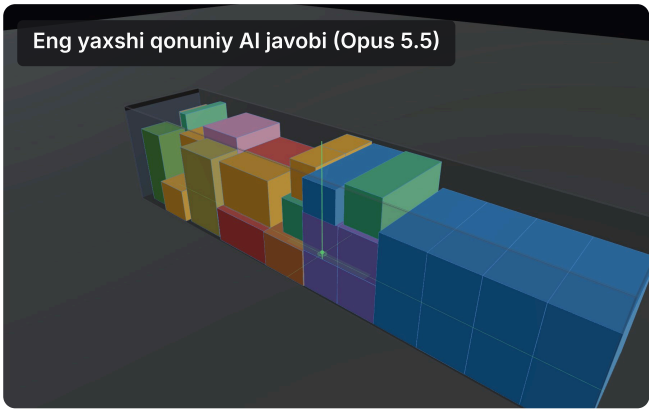
H01 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
40' High Cube	27	Eng qisqa yuk uzunligi	Dvigatel ozgina oldinda

Qiyinlashtiruvchi omillar

27 tik turishi kerak bo‘lgan buyumlar





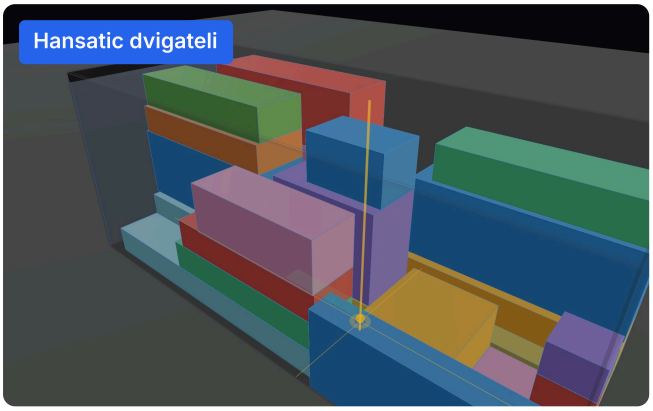
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**26 / 27**	**11.69 m (38.4 ft)**	
GPT-5.5	Qonuniy	25 / 27	11.88 m (39.0 ft)	
Opus 5.5	Qonuniy	26 / 27	11.74 m (38.5 ft)	
Grok 4.7	Qonuniy	25 / 27	11.37 m (37.3 ft)	
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	22 / 27	11.56 m (37.9 ft)	1 noto‘g‘ri o‘lchamdagi yuklar, 1 transport vositasidan tashqarida, 1 osilib turgan yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	27 / 27	12.09 m (39.7 ft)	7 bir-biriga yopishgan yuklar, 14 transport vositasidan tashqarida, 3 balandlik chegarasidan oshib ketgan, 1 osilib turgan yuklar, 1 og‘irlik markazi noto‘g‘ri

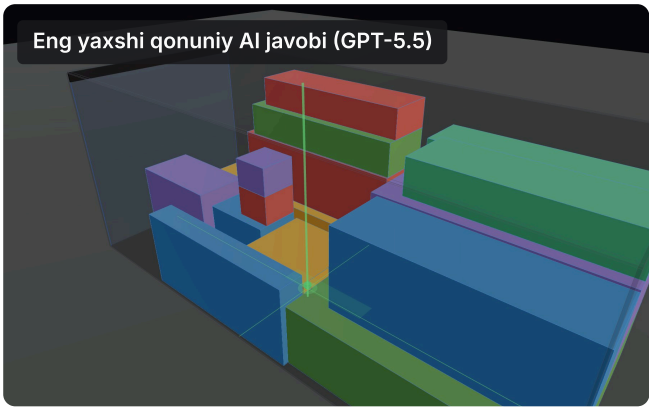
H02 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
20' Dry Container	29	Eng qisqa yuk uzunligi	Dvigatel aniq oldinda

Qiyinlashtiruvchi omillar

29 tik turishi kerak bo‘lgan buyumlar; uzunligi 5.00 m (16.4 ft) gacha bo‘lgan buyumlar; eng og‘ir buyum 1,550 kg (3,417 lb)





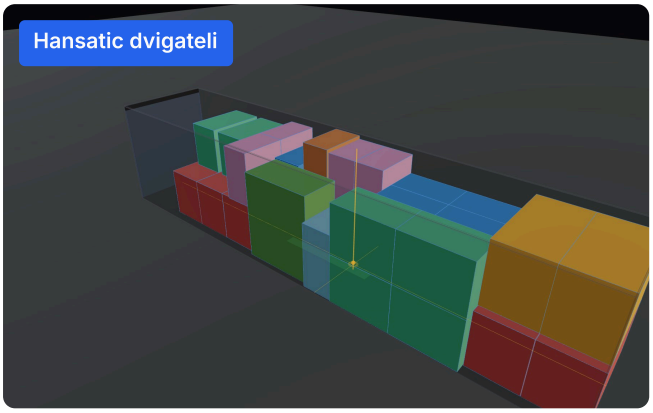
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**24 / 29**	**5.78 m (19.0 ft)**	
GPT-5.5	Qonuniy	18 / 29	5.76 m (18.9 ft)	
Opus 5.5	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Grok 4.7	Provayder xatosi	-	-	Provayder so‘rovni rad etdi.
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	23 / 29	5.00 m (16.4 ft)	6 noto‘g‘ri o‘lchamdagi yuklar, 13 bir-biriga yopishgan yuklar, 9 osilib turgan yuklar, 9 ezilgan yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	29 / 29	7.97 m (26.1 ft)	37 bir-biriga yopishgan yuklar, 23 transport vositasidan tashqarida, 1 balandlik chegarasidan oshib ketgan, 7 osilib turgan yuklar, 5 ezilgan yuklar, 2 og‘irlik markazi noto‘g‘ri

H03 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
40' High Cube	32	Eng qisqa yuk uzunligi	Dvigatel aniq oldinda

Qiyinlashtiruvchi omillar

25 tik turishi kerak bo‘lgan buyumlar; eng og‘ir buyum 2,680 kg (5,908 lb)



Hech bir AI modeli bu sinovda qonuniy reja qaytarmadi.

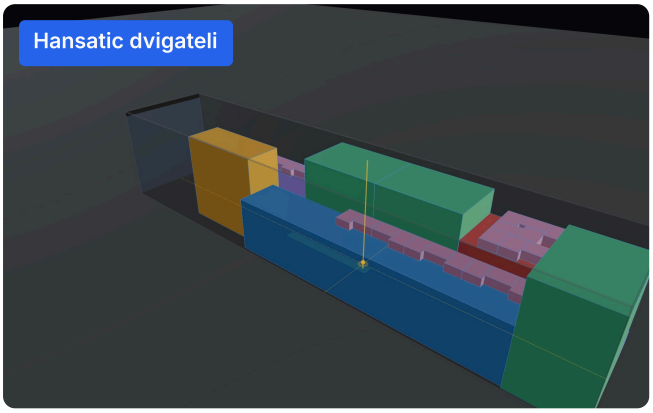
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**31 / 32**	**10.51 m (34.5 ft)**	
GPT-5.5	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Opus 5.5	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Grok 4.7	Qonunga xilof	31 / 32	12.03 m (39.5 ft)	1 ezilgan yuklar
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	31 / 32	11.81 m (38.7 ft)	1 noto‘g‘ri o‘lchamdagi yuklar, 12 bir-biriga yopishgan yuklar, 6 transport vositasidan tashqarida, 3 balandlik chegarasidan oshib ketgan, 2 osilib turgan yuklar, 3 ezilgan yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Reja qaytarilmagan	-	-	Javobda haqiqiy reja mavjud emas edi.

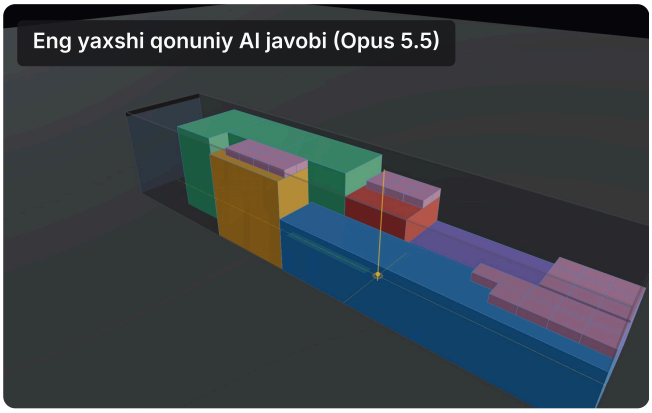
H04 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
40' Dry Container	39	Eng qisqa yuk uzunligi	Durang

Qiyinlashtiruvchi omillar

uzunligi 6.30 m (20.7 ft) gacha bo‘lgan buyumlar; eng og‘ir buyum 998 kg (2,200 lb)





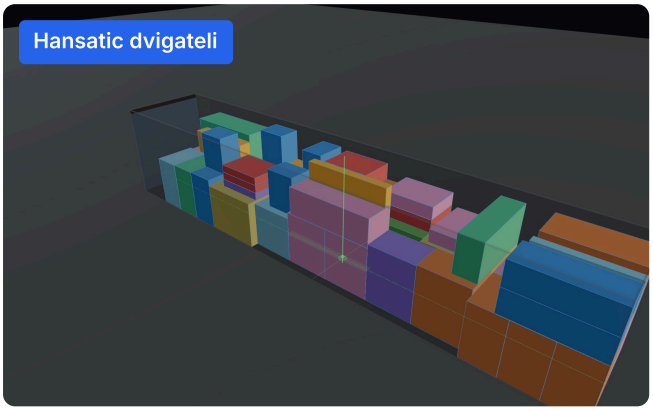
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**39 / 39**	**10.44 m (34.3 ft)**	
GPT-5.5	Qonuniy	39 / 39	10.72 m (35.2 ft)	
Opus 5.5	Qonuniy	39 / 39	10.44 m (34.3 ft)	
Grok 4.7	Qonuniy	39 / 39	11.10 m (36.4 ft)	
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	29 / 39	6.30 m (20.7 ft)	10 noto‘g‘ri o‘lchamdagi yuklar, 6 osilib turgan yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	38 / 39	10.20 m (33.5 ft)	1 noto‘g‘ri o‘lchamdagi yuklar, 27 bir-biriga yopishgan yuklar, 6 transport vositasidan tashqarida, 24 osilib turgan yuklar, 1 ezilgan yuklar, 1 og‘irlik markazi noto‘g‘ri

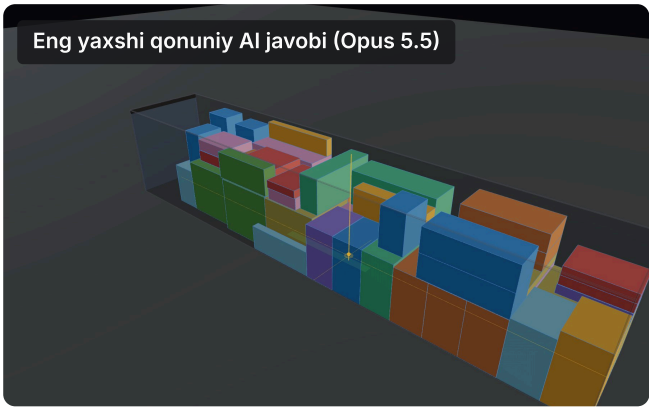
H05 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
45' High Cube	49	Eng qisqa yuk uzunligi	Durang

Qiyinlashtiruvchi omillar

49 tik turishi kerak bo‘lgan buyumlar; 27 ustma-ust joylashish vazn chegarasi bo‘lgan buyumlar; eng og‘ir buyum 814 kg (1,795 lb)





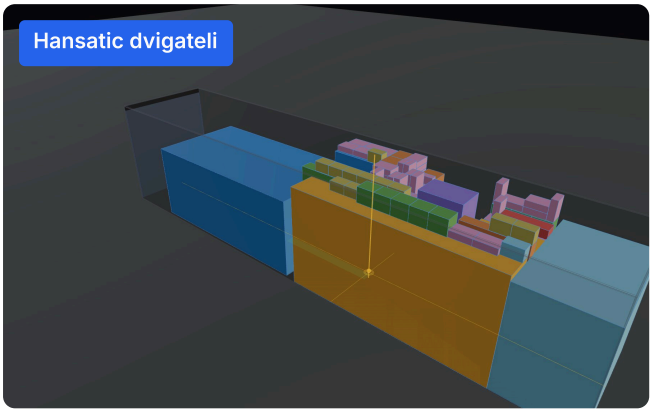
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**49 / 49**	**12.40 m (40.7 ft)**	
GPT-5.5	Qonuniy	45 / 49	13.28 m (43.6 ft)	
Opus 5.5	Qonuniy	49 / 49	12.40 m (40.7 ft)	
Grok 4.7	Qonuniy	43 / 49	12.96 m (42.5 ft)	
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	37 / 49	10.49 m (34.4 ft)	11 noto‘g‘ri o‘lchamdagi yuklar, 2 bir-biriga yopishgan yuklar, 5 transport vositasidan tashqarida, 2 balandlik chegarasidan oshib ketgan, 3 osilib turgan yuklar, 2 ezilgan yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	47 / 49	12.73 m (41.8 ft)	2 noto‘g‘ri o‘lchamdagi yuklar, 31 bir-biriga yopishgan yuklar, 9 transport vositasidan tashqarida, 14 balandlik chegarasidan oshib ketgan, 21 osilib turgan yuklar, 2 ezilgan yuklar

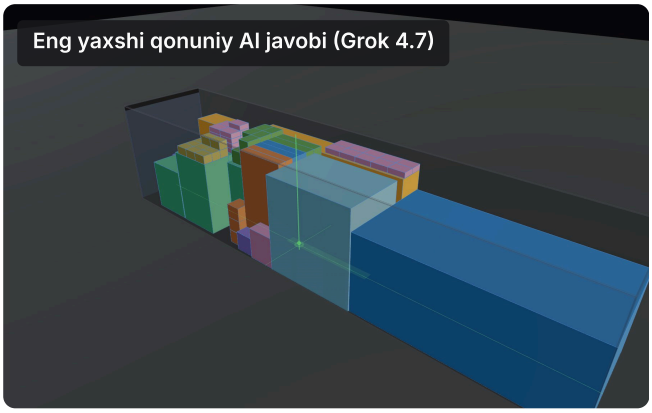
H06 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
40' High Cube	83	Eng qisqa yuk uzunligi	Dvigatel aniq oldinda

Qiyinlashtiruvchi omillar

5 ustma-ust joylanmaydigan buyumlar; 1 tik turishi kerak bo‘lgan buyumlar; eng og‘ir buyum 3,020 kg (6,658 lb)





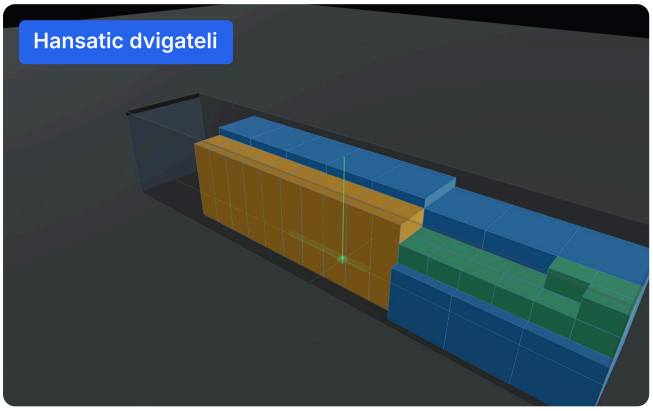
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**83 / 83**	**10.65 m (35.0 ft)**	
GPT-5.5	Qonuniy	83 / 83	11.78 m (38.7 ft)	
Opus 5.5	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Grok 4.7	Qonuniy	83 / 83	11.41 m (37.4 ft)	
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	7 / 83	6.89 m (22.6 ft)	2 noto‘g‘ri o‘lchamdagi yuklar, 1 og‘irlik markazi noto‘g‘ri
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	20 / 83	12.25 m (40.2 ft)	2 bir-biriga yopishgan yuklar, 4 transport vositasidan tashqarida, 1 balandlik chegarasidan oshib ketgan, 14 osilib turgan yuklar, 1 og‘irlik markazi noto‘g‘ri

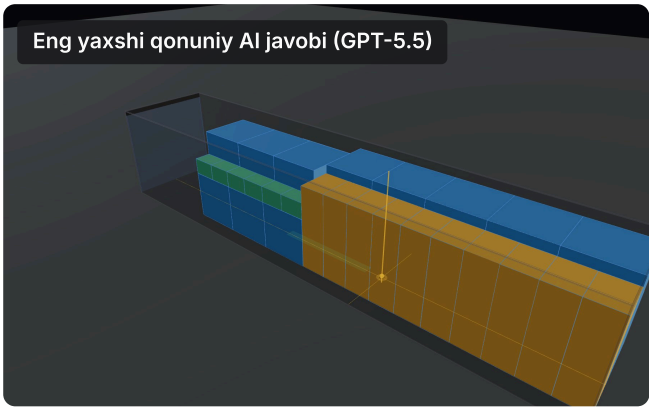
H07 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
40' Dry Container	45	Eng qisqa yuk uzunligi	Durang

Qiyinlashtiruvchi omillar

10 ustma-ust joylanmaydigan buyumlar; 15 tik turishi kerak bo‘lgan buyumlar; 15 ustma-ust joylashish vazn chegarasi bo‘lgan buyumlar; eng og‘ir buyum 1,200 kg (2,646 lb)





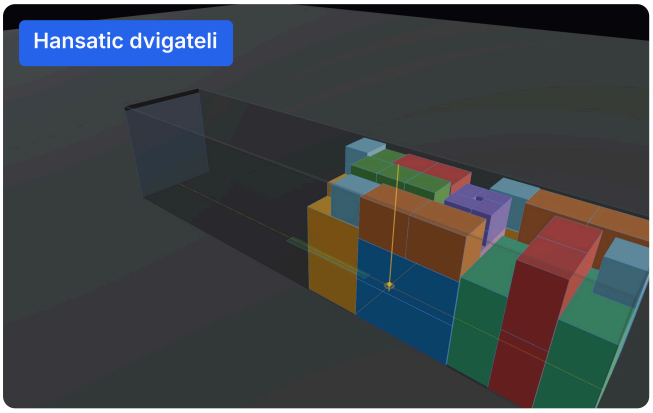
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**45 / 45**	**9.60 m (31.5 ft)**	
GPT-5.5	Qonuniy	45 / 45	9.60 m (31.5 ft)	
Opus 5.5	Qonuniy	45 / 45	9.61 m (31.5 ft)	
Grok 4.7	Qonunga xilof	45 / 45	10.80 m (35.4 ft)	1 og‘irlik markazi noto‘g‘ri
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
DeepSeek V4 Pro	Qonuniy	45 / 45	12.00 m (39.4 ft)	
Gemini 4 Argon	Qonunga xilof	32 / 45	7.60 m (24.9 ft)	13 noto‘g‘ri o‘lchamdagi yuklar, 1 bir-biriga yopishgan yuklar, 16 osilib turgan yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	10 / 45	12.00 m (39.4 ft)	1 og‘irlik markazi noto‘g‘ri

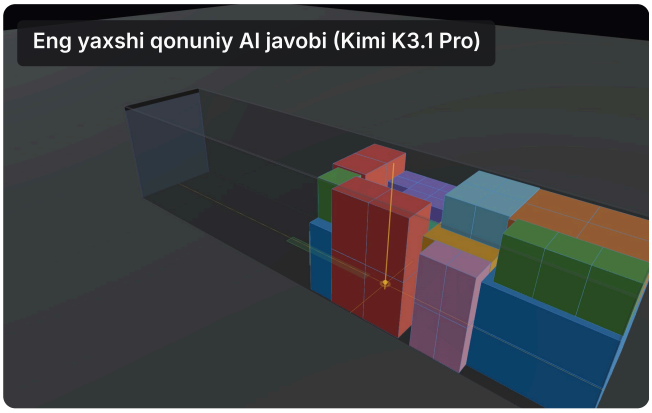
H08 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
40' High Cube	52	Eng qisqa yuk uzunligi	Dvigatel aniq oldinda

Qiyinlashtiruvchi omillar

52 tik turishi kerak bo‘lgan buyumlar





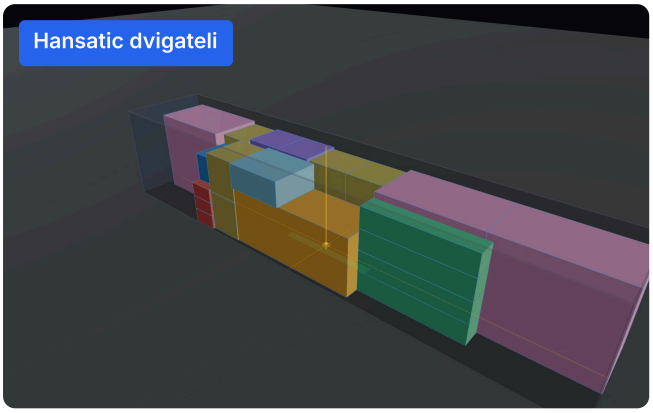
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**52 / 52**	**5.92 m (19.4 ft)**	
GPT-5.5	Qonuniy	52 / 52	6.26 m (20.5 ft)	
Opus 5.5	Qonuniy	52 / 52	6.20 m (20.3 ft)	
Grok 4.7	Qonuniy	52 / 52	6.18 m (20.3 ft)	
Kimi K3.1 Pro	Qonuniy	52 / 52	6.12 m (20.1 ft)	
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	51 / 52	6.51 m (21.4 ft)	1 noto‘g‘ri o‘lchamdagi yuklar, 4 bir-biriga yopishgan yuklar, 1 osilib turgan yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	52 / 52	11.25 m (36.9 ft)	14 bir-biriga yopishgan yuklar, 20 transport vositasidan tashqarida

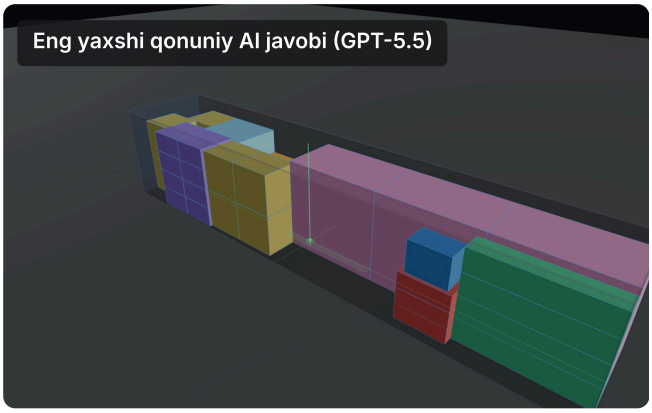
H09 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
13.6m Curtainsider	30	Eng qisqa yuk uzunligi	Dvigatel ozgina oldinda

Qiyinlashtiruvchi omillar

30 tik turishi kerak bo‘lgan buyumlar; eng og‘ir buyum 2,400 kg (5,291 lb)





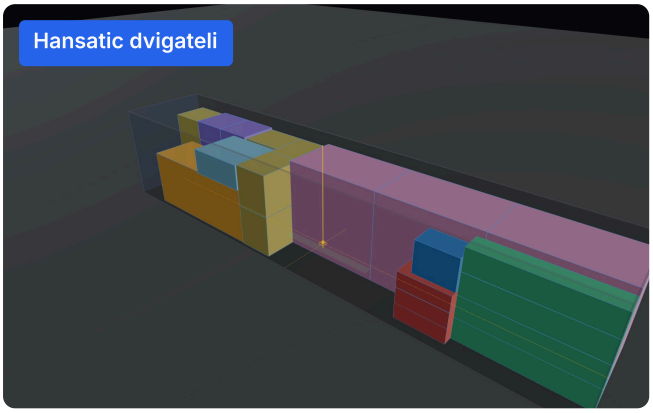
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**29 / 30**	**13.36 m (43.8 ft)**	
GPT-5.5	Qonuniy	29 / 30	13.56 m (44.5 ft)	
Opus 5.5	Qonuniy	29 / 30	13.60 m (44.6 ft)	
Grok 4.7	Qonuniy	29 / 30	13.60 m (44.6 ft)	
Kimi K3.1 Pro	Qonuniy	29 / 30	13.60 m (44.6 ft)	
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	19 / 30	11.60 m (38.1 ft)	11 noto‘g‘ri o‘lchamdagi yuklar, 7 bir-biriga yopishgan yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	30 / 30	13.36 m (43.8 ft)	17 bir-biriga yopishgan yuklar, 25 transport vositasidan tashqarida, 7 osilib turgan yuklar, 1 o‘q yuklanishi oshib ketgan

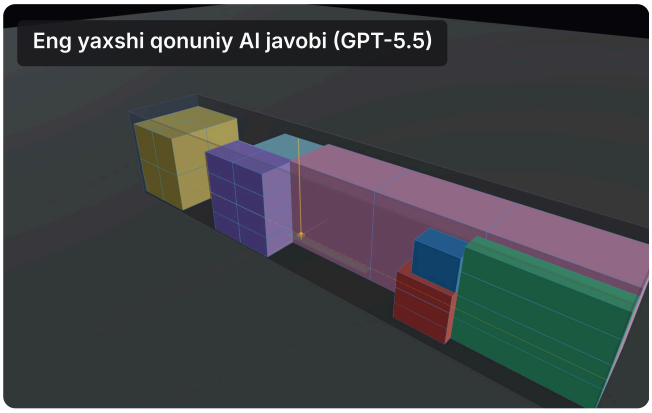
H09 Eng kam pallet joylari

Transport vositasi	Buyumlar soni	Maqsad	Natija
13.6m Curtainsider	30	Eng kam pallet joylari	Dvigatel ozgina oldinda

Qiyinlashtiruvchi omillar

30 tik turishi kerak bo‘lgan buyumlar; eng og‘ir buyum 2,400 kg (5,291 lb)





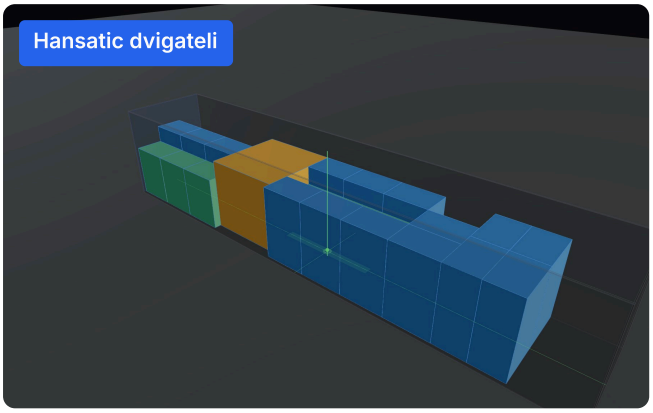
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**29 / 30**	**29 joylashuv, 13.36 m (43.8 ft)**	
GPT-5.5	Qonuniy	29 / 30	29 joylashuv, 13.60 m (44.6 ft)	
Opus 5.5	Qonuniy	29 / 30	31 joylashuv, 13.60 m (44.6 ft)	
Grok 4.7	Qonuniy	29 / 30	29 joylashuv, 13.62 m (44.7 ft)	
Kimi K3.1 Pro	Qonuniy	29 / 30	29 joylashuv, 13.60 m (44.6 ft)	
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	30 / 30	29 joylashuv, 11.72 m (38.5 ft)	18 bir-biriga yopishgan yuklar, 1 transport vositasidan tashqarida, 3 ezilgan yuklar, 1 o‘q yuklanishi oshib ketgan
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	30 / 30	34 joylashuv, 13.36 m (43.8 ft)	4 bir-biriga yopishgan yuklar, 25 transport vositasidan tashqarida, 1 o‘q yuklanishi oshib ketgan, 1 noto‘g‘ri tekislangan qatorlar

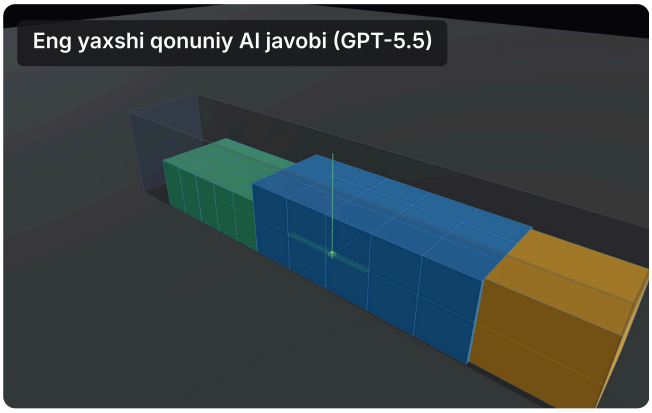
H10 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
13.6m Curtainsider	26	Eng qisqa yuk uzunligi	Durang

Qiyinlashtiruvchi omillar

26 ustma-ust joylanmaydigan buyumlar; 16 tik turishi kerak bo‘lgan buyumlar; eng og‘ir buyum 666 kg (1,468 lb)





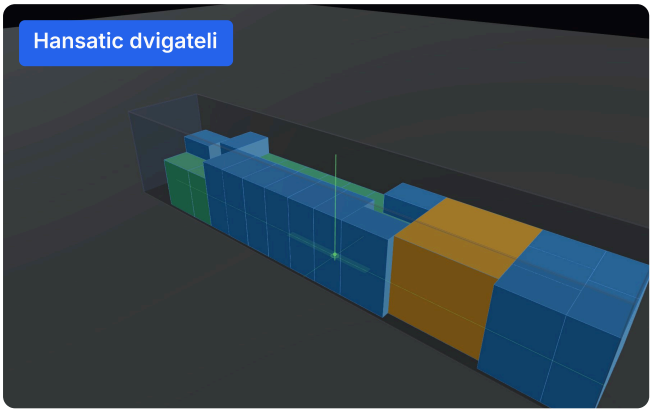
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**26 / 26**	**12.20 m (40.0 ft)**	
GPT-5.5	Qonuniy	26 / 26	12.20 m (40.0 ft)	
Opus 5.5	Qonuniy	26 / 26	12.20 m (40.0 ft)	
Grok 4.7	Qonuniy	26 / 26	12.20 m (40.0 ft)	
Kimi K3.1 Pro	Qonuniy	26 / 26	12.20 m (40.0 ft)	
DeepSeek V4 Pro	Qonuniy	26 / 26	12.20 m (40.0 ft)	
Gemini 4 Argon	Qonuniy	26 / 26	12.60 m (41.3 ft)	
Qwen3p8	Qonuniy	26 / 26	12.20 m (40.0 ft)	
Magistral Medium	Qonuniy	26 / 26	13.00 m (42.7 ft)	

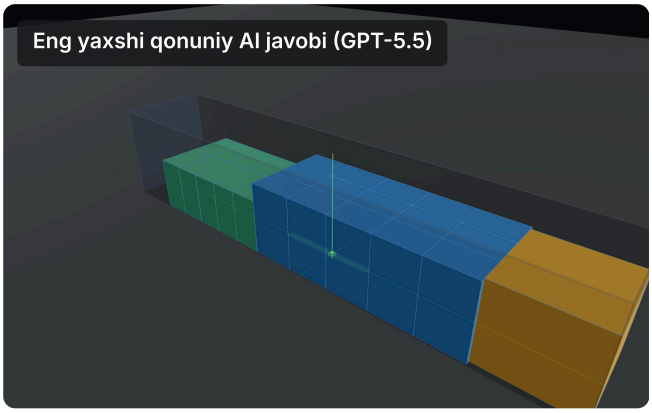
H10 Eng kam pallet joylari

Transport vositasi	Buyumlar soni	Maqsad	Natija
13.6m Curtainsider	26	Eng kam pallet joylari	Durang

Qiyinlashtiruvchi omillar

26 ustma-ust joylanmaydigan buyumlar; 16 tik turishi kerak bo‘lgan buyumlar; eng og‘ir buyum 666 kg (1,468 lb)





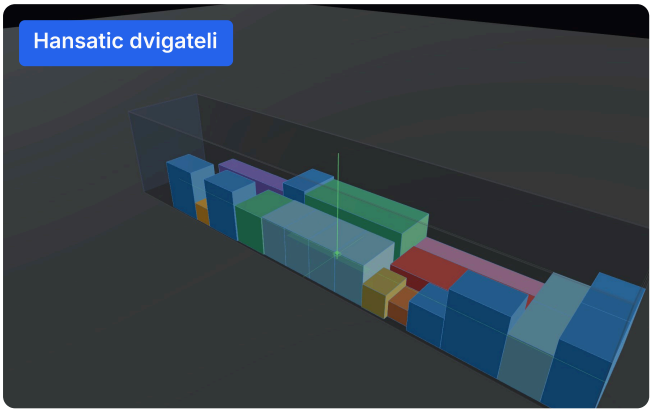
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**26 / 26**	**31 joylashuv, 12.20 m (40.0 ft)**	
GPT-5.5	Qonuniy	26 / 26	31 joylashuv, 12.20 m (40.0 ft)	
Opus 5.5	Qonuniy	26 / 26	31 joylashuv, 13.00 m (42.7 ft)	
Grok 4.7	Qonuniy	26 / 26	31 joylashuv, 12.20 m (40.0 ft)	
Kimi K3.1 Pro	Qonuniy	26 / 26	31 joylashuv, 12.20 m (40.0 ft)	
DeepSeek V4 Pro	Qonuniy	26 / 26	31 joylashuv, 12.20 m (40.0 ft)	
Gemini 4 Argon	Qonunga xilof	26 / 26	31 joylashuv, 12.60 m (41.3 ft)	1 o‘q yuklanishi oshib ketgan
Qwen3p8	Qonuniy	26 / 26	31 joylashuv, 13.00 m (42.7 ft)	
Magistral Medium	Qonunga xilof	26 / 26	28 joylashuv, 13.00 m (42.7 ft)	10 transport vositasidan tashqarida

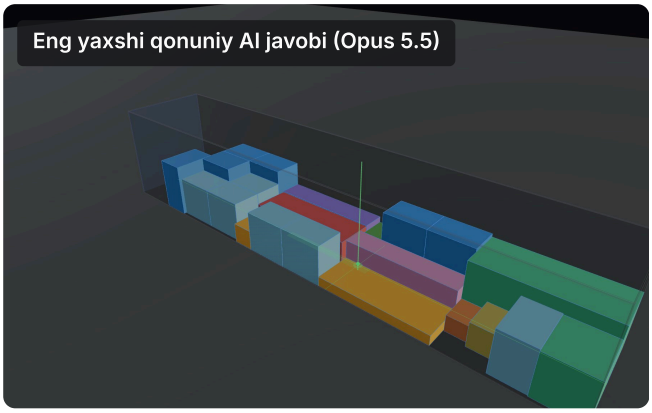
H11 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
13.6m Curtainsider	23	Eng qisqa yuk uzunligi	Dvigatel ozgina oldinda

Qiyinlashtiruvchi omillar

23 ustma-ust joylanmaydigan buyumlar; 23 tik turishi kerak bo‘lgan buyumlar; eng og‘ir buyum 2,700 kg (5,952 lb)





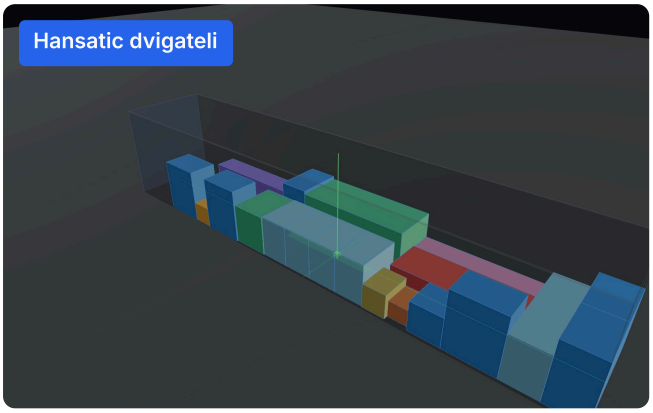
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**23 / 23**	**12.00 m (39.4 ft)**	
GPT-5.5	**Qonuniy**	23 / 23	12.42 m (40.7 ft)	
Opus 5.5	**Qonuniy**	23 / 23	12.20 m (40.0 ft)	
Grok 4.7	**Qonuniy**	23 / 23	12.62 m (41.4 ft)	
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	**Qonuniy**	23 / 23	13.02 m (42.7 ft)	
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	**Qonunga xilof**	23 / 23	12.34 m (40.5 ft)	7 bir-biriga yopishgan yuklar, 8 transport vositasidan tashqarida

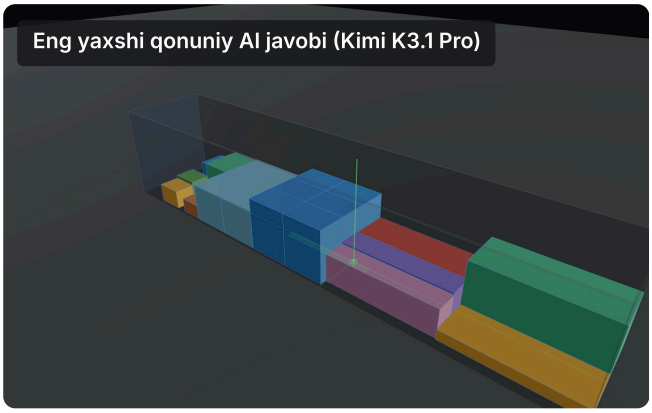
H11 Eng kam pallet joylari

Transport vositasi	Buyumlar soni	Maqsad	Natija
13.6m Curtainsider	23	Eng kam pallet joylari	Dvigatel aniq oldinda

Qiyinlashtiruvchi omillar

23 ustma-ust joylanmaydigan buyumlar; 23 tik turishi kerak bo‘lgan buyumlar; eng og‘ir buyum 2,700 kg (5,952 lb)





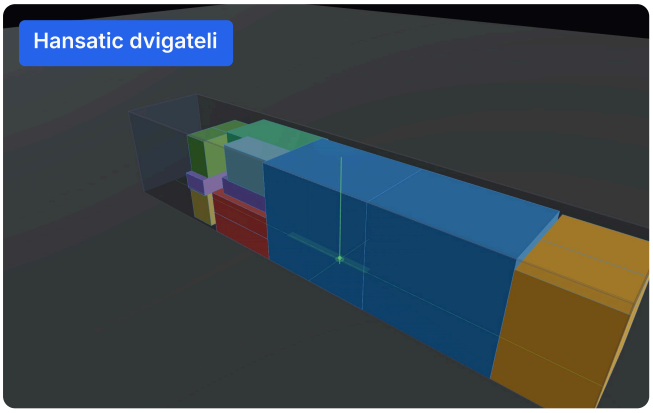
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**23 / 23**	**30 joylashuv, 12.00 m (39.4 ft)**	
GPT-5.5	Qonuniy	23 / 23	32 joylashuv, 12.64 m (41.5 ft)	
Opus 5.5	Qonuniy	23 / 23	32 joylashuv, 12.84 m (42.1 ft)	
Grok 4.7	Provayder xatosi	-	-	Provayder so‘rovni rad etdi.
Kimi K3.1 Pro	Qonuniy	23 / 23	32 joylashuv, 12.62 m (41.4 ft)	
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	22 / 23	30 joylashuv, 12.44 m (40.8 ft)	1 noto‘g‘ri o‘lchamdagi yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	23 / 23	30 joylashuv, 12.60 m (41.3 ft)	11 bir-biriga yopishgan yuklar, 9 transport vositasidan tashqarida

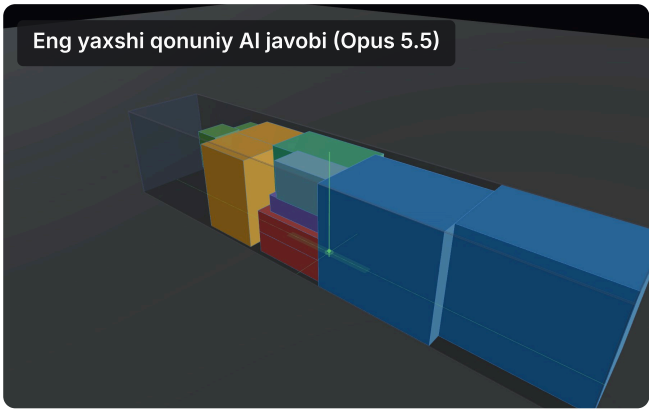
H12 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
13.6m Curtainsider	14	Eng qisqa yuk uzunligi	Durang

Qiyinlashtiruvchi omillar

6 ustma-ust joylanmaydigan buyumlar; 9 tik turishi kerak bo‘lgan buyumlar; eng og‘ir buyum 732 kg (1,614 lb)





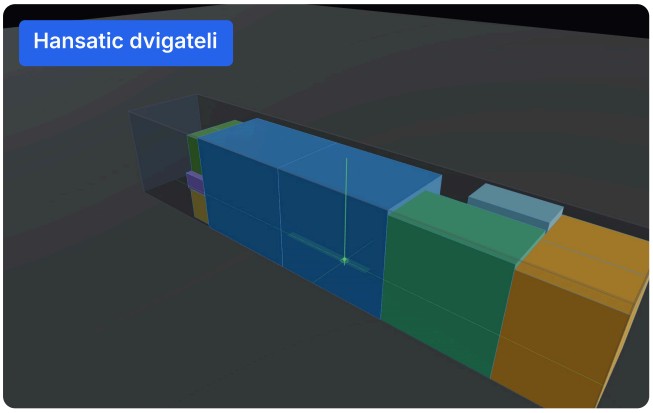
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**13 / 14**	**11.00 m (36.1 ft)**	
GPT-5.5	Qonuniy	13 / 14	11.40 m (37.4 ft)	
Opus 5.5	Qonuniy	13 / 14	11.00 m (36.1 ft)	
Grok 4.7	Provayder xatosi	-	-	Provayder so‘rovni rad etdi.
Kimi K3.1 Pro	Qonuniy	13 / 14	11.00 m (36.1 ft)	
DeepSeek V4 Pro	Qonuniy	13 / 14	11.70 m (38.4 ft)	
Gemini 4 Argon	Qonuniy	13 / 14	11.00 m (36.1 ft)	
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	14 / 14	13.50 m (44.3 ft)	5 bir-biriga yopishgan yuklar, 5 transport vositasidan tashqarida, 2 osilib turgan yuklar

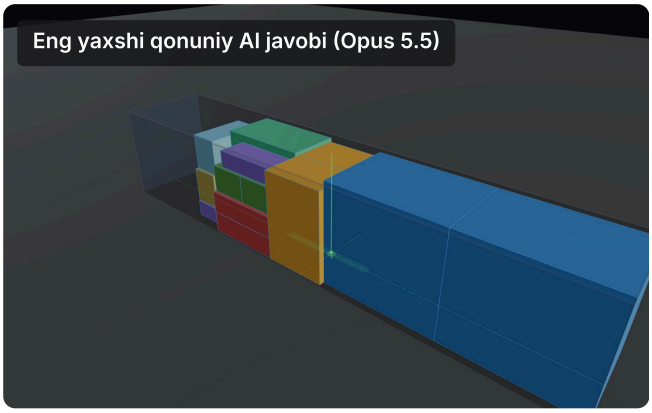
H12 Eng kam pallet joylari

Transport vositasi	Buyumlar soni	Maqsad	Natija
13.6m Curtainsider	14	Eng kam pallet joylari	Dvigatel aniq oldinda

Qiyinlashtiruvchi omillar

6 ustma-ust joylanmaydigan buyumlar; 9 tik turishi kerak bo‘lgan buyumlar; eng og‘ir buyum 732 kg (1,614 lb)





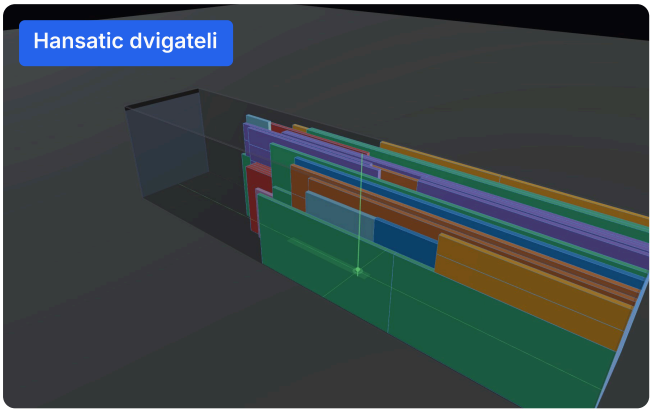
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**13 / 14**	**25 joylashuv, 11.00 m (36.1 ft)**	
GPT-5.5	Qonuniy	13 / 14	29 joylashuv, 11.73 m (38.5 ft)	
Opus 5.5	Qonuniy	13 / 14	28 joylashuv, 11.00 m (36.1 ft)	
Grok 4.7	Provayder xatosi	-	-	Provayder so‘rovni rad etdi.
Kimi K3.1 Pro	Qonuniy	13 / 14	28 joylashuv, 11.00 m (36.1 ft)	
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonuniy	13 / 14	28 joylashuv, 11.15 m (36.6 ft)	
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	14 / 14	33 joylashuv, 13.20 m (43.3 ft)	9 bir-biriga yopishgan yuklar, 9 transport vositasidan tashqarida

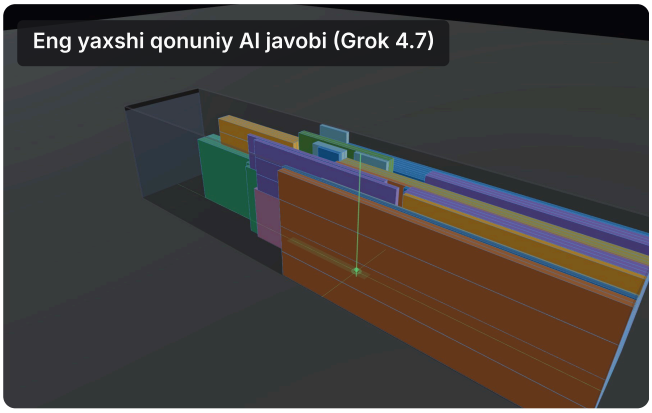
BV1 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
40' High Cube	103	Eng qisqa yuk uzunligi	Dvigatel aniq oldinda

Qiyinlashtiruvchi omillar

37 tik turishi kerak bo‘lgan buyumlar; uzunligi 8.27 m (27.1 ft) gacha bo‘lgan buyumlar





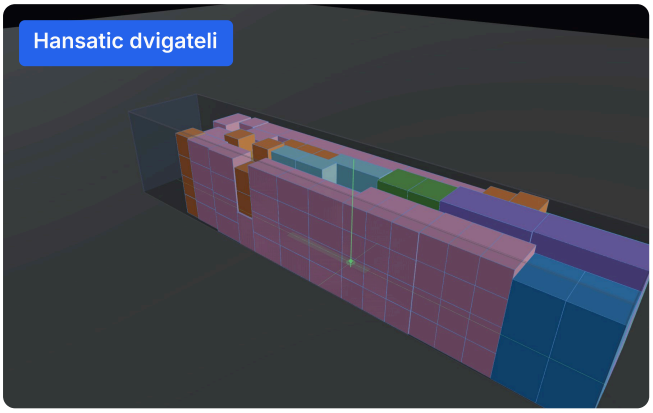
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**103 / 103**	**9.17 m (30.1 ft)**	
GPT-5.5	Qonuniy	92 / 103	8.27 m (27.1 ft)	
Opus 5.5	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Grok 4.7	Qonuniy	103 / 103	10.66 m (35.0 ft)	
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	77 / 103	8.36 m (27.4 ft)	1 noto‘g‘ri o‘lchamdagi yuklar, 4 balandlik chegarasidan oshib ketgan, 4 osilib turgan yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	22 / 103	16.54 m (54.3 ft)	9 transport vositasidan tashqarida

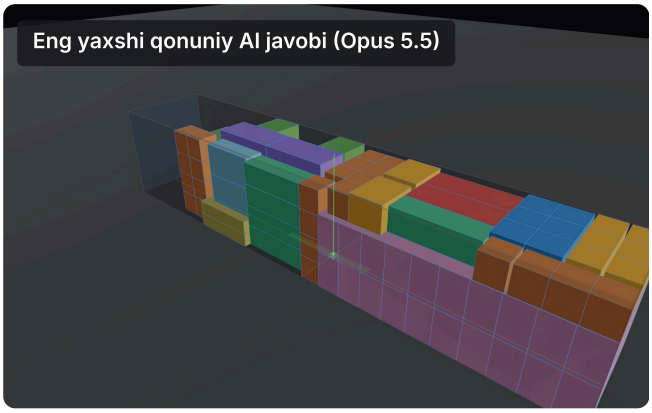
BV2 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
13.6m Curtainsider	153	Eng qisqa yuk uzunligi	Dvigatel aniq oldinda

Qiyinlashtiruvchi omillar

2 ustma-ust joylanmaydigan buyumlar; eng og‘ir buyum 578 kg (1,274 lb)





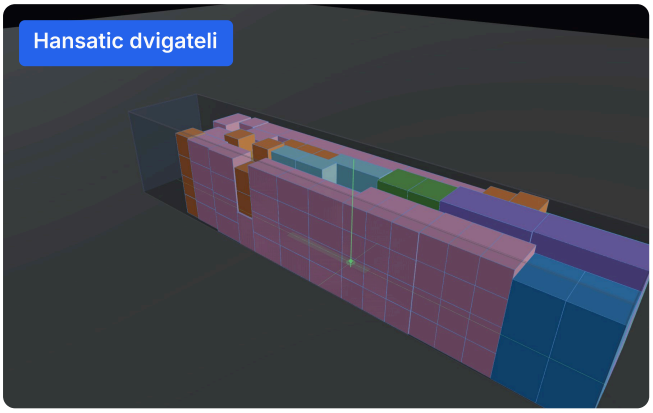
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**153 / 153**	**11.52 m (37.8 ft)**	
GPT-5.5	Qonuniy	153 / 153	13.14 m (43.1 ft)	
Opus 5.5	Qonuniy	153 / 153	11.78 m (38.6 ft)	
Grok 4.7	Qonuniy	153 / 153	12.30 m (40.4 ft)	
Kimi K3.1 Pro	Qonuniy	153 / 153	11.99 m (39.3 ft)	
DeepSeek V4 Pro	Qonuniy	153 / 153	12.79 m (42.0 ft)	
Gemini 4 Argon	Qonunga xilof	147 / 153	12.77 m (41.9 ft)	6 noto‘g‘ri o‘lchamdagi yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	56 / 153	14.02 m (46.0 ft)	39 bir-biriga yopishgan yuklar, 27 transport vositasidan tashqarida

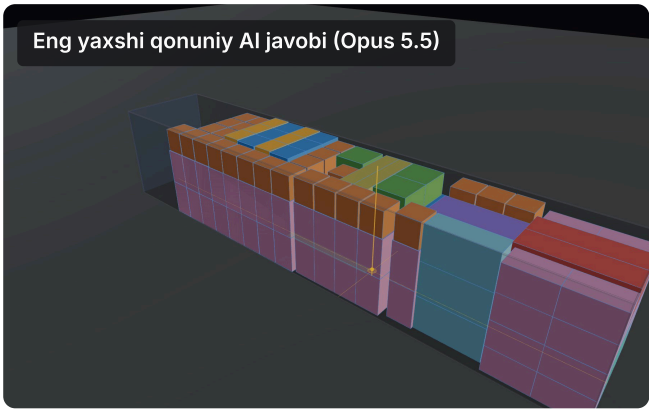
BV2 Eng kam pallet joylari

Transport vositasi	Buyumlar soni	Maqsad	Natija
13.6m Curtainsider	153	Eng kam pallet joylari	Dvigatel ozgina oldinda

Qiyinlashtiruvchi omillar

2 ustma-ust joylanmaydigan buyumlar; eng og‘ir buyum 578 kg (1,274 lb)





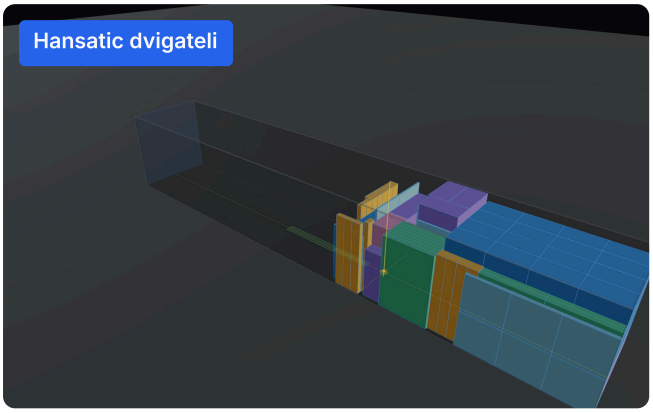
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**153 / 153**	**29 joylashuv, 11.52 m (37.8 ft)**	
GPT-5.5	Qonuniy	153 / 153	32 joylashuv, 12.60 m (41.3 ft)	
Opus 5.5	Qonuniy	153 / 153	29 joylashuv, 11.67 m (38.3 ft)	
Grok 4.7	Qonuniy	153 / 153	32 joylashuv, 12.78 m (41.9 ft)	
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	153 / 153	34 joylashuv, 14.82 m (48.6 ft)	7 bir-biriga yopishgan yuklar, 31 transport vositasidan tashqarida, 86 balandlik chegarasidan oshib ketgan, 96 osilib turgan yuklar

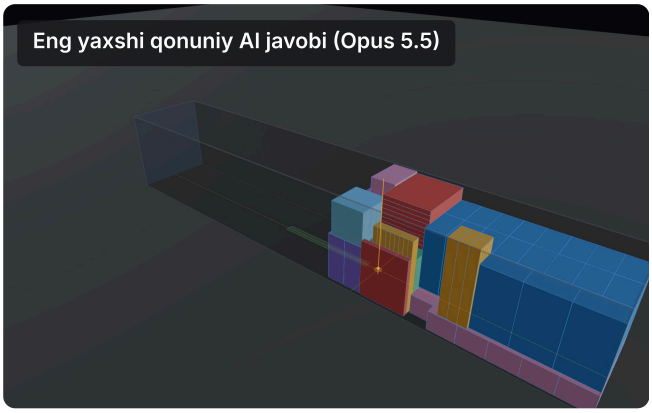
BV3 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
53ft Dry Van	119	Eng qisqa yuk uzunligi	Dvigatel aniq oldinda

Qiyinlashtiruvchi omillar

19 ustma-ust joylanmaydigan buyumlar; 35 tik turishi kerak bo‘lgan buyumlar





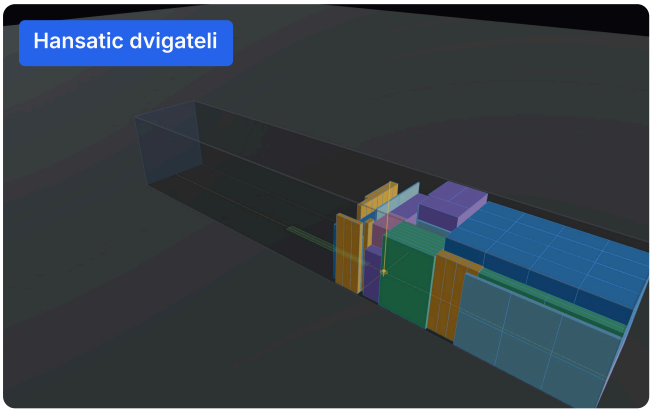
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**119 / 119**	**6.83 m (22.4 ft)**	
GPT-5.5	Qonuniy	119 / 119	9.14 m (30.0 ft)	
Opus 5.5	Qonuniy	119 / 119	6.99 m (22.9 ft)	
Grok 4.7	Qonuniy	119 / 119	8.10 m (26.6 ft)	
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Javobda haqiqiy reja mavjud emas edi.
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	115 / 119	8.36 m (27.4 ft)	4 noto‘g‘ri o‘lchamdagi yuklar, 5 bir-biriga yopishgan yuklar, 3 ezilgan yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	22 / 119	16.76 m (55.0 ft)	11 transport vositasidan tashqarida

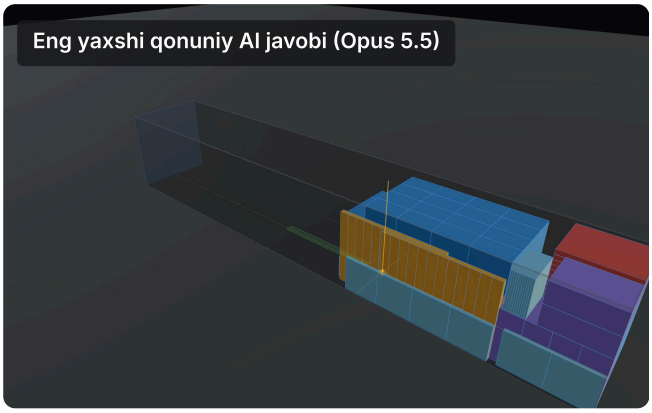
BV3 Eng kam pallet joylari

Transport vositasi	Buyumlar soni	Maqsad	Natija
53ft Dry Van	119	Eng kam pallet joylari	Dvigatel aniq oldinda

Qiyinlashtiruvchi omillar

19 ustma-ust joylanmaydigan buyumlar; 35 tik turishi kerak bo‘lgan buyumlar





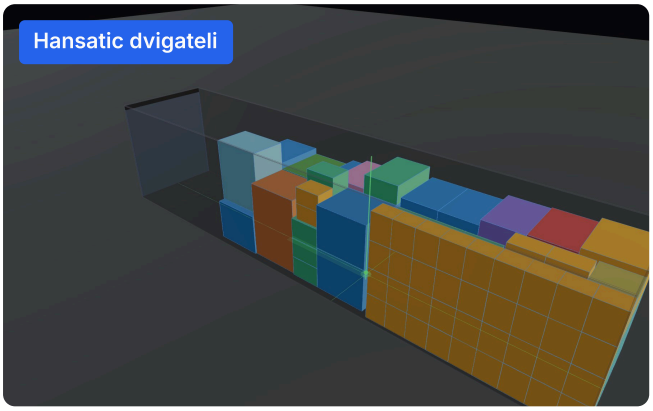
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**119 / 119**	**17 joylashuv, 6.83 m (22.4 ft)**	
GPT-5.5	**Qonuniy**	119 / 119	23 joylashuv, 9.07 m (29.8 ft)	
Opus 5.5	**Qonuniy**	119 / 119	18 joylashuv, 6.99 m (22.9 ft)	
Grok 4.7	**Qonuniy**	119 / 119	22 joylashuv, 8.64 m (28.3 ft)	
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	**Qonunga xilof**	107 / 119	21 joylashuv, 16.18 m (53.1 ft)	12 noto‘g‘ri o‘lchamdagi yuklar, 66 bir-biriga yopishgan yuklar, 35 transport vositasidan tashqarida, 60 osilib turgan yuklar, 1 ezilgan yuklar, 1 yuk bilan mustahkamlanmagan ajratilgan guruhlar

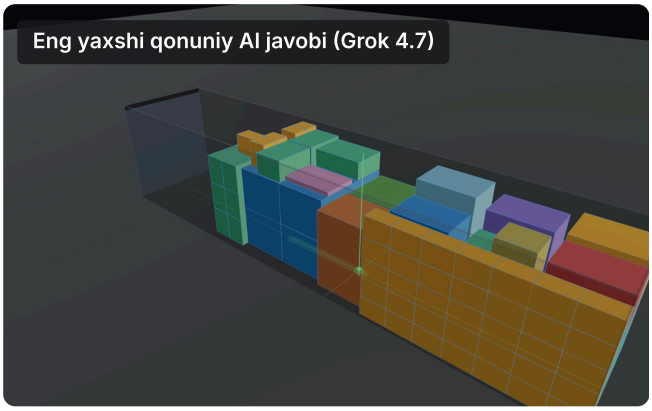
BV4 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
40' High Cube	145	Eng qisqa yuk uzunligi	Dvigatel aniq oldinda

Qiyinlashtiruvchi omillar

11 ustma-ust joylanmaydigan buyumlar; 11 mo‘rt buyumlar, faqat ustiga joylanadi; 20 tik turishi kerak bo‘lgan buyumlar





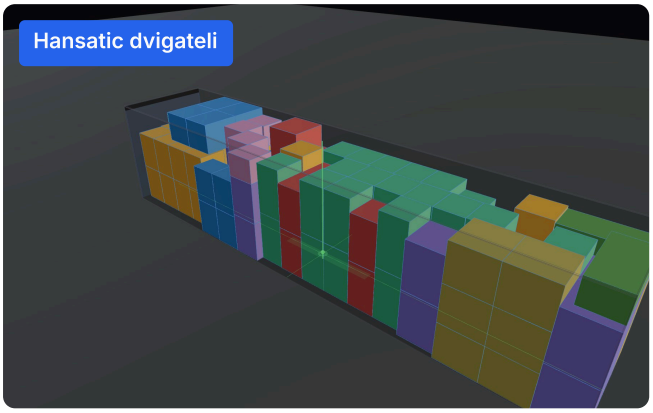
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**145 / 145**	**8.57 m (28.1 ft)**	
GPT-5.5	Qonuniy	145 / 145	11.96 m (39.2 ft)	
Opus 5.5	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Grok 4.7	Qonuniy	145 / 145	8.85 m (29.0 ft)	
Kimi K3.1 Pro	Qonuniy	145 / 145	10.87 m (35.7 ft)	
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	145 / 145	10.05 m (33.0 ft)	19 bir-biriga yopishgan yuklar, 3 transport vositasidan tashqarida, 9 balandlik chegarasidan oshib ketgan, 4 osilib turgan yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonuniy	11 / 145	10.33 m (33.9 ft)	

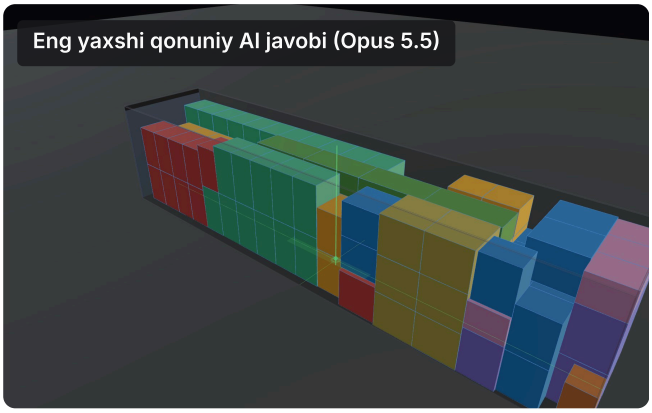
BV5 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
40' High Cube	136	Eng qisqa yuk uzunligi	Dvigatel aniq oldinda

Qiyinlashtiruvchi omillar

136 tik turishi kerak bo‘lgan buyumlar





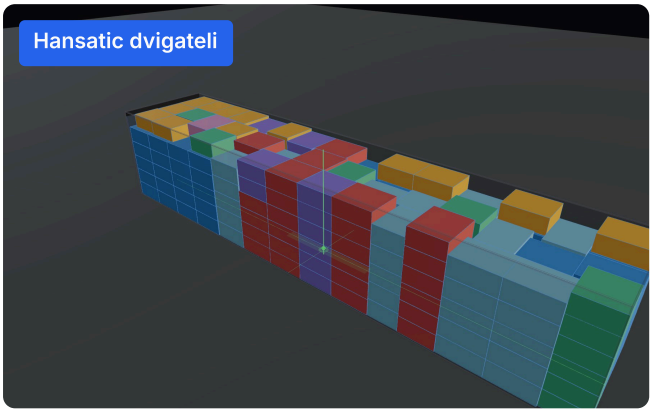
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**127 / 136**	**12.00 m (39.4 ft)**	
GPT-5.5	Qonuniy	115 / 136	11.73 m (38.5 ft)	
Opus 5.5	Qonuniy	124 / 136	11.77 m (38.6 ft)	
Grok 4.7	Qonuniy	115 / 136	11.87 m (39.0 ft)	
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	121 / 136	12.00 m (39.4 ft)	1 tik turishi kerak bo‘lgan yukni egilgan, 12 bir-biriga yopishgan yuklar, 6 transport vositasidan tashqarida, 6 osilib turgan yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	51 / 136	12.89 m (42.3 ft)	34 transport vositasidan tashqarida, 6 osilib turgan yuklar

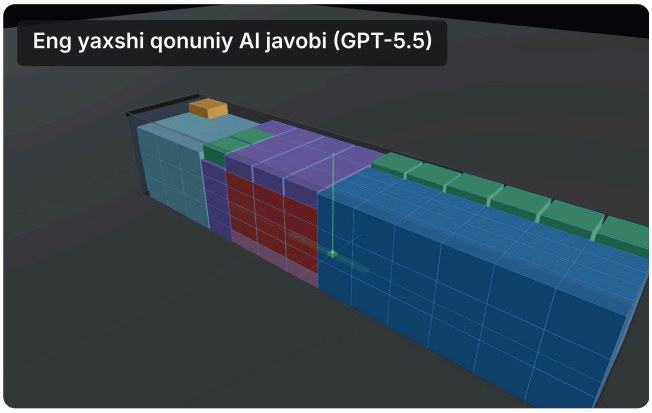
BV6 Eng qisqa yuk uzunligi

Transport vositasi	Buyumlar soni	Maqsad	Natija
40' Dry Container	253	Eng qisqa yuk uzunligi	Dvigatel aniq oldinda

Qiyinlashtiruvchi omillar

turli o‘lchamlar, maxsus belgilar yo‘q





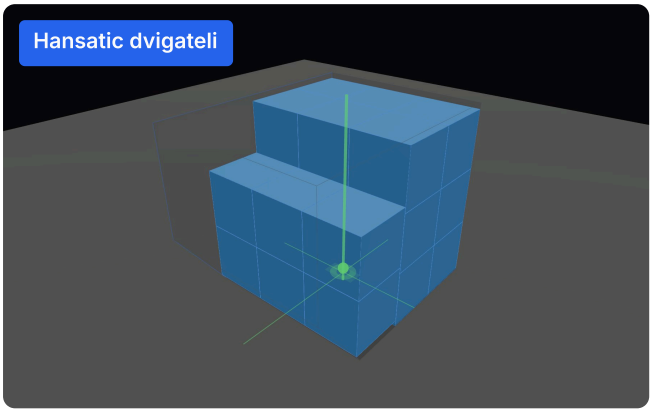
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**244 / 253**	**11.98 m (39.3 ft)**	
GPT-5.5	Qonuniy	238 / 253	11.97 m (39.3 ft)	
Opus 5.5	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Grok 4.7	Qonuniy	218 / 253	11.98 m (39.3 ft)	
Kimi K3.1 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
DeepSeek V4 Pro	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Gemini 4 Argon	Qonunga xilof	197 / 253	11.50 m (37.7 ft)	13 bir-biriga yopishgan yuklar
Qwen3p8	Reja qaytarilmagan	-	-	Model rejani yozishdan oldin chiqish chegarasiga yetdi.
Magistral Medium	Qonunga xilof	42 / 253	12.18 m (40.0 ft)	3 transport vositasidan tashqarida

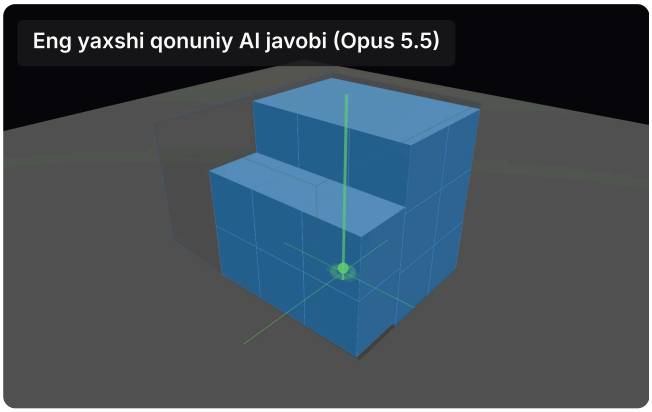
U01 Eng ko‘p joylashtirilgan dona

Transport vositasi	Buyumlar soni	Maqsad	Natija
AKE (LD3)	50	Eng ko‘p joylashtirilgan dona	Durang

Qiyinlashtiruvchi omillar

qiya devor





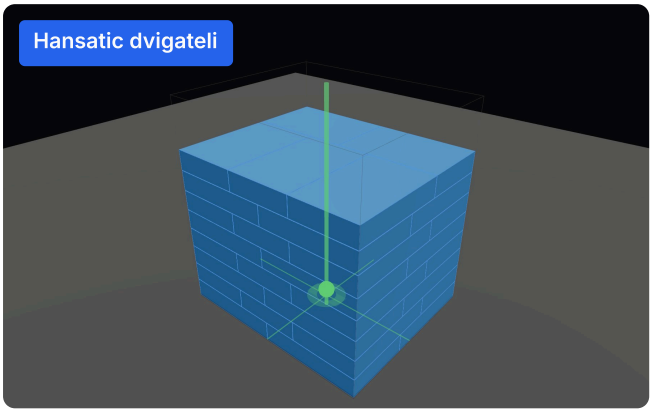
Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**24 / 50**	**24**	
GPT-5.5	Qonuniy	18 / 50	18	
Opus 5.5	Qonuniy	24 / 50	24	
Grok 4.7	Qonuniy	24 / 50	24	
Kimi K3.1 Pro	Qonuniy	24 / 50	24	
DeepSeek V4 Pro	Qonuniy	18 / 50	18	
Gemini 4 Argon	Qonuniy	24 / 50	24	
Qwen3p8	Qonuniy	24 / 50	24	
Magistral Medium	Qonunga xilof	24 / 50	24	3 havo konteyneri konturidan tashqarida

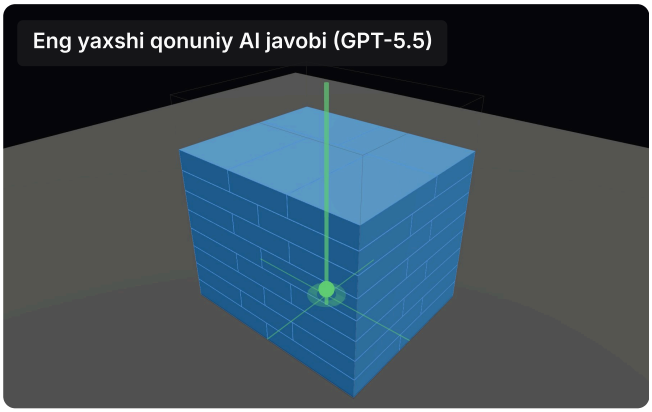
P01 Eng ko‘p bir-biriga bog‘langan pallet

Transport vositasi	Buyumlar soni	Maqsad	Natija
Industrial / Block 1200×1000	40	Eng ko‘p bir-biriga bog‘langan pallet	Durang

Qiyinlashtiruvchi omillar

40 tik turishi kerak bo‘lgan buyumlar; uzunligi 0.60 m (2.0 ft) gacha bo‘lgan buyumlar





Ishtirokchi	Holati	Joylashtirilgan	Ball	Eslatmalar
Hansatic dvigateli	**Qonuniy**	**40 / 40**	**100%**	
GPT-5.5	Qonuniy	40 / 40	100%	
Opus 5.5	Qonuniy	40 / 40	100%	
Grok 4.7	Qonuniy	40 / 40	100%	
Kimi K3.1 Pro	Qonuniy	40 / 40	100%	
DeepSeek V4 Pro	Qonuniy	40 / 40	100%	
Gemini 4 Argon	Qonunga xilof	35 / 40	100%	5 noto‘g‘ri o‘lchamdagi yuklar, 12 osilib turgan yuklar
Qwen3p8	Qonuniy	40 / 40	100%	
Magistral Medium	Qonunga xilof	40 / 40	100%	30 bir-biriga yopishgan yuklar, 9 transport vositasidan tashqarida