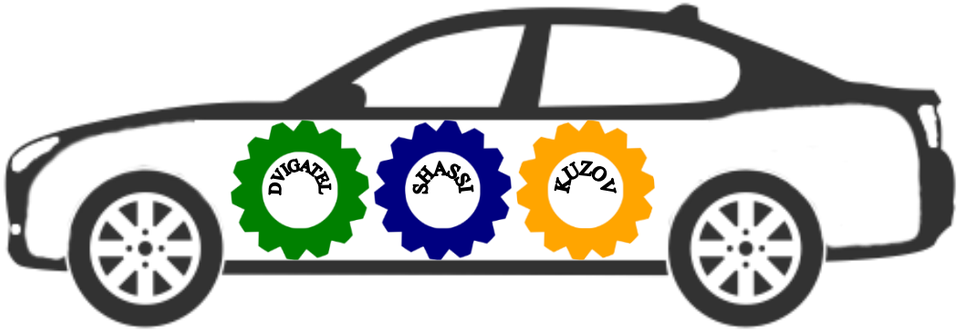
VEHICLES CONSTRUCTION

AVTOMOBILLAR KONSTRUKSIYASI



2nd Topic: Engine

(2-Mavzu: Dvigatel)

Part 2

Associate Professor: Yusupov Sarvarbek

2-Mavzu: Dvigatel

(2nd Topic: Engine)

O‘quv rejasi:

2.1. Avtomobil dvigatellarining tasnifi.

2.2. Ichki yonuv dvigatelining asosiy parametrlari.

2.3. Ikki taktli dvigatellar.

2.4. To‘rt taktli benzinli dvigatellar.

2.5. To‘rt taktli dizelli dvigatellar.

2.6. Rotor-porshenli dvigatellar.

2.7. Gazturbinali dvigatellar.

2.4. To‘rt taktli benzinli dvigatellar.

Zamonaviy avtomobillarning dvigatellari asosan to‘rt taktli ishchi sikl bo‘yicha ishlaydi.

To‘rt taktli dvigatel deb nimaga aytiladi?

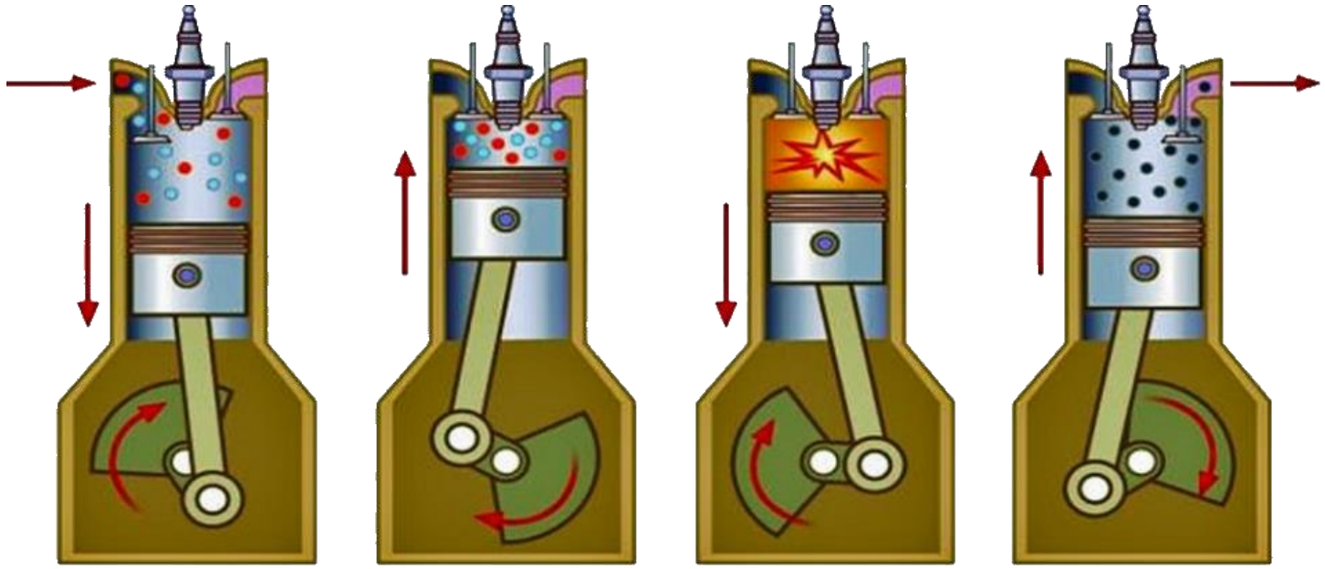
Ish sikliga ta’rif bering!

1) kiritish takti;

2) siqish takti;

3) kengayish takti (ish yo‘li);

4) chiqarish takti.

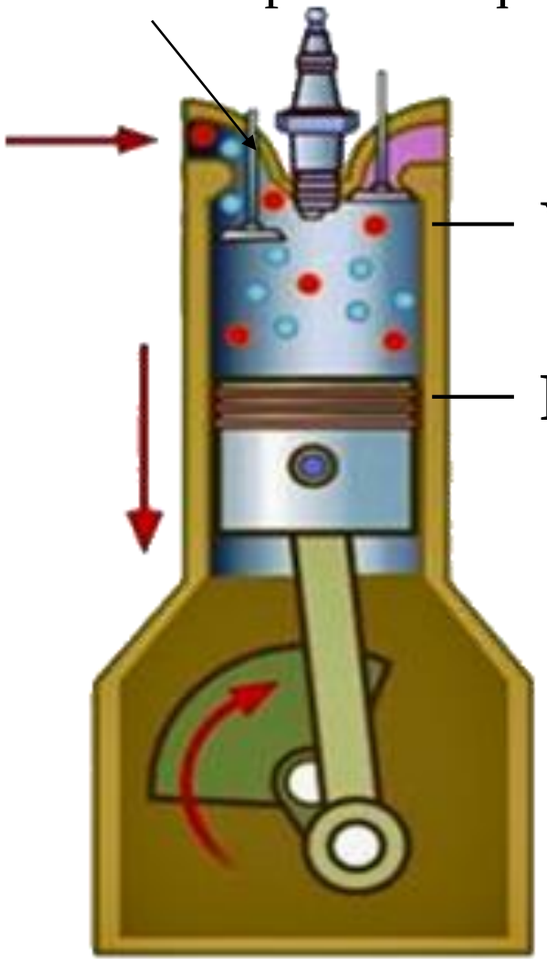


Kiritish | Siqish | Kengayish (ish yo‘li) | Chiqarish

[6]

1) kiritish takti: 0 – 180 °

Kiritish klapani ochiq



[6]

Bu takt silindrni yonuvchi aralashma bilan to‘ldiriladi.

Yonilg‘i aralashmasi

⬇

Yu.Ch.N

So‘rish tufayli

⬇

P.Ch.N

⬇

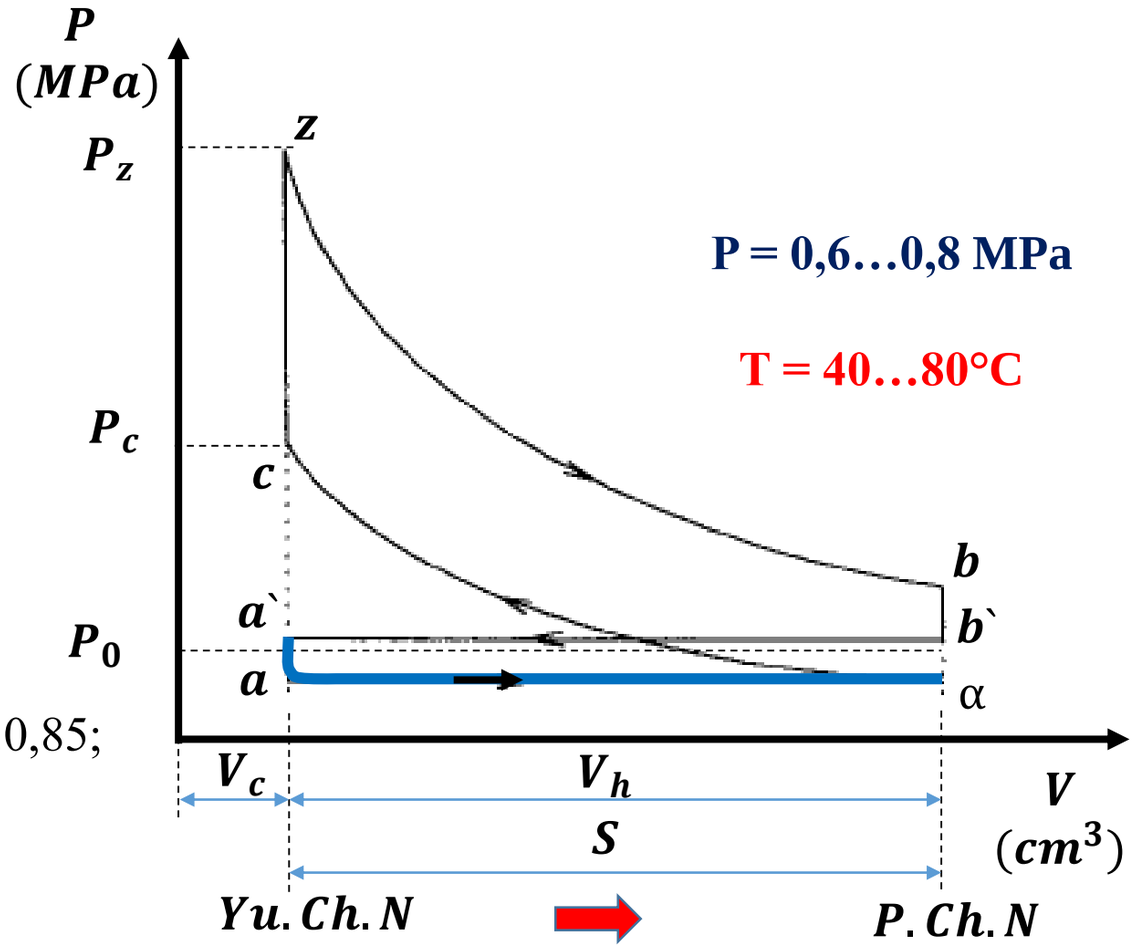
To‘ladi

Yonilg‘i
+
Havo
+
Qoldiq gaz
=
Ish aralashma

To‘lirish koeffitsienti:

Benzinli dv. – 0,75…0,85;

Dizelli dv. – 0,9.



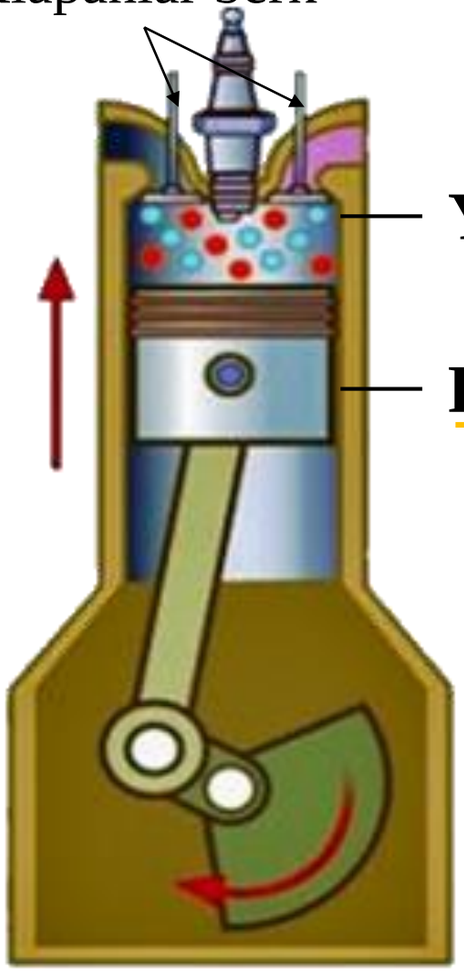
P = 0,6…0,8 MPa

T = 40…80°C

Benzinli dvigatelning indikator diagrammasi.

2) siqish takti: 180°-360° Ish aralashmasining hajmini kamaytirish natijasida ichki energiyasini ko‘paytirib, uni yonishga tayyorlaydi.

Klapanlar berk



Yu.Ch.N

Siqiladi

P.Ch.N

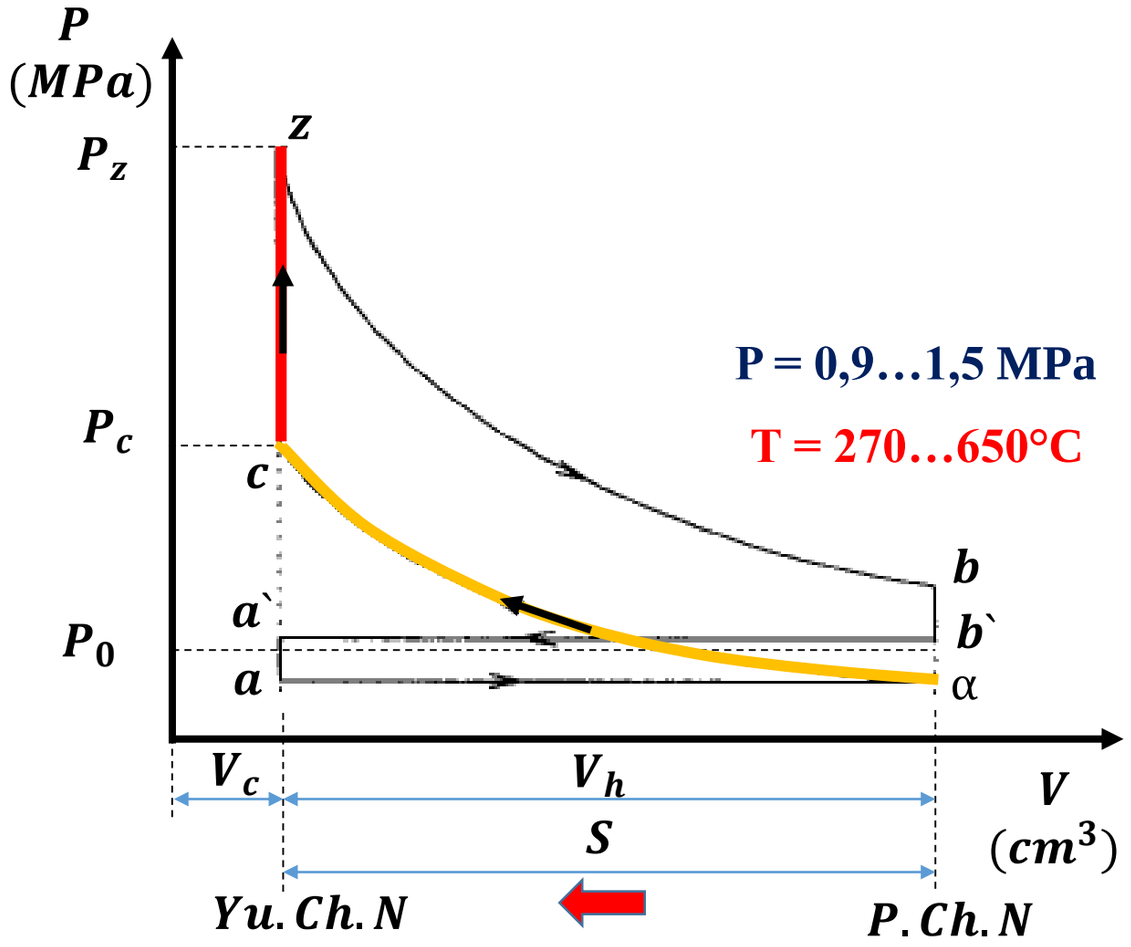
[6]

Siqish taktining oxirida

elektr svechada

elektr uchquni paydo bo‘ladi,

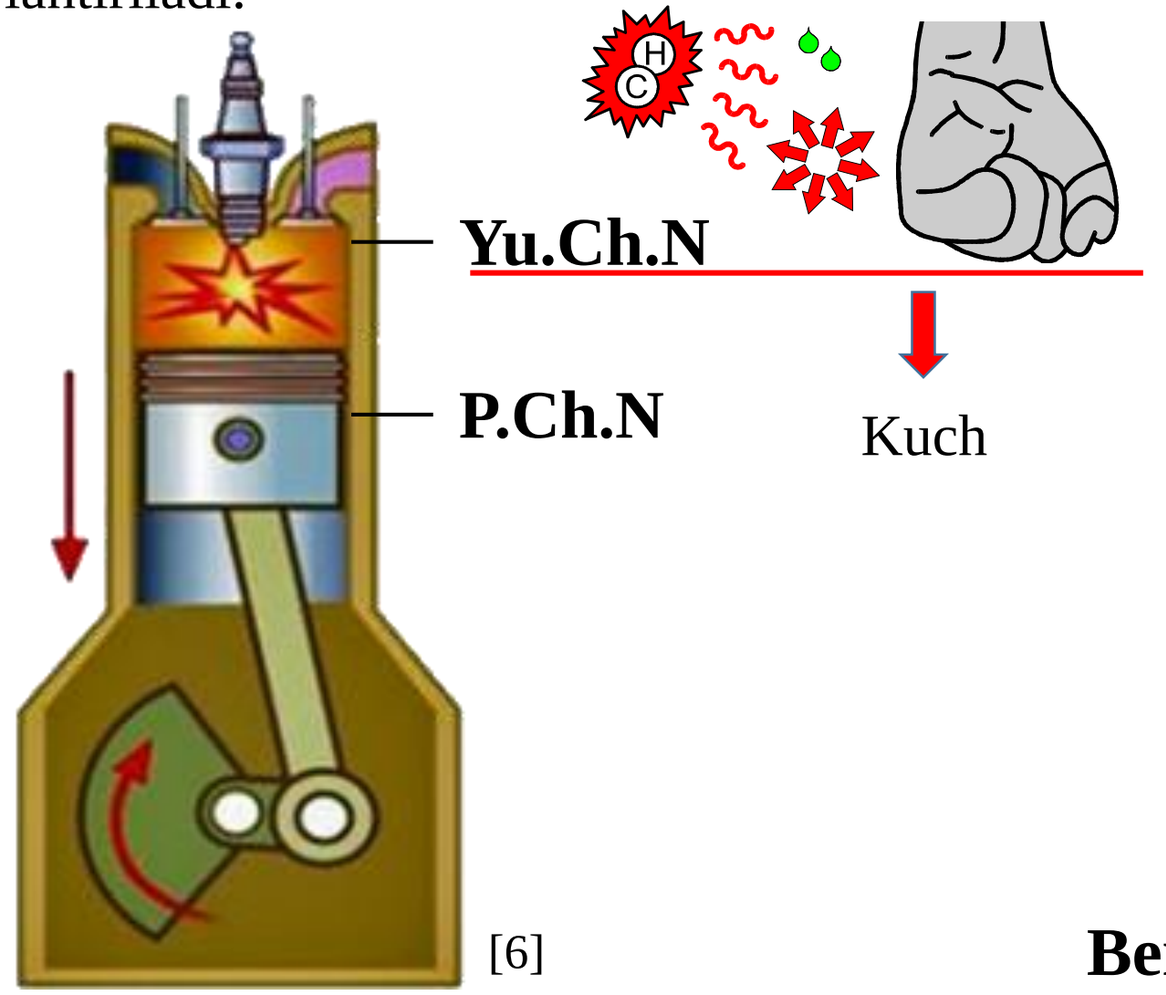
siqilgan ish aralashma alangalanadi



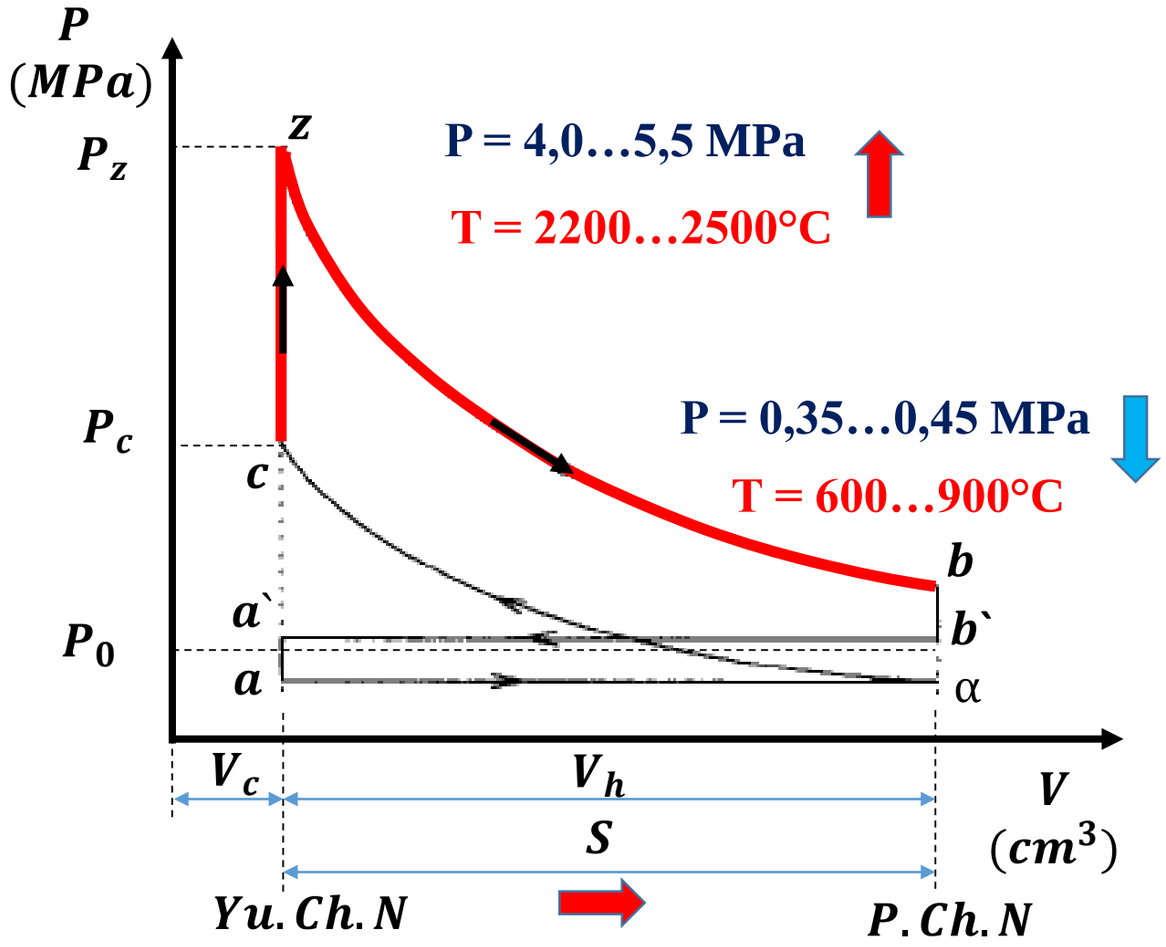
Benzinli dvigatelning indikator diagrammasi.

3) kengayish takti (ish yo‘li): 360°-540°

Bu taktda ish aralashmasining yonishdan hosil bo‘lgan issiqlik energiyasi foydali mexanik energiyaga aylantiriladi.



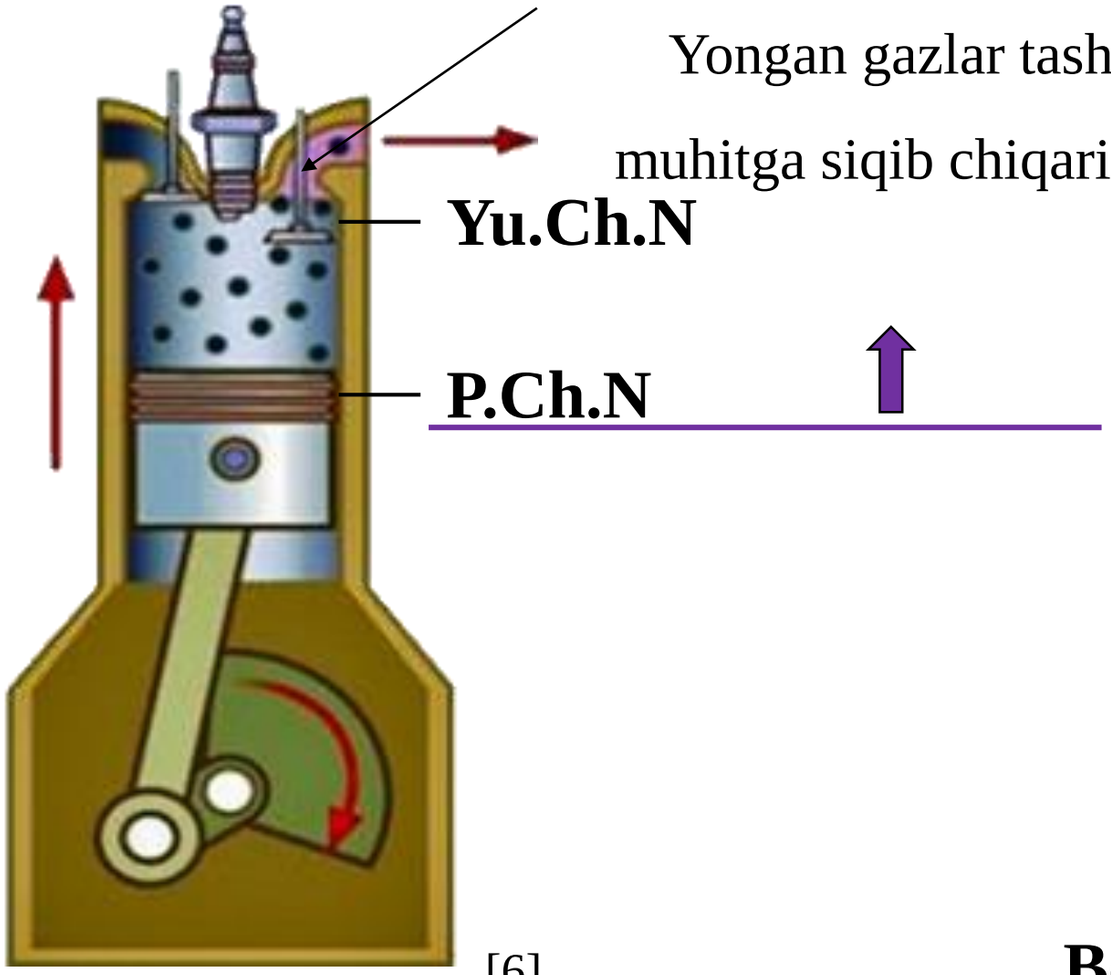
[6]



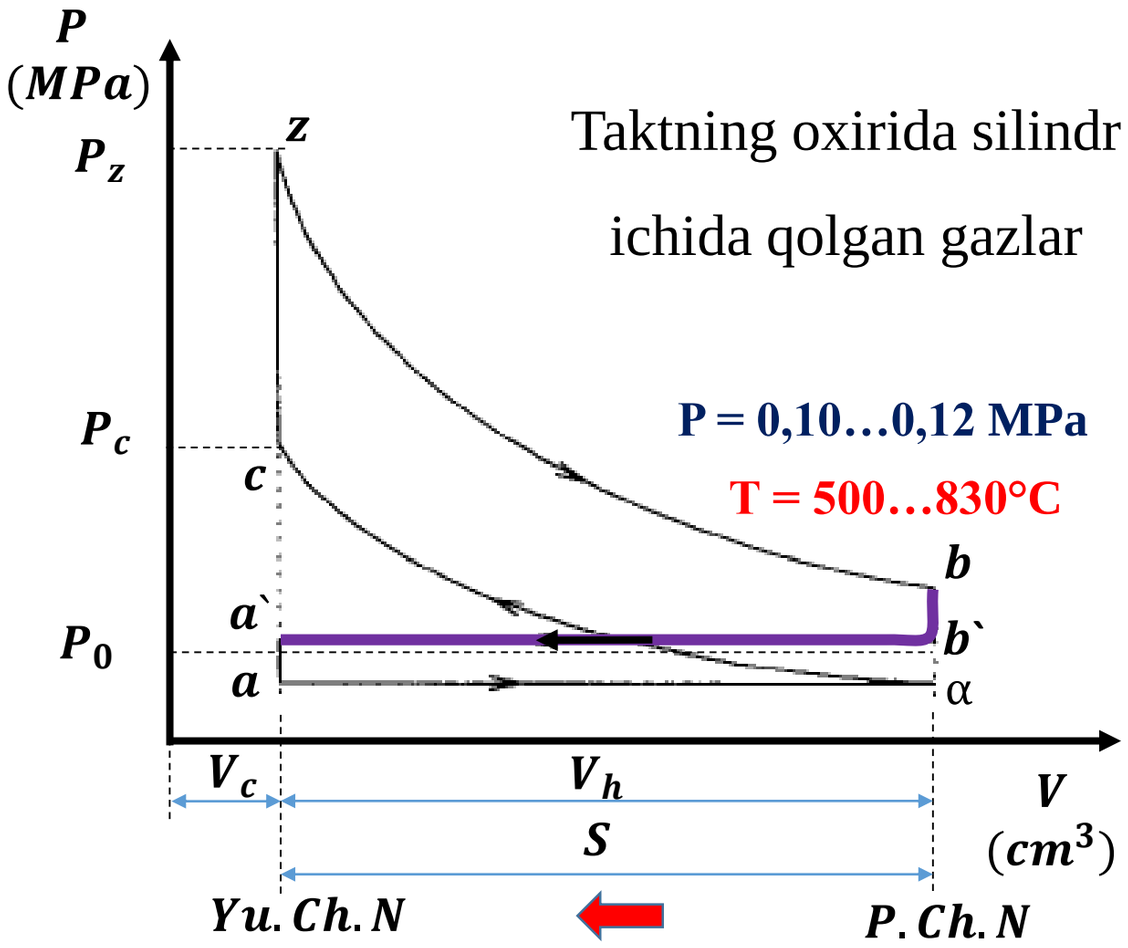
Benzinli dvigatelning indikator diagrammasi.

4) chiqarish takti: 540°-720°

Bu taktda silindr ishlatilgan gazlardan tozalanadi.



[6]



Taktning oxirida silindr ichida qolgan gazlar

P = 0,10…0,12 MPa

T = 500…830°C

Benzinli dvigatelning indikator diagrammasi.

2.5. To‘rt taktli dizelli dvigatellar.

Siqish taktining oxirida silindrga purkalgan suyuq yonilg‘i siqilish natijasida o‘ta qizigan havo bilan aralashib o‘z – o‘zidan alangalansa, bunday dvigatel ***dizel*** deyiladi.

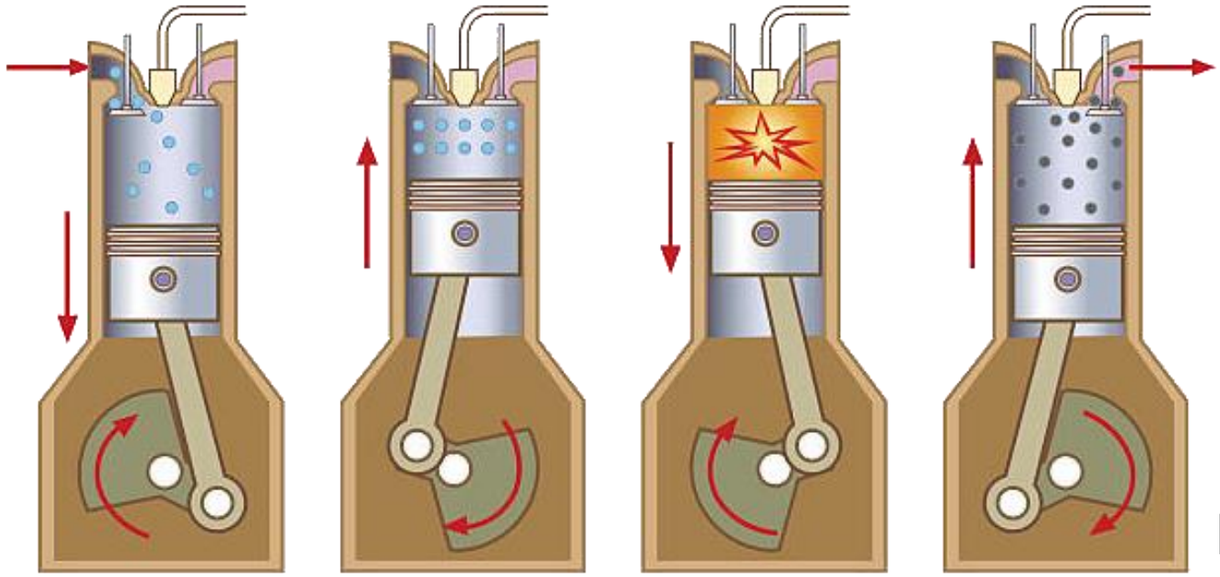
→ 1 → 2 → 3 → 4 →

Ish sikli

Benzinli dvigatel = Dizelli dvigatel

Havo + Yonig‘i **!** **Havo**

Yonilg‘i

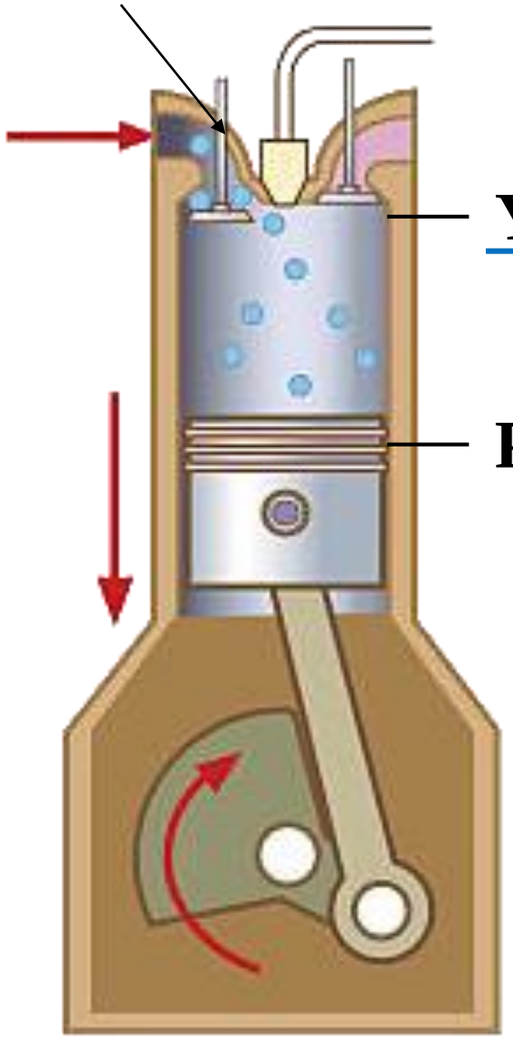


Kiritish **Siqish** **Kengayish (ish yo‘li)** **Chiqarish**

[24]

1) kiritish takti: 0 – 180 °

Kiritish klapani ochiq

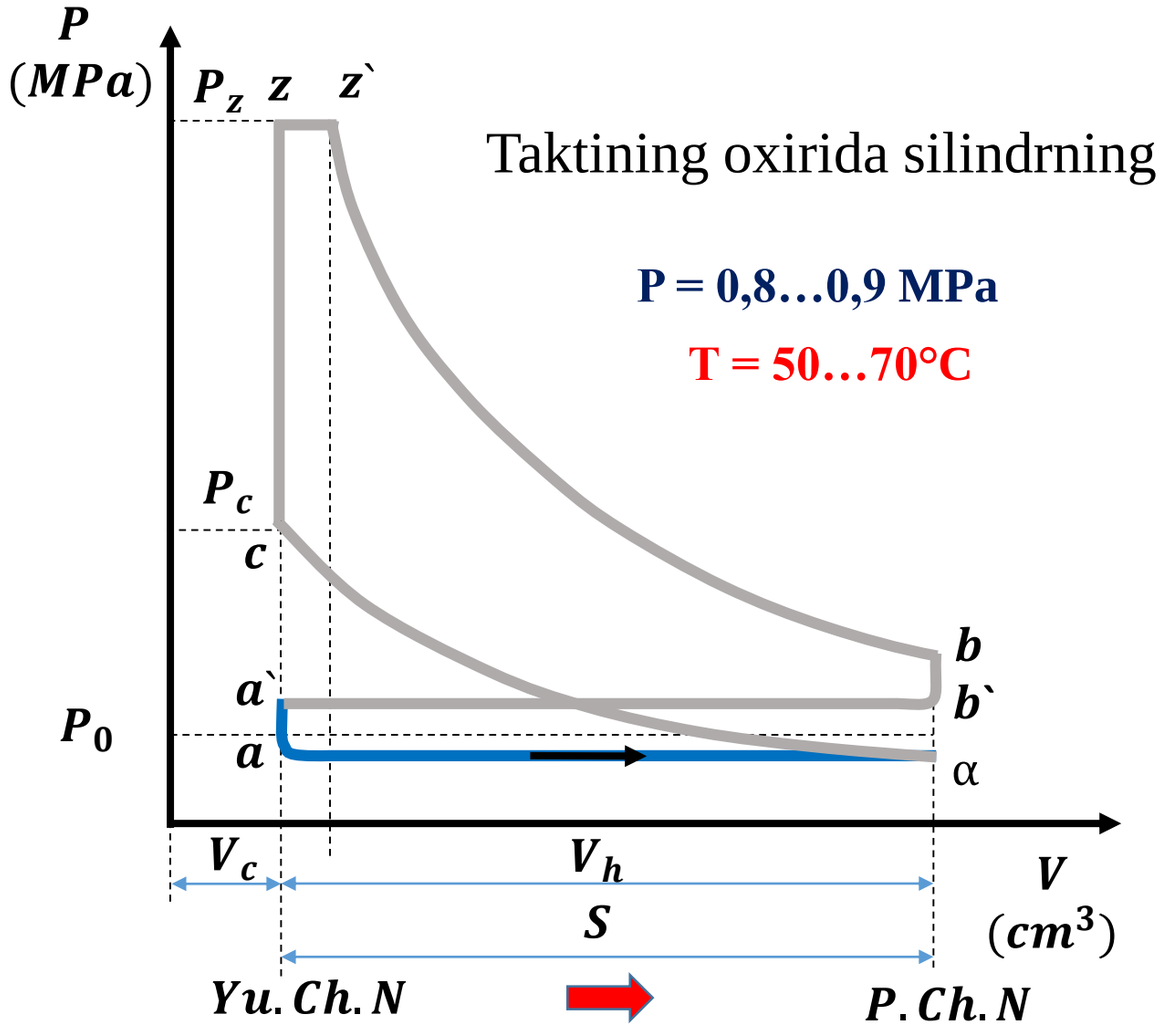


Yu.Ch.N

P.Ch.N

Havo so‘riladi

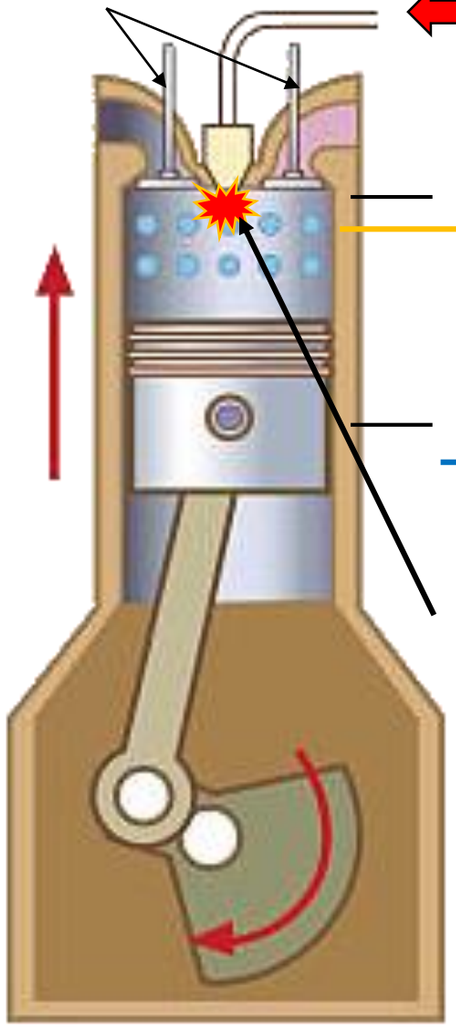
[24]



Dizelli dvigatelning indikator diagrammasi.

2) siqish takti: 180°-360°

Klapanlar berk



Yu.B.Yo.N

20 MPa

purkaladi

Yu.Ch.N

P.Ch.N

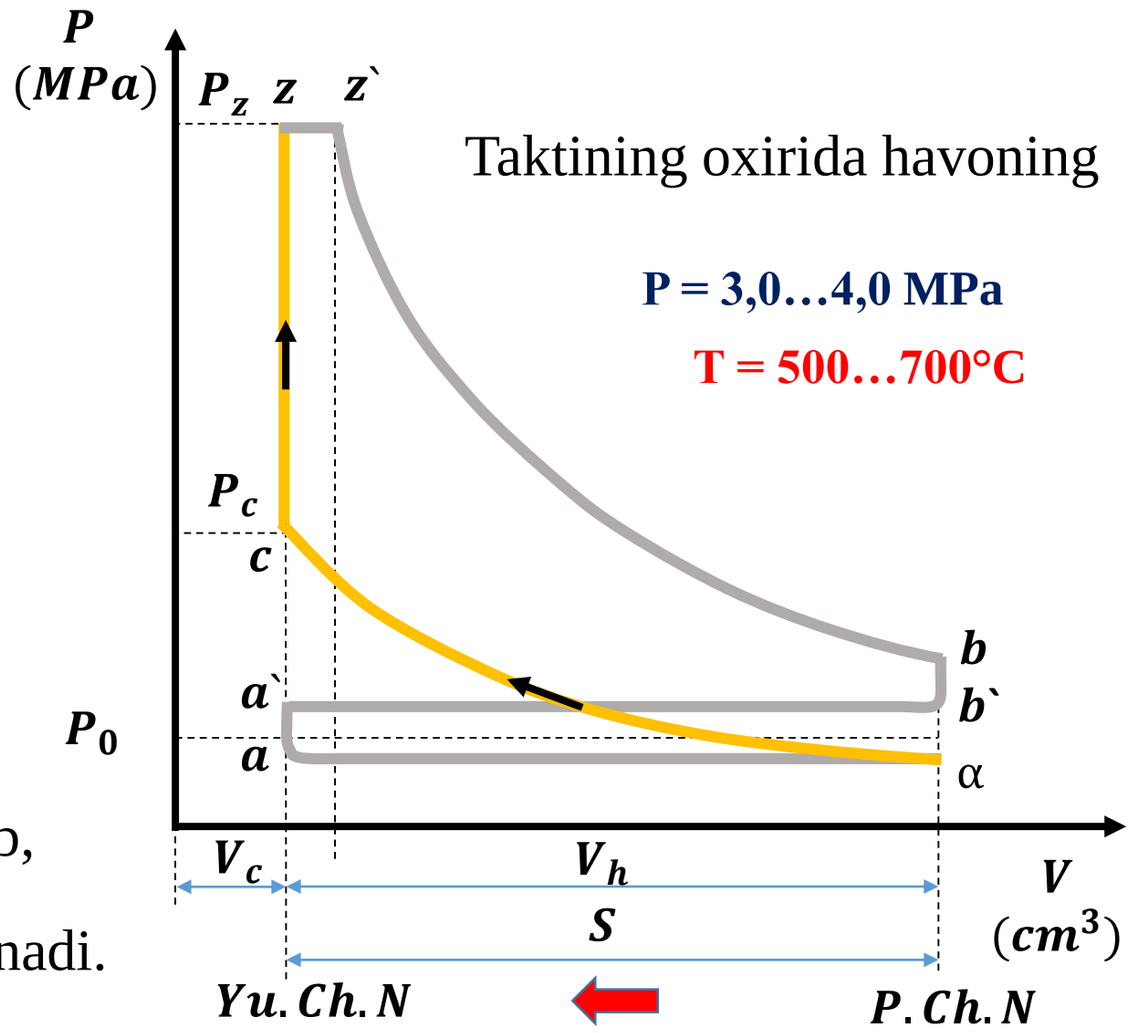
Havo siqiladi

Purkalgan yonilg‘i

o‘ta qizigan havo bilan aralashib,

o‘z – o‘zidan alangalanadi.

[24]



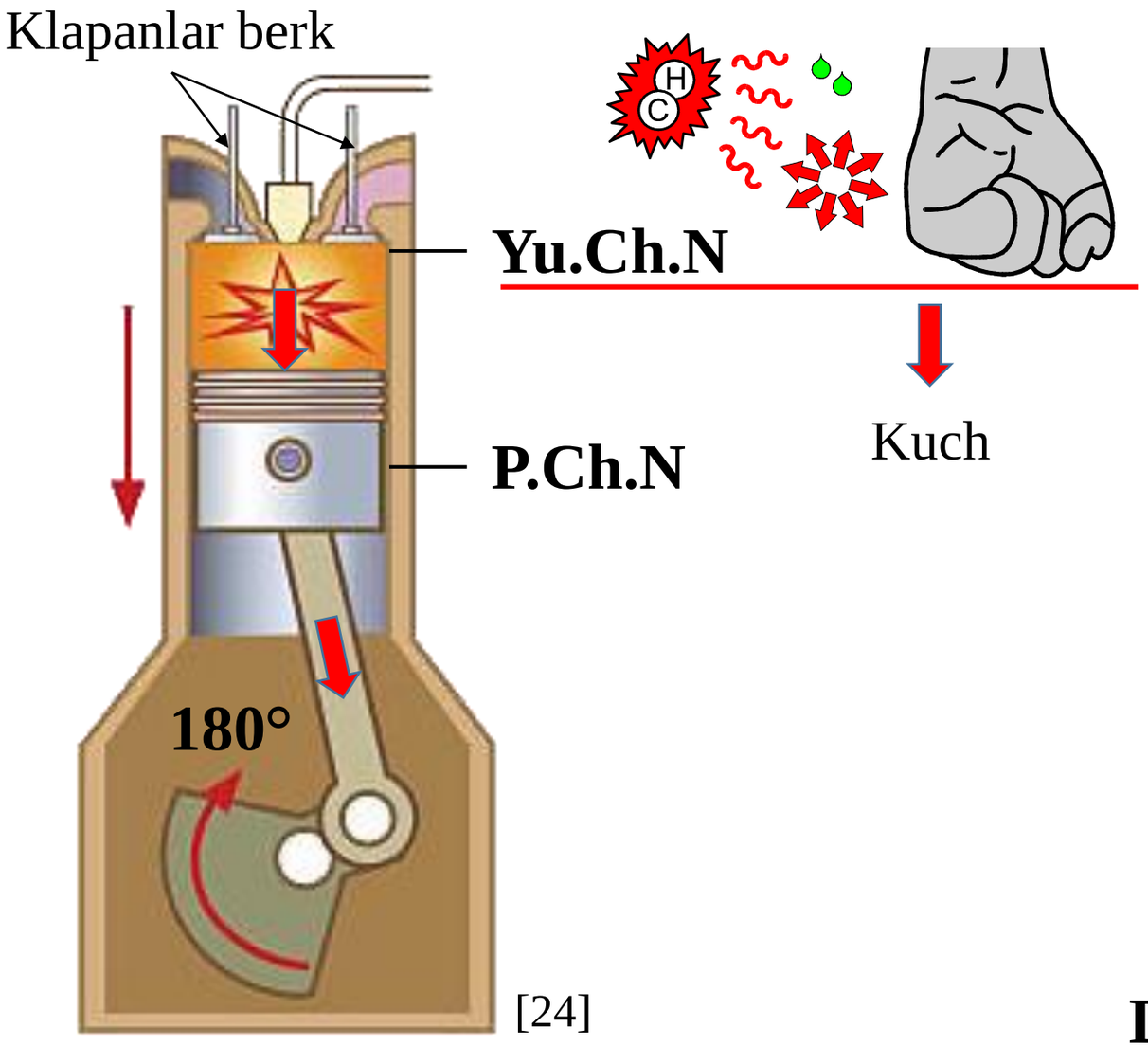
Taktining oxirida havoning

P = 3,0…4,0 MPa

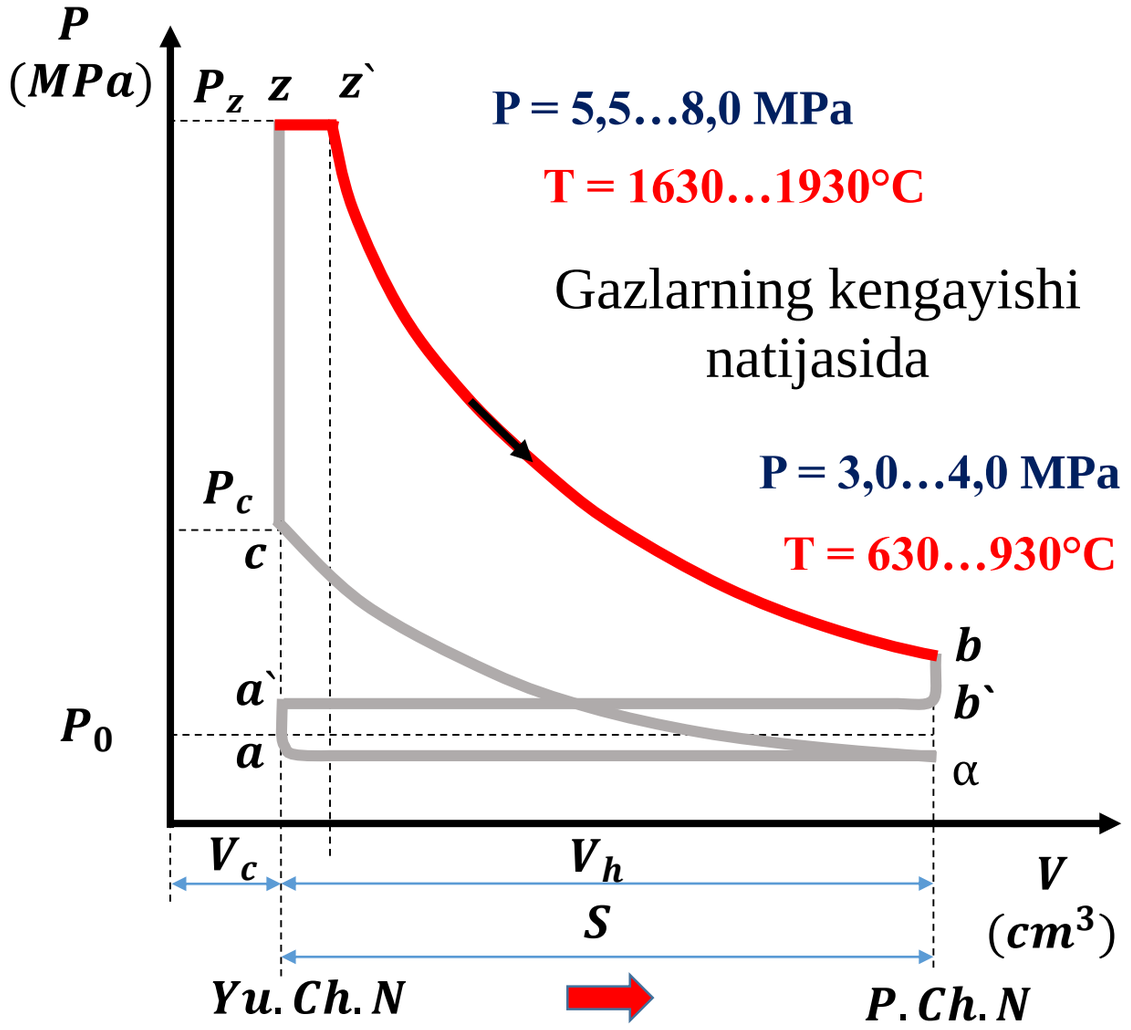
T = 500…700°C

Dizelli dvigatelning indikator diagrammasi.

3) kengayish takti (ish yo‘li): 360°-540°

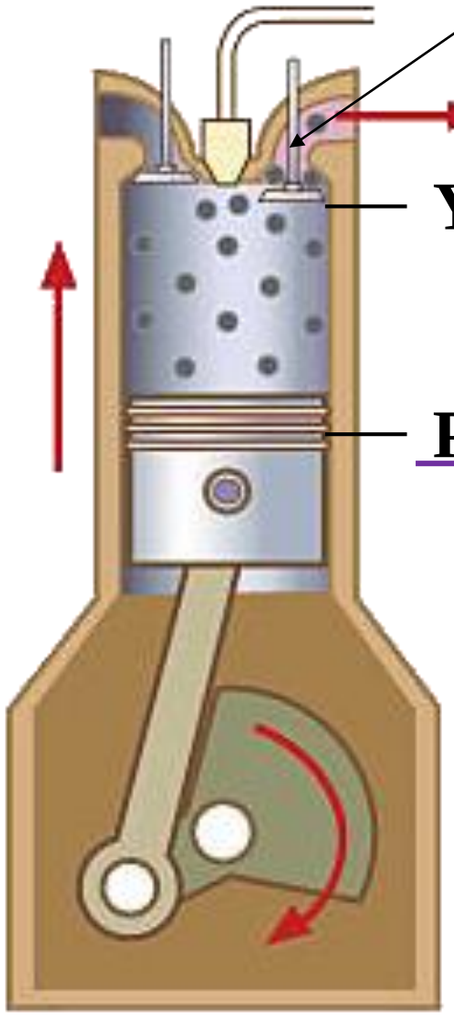


[24]



Dizelli dvigatelning indikator diagrammasi.

4) chiqarish takti: 540°-720°



[24]

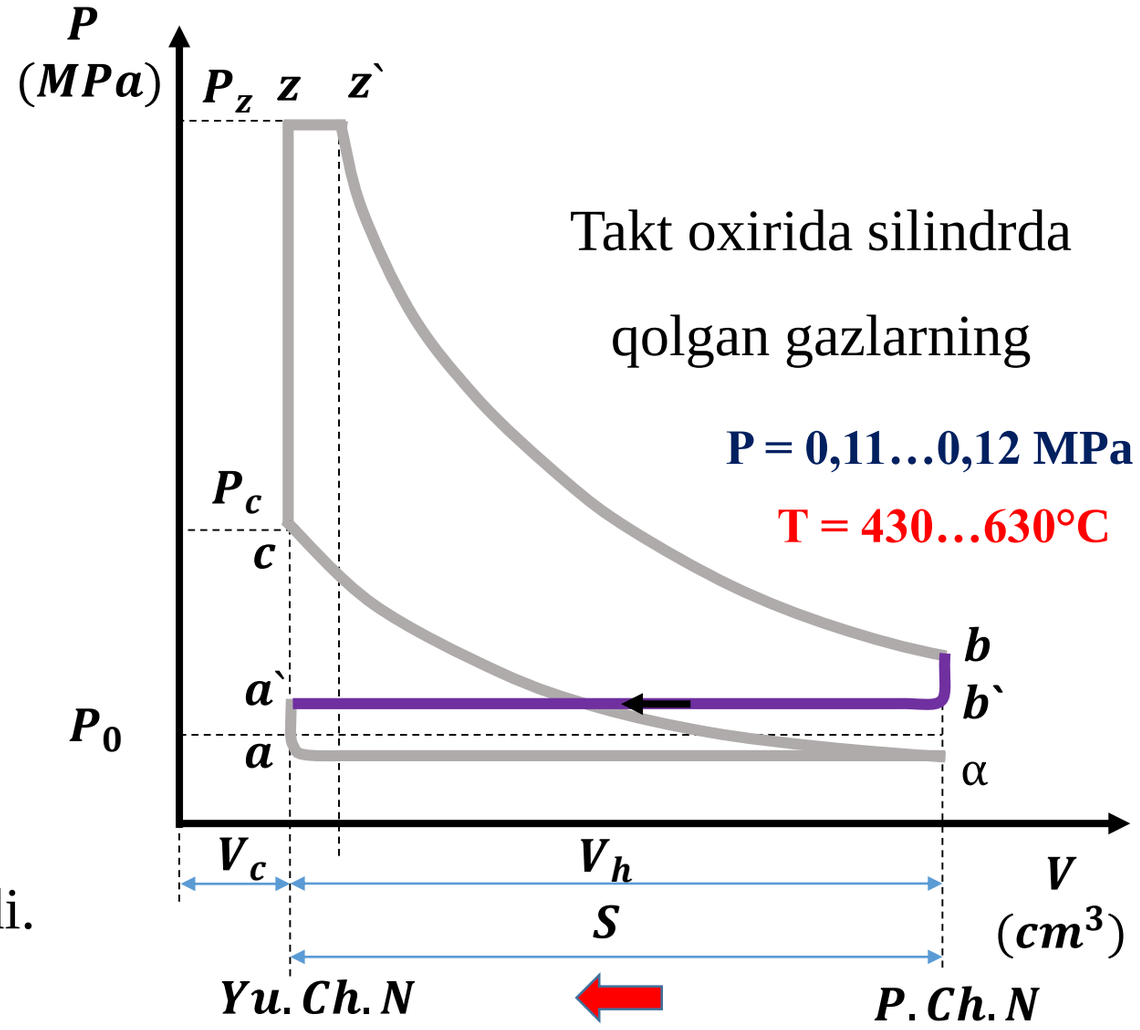
Ishlatilgan gazlar tashqi muhitga chiqarib yuboriladi.

Ish sikli

1 → 2 ↓

↑ 4 ← 3

davom etadi.



Takt oxirida silindrda qolgan gazlarning

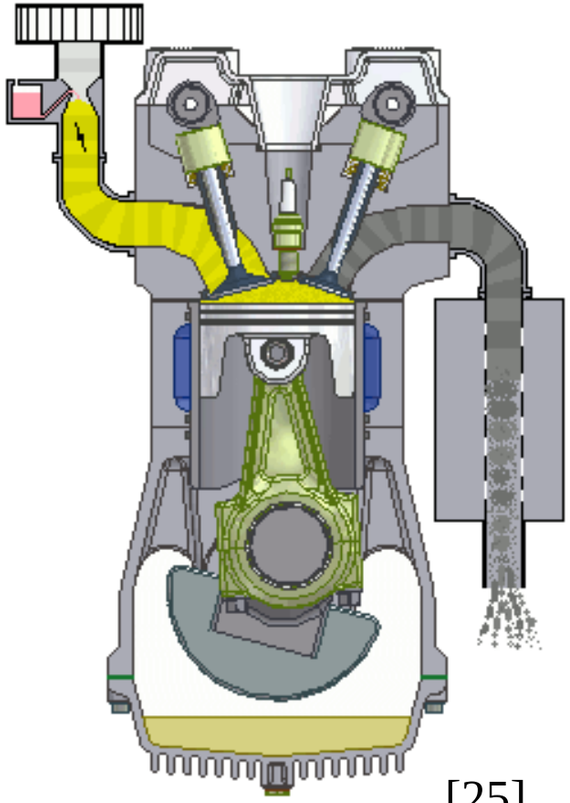
P = 0,11…0,12 MPa

T = 430…630°C

Dizelli dvigatelning indikator diagrammasi.

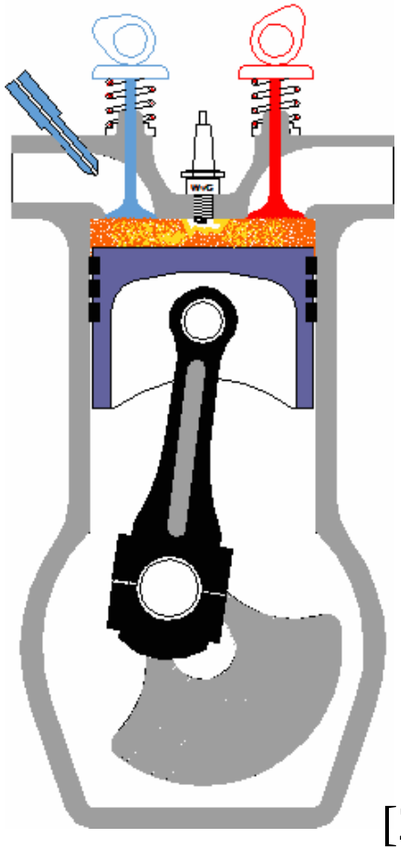
Tushunchalarni taqqoslash:

Karburatorli



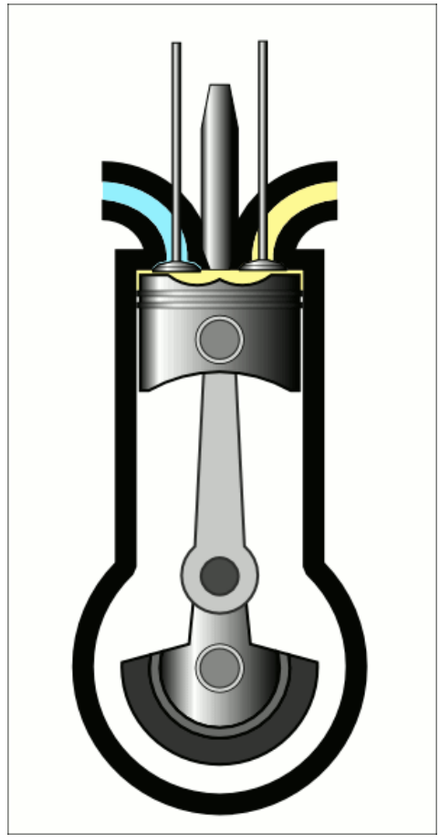
[25]

Injektorli



[26]

Dizelli

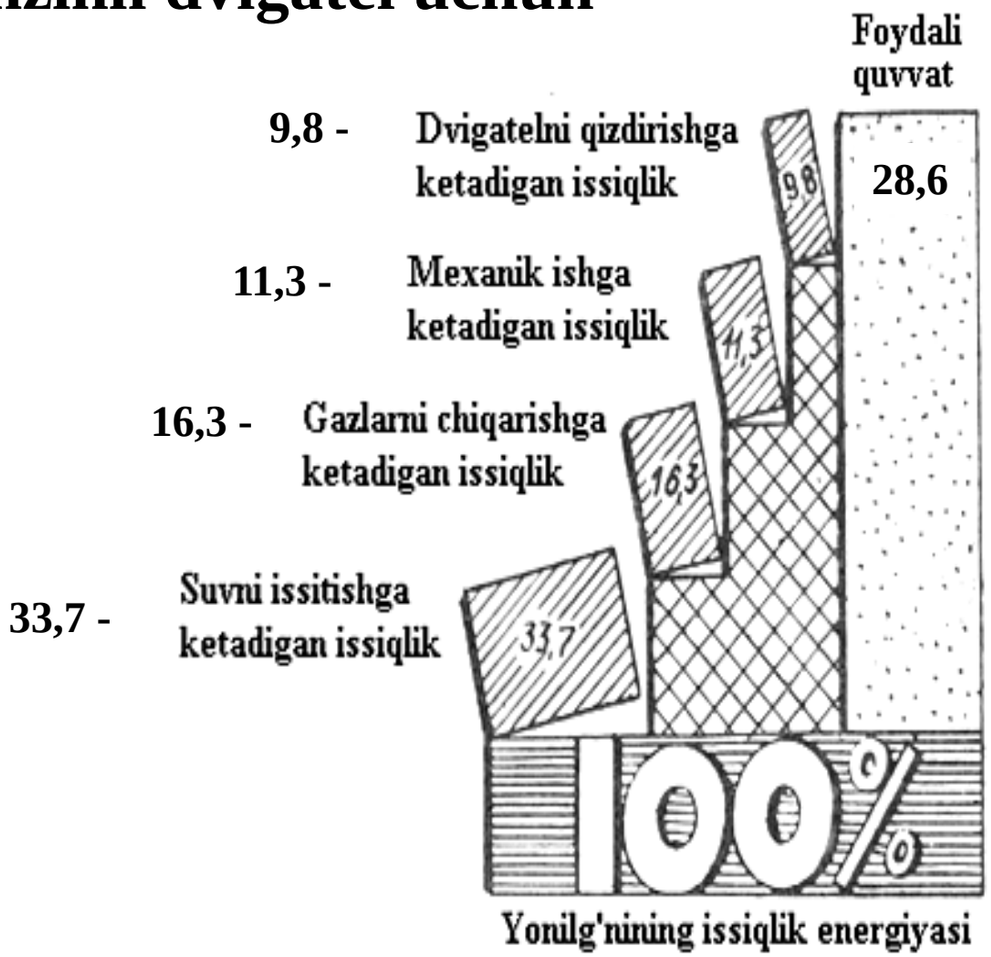


[27]

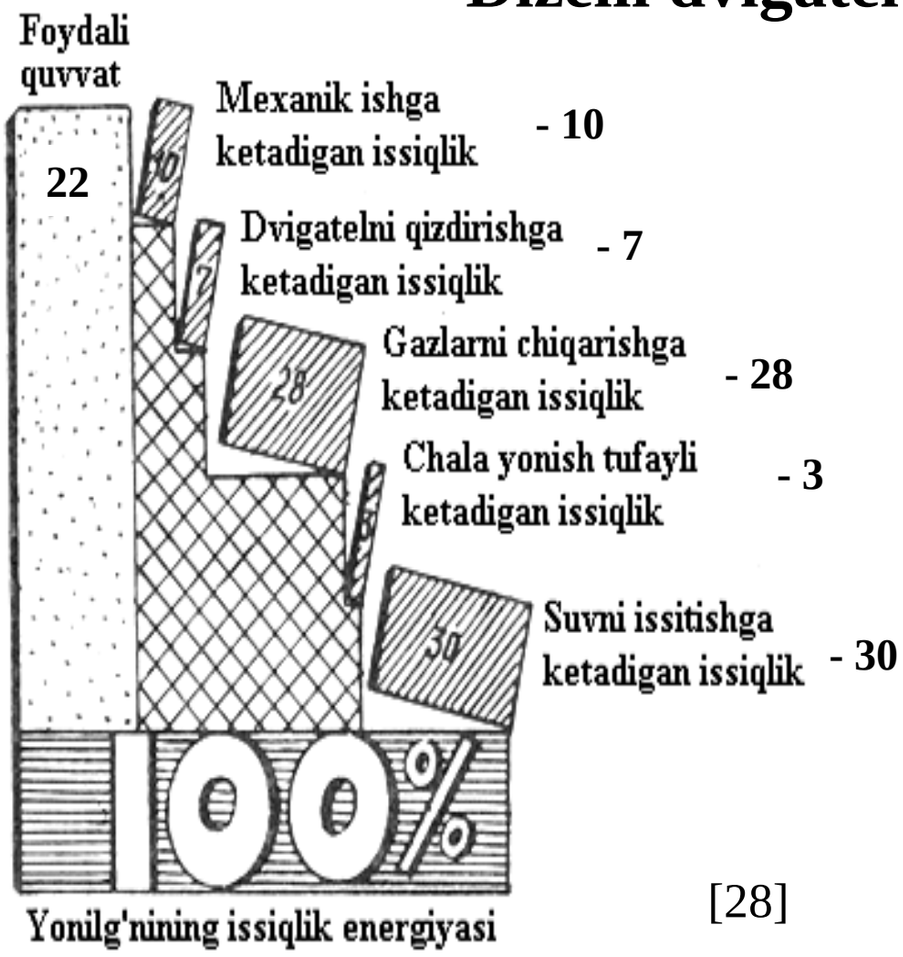
YONILG‘INI ISSIQLIK ENERGIYASIDAN FOYDALANISH

DARAJASINI KO‘RSATUVCHI DIAGRAMMA

Benzinli dvigatel uchun



Dizelli dvigatel uchun



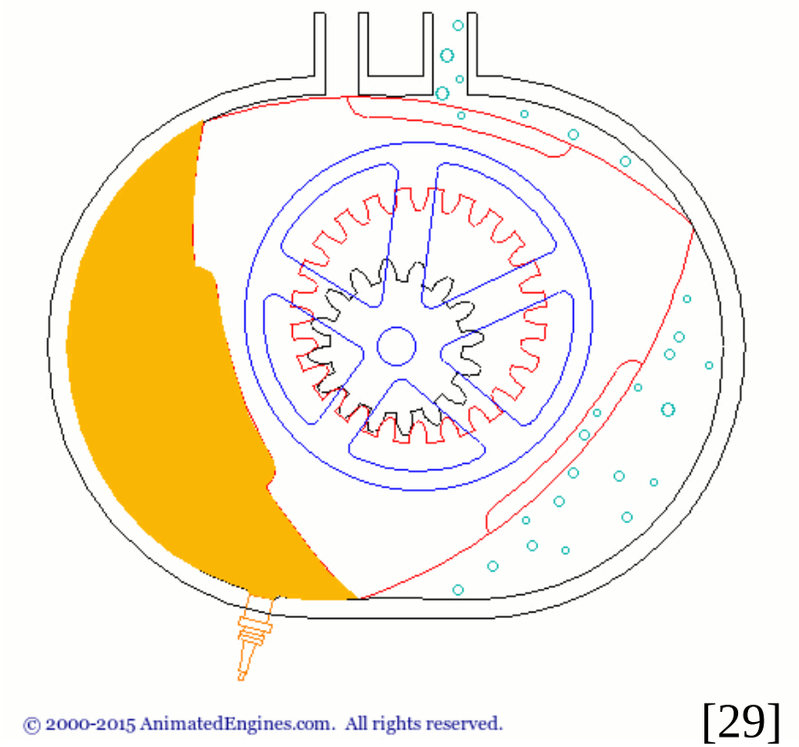
[28]

2.6. Rotor-porshenli dvigatellar.

Hozirgi vaqtda ayrim avtomobillarda rotor-porshenli dvigatellar qo‘lanilmoqda.

Statorning ichki boshlig‘i murakkab bo‘lgan geometrik shaklga ega.

Rotor-porshenli dvigatelning ishlash sxemasi:



[29]

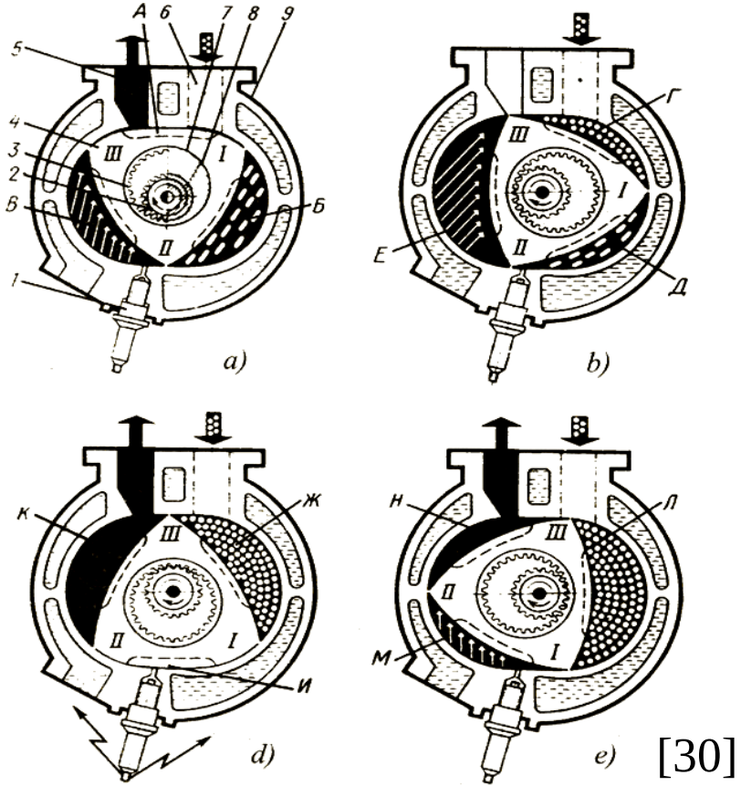
1-yondirish svechasi;

2-harakatsiz shesternya;

3-rotorning tishli gardishi;

4-rotor-porshen; 5 va 6-sovitish suyuqligi uchun kiritish va chiqarish kanallari; 7-ekssentrik; 8-val;

9-statorning ichki bo‘shlig‘i.



[30]

Statorga podshipniklar yordamida val joylashtirilgan.

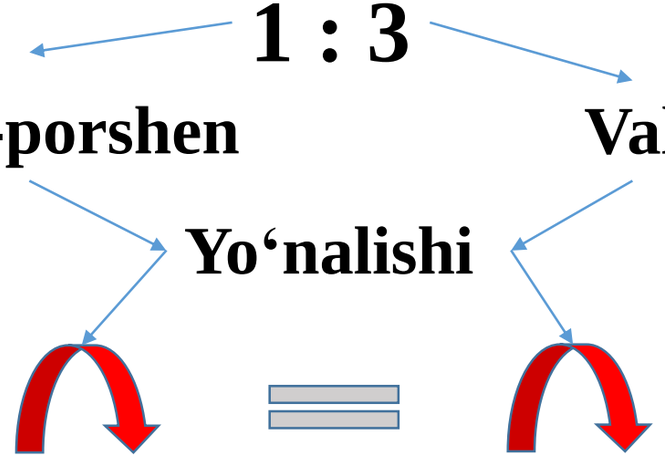
Rotorning tishli gardishi statorga mahkamlangan harakatsiz shesterna bilan ilashgan.

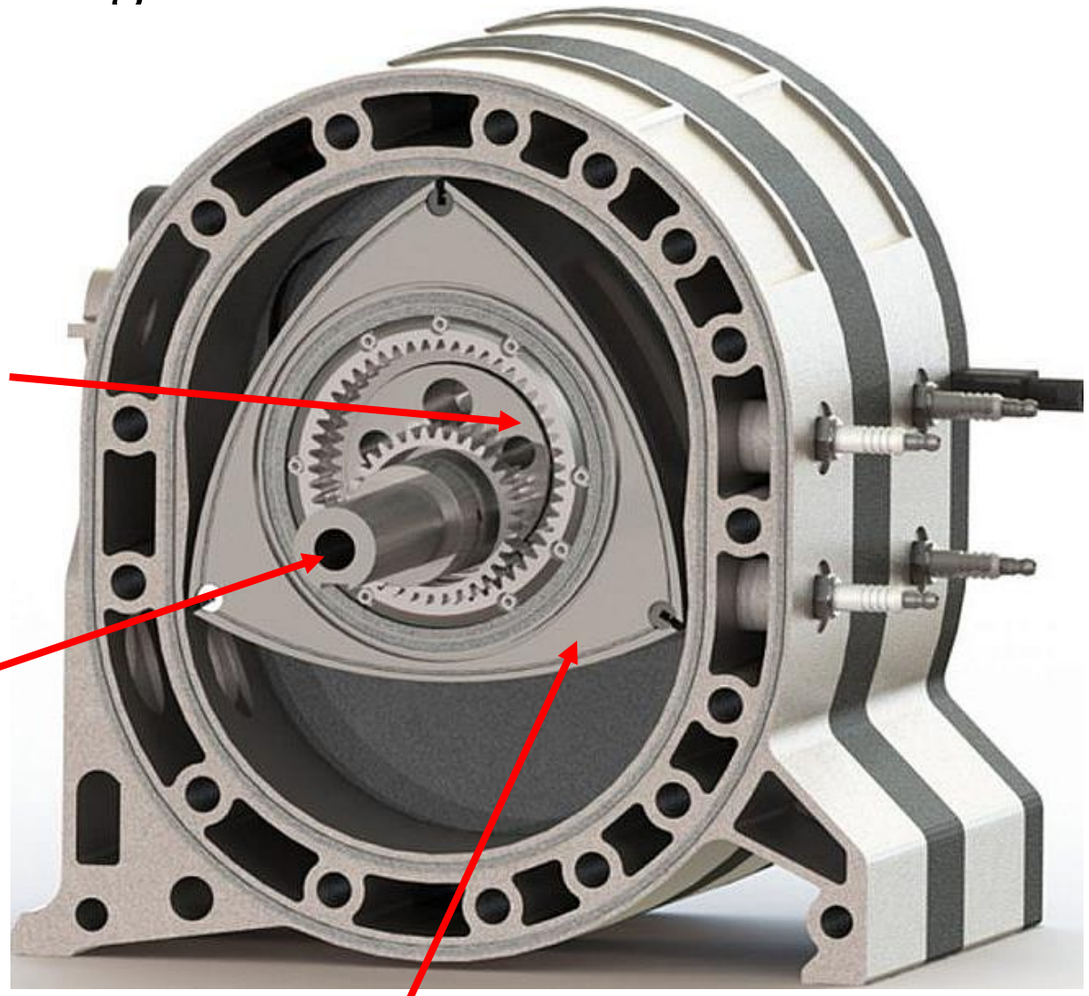
Tishli ilashishning uzatish soni

1 : 3

Rotor-porshen **Val**

Yo‘nalishi



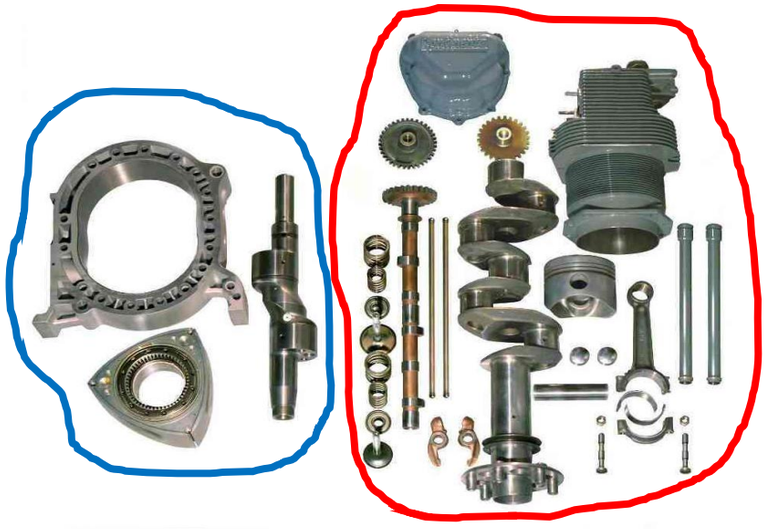


[31]

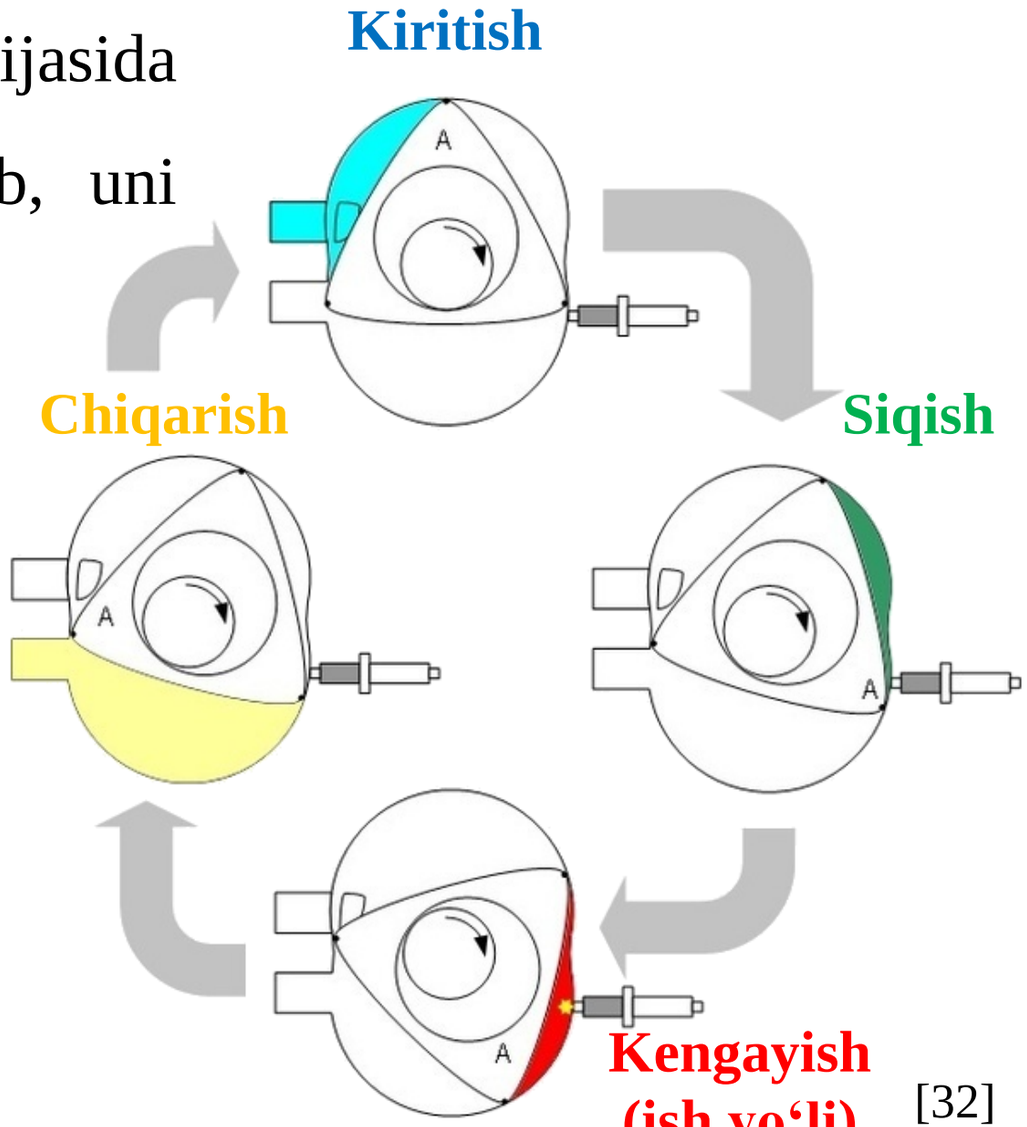
Rotorli dvigatellarda yonilg‘ining yonishi natijasida kengaygan gazlar bosim bilan rotorga ta’sir etib, uni aylantiradi.

Rotorli dvigatellar:

- gaz trubinali;
- rotor-porshenli.



Rotary verses the aircraft piston engine. [33]



[32]

2.7. Gazturbinali dvigatellar.

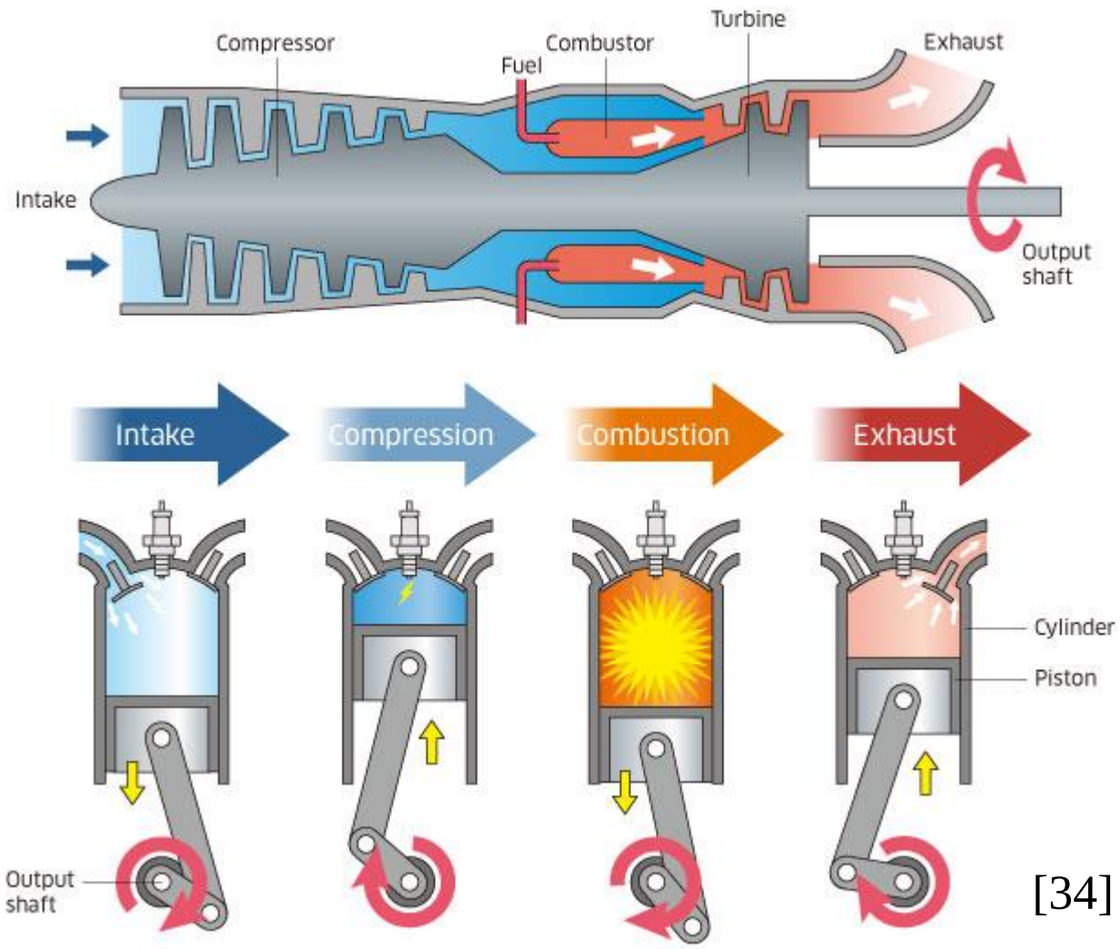
Gaz trubinalaridan avtomobil dvigateli sifatida foydalanish avtomobilsozlik texnikasida yangi bosqich hisoblanadi.

Porshenli IYoD ga nisbatan bir qancha afzalliklarga ega.

Bunda avtomobil konstruksiyasi soddalashadi va dvigatel vazni yengillashadi.

Gaz trubinali dvigatelning FIK yuqori.

Unda ilgarilama-qaytma harakat qiladigan detallar yo‘q.

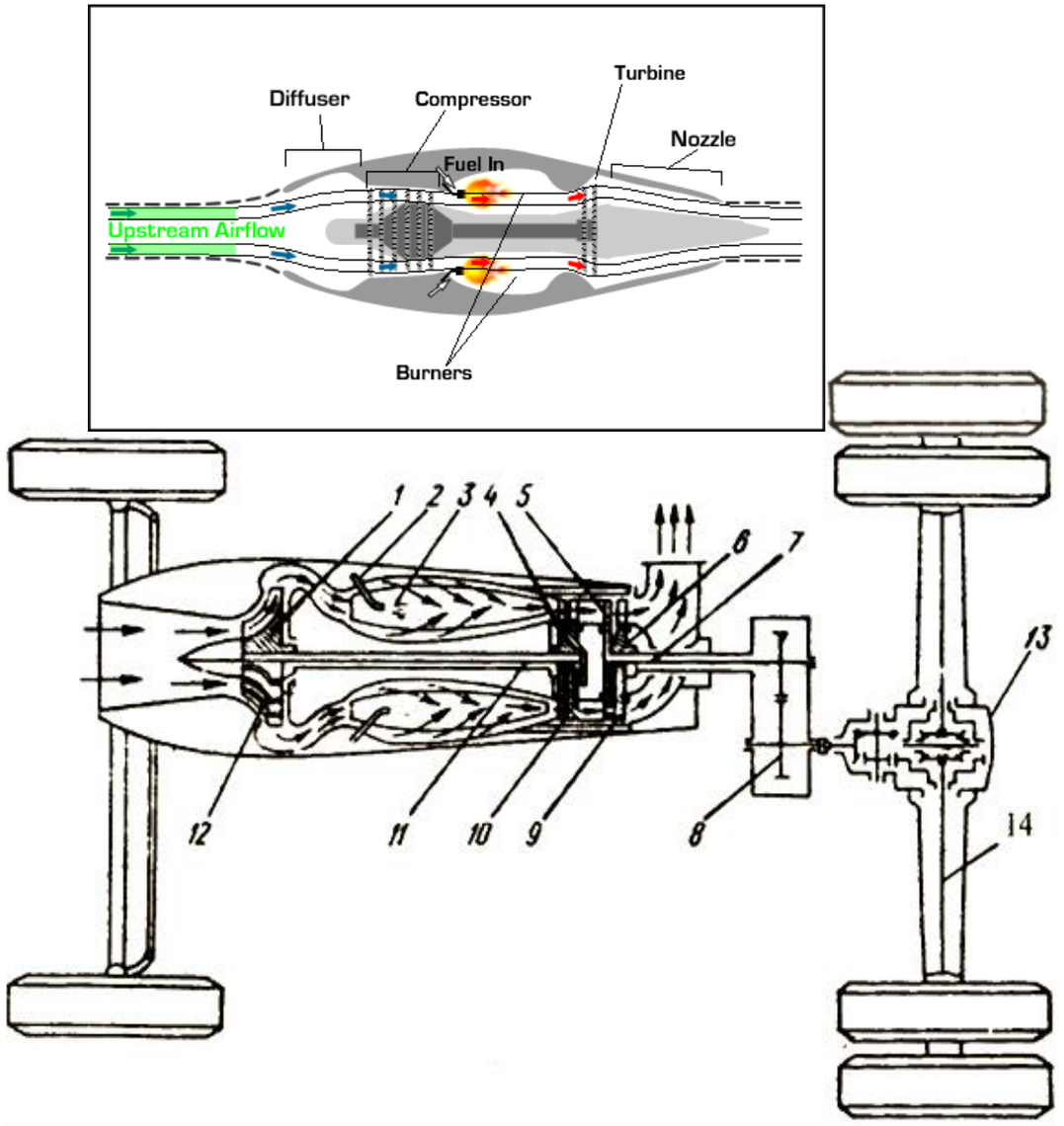


[34]

Bunday dvigatellarda uzatmalar qutisi va ilashish muftasi bo‘lmaydi.

Gaz trubinali dvigatel o‘rnatilgan avtomobilning oddiy sxemasi:

1-kompressor trubinasining parragi; 2-forsunka; 3-yonish kamerasi; 4-kompressor trubinasining diski; 5-trubina kurakchalari; 6-kuch trubinasining diski; 7-ikkinchi (trubina) val; 8-reduktor; 9-kuch trubinasi; 10-kompressor trubinasi; 11-birinchi (kompressor) val; 12-markazdan qochma kompressor; 13-asosiy uzatma; 14-yarim o‘q.



[35-36]

Gazturbinali avtomobillar

[37]

[38]

[39]

FOYDALANILGAN ADABIYOTLAR

24. Motore diesel a quattro tempi. - illustrazioni stock. [Online Image]. https://media.istockphoto.com/id/586705100/it/vettoriale/motore-diesel-a-quattro-tempi.jpg?s=612x612&w=0&k=20&c=0_5mHEFLbwrp1Pkdj2Th7KpuX96B4cGIY8Yy2Froz64=
25. Working Of Four Stroke Spark Ignition Engine (SI) with PV Diagram | Mecholic. [Online Image]. https://3.bp.blogspot.com/-8uAU1cv_2i4/W5vnaKBx8yI/AAAAAAAABTs/GAYZAHZDrfMTdN-TkmA-LKmBsSsRIX7YACLcBGAs/s1600/4-Stroke-Engine-with-airflows.gif
26. Internal Combustion Engine. [Online Image] [Accessed on October 2017]. https://mechaniclove.com/wp-content/uploads/2017/10/torque_motor.gif
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33. Powersport 200HP Lightweight Rotary Engine. [Online Image] [Accessed on 6 October 2020]. https://www.redbackaviation.com/wp-content/uploads/2017/06/Rotary-vs-reciprocating-parts.jpg
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35. Jet Engine. [Online Image] [Accessed on 22 November 2018]. https://www.mech.kuleuven.be/en/tme/thermotechnisch-instituut/basisprincipes/afbeeldingen/turbojet/image
36. Yusupov S. “Avtomobillar konstruksiyasi” 1-qism. O‘quv-uslubiy majmua. A.: AndMI. 2019 yil, -b. 44 (493).
37. Vintage vehicles, Automotive history and stories from motoring's past. [Online Image] [Accessed on 23 September 2018]. https://images.squarespace-cdn.com/content/v1/54d50f84e4b0bc3abee6ebfa/1537722814700-BIPMF1HHK0X7I6FPZJVF/1952-Socema-Gregoire-side.png
38. When regular engines won't cut it, there are cars with jet engines. [Online Image] [Accessed on 29 April 2018]. https://www.cnet.com/a/img/resize/56b8d5d88fef4b54f938903d91d50453ab0b9ea7/hub/2018/02/23/02140d81-7c5b-4ca2-9ca7-f5073943655b/cnet-jet-powered-a2.jpg?auto=webp&width=1200
39. When regular engines won't cut it, there are cars with jet engines. [Online Image] [Accessed on 29 April 2018]. https://www.cnet.com/a/img/resize/fef80bae494f7228097ba7d829a3105b73bd87ed/hub/2018/02/23/a99fb26e-f47e-4bd8-8598-63ea9f9efe75/bloodhound-ssc-cornwall-speed-test-42.jpg?auto=webp&width=1200

E'TIBORINGIZ UCHUN RAHMAT!!!