

ANDIJON MASHINASOZLIK INSTITUTI

“MASHINASOZLIK TEXNOLOGIYASI” FAKULTETI

“MASHINASOZLIK TEXNOLOGIYASI” KAFEDRASI

DIPLOM LOYIHASI

T U S H I N T I R I S H X A T I

Diplom loyihasining mavzusi: “Texnometal-servis” MCHJ sharoitlari uchun “153.07.13 Polzun tanasi” detalini tayyorlash texnologik jarayonini va operatsiyalarining texnologik ta’minot vositalari konstruktsiyalarini ishlab chiqish.

Yo’nalish: Mashinasozlik texnologiyasi, mashinasozlik ishlab chiqarishini jixozlash va avtomatlashtirish

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Rahbar:	M. Kabulov
Maslaxatchilar:	
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Konstruktorlik qismi:	M. Kabulov
Xayot faoliyati xavfsizligi qismi:	SH. Abdullayev
Iqtisodiy qism:	Z. Teshabayeva

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DIPLOM LOYIHASINI BAJARISH BO’YICHA

T O P S H I R I Q

Shokirov Farxod Zokirjon o’g’li

1. Diplom loyihasining mavzusi:

“Texnometal-servis” MCHJ sharoitlari uchun “153.07.13 Polzun tanasi” detalini tayyorlash texnologik jarayonini va operatsiyalarining texnologik ta’minot vositalari konstruktsiyalarini ishlab chiqish.

Institut bo’yicha 2018 yil 7-dekabrda 310-sonli buyruq bilan tasdiqlangan.

2. Diplom loyihasini bajarish uchun ma’lumotlar:

O’zbekiston Respublikasi Prezidenti asarlari, qarorlari, farmoyishlari, Vazirlar maxkamasining qarorlari, ilmiy-texnik adabiyotlar, o’quv qo’llanmalar, internet ma’lumotlari, detal ishchi chizmasi, ishlab chiqarish xajmi.

3. Tushintirish xatida keltiriladigan ma’lumotlar:

1) Kirish. O’zbekistonning rivojlanishida mashinasozlik sanoatining roli va ahamiyati, qaror va farmonlar, diplom loyihasining maqsad va vazifalari to’g’risida ma’lumotlar yoritiladi.

2) Umumiy qism. Detalning xizmat vazifasi, ishlab chiqarish turini aniqlash, detal konstruktsiyasini texnologiklikka tahlili va boshqalar.

3) Texnologik qism. Zagatovka olish turini tanlash, texnologik jarayon marshuritini ishlab chiqish, zagatovkaga ishlov berishda qo’yim hisobi, kesish maromlarini hisoblash, vaqt me’yori hisoblash.

4) Konstruktorlik qism. Dastgoh moslamasi, kesuvchi asbob va o’lchov vositalarini bayoni va hisoblari.

5) Xayot faoliyati xavfsizligi qismi. Loyihalanayotgan ishchi joyini mehnat sharoitlarining ta’rifi, ishlab chiqarish joyida yoritish tizimini tanlash, ventilatsiya tizimini tanlash, elektr xavfsizligi, yong’in xavfsizligi, aloqa yong’in signalizatsiya tizimi va boshqalar, mehnat xavfsizligi bo’yicha barcha talablar va qonun qoidalar.

6) Iqtisodiy qism. Texnologik jarayonning iqtisodiy samaradorligini aniqlash.

7) Xulosa. Bajarilgan diplom loyihasi bo’yicha xulosalar va takliflar yoritiladi.

8) Foydalanilgan adabiyotlar ro'yxati. Bajarilgan diplom loyihasi bo'yicha foydalanilgan adabiyotlar ro'yxati tuziladi.

9) Ilovalar. Spetsifikatsiyalar va texnologik jarayon xujjatlari.

4. Diplom loyihasining chizmalari ro'yxati:

1. Zagotovka va detal ishchi chizmalari. (A2)
2. Texnologik sozlash eskizlari. (A2)
3. Texnologik sozlash eskizlari. (A2)
4. Dastgoh moslamasi chizmasi. (A2)
5. Kesuvchi asbob chizmasi. (A2)
6. O'lchov vositasi yoki mexanik tsex rejasi (plan). (A2).

5. Diplom loyihasining bo'limlari bo'yicha maslahatchilar:

№	Diplom loyihasining qismlari	Boshlanish muddati	Tugallanish muddati	Imzo	Maslahatchining familiyasi va ismi
1	Texnologik qism	10.12.18 y.	11.03.19 y.		M. Kabulov
2	Konstruktorlik qism	11.03.19 y.	10.05.19 y.		M. Kabulov
3	Xayot faoliyati xavfsizligi qismi	25.03.19 y.	25.05.19 y.		SH. Abdullayev
4	Iqtisodiy qism	25.03.19 y.	25.05.19 y.		Z. Teshabayeva

6. Topshiriq berilgan sana:

10.12.2018 y.

Diplom loyihasini himoya qiluvchi:

F. Shokirov

(imzo)

Rahbar:

M. Kabulov

(imzo)

Kafedra mudiri

X.U. Akbarov

(imzo)

KIRISH

Mamlakatimizda olib borilayotgan iqtisodiy islohotlar natijasida bugungi kunda iqtisodiyotning barcha jabhalarida keskin burilishlar, o'zgarishlar va rivojlanishlar sodir bo'lmoqda. Ushbu rivojlanishlarning asosiy sababi esa oqilona yuritilayotgan iqtisodiy jarayonlar va tadbirkorlikka asoslangan holda qabul qilinayotgan moliyaviy qarorlardir.

Bu fikrlarning to'g'riligini esa yillar davomida erishib kelinayotgan yutuqlarimiz so'zsiz isbotlaydi. O'zbekiston Respublikasini 2019 yilning I choragida ijtimoiy-iqtisodiy rivojlantirish yakunlarida ham O'zbekiston Respublikasi Prezidenti Shavkat Mirziyoyev tomonidan belgilab berilgan 2019 yilgi iqtisodiy dasturning eng muhim ustuvor vazifalari va yo'nalishlarini amalga oshirish, shuningdek, iqtisodiyot tarmoqlari va sohalarini rivojlantirish bo'yicha o'rta muddatli dasturlarning bajarilishini davom ettirish 2019 yilning 1 choragida asosiy makroiqtisodiy ko'rsatkichlarning ijobiy dinamikasini saqlash va keyingi choraklarda iqtisodiyotni yanada rivojlantirishning mustahkam asosini yaratishni ta'minlayotganligini ko'rishimiz mumkin.

Davlatimizning dunyodagi sanoati rivojlangan mamlakatlaridan o'z o'rnini egalallashda yuqori malakali raqobatbardosh mutaxassislar tayyorlash "Kadrlar tayyorlash Milliy dasturi" da ko'rsatilgan asosiy masaladir. Bunday mutaxassislar zamonaviy mashina va jihozlarni ishlab chiqarishni, loyihalashni, avtomatlashtirilgan loyihalash tizimlaridan foydalanishni, raqamli dastur bilan boshqariladigan dastgohlar asosida yuqori unumdorlikdagi moslanuvchan ishlab chiqarish modullarni va avtomatlashtirilgan ishlab chiqarishni har tomonlama bilishlari va ulardan foydalana olishlari kerak. SHuning uchun bitiruv malakaviy ishi zamonaviy mashina va jihozlarini ishlab chiqarishni samaradorligini oshirish maqsadida ilg'or texnika va yuqori texnologiyalardan foydalangan holda bajarilishi kerak.

Jamiyatning moddiy texnika bazasini yaratuvchi va mamlakatimizning texnik taraqqiyotini rivojlanishini belgilovchi soha mashinasozlikdir. U sanoatning turli tarmoqlarini yangi texnika, ishlab chiqarish vositalari bilan ta'minlaydi. SHu

sababli mashinasozlik ishlab chiqarishning barcha sohalarini rivojlanishiga katta ta'sir ko'rsatuvchi sanoatning muhim ko'rsatkichlaridan biridir.

Mashinasozlikning asosini mashinalarni loyixalash va ishlab chiqarish tashkil etadi. Mashinalar o'z navbatida jamiyat turmush farovonligini ko'rsatadi. Ular ish unumdorligini, mehnat samaradorligini va mahsulot sifatini oshiradilar. Mustaqillikning boshlang'ich davridayoq, mamlakatimizda mashinasozlikni rivojlantirishga asosiy e'tibor qaratildi. Ko'plab qo'shma korxonalari mashinasozlik mahsulotlarini ishlab chiqara boshladi.

Mashinalarga yuqori aniqlik va tezlik, issiqlikka chidamlilik, kichik vazn va xajm, mustahkamlik va ishonchlilik kabi yuqori talablar qo'yilgan. Bunday talablarni oshib borishi mashinasozlar oldiga murakkab konstruktorlik va texnologik savollarni qisqa vaqt ichida echish masalasini qo'ymoqda.

Xar bir mamlakatning shu jumladan bizning mustaqil O'zbekistonimizning iqtisodiy rivojlanishi, iqtisodiy ravnaqi barcha xo'jalik ishlar darajasining ko'tarilishi orqali belgilanadi. Bu ayniqsa xalq xo'jaligining etarli tarmoqlaridan bo'lmish mashinasozlikka taaluqlidir. SHuning uchun mashinasozlik rivojlanishiga umumiy ishlab chiqarishni rivojlanishiga nisbatan ortiqroq e'tibor beriladi.

Mustaqil O'zbekiston Respublikamiz mashinasozligi oldida yaqin yillarda mo'ljallagan ulkan va ma'suliyatli vazifalar turibdi. Bular jumladan xalq xo'jaligining barcha tarmoqlarida yuqori darajasida ishlab chiqarish quvvatiga ega bo'lgan energiya va metalni iqtisod qilish texnologiyalarini keng qo'llash, mashinasozlik mahsulotlarini texnik darajasini va sifatini oshirish, zararli va og'ir qo'l mehnatini engillashtiruvchi mashina va jixozlarni chiqarish, materiallarga ishlov berish dastgohlari sifatini yaxshilash.

1. UMUMIY QISM

1.1. Detalning vazifasi

Flanets detali mashina va jihozlardagi vallarga o'rnatilgan podshipniklarning o'q bo'ylab harakatlanishini podshipnikning tashqi halqasi va SHuningdek, Flanetslar tashqi muhitdan ichkaridagi turli teshik va bo'shliqlarni himoya qilish maqsadida zich berkitish uchun qo'llaniladi.

Detal odatda kul rang cho'yandan yasaladi: CЧ18 GOST

Polzun korpusi detali gabarit o'lchamlari 80*86 mm bo'lgan to'rtburchak shaklidagi detal ko'rinishida namoyon bo'ladi.

Detal yuzasi 14 kvalitet bo'yicha bajarilgan. Detalga ishlov berilgandan so'ng aniqlikka tekshiriladi.

Detal materialining xarakteristikalar

Cho'yan–texnologik xossalarining yaxshiligi va nisbatan arzonligi tufayli quyib ishlab chiqarishda eng ko'p tarqalgan material hisoblanadi. Kulrang cho'yanlar yaxshi texnologik va mustahkamlik xossalariga ega.

Quyma uchun mo'ljallangan CЧ18 cho'yanning kimyoviy tarkibi quyida ko'rsatilgan jadvalga muvofiq kelishi zarur.

Jadval №1.1. CЧ18 ning kimyoviy tarkibi, %

Marka	C	Si	Mn	S	P	Cr	Ni
CЧ18	3,2-3,5	2,-2,4	0,7-1,1	do 0,15	do 0,4	Do 0,15	do 0,5

Jadval №1.2. Mexanik xossalari

Marka	σ_i , MPa	σ_v , MPa	F600/300, mm	σ_{sj} MPa	NV
SCH18	32	15	8/2,5	56	163-229

1.2. Ishlab chiqarish turini aniqlash

Har bir mashinasozlik korxonasi bir yil davomida ishlab chiqarishga kerak bo'lgan mahsulot va zaxira qismlarining ma'lumotiga ega. Bu ma'lumot ishlab chiqarish dasturi deb ataladi va unda ma'lumotni turi, soni, o'lchami va materiali to'g'risida ham etarlicha axborot bor. Korxonaning umumiy ishlab chiqarish dasturiga asosan sexlar bo'yicha ishlab chiqarish dasturi tuziladi. Har bir mahsulot umumiy ko'rinishining chizmasi, detallarning ishchi chizmasi, yig'uv chizma, spetsifikatsiyalar va texnik talablar bilan boyitiladi.

Ishlab chiqarish dasturining xajmi, mahsulot tasnifi, jarayonning texnik va iqtisodiy shartlariga asosan shartli ravishda uchta ishlab chiqarish turi mavjud: donali, seriyali, yalpi. Har bir ishlab chiqarish turi o'ziga xos tashkiliy shaklga ega. SHuni aytish kerakki, bitta korxonada xar-hil ishlab chiqarish turlari bo'lishi mumkin.

Ishlab chiqarish turi va unga to'g'ri keladigan ishni tashkil qilish shakli texnologik jarayonni tasnifini hamda uning tuzilishini aniqlaydi. SHuning uchun ham ishlab chiqarish turini aniqlash detalga mexanik ishlov berish texnologik jarayonni loyixalashni boshlang'ich asosiy bosqichidir. Ishlab chiqarish turini jadvallar usuli bilan aniqlaganda detalning og'irligi va yillik ishlab chiqarish dasturi talab qilinadi.

Bunda $N=3200$ dona va $m=5.65$ kg bo'lganda ishlab chiqarish turi o'rta seriyali deb aytishimiz mumkin.

Berilgan yillik dasturga asosan ishlab chiqarish qadamini quyidagi ifoda yordamida hisoblanadi.

$$T_B = \frac{F_k \cdot 60}{N} = \frac{4029 \cdot 60}{3200} = 75.5$$

bu erda: $F_g = 4029 \text{ coam}$ – dastgohlarni bir yillik haqiqiy ishlash vaqti fondi;
 $N=3200$ dona – yillik ishlab chiqarish dasturi.

Bo'limdagi ish tartibi 2 smenali. Seriyali ishlab chiqarish turida detallarni partiyalarga bo'lib ishlov berish sababli partiyadagi detallar sonini hisoblab topish talab qilinadi.

$$n = \frac{N \cdot a}{F} = \frac{3200 \cdot 6}{254} = 75.5$$

bu erda: $a=3,6,12,24$ kun – partiyadagi detallarni ishlov berishga kiritilish davri;
 $F=254$ kun – bir yildagi ishchi kunlar soni.

2. TEXNOLOGIK QISM

2.1. Detal konstruksiyasini texnologiklikga taxlili

Mashina detallarini tayyorlashda quyidagi ko'rsatkichlariga ehtibor berish kerak;

1. Detal ishlab chiqarishda iloji boricha ish xajmini kamaytirish;
2. Mexanik ishlov berishni iloji boricha yuqori darajaga ko'tarish;
3. Metalni tejashda yuqori ko'rsatkichga erishish.

Ishlab chiqarish dasturiga, ishlab chiqarish turiga va tayyorlov sexlarining imkoniyatiga qarab, zagotovkalarining shakli tanlanadi. Zagotovkalar shakli va o'lchamlari jixatidan tayyor detalning shakli va o'lchamlariga yaqin bo'lishi kerak.

Quyidagi texnologiklik ko'rsatkichlarni aniqlaymiz:

Detal konstruksiyasini texnologikligi — konstruksiyasini shunday xossalari yig'indisiki bunda bir xil sifat ko'rsatkichlariga ega bo'lgan bir xil sharoitda tayyorlangan va ekspluatatsiya qilinadigan o'xshash konstruksiyasiga ega bo'lgan maxsulotga nisbatan yanada samarador texnologiyalar bilan ishlov berish tahrirlash va texnik xizmat ko'rsatish imkoniyatini beradi.

Detalni texnologilikka taxlil qilish ishlab chiqarishni texnologik tayyorlashni muxim masalasidir.

Loyixalanayotgan detalni chizmasini taxlili shuni ko'rsatadiki detalni ishchi vazifasini o'zgartirmagan holda uni tuzilishi elementlarini qisqartirish imkoni yo'q. Ishlov berishda qiyinchilik tug'diradigan va maqsadga muvofiq bo'lmagan yuzalar aniqlanadi.

Bajarilgan taxlil quyidagi koeffitsentlarni aniqlashga imkon beradi.

1. Materiallardan foydalanish koeffitsenti.

$$KIM = \frac{q}{Q}$$

bu erda:

q—detal og'irligi, q=2.28

Q—zagotovka og'irligi,

2. Ishlov berish aniqligi koeffitsenti.

$$K_{m.o} = 1 - \frac{1}{A_{yp}}$$

bu erda:

$$K_{m.o} = 1 - \frac{1}{A_{yp}} = 1 - \frac{\sum_1^{19} n_i}{\tau_{n_i}} = 1 - \frac{\sum_1^{19} n_i}{(n_1 + 2n_2 + 3n_3 + \dots + 19n_{19})} = \frac{1+1+1+15}{(6 \cdot 1) + (8 \cdot 1) + (9 \cdot 1) + (14 \cdot 15)} =$$
$$= 1 - \frac{18}{233} = 1 - 0.077 = 0.923$$

3. YUzalar g'adir-budurlik koeffitsenti.

$$K_m = \frac{1}{B_{ep}}$$

bu erda:

$$B_{ep} = \frac{(0.01n_1 + 0.02n_2 + \dots + 40n_{13} + 80n_{14})}{\sum_1^{14} n_i} = \frac{101}{18} = 5.61$$

$$K_m = \frac{1}{B_{ep}} = \frac{1}{5.61} = 0.178 \approx 0.18$$

Bajarilgan taxlil yig'uv birikmaning berilgan detalni to'g'ri loyixalashga imkon beradi.

2.2. Zagotovka tanlash

Zagotovkalar toza va xomaki zagotovkalarga bo'linadi. Toza zagotovka deganda tayyorlangandan keyin kesib ishlanmaydigan, o'lchamlari va tozaligi tayyor detal chizmasida ko'rsatilgan o'lcham va tozalikka to'g'ri keladigan zagotovkalar tushuniladi. Xomaki zagotovkalar chizma talablariga muvofiq keladigan o'lcham, aniqlik va tozalikdagi detal hosil qilish maqsadida qo'yim kesib olish uchun mexanik ishlanish zarur bo'lgan zagotovkalardir.

Mashina detallari uchun zagotovkalar asosan quyidagi usullar bilan tayyorlanadi:

- 1) qora va rangli metallardan quyish yo'li bilan;
- 2) bosim bilan ishlash (bolg'lash va shtamplash) orqali;
- 3) qora va rangli metallar prokatidan;
- 4) metallokeramikadan (kukun metallurgiyasi yo'li bilan);
- 5) payvandlash – zagotovka qismlarini bir butun qilib ulash yo'li bilan;
- 6) metallmas materiallardan (plastik massalar va boshqalardan).

Zagotovka olish usulini tanlash, detalni o'lcham va materiali, ishchi vazifasi, uni tayyorlashga texnik talablar, yillik dastur va umumiy tuzilishi kabi omillar belgilab beradi. Bu masalani hal qilishda zagotovka o'lchami va tuzilishi detalni o'lcham va tuzilishiga maksimal yaqin bo'lishini ta'minlash kerak. Lekin shuni unutmaslik kerakki, zagotovka aniqligini oshirish va tuzilishini murakkablashtirish uni tannarxini oshishiga olib keladi. SHuning uchun ham zagotovka olishni optimal usuli qilib, zagotovka tannarxi kam bo'lgandagi usuli hisoblanadi.

Zagotovka olishni mavjud usullarini tahlil qilib, berilgan ishlab chiqarish sharoitida detalimiz uchun zagotovkani optimal tayyorlash usuli quyma usulidan foydalanamiz.

2.3.Zagotovkaga ishlov berishda quyim hisobi

Uzunligi 65 eni 76 bo'lgan A torets yuza uchun qo'yim miqdorini hisoblaymiz. Zagotovka quyish usuli bilan olingan. A yuzaga ishlov berish texnologik marshrutiga qora va toza yo'nib frezalash jarayonlari kiradi.

Qarama-qarshi joylashgan yuzalarga parallel ishlov berishda qo'yimlarni aniqlash quyidagi formula yordamida topiladi [3, 62 b.]:

$$2z_{i_{min}} = R_{z_{i-1}} + T_{i-1} + \rho_{i-1} + e$$

Zagotovka uchun profilning notekisliklari balandligi R va sirt qatlamdagi nuqsonlar chuqurligi T ni jadvaldan olamiz [4, 186-188 b.]:

- 1). Zagotovka: $R+T=700$ mkm ;
- 2). Qora kengaytirish: $R=100$ mkm; $T=100$ mkm;

Agar ishlov berish markaziy teshiklar orqali amalga oshirilayotgan bo'lsa, u holda o'rnatishdagi xatolik radial yo'nalishda nulga teng deb olinishi mumkin.

Fazoviy chetlanishlarning umumiy yig'indisi quyidagi formula yordamida topiladi:

$$\rho = \sqrt{\rho_{sur}^2 + \rho_{kor}^2}$$

bu erda $\rho_{sur}=80$ mkm – boshqa yuzaga nisbatan surilish qiymati;

$$\rho_{kor} = \Delta_k \cdot l = 1 \cdot 80 = 80 \text{ mkm} = 80 \text{ mm};$$

$\rho_{o'} = 80 \text{ mkm.}$

Qo‘yimlarning minimal miqdorini hisoblaymiz:

- qora kengaytirish:

$$z_{min_2} = 700 + 80 + 200 = 980 \text{ mkm};$$

- toza kengaytirish:

$$z_{min_7} = 100 + 100 + 80 + 200 = 580 \text{ mkm.}$$

Hisob to'g'ri bajarilgan.

2.1-jadval

[illegible]

005	<i>Vertikal frezalash operatsiyasi</i>	Dastgoh nomi	Moslama nomi	Kesuvchi asbob
1	A o'rnatish A yuza qora frezalansin	679		GOST9473-80 D=100 B=39 Z=10
2	A yuza toza frezalansin			GOST9473-80 D=100 B=39 Z=10
1	B o'rnatish B yuza qora frezalansin			GOST9473-80 D=100 B=39 Z=10
2	B yuza toza frezalansin			GOST9473-80 D=100 B=39 Z=10
1	C o'rnatish E yuza qora frezalansin			GOST9473-80 D=100 B=39 Z=10
2	E yuza toza frezalansin			GOST9473-80 D=100 B=39 Z=10
	D o'rnatish			
1	F ₁ yuza qora frezalansin		maxsus	GOST9304-80 D=40 Z=10 d=16 L=32
2	F ₁ yuza toza frezalansin		maxsus	GOST9304-80 D=40 Z=10 d=16 L=32
3	F ₂ yuza qora frezalansin		maxsus	GOST9304-80 D=40 Z=10 d=16 L=32
4	F ₂ yuza toza frezalansin		maxsus	GOST9304-80 D=40 Z=10 d=16 L=32
010	<i>Gorizontal frezalash operatsiyasi</i>	679		
1	A o'rnatish C yuza qora frezalansin			GOST9473-80 D=100 B=39 Z=10
2	C yuza toza frezalansin			GOST9473-80 D=100 B=39 Z=10
3	M yuza qora frezalansin			GOST9473-80 D=100 B=39 Z=10
4	M yuza toza frezalansin			GOST9473-80 D=100 B=39 Z=10
5	K yuza qora frezalansin			GOST9473-80 D=100 B=39 Z=10
6	K yuza toza frezalansin			GOST9473-80 D=100 B=39 Z=10
7	D yuza qora frezalansin			GOST9473-80 D=60 B= Z=
8	D yuza toza frezalansin			GOST9473-80 D=60 B= Z=
	B o'rnatish			
1	G' ₂ +G' ₁ yuza qora frezalansin			GOST1671-77 D=160 B=14 Z=20 d=40
2	G' ₂ +G' ₁ yuza toza frezalansin			GOST1671-77 D=160 B=14 Z=20 d=40
3	L +G yuza qora frezalansin			GOST1671-77 D=160 B=14 Z=20 d=40
4	L +G yuza qora frezalansin			GOST1671-77 D=160 B=14 Z=20 d=40
015	<i>Gorizontal frezalash operatsiyasi</i>	679		
1	X Ariqchalar frezalansin		maxsus	GOST2679-73 D=80 B=2 Z=40 d=22
2	X Ariqchalar frezalansin		maxsus	GOST2679-73 D=80 B=2 Z=40

				d=22
3	N Ariqchalar frezalansin		maxsus	GOST2679-73 D=80 B=2 Z=40 d=22
4	N Ariqchalar frezalansin		maxsus	GOST2679-73 D=80 B=2 Z=40 d=22
020	Vertikal parmalash operatsiyasi	2AM5		
1	A O' rnatish P yuza parmalansin			GOST2092-73 d=28 L=395 l=275
2	P yuza zenkerlansin			GOST3231-71 D=14-50 L=14-50 L=180-355
3	P yuza razvyotkalansin			GOST883-80 D=32-50 L=14-50 L=292-344 l=38-45
4	P yuzaga faska ochilsin			MH 729-60 D=25-50
5	O yuza parmalansin x2			GOST10902-77 d=0.3-20 L=19-205
6	O yuzaga M8 razmerda rezba ochilsin x2			
1	B O' rnatish P yuzaga faska ochilsin x2			D=2.3-14 L=40-100 l=6-20

Qabul qilingan zagotovka turi va texnologik marshrutga ko'ra qo'yim

Qo'yim miqdorini aniqlash va chetlanishlarni belgilash GOST

2.3-jadval

Ishlov beriladigan yuza	O'lcham	Qo'yim			CHetlanish, mm
		Jadval, mm		Hisobiy, mm	
A	76			0.98	±0,5
A,V	6±0,1	0,3			±0,1
O	Ø8			2.8	±0,5
P	Ø28	2,0			±0,6

2.4. Texnologik jarayon marshrutini ishlab chiqish

2.4-jadval

2.5. Kesish maromlarini hisoblash

Torets freza yordamida frezalash operatsiyasi uchun kesish maromlarini hisoblash.

A torets yuza H14 o'lchamda qora frezalansin.

Frezalash eni $B=76\text{mm}$, uzunligi $l=65\text{mm}$, qo'yim miqdori $h=0.98\text{mm}$
 Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material
 SCH 18, HB=200

Kesuvchi asbob torets freza $D=100\text{ mm}$, GOST 9473-80. Kesuvchi qismi
 materiali BK6, tishlar soni $z=10$ ta; Geometrik parametrlari: $\varphi=60^\circ, \varphi_1=5^\circ, \varphi_0=20^\circ, \lambda=+5^\circ, \gamma=-5^\circ, \alpha=12^\circ$

1. Kesish chuqurligi va frezalash enini aniqlaymiz.
2. $t=h=0.98\text{mm}$

2. Surish miqdori

$$S_z=0.14-0.24\text{ mm/ayl} \quad ([3], 2.78\text{-j, } 86\text{-b})$$

$S_z=0.2$ qabul qilamiz

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

T – frezani turg'unlik davri, $T=180\text{ daq}$ ([3], 2.85-j, 93-b)

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1\text{-j, } 34\text{-b})$$

$n_v=1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{pv}=0.8 \quad ([3], 2.5\text{-j, } 37\text{-b})$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \quad ([3], 2.6\text{-j, } 37\text{-b})$$

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$$C_v=445, q=0.2, x=0.15, y=0.35, u=0.2, r=0, m=0.32 \quad ([3], 2.84\text{-j, } 90\text{-b})$$

$$V = \frac{445 \cdot 100^{0.2}}{180^{0.32} \cdot 0.98^{0.15} \cdot 0.2^{0.35} \cdot 76^{0.2} \cdot 10^0} \cdot 0.76 = \frac{1117.8}{7.11} = 119.5\text{m/daq}$$

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 119.5}{3.14 \cdot 100} = 380.5\text{ min}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=445$ ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 100 \cdot 445}{1000} = 139.73\text{m / daq}$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.2 \cdot 445 \cdot 10 = 890\text{ mm/daq}$$

Dastgoh pasportidan $S_M=285$ mm/daq qabul qilamiz.

U xolda $S_z=285/445 \cdot 10=0.064$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p=54.5, \quad x=0.9, y=0.74, \quad n=1, \quad q=1, \quad w=0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.98^{0.9} \cdot 0.064^{0.74} \cdot 76^1 \cdot 10}{100^1 \cdot 445^0} \cdot 1.052 = \frac{53196.95}{100} \cdot 1.052 = 531.97 N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} = \frac{531.97 \cdot 119.5}{1020 \cdot 60} = 1.038 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$1.038 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 70$$

$$y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 17.5$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 1 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = \frac{88.5}{285} = 0.31 \text{ daq}$$

2 A torets yuza H14 o'lchamda toza frezalansin.

Frezalash eni $B=76$ mm, uzunligi $l=65$ mm, qo'yim miqdori $h=0.58$ mm

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material

SCH 18, HB=200

Kesuvchi asbob torets freza $D=100$ mm, GOST 9473-80. Kesuvchi qismi materiali BK6, tishlar soni $z=10$ ta; Geometrik parametrlari: $\varphi=60^\circ, \varphi_1=5^\circ, \varphi_0=20^\circ, \lambda=+5^\circ, \gamma=-5^\circ, \alpha=12^\circ$

1. Kesish chuqurligi va frezalash enini aniqlaymiz.

2. $t=h=0.58$ mm

2. Surish miqdori

$$S_z=0.14-0.24 \text{ mm/ayl} \quad ([3], 2.78\text{-j}, 86\text{-b})$$

$$S_z=0.2 \text{ qabul qilamiz}$$

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

$$T - \text{frezani turg'unlik davri, } T=180 \text{ daq} \quad ([3], 2.85\text{-j}, 93\text{-b})$$

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1\text{-j}, 34\text{-b})$$

$$n_v=1 \quad ([3], 2.2\text{-j}, 35\text{-b})$$

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{pv}=0.8 \quad ([3], 2.5\text{-j}, 37\text{-b})$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \quad ([3], 2.6\text{-j}, 37\text{-b})$$

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$$C_v=445, q=0.2, x=0.15, y=0.35, u=0.2, r=0, m=0.32 \quad ([3], 2.84\text{-j}, 90\text{-b})$$

$$V = \frac{445 \cdot 100^{0.2}}{180^{0.32} \cdot 0.58^{0.15} \cdot 0.2^{0.35} \cdot 76^{0.2} \cdot 10^0} \cdot 0.76 = \frac{1117.8}{2.6165} = 427.2 \text{ m/daq}$$

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 427.2}{3.14 \cdot 100} = 1360.5 \text{ min}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=1230$ ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 100 \cdot 1230}{1000} = 386.22 \text{ m/daq}$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.2 \cdot 1230 \cdot 10 = 2460 \text{ mm/daq}$$

Dastgoh pasportidan $S_M=285$ mm/daq qabul qilamiz.

$$U \text{ xolda } S_z = 285 / 1230 \cdot 10 = 0.023$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9\text{-j}, 38\text{-b})$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p = 54.5, \quad x = 0.9, y = 0.74, \quad n = 1, \quad q = 1, \quad w = 0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.58^{0.9} \cdot 0.023^{0.74} \cdot 76^1 \cdot 10}{100^1 \cdot 1360^0} \cdot 1.052 = \frac{15558.7}{100} \cdot 1.052 = 155.587 N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} = \frac{155.587 \cdot 386.22}{1020 \cdot 60} = 0.982 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$0.982 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 70$$

$$y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 17.5$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 5 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = \frac{88.5}{285} = 0.31 \text{ daq}$$

3 B torets yuza H14 o'lchamda qora frezalansin.

Frezalash eni B=76mm, uzunligi l=75mm, qo'yim miqdori h=0.8mm

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material

SCH 18, HB=200

Kesuvchi asbob torets freza D=100 mm, GOST 9473-80. Kesuvchi qismi materiali BK6, tishlar soni z=10 ta; Geometrik parametrlari: $\varphi=60^\circ, \varphi_1=5^\circ, \varphi_0=20^\circ, \lambda=+5^\circ, \gamma=-5^\circ, \alpha=12^\circ$

3. Kesish chuqurligi va frezalash enini aniqlaymiz.

4. $t=h=0.8$ mm

2. Surish miqdori

$S_z=0.14-0.24$ mm/ayl ([3], 2.78-j, 86-b)

$S_z=0.2$ qabul qilamiz

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

T – frezani turg'unlik davri, T=180 daq ([3], 2.85-j, 93-b)

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$n_v=1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$K_{pv}=0.8$ ([3], 2.5-j, 37-b)

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$K_{uv} = 1$ ([3], 2.6-j, 37-b)

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$C_v=445, q=0.2, x=0.15, y=0.35, u=0.2, r=0, m=0.32$ ([3], 2.84-j, 90-b)

$$V = \frac{445 \cdot 100^{0.2}}{180^{0.32} \cdot 0.8^{0.15} \cdot 0.2^{0.35} \cdot 76^{0.2} \cdot 10^0} \cdot 0.76 = \frac{1117.8}{6.897} = 162.07 \text{ m/daq}$$

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 162.07}{3.14 \cdot 100} = 516.147 \text{ min}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=445$ ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 100 \cdot 445}{1000} = 139.73 \text{ m / daq}$$

6. Tishlar bo'yicha surish tezligi

$S_M = S_z \cdot z \cdot n = 0.2 \cdot 445 \cdot 10 = 890$ mm/daq

Dastgoh pasportidan $S_M=285$ mm/daq qabul qilamiz.

U xolda $S_z=285/445 \cdot 10=0.064$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsenti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p=54.5, \quad x=0.9, y=0.74, \quad n=1, \quad q=1, \quad w=0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.8^{0.9} \cdot 0.064^{0.74} \cdot 76^1 \cdot 10}{100^1 \cdot 445^0} \cdot 1.052 = \frac{44316.37}{100} \cdot 1.052 = 466.2 N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} = \frac{466.2 \cdot 139.73}{1020 \cdot 60} = 1.0644 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt}.$$

$$1.0644 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 75$$

$$y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 17.5$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 1 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = \frac{93.5}{285} = 0.33 \text{ daq}$$

4 B torets yuza H14 o'lchamda toza frezalansin.

Frezalash eni $B=76\text{mm}$, uzunligi $l=75\text{mm}$, qo'yim miqdori $h=0.7\text{mm}$

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material

SCH 18,HB=200

Kesuvchi asbob torets freza D=100 mm, GOST 9473-80. Kesuvchi qismi materiali BK6, tishlar soni $z=10$ ta; Geometrik parametrlari: $\varphi=60^0, \varphi_1=5^0, \varphi_0=20^0, \lambda=+5^0, \gamma=-5^0, \alpha=12^0$

3. Kesish chuqurligi va frezalash enini aniqlaymiz.

4. $t=h=0.7\text{mm}$

2.Surish miqdori

$S_z=0.14-0.24\text{ mm/ayl}$ ([3], 2.78-j, 86-b)

$S_z=0.2$ qabul qilamiz

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

T –frezani turg'unlik davri, $T=180\text{ daq}$ ([3], 2.85-j, 93-b)

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$n_v=1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$K_{nv}=0.8$ ([3], 2.5-j, 37-b)

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$K_{uv} = 1$ ([3], 2.6-j, 37-b)

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$C_v=445, q=0.2, x=0.15, y=0.35, u=0.2, r=0, m=0.32$ ([3], 2.84-j, 90-b)

$$V = \frac{445 \cdot 100^{0.2}}{180^{0.32} \cdot 0.7^{0.15} \cdot 0.2^{0.35} \cdot 76^{0.2} \cdot 10^0} \cdot 0.76 = \frac{1117.8}{6.76} = 125.669\text{ m/daq}$$

4.Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 125.669}{3.14 \cdot 100} = 400.22\text{ min}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=445$ ayl/daq qabul qilamiz.

5.Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 100 \cdot 445}{1000} = 139.73\text{ m/daq}$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.2 \cdot 445 \cdot 10 = 890\text{ mm/daq}$$

Dastgoh pasportidan $S_M=285\text{ mm/daq}$ qabul qilamiz.

$$U \text{ xolda } S_z = 890 / (445 \cdot 10) = 0.2$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsenti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p = 54.5, \quad x = 0.9, \quad y = 0.74, \quad n = 1, \quad q = 1, \quad w = 0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.7^{0.9} \cdot 0.2^{0.74} \cdot 76^1 \cdot 10}{100^1 \cdot 1360^0} \cdot 1.052 = \frac{91318.87}{100} \cdot 1.052 = 960.7 N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} = \frac{960.7 \cdot 139.73}{1020 \cdot 60} = 2.193 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt}.$$

$$2.193 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 75$$

$$y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 17.5$$

$$\Delta = 1 \dots 5 \text{ mm}. \quad \Delta = 1 \text{ mm qabul qilamiz}.$$

$$T_{as} = \frac{L}{S_M} = \frac{93.5}{285} = 0.33 \text{ daq}$$

5 E torets yuza H14 o'lchamda qora frezalansin.

Frezalash eni $B=45\text{mm}$, uzunligi $l=75\text{mm}$, qo'yim miqdori $h=1.5\text{mm}$
 Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material
 SCH 18, HB=200

Kesuvchi asbob torets freza $D=100\text{ mm}$, GOST 9473-80. Kesuvchi qismi
 materiali BK6, tishlar soni $z=10$ ta; Geometrik parametrlari: $\varphi=60^\circ, \varphi_1=5^\circ, \varphi_0=20^\circ, \lambda=+5^\circ, \gamma=-5^\circ, \alpha=12^\circ$

5. Kesish chuqurligi va frezalash enini aniqlaymiz.

6. $t=h=1.5\text{mm}$

2. Surish miqdori

$S_z=0.14-0.24\text{ mm/ayl}$ ([3], 2.78-j, 86-b)

$S_z=0.2$ qabul qilamiz

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

T – frezani turg'unlik davri, $T=180\text{ daq}$ ([3], 2.85-j, 93-b)

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$n_v=1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{pv}=0.8 \quad ([3], 2.5-j, 37-b)$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \quad ([3], 2.6-j, 37-b)$$

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$$C_v=445, q=0.2, x=0.15, y=0.35, u=0.2, r=0, m=0.32 \quad ([3], 2.84-j, 90-b)$$

$$V = \frac{445 \cdot 100^{0.2}}{180^{0.32} \cdot 15^{0.15} \cdot 0.2^{0.35} \cdot 45^{0.2} \cdot 10^0} \cdot 0.76 = \frac{1117.8}{7579} = 119.5\text{m/daq}$$

4. Shpindel aylanishlar chastotasini aniqlaymiz.

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=445$ ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 100 \cdot 445}{1000} = 139.73\text{m/daq}$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.2 \cdot 445 \cdot 10 = 890\text{ mm/daq}$$

Dastgoh pasportidan $S_M=285\text{ mm/daq}$ qabul qilamiz.

$$U \text{ xolda } Sz=285/445 \cdot 10=0.064$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p=54.5, \quad x=0.9, y=0.74, \quad n=1, \quad q=1, \quad w=0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.98^{0.9} \cdot 0.064^{0.74} \cdot 76^1 \cdot 10}{100^1 \cdot 445^0} \cdot 1.052 = \frac{53196.95}{100} \cdot 1.052 = 531.97 N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} = \frac{531.97 \cdot 119.5}{1020 \cdot 60} = 1.038 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$1.038 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 75$$

$$y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 5.5$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 1 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = \frac{93.5}{285} = 0.33 \text{ daq}$$

6 A torets yuza H14 o'lchamda toza frezalansin.

Frezalash eni $B=45\text{mm}$, uzunligi $l=75\text{mm}$, qo'yim miqdori $h=0.7\text{mm}$

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material SCH 18, HB=200

Kesuvchi asbob torets freza $D=100 \text{ mm}$, GOST 9473-80. Kesuvchi qismi materiali BK6, tishlar soni $z=10$ ta; Geometrik parametrlari: $\varphi=60^\circ, \varphi_1=5^\circ, \varphi_0=20^\circ, \lambda=+5^\circ, \gamma=-5^\circ, \alpha=12^\circ$

5. Kesish chuqurligi va frezalash enini aniqlaymiz.

6. $t=h=0.7 \text{ mm}$

2. Surish miqdori

$$S_z = 0.14 - 0.24 \text{ mm/ayl} \quad ([3], 2.78\text{-j}, 86\text{-b})$$

$$S_z = 0.2 \text{ qabul qilamiz}$$

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

$$T - \text{frezani turg'unlik davri, } T = 180 \text{ daq} \quad ([3], 2.85\text{-j}, 93\text{-b})$$

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1\text{-j}, 34\text{-b})$$

$$n_v = 1 \quad ([3], 2.2\text{-j}, 35\text{-b})$$

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{pv} = 0.8 \quad ([3], 2.5\text{-j}, 37\text{-b})$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \quad ([3], 2.6\text{-j}, 37\text{-b})$$

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$$C_v = 445, \quad q = 0.2, \quad x = 0.15, \quad y = 0.35, \quad u = 0.2, \quad r = 0, \quad m = 0.32 \quad ([3], 2.84\text{-j}, 90\text{-b})$$

$$V = \frac{445 \cdot 100^{0.2}}{180^{0.32} \cdot 0.7^{0.15} \cdot 0.2^{0.35} \cdot 45^{0.2} \cdot 10^0} \cdot 0.76 = \frac{1117.8}{6.08} = 139.73 \text{ m/daq}$$

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 139.73}{3.14 \cdot 100} = 444.98 \text{ min}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n = 445$ ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 100 \cdot 445}{1000} = 139.73 \text{ m/daq}$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.2 \cdot 445 \cdot 10 = 890 \text{ mm/daq}$$

Dastgoh pasportidan $S_M = 285 \text{ mm/daq}$ qabul qilamiz.

$$\text{U xolda } S_z = 285 / 1230 \cdot 10 = 0.023$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p = 54.5, \quad x = 0.9, y = 0.74, \quad n = 1, \quad q = 1, \quad w = 0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.7^{0.9} \cdot 0.023^{0.74} \cdot 45^1 \cdot 10}{100^1 \cdot 1360^0} \cdot 1.052 = \frac{10911.3}{100} \cdot 1.052 = 114.79 N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} = \frac{114.8 \cdot 139.73}{1020 \cdot 60} = 0.26 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt}.$$

$$0.26 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$d = 93.5 \text{ mm}, \quad y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 5.5$$

$$\Delta = 1 \dots 5 \text{ mm}. \quad \Delta = 1 \text{ mm qabul qilamiz}.$$

$$T_{as} = \frac{L}{S_M} = \frac{93.5}{285} = 0.33 \text{ daq}$$

7 F₁ yuza H14 o'lchamda qora frezalansin.

Frezalash eni B=18mm, uzunligi l=65mm, qo'yim miqdori h=1.2mm

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material

SCH 18,HB=200

Kesuvchi asbob torets freza D=40 mm, GOST 9304-69. Kesuvchi qismi materiali BK6, tishlar soni $z=10$ ta; Geometrik parametrlari: $\varphi=60^0, \varphi_1=5^0, \varphi_0=20^0, \lambda=+5^0$
 $\gamma=-5^0 \quad \alpha=12^0$

7. Kesish chuqurligi va frezalash enini aniqlaymiz.

8. $t=h=1.2$ mm

2.Surish miqdori

$S_z=0.14-0.24$ mm/ayl ([3], 2.78-j, 86-b)

$S_z=0.2$ qabul qilamiz

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

T –frezani turg'unlik davri, $T=180$ daq ([3], 2.85-j, 93-b)

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$n_v=1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$K_{pv}=0.8$ ([3], 2.5-j, 37-b)

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$K_{uv} = 1$ ([3], 2.6-j, 37-b)

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$C_v=445, q=0.2, x=0.15, y=0.35, u=0.2, r=0, m=0.32$ ([3], 2.84-j, 90-b)

$$V = \frac{445 \cdot 40^{0.2}}{180^{0.32} \cdot 1.2^{0.15} \cdot 0.2^{0.35} \cdot 18^{0.2} \cdot 10^0} \cdot 0.76 = \frac{930.6}{5.5} = 128.6 \text{ m/daq}$$

4.Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 128.6}{3.14 \cdot 40} = 1023.8 \text{ min}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=1230$ ayl/daq qabul qilamiz.

5.Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 100 \cdot 1230}{1000} = 386.22 \text{ m/daq}$$

6. Tishlar bo'yicha surish tezligi

$S_M = S_z \cdot z \cdot n = 0.2 \cdot 386.22 \cdot 10 = 772.4$ mm/daq

Dastgoh pasportidan $S_M=285$ mm/daq qabul qilamiz.

U xolda $S_z=285/1230 \cdot 10=2.317$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsenti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p = 54.5, \quad x = 0.9, \quad y = 0.74, \quad n = 1, \quad q = 1, \quad w = 0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 1.2^{0.9} \cdot 2.317^{0.74} \cdot 18^1 \cdot 10}{40^1 \cdot 1023^0} \cdot 1.052 = \frac{215.266}{40} \cdot 1.052 = 566.1 N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} = \frac{5661 \cdot 386.22}{1020 \cdot 60} = 0.337 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$0.337 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 65 \text{ mm}, \quad d = 40 \text{ mm}, \quad y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 2.15$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 2 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = \frac{65 + 2 + 2}{285} = 0.24 \text{ daq}$$

8 F₁ yuza H14 o'lchamda toza frezalansin.

Frezalash eni B=18mm, uzunligi l=65mm, qo'yim miqdori h=0.7mm

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material
SCH 18, HB=200

Kesuvchi asbob torets freza D=40 mm, GOST 9473-80. Kesuvchi qismi materiali
BK6, tishlar soni $z=10$ ta; Geometrik parametrlari: $\varphi=60^0, \varphi_1=5^0, \varphi_0=20^0, \lambda=+5^0$
 $\gamma=-5^0 \quad \alpha=12^0$

7. Kesish chuqurligi va frezalash enini aniqlaymiz.

8. $t=h=0.7\text{mm}$

2. Surish miqdori

$$S_z=0.14-0.24 \text{ mm/ayl} \quad ([3], 2.78\text{-j, } 86\text{-b})$$

$S_z=0.2$ qabul qilamiz

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

T – frezani turg'unlik davri, $T=180$ daq $([3], 2.85\text{-j, } 93\text{-b})$

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1\text{-j, } 34\text{-b})$$

$n_v=1$ $([3], 2.2\text{-j, } 35\text{-b})$

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{pv}=0.8 \quad ([3], 2.5\text{-j, } 37\text{-b})$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \quad ([3], 2.6\text{-j, } 37\text{-b})$$

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$$C_v=445, q=0.2, x=0.15, y=0.35, u=0.2, r=0, m=0.32 \quad ([3], 2.84\text{-j, } 90\text{-b})$$

$$V = \frac{445 \cdot 40^{0.2}}{180^{0.32} \cdot 0.7^{0.15} \cdot 0.2^{0.35} \cdot 18^{0.2} \cdot 10^0} \cdot 0.76 = \frac{930.6}{4.3} = 164.4 \text{ m/daq}$$

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 164.4}{3.14 \cdot 40} = 1308.9 \text{ min}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=1230$ ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 40 \cdot 1230}{1000} = 154.5 \text{ m/daq}$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.2 \cdot 1230 \cdot 10 = 2460 \text{ mm/daq}$$

Dastgoh pasportidan $S_M=285\text{mm/daq}$ qabul qilamiz.

$$U \text{ xolda } S_z = 285 / (2460 \cdot 10) = 0.0115$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p = 54.5, \quad x = 0.9, y = 0.74, \quad n = 1, \quad q = 1, \quad w = 0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.7^{0.9} \cdot 0.011^{0.74} \cdot 18^1 \cdot 10}{40^1 \cdot 1360^0} \cdot 1.052 = \frac{2528.6}{40} \cdot 1.052 = 66.5 N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} = \frac{66.5 \cdot 154.5}{1020 \cdot 60} = 0.168 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$0.168 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 65 \text{ mm}, d = 40 \text{ mm}, y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 2.15$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 2 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = \frac{65 + 2 + 2}{285} = 0.24 \text{ daq}$$

9 F₂ yuza H14 o'lchamda qora frezalansin.

Frezalash eni B=18mm, uzunligi l=65mm, qo'yim miqdori h=1.2mm

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material

SCH 18, HB=200

Kesuvchi asbob torets freza D=40 mm, GOST 9304-69. Kesuvchi qismi materiali

BK6, tishlar soni z=10 ta; Geometrik parametrlari: $\varphi = 60^\circ, \varphi_1 = 5^\circ, \varphi_0 = 20^\circ, \lambda = +5^\circ$

$$\gamma = -5^\circ \quad \alpha = 12^\circ$$

9. Kesish chuqurligi va frezalash enini aniqlaymiz.

$$10. t = h = 1.2 \text{ mm}$$

2. Surish miqdori

$$S_z = 0.14 - 0.24 \text{ mm/ayl} \quad ([3], 2.78-j, 86-b)$$

$$S_z = 0.2 \text{ qabul qilamiz}$$

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

T – frezani turg'unlik davri, T=180 daq ([3], 2.85-j, 93-b)

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$n_v=1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{pv}=0.8 \quad ([3], 2.5-j, 37-b)$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \quad ([3], 2.6-j, 37-b)$$

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$$C_v=445, q=0.2, x=0.15, y=0.35, u=0.2, r=0, m=0.32 \quad ([3], 2.84-j, 90-b)$$

$$V = \frac{445 \cdot 40^{0.2}}{180^{0.32} \cdot 1.2^{0.15} \cdot 0.2^{0.35} \cdot 18^{0.2} \cdot 10^0} \cdot 0.76 = \frac{930.6}{5.5} = 128.6 \text{ m/daq}$$

4.Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 128.6}{3.14 \cdot 40} = 1023.8 \text{ min}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=1230$ ayl/daq qabul qilamiz.

5.Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 100 \cdot 1230}{1000} = 386.22 \text{ m / daq}$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.2 \cdot 386.22 \cdot 10 = 772.4 \text{ mm/daq}$$

Dastgoh pasportidan $S_M=285$ mm/daq qabul qilamiz.

$$U \text{ xolda } S_z = 285 / 1230 \cdot 10 = 2.317$$

7.Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p=54.5, \quad x=0.9, y=0.74, \quad n=1, \quad q=1, \quad w=0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 1.2^{0.9} \cdot 2.317^{0.74} \cdot 18^1 \cdot 10}{40^1 \cdot 1023^0} \cdot 1.052 = \frac{215.266}{40} \cdot 1.052 = 566.1N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} = \frac{5661 \cdot 386.22}{1020 \cdot 60} = 0.337 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$0.337 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 65 \text{ mm}, \quad d = 40 \text{ mm}, \quad y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 2.15$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 2 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = \frac{65 + 2 + 2}{285} = 0.24 \text{ daq}$$

10 F₂ yuza H14 o'lchamda toza frezalansin.

Frezalash eni B=18mm, uzunligi l=65mm, qo'yim miqdori h=0.7mm

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material

SCH 18, HB=200

Kesuvchi asbob torets freza D=40 mm, GOST 9473-80. Kesuvchi qismi materiali

BK6, tishlar soni z=10 ta; Geometrik parametrlari: $\varphi=60^\circ, \varphi_1=5^\circ, \varphi_0=20^\circ, \lambda=+5^\circ$

$$\gamma = -5^\circ \quad \alpha = 12^\circ$$

9. Kesish chuqurligi va frezalash enini aniqlaymiz.

$$10. t = h = 0.7 \text{ mm}$$

2. Surish miqdori

$$S_z = 0.14 - 0.24 \text{ mm/ayl} \quad ([3], 2.78-j, 86-b)$$

$$S_z = 0.2 \text{ qabul qilamiz}$$

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

T – frezani turg'unlik davri, T=180 daq ([3], 2.85-j, 93-b)

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$n_v=1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$K_{pv}=0.8$ ([3], 2.5-j, 37-b)

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$K_{uv} = 1$ ([3], 2.6-j, 37-b)

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$C_v=445$, $q=0.2$, $x=0.15$, $y=0.35$, $u=0.2$, $r=0$, $m=0.32$ ([3], 2.84-j, 90-b)

$$V = \frac{445 \cdot 40^{0.2}}{180^{0.32} \cdot 0.7^{0.15} \cdot 0.2^{0.35} \cdot 18^{0.2} \cdot 10^0} \cdot 0.76 = \frac{930.6}{4.3} = 164.4 \text{ m/daq}$$

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 164.4}{3.14 \cdot 40} = 1308.9 \text{ min}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=1230$ ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 40 \cdot 1230}{1000} = 154.5 \text{ m/daq}$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.2 \cdot 1230 \cdot 10 = 2460 \text{ mm/daq}$$

Dastgoh pasportidan $S_M=285 \text{ mm/daq}$ qabul qilamiz.

$$U \text{ xolda } S_z = 285 / (2460 \cdot 10) = 0.0115$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p = 54.5, \quad x = 0.9, \quad y = 0.74, \quad n = 1, \quad q = 1, \quad w = 0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.7^{0.9} \cdot 0.011^{0.74} \cdot 18^1 \cdot 10}{40^1 \cdot 1360^0} \cdot 1.052 = \frac{2528.6}{40} \cdot 1.052 = 66.5 N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z \cdot v}{1020 \cdot 60} = \frac{66.5 \cdot 154.5}{1020 \cdot 60} = 0.168 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$0.168 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 65 \text{ mm}, \quad d = 40 \text{ mm}, \quad y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 2.15$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 2 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = \frac{65 + 2 + 2}{285} = 0.24 \text{ daq}$$

11 C torets yuza H14 o'lchamda qora frezalansin.

Frezalash eni $B = 80 \text{ mm}$, uzunligi $l = 84 \text{ mm}$, qo'yim miqdori $h = 0.8 \text{ mm}$

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material

SCH 18, HB = 200

Kesuvchi asbob torets freza $D = 100 \text{ mm}$, GOST 9473-80. Kesuvchi qismi materiali BK6, tishlar soni $z = 10$ ta; Geometrik parametrlari: $\varphi = 60^\circ, \varphi_1 = 5^\circ, \varphi_0 = 20^\circ, \lambda = +5^\circ, \gamma = -5^\circ, \alpha = 12^\circ$

1. Kesish chuqurligi va frezalash enini aniqlaymiz.

$$2. \quad t = h = 0.8 \text{ mm}$$

2. Surish miqdori

$$S_z = 0.14 - 0.24 \text{ mm/ayl} \quad ([3], 2.78-j, 86-b)$$

$$S_z = 0.2 \text{ qabul qilamiz}$$

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

$$T - \text{frezani turg'unlik davri, } T = 180 \text{ daq} \quad ([3], 2.85-j, 93-b)$$

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$$n_v=1 \text{ ([3], 2.2-j, 35-b)}$$

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{nv}=0.8 \text{ ([3], 2.5-j, 37-b)}$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \text{ ([3], 2.6-j, 37-b)}$$

$$K_v=0.95 \cdot 0.8 \cdot 1=0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$$C_v=445, q=0.2, x=0.15, y=0.35, u=0.2, r=0, m=0.32 \text{ ([3], 2.84-j, 90-b)}$$

$$V = \frac{445 \cdot 100^{0.2}}{180^{0.32} \cdot 0.8^{0.15} \cdot 0.2^{0.35} \cdot 80^{0.2} \cdot 10^0} \cdot 0.76 = \frac{1117.8}{6.968} = 121.9 \text{ m/daq}$$

4.Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 121.9}{3.14 \cdot 100} = 388.3 \text{ min}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=445$ ayl/daq qabul qilamiz.

5.Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 100 \cdot 445}{1000} = 154.5 \text{ m / daq}$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.2 \cdot 445 \cdot 10 = 890 \text{ mm/daq}$$

Dastgoh pasportidan $S_M=285 \text{ mm/daq}$ qabul qilamiz.

$$U \text{ xolda } S_z = 285 / (445 \cdot 10) = 0.064$$

7.Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \text{ ([3], 2.9-j, 38-b)}$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p=54.5, x=0.9, y=0.74, n=1, q=1, w=0 \text{ ([3], 2.86-j, 94-b)}$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.8^{0.9} \cdot 0.064^{0.74} \cdot 80^1 \cdot 10}{100^1 \cdot 1360^0} \cdot 1.052 = \frac{46648.8}{100} \cdot 1.052 = 490.75 \text{ N}$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} = \frac{490.75 \cdot 154.5}{1020 \cdot 60} = 1.239 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$1.239 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 84 \text{ mm}, d = 40 \text{ mm}, y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 20$$

$\Delta = 1 \dots 5 \text{ mm}$. $\Delta = 2 \text{ mm}$ qabul qilamiz.

$$T_{as} = \frac{L}{S_M} = \frac{106}{285} = 0.37 \text{ daq}$$

12 C torets yuza H14 o'lchamda toza frezalansin.

Frezalash eni $B = 80 \text{ mm}$, uzunligi $l = 84 \text{ mm}$, qo'yim miqdori $h = 0.7 \text{ mm}$

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material

SCH 18, HB = 200

Kesuvchi asbob torets freza $D = 100 \text{ mm}$, GOST 9473-80. Kesuvchi qismi materiali BK6, tishlar soni $z = 10$ ta; Geometrik parametrlari: $\varphi = 60^\circ, \varphi_1 = 5^\circ, \varphi_0 = 20^\circ, \lambda = +5^\circ, \gamma = -5^\circ, \alpha = 12^\circ$

1. Kesish chuqurligi va frezalash enini aniqlaymiz.

2. $t = h = 0.8 \text{ mm}$

2. Surish miqdori

$$S_z = 0.14 - 0.24 \text{ mm/ayl} \quad ([3], 2.78\text{-j}, 86\text{-b})$$

$S_z = 0.2$ qabul qilamiz

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

T – frezani turg'unlik davri, $T = 180 \text{ daq}$ ([3], 2.85-j, 93-b)

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1\text{-j}, 34\text{-b})$$

$n_v = 1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{pv} = 0.8 \quad ([3], 2.5\text{-j}, 37\text{-b})$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \quad ([3], 2.6\text{-j}, 37\text{-b})$$

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$$C_v = 445, q = 0.2, x = 0.15, y = 0.35, u = 0.2, r = 0, m = 0.32 \quad ([3], 2.84\text{-j}, 90\text{-b})$$

$$V = \frac{445 \cdot 100^{0.2}}{180^{0.32} \cdot 0.7^{0.15} \cdot 0.2^{0.35} \cdot 80^{0.2} \cdot 10^0} \cdot 0.76 = \frac{1117.8}{9.35} = 119.5 \text{ m/daq}$$

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 119.5}{3.14 \cdot 100} = 380.7 \text{ min}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=445$ ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 100 \cdot 445}{1000} = 154.5 \text{ m / daq}$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.2 \cdot 445 \cdot 10 = 890 \text{ mm/daq}$$

Dastgoh pasportidan $S_M = 890 \text{ mm/daq}$ qabul qilamiz.

$$U \text{ xolda } S_z = 285 / (445 \cdot 10) = 0.064$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsenti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p = 54.5, \quad x=0.9, \quad y=0.74, \quad n=1, \quad q=1, \quad w=0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.7^{0.9} \cdot 0.064^{0.74} \cdot 80^1 \cdot 10}{100^1 \cdot 1360^0} \cdot 1.052 = \frac{43520}{100} \cdot 1.052 = 435.2 \text{ N}$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} = \frac{435.2 \cdot 154.5}{1020 \cdot 60} = 1.09 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$1.09 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 84 \text{ mm}, \quad d = 100 \text{ mm}, \quad y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 20$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 2 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = \frac{106}{285} = 0.37 \text{ daq}$$

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M yon yuzani $B=80 \text{ mm}$, uzunligi $l=15 \text{ mm}$ o'lchamda qora frezalansin. Qo'yim miqdori $h=1.2 \text{ mm}$

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material ЧЧ 18, HB= 200

Kesuvchi asbob barmoq freza $D=10 \text{ mm}$, GOST 17025-71. Kesuvchi qismi materiali BK6 tishlar soni $z=4$ ta;

1. Kesish chuqurligi va frezalash enini aniqlaymiz.
2. $t=h=1.2 \text{ mm}$
2. Surish miqdori
 $S_z=0.08-0.05 \text{ mm/ayl}$ ([3], 2.80-j, 88-b) (Disk freza uchun (2.79-j, 87-b)
 $S_z=0.05$ qabulqilamiz
3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

T – frezani turg'unlik davri, $T=80 \text{ daq}$ ([3], 2.85-j, 93-b)

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{nv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$n_v=1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{nv}=0.8 \quad ([3], 2.5-j, 37-b)$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \quad ([3], 2.6-j, 37-b)$$

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$$C_v=445, q=0.2, x=0.15, y=0.35, u=0.2, p=0, m=0.32 \quad ([3], 2.84-j, 90-b)$$

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D}$$

$$n=1000 \cdot 445 / 3.14 \cdot 10 = 14.171 \text{ m/daq}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=2400 \text{ ayl/daq}$ qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000}$$

$$V_{xaq} = 3.14 \cdot 10 \cdot 2400 / 1000 = 75.36$$

6. Tishlarbo'yichasurishtezi

$$S_M = S_z \cdot z \cdot n = 0.05 \cdot 4 \cdot 2400 = 480$$

Dastgohpasportidan $S_M=285 \text{ mm/daq}$ qabulqilamiz.

$$U \text{ xolda } S_z = \frac{S_M}{z \cdot n} = 0.11875$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$P_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p = 54.5, \quad x = 0.9, y = 0.74, \quad n = 1, \quad q = 1, \quad w = 0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 1.2^{0.9} \cdot 0.11^{0.74} \cdot 10^1 \cdot 4}{10^1 \cdot 2400^0} \cdot 1.052 = \frac{5015.9}{10} \cdot 1.052 = 527.67 N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} \text{ kVt};$$

$$N_e = 527.67 \cdot 75.36 / 1020 \cdot 60 = 0.6497$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$0.6497 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 15 \text{ mm,}$$

$$y = 0.5 \left(D - \sqrt{D^2 - B^2} \right) = 0.5 \left(16 - \sqrt{16^2 - 10^2} \right) = 1.7 \text{ mm}$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 3 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = 0.07 \text{ daq}$$

14 M yon yuzani $B = 80 \text{ mm}$, uzunligi $l = 15 \text{ mm}$ o'lchamda toza frezalansin. Qo'yim miqdori $h = 0.7 \text{ mm}$

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material CЧ 18, HB = 200

Kesuvchi asbob barmoq freza $D = 10 \text{ mm}$, GOST 17025-71. Kesuvchi qismi materiali BK6 tishlar soni $z = 4$ ta;

1. Kesish chuqurligi va frezalash enini aniqlaymiz.

$$2. \quad t = h = 1.2 \text{ mm}$$

2. Surish miqdori

$$S_z = 0.08 - 0.05 \text{ mm/ayl} \quad ([3], 2.80-j, 88-b) \quad (\text{Disk freza uchun } (2.79-j, 87-b))$$

$$S_z = 0.05 \text{ qabul qilamiz}$$

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

$$T - \text{frezani turg'unlik davri, } T = 80 \text{ daq} \quad ([3], 2.85-j, 93-b)$$

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{nv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni hisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$$n_v = 1 \quad ([3], 2.2-j, 35-b)$$

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{nv} = 0.8 \quad ([3], 2.5-j, 37-b)$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \quad ([3], 2.6-j, 37-b)$$

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$$C_v = 445, \quad q = 0.2, \quad x = 0.15, \quad y = 0.35, \quad u = 0.2, \quad p = 0, \quad m = 0.32 \quad ([3], 2.84-j, 90-b)$$

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D}$$

$$n = 1000 \cdot 445 / 3.14 \cdot 10 = 14.171 \text{ m/daq}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n = 2400$ ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000}$$

$$V_{xaq} = 3.14 \cdot 10 \cdot 2400 / 1000 = 75.36$$

6. Tishlar bo'yichasurish tezligi

$$S_M = S_z \cdot z \cdot n = 0.05 \cdot 4 \cdot 2400 = 480$$

Dastgoh pasportidan $S_M = 285$ mm/daq qabul qilamiz.

$$U \text{ xolda } S_z = \frac{S_M}{z \cdot n} = 0.11875$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$P_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n = 1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p = 54.5, \quad x = 0.9, \quad y = 0.74, \quad n = 1, \quad q = 1, \quad w = 0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.7^{0.9} \cdot 0.11^{0.74} \cdot 10^1 \cdot 4}{10^1 \cdot 2400^0} \cdot 1.052 = \frac{3088}{10} \cdot 1.052 = 324.9 \text{ N}$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} \text{ kVt};$$

$$N_e = 324.9 \cdot 75.36 / 1020 \cdot 60 = 0.4$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$0.4 \leq 2.8$$

Demakishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 20 \text{ mm,}$$

$$y = 0.5 \left(D - \sqrt{D^2 - B^2} \right) = 0.5 \left(16 - \sqrt{16^2 - 10^2} \right) = 1.7 \text{ mm}$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 3 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = 0.07 \text{ daq}$$

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K yon yuzani $B=80 \text{ mm}$, uzunligi $l=15 \text{ mm}$ o'lchamda qora frezalansin. Qo'yim miqdori $h=1.2 \text{ mm}$

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material C4 18, HB= 200

Kesuvchi asbob barmoq freza $D=10 \text{ mm}$, GOST 17025-71. Kesuvchi qismi materiali BK6 tishlar soni $z=4$ ta;

3. Kesish chuqurligi va frezalash enini aniqlaymiz.

4. $t=h=1.2 \text{ mm}$

2. Surish miqdori

$$S_z = 0.08 - 0.05 \text{ mm/ayl} \quad ([3], 2.80\text{-j, } 88\text{-b}) \quad (\text{Disk freza uchun } (2.79\text{-j, } 87\text{-b}))$$

$$S_z = 0.05 \text{ qabul qilamiz}$$

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

$$T - \text{frezani turg'unlik davri, } T = 80 \text{ daq} \quad ([3], 2.85\text{-j, } 93\text{-b})$$

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{nv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1\text{-j, } 34\text{-b})$$

$$n_v = 1 \quad ([3], 2.2\text{-j, } 35\text{-b})$$

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{nv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{nv} = 0.8 \quad ([3], 2.5\text{-j, } 37\text{-b})$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \quad ([3], 2.6\text{-j, } 37\text{-b})$$

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsentlar va daraja ko'rsatkichlarini yozib olamiz

$C_v=445$, $q=0.2$, $x=0.15$, $y=0.35$, $u=0.2$, $p=0$, $m=0.32$ ([3], 2.84-j, 90-b)

4.Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D}$$

$$n=1000 \cdot 445 / 3.14 \cdot 10 = 14.171 \text{ m/daq}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=2400$ ayl/daq qabul qilamiz.

5.Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000}$$

$$V_{xaq} = 3.14 \cdot 10 \cdot 2400 / 1000 = 75.36$$

6. Tishlarbo'yichasurishtezi

$$S_M = S_z \cdot z \cdot n = 0.05 \cdot 4 \cdot 2400 = 480$$

Dastgohpasportidan $S_M=285$ mm/daqqabulqilamiz.

$$U \text{ xolda } S_z = \frac{S_M}{z \cdot n} = 0.11875$$

7.Kesish jarayonida ta'sir etayotgan kuch:

$$P_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p=54.5, \quad x=0.9, \quad y=0.74, \quad n=1, \quad q=1, \quad w=0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 1.2^{0.9} \cdot 0.11^{0.74} \cdot 10^1 \cdot 4}{10^1 \cdot 2400^0} \cdot 1.052 = \frac{5015.9}{10} \cdot 1.052 = 527.67 N$$

8. Kesishdagiquvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} \text{ kVt};$$

$$N_e = 527.67 \cdot 75.36 / 1020 \cdot 60 = 0.6497$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$0.6497 \leq 2.8$$

Demakishlovberishmumkin.

9.Asosiyvaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 15 \text{ mm,}$$

$$y = 0.5 \left(D - \sqrt{D^2 - B^2} \right) = 0.5 \left(16 - \sqrt{16^2 - 10^2} \right) = 1.7 \text{ mm}$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 3 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = 0.07 \text{ daq}$$

16 K yon yuzani B=80 mm, uzunligi l=15 mm o'lchamda toza frezalansin. Qo'yim miqdori h=0.7 mm

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material CЧ 18, HB= 200

Kesuvchi asbob barmoq freza D=10 mm, GOST 17025-71. Kesuvchi qismi materiali BK6 tishlar soni z=4 ta;

3. Kesish chuqurligi va frezalash enini aniqlaymiz.

4. t=h=1.2 mm

2. Surish miqdori

$S_z = 0.08-0.05 \text{ mm/ayl}$ ([3], 2.80-j, 88-b) (Disk freza uchun (2.79-j, 87-b))

$S_z = 0.05$ qabul qilamiz

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

T – frezani turg'unlik davri, T=80 daq ([3], 2.85-j, 93-b)

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{nv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$n_v = 1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$K_{nv} = 0.8$ ([3], 2.5-j, 37-b)

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$K_{uv} = 1$ ([3], 2.6-j, 37-b)

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$C_v = 445$, $q = 0.2$, $x = 0.15$, $y = 0.35$, $u = 0.2$, $p = 0$, $m = 0.32$ ([3], 2.84-j, 90-b)

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D}$$

$$n = 1000 \cdot 445 / 3.14 \cdot 10 = 14.171 \text{ m/daq}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib n=2400 ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000}$$

$$V_{xaq} = 3.14 \cdot 10 \cdot 2400 / 1000 = 75.36$$

6. Tishlar bo'yichasuri tezligi

$$S_M = S_z \cdot z \cdot n = 0.05 \cdot 4 \cdot 2400 = 480$$

Dastgohpasportidan $S_M=285$ mm/daqqabulqilamiz.

$$U \text{ xolda } S_z = \frac{S_M}{z \cdot n} = 0.11875$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$P_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsenti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p=54.5, \quad x=0.9, \quad y=0.74, \quad n=1, \quad q=1, \quad w=0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.7^{0.9} \cdot 0.11^{0.74} \cdot 10^1 \cdot 4}{10^1 \cdot 2400^0} \cdot 1.052 = \frac{3088}{10} \cdot 1.052 = 324.9 N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} \text{ kVt};$$

$$N_e = 324.9 \cdot 75.36 / 1020 \cdot 60 = 0.4$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$0.4 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 15 \text{ mm,}$$

$$y = 0.5 \left(D - \sqrt{D^2 - B^2} \right) = 0.5 \left(16 - \sqrt{16^2 - 10^2} \right) = 1.7 \text{ mm}$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 3 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = 0.07 \text{ daq}$$

17 D torets yuza H14 o'lchamda qora frezalansin.

Frezalash eni $B=60$ mm, uzunligi $l=80$ mm, qo'yim miqdori $h=0.8$ mm

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material

SCH 18, HB=200

Kesuvchi asbob torets freza D=60 mm, GOST 9473-80. Kesuvchi qismi materiali BK6, tishlar soni $z=10$ ta; Geometrik parametrlari: $\varphi=60^0, \varphi_1=5^0, \varphi_0=20^0, \lambda=+5^0$
 $\gamma=-5^0 \quad \alpha=12^0$

1. Kesish chuqurligi va frezalash enini aniqlaymiz.

2. $t=h=0.8\text{mm}$

2.Surish miqdori

$S_z=0.14-0.24 \text{ mm/ayl}$ ([3], 2.78-j, 86-b)

$S_z=0.2$ qabul qilamiz

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

T –frezani turg'unlik davri, $T=180 \text{ daq}$ ([3], 2.85-j, 93-b)

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$n_v=1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$K_{pv}=0.8$ ([3], 2.5-j, 37-b)

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$K_{uv} = 1$ ([3], 2.6-j, 37-b)

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$C_v=445, q=0.2, x=0.15, y=0.35, u=0.2, r=0, m=0.32$ ([3], 2.84-j, 90-b)

$$V = \frac{445 \cdot 60^{0.2}}{180^{0.32} \cdot 0.8^{0.15} \cdot 0.2^{0.35} \cdot 60^{0.2} \cdot 10^0} \cdot 0.76 = \frac{1009.23}{6.579} = 153.4 \text{ m/daq}$$

4.Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 153.4}{3.14 \cdot 100} = 488.5 \text{ min}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=445$ ayl/daq qabul qilamiz.

5.Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 100 \cdot 445}{1000} = 154.5 \text{ m/daq}$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.2 \cdot 445 \cdot 10 = 890 \text{ mm/daq}$$

Dastgoh pasportidan $S_M=285 \text{ mm/daq}$ qabul qilamiz.

$$U \text{ xolda } S_z = 285 / (445 \cdot 10) = 0.064$$

7.Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsenti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p=54.5, \quad x=0.9, y=0.74, \quad n=1, \quad q=1, \quad w=0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.8^{0.9} \cdot 0.064^{0.74} \cdot 60^1 \cdot 10}{60^1 \cdot 1360^0} \cdot 1.052 = \frac{34986.6}{60} \cdot 1.052 = 613.4 N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} = \frac{613.4 \cdot 154.5}{1020 \cdot 60} = 1.55 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt}.$$

$$1.55 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 80 \text{ mm}, \quad d = 60 \text{ mm}, \quad y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 0$$

$$\Delta = 1 \dots 5 \text{ mm}. \quad \Delta = 1 \text{ mm qabul qilamiz}.$$

$$T_{as} = \frac{L}{S_M} = \frac{80 + 1 + 1}{285} = 0.29 \text{ daq}$$

18 D torets yuza H14 o'lchamda toza frezalansin.

Frezalash eni $B=60\text{mm}$, uzunligi $l=65\text{mm}$, qo'yim miqdori $h=0.7\text{mm}$

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material

SCH 18, HB=200

Kesuvchi asbob torets freza $D=60 \text{ mm}$, GOST 9473-80. Kesuvchi qismi materiali

BK6, tishlar soni $z=10$ ta; Geometrik parametrlari: $\varphi=60^\circ, \varphi_1=5^\circ, \varphi_0=20^\circ, \lambda=+5^\circ$

$$\gamma = -5^\circ \quad \alpha = 12^\circ$$

1. Kesish chuqurligi va frezalash enini aniqlaymiz.

$$2. \quad t=h=0.8\text{mm}$$

2. Surish miqdori

$$S_z = 0.14 - 0.24 \text{ mm/ayl} \quad ([3], 2.78-j, 86-b)$$

$$S_z = 0.2 \text{ qabul qilamiz}$$

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

$$T - \text{frezani turg'unlik davri}, \quad T = 180 \text{ daq} \quad ([3], 2.85-j, 93-b)$$

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{pv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$n_v = 1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$K_{pv} = 0.8$ ([3], 2.5-j, 37-b)

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$K_{uv} = 1$ ([3], 2.6-j, 37-b)

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$C_v = 445$, $q = 0.2$, $x = 0.15$, $y = 0.35$, $u = 0.2$, $r = 0$, $m = 0.32$ ([3], 2.84-j, 90-b)

$$V = \frac{445 \cdot 60^{0.2}}{180^{0.32} \cdot 0.7^{0.15} \cdot 0.2^{0.35} \cdot 60^{0.2} \cdot 10^0} \cdot 0.76 = \frac{1009.23}{6.448} = 156.5 \text{ m/daq}$$

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 156.5}{3.14 \cdot 100} = 498.4 \text{ min}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n = 445$ ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 100 \cdot 445}{1000} = 154.5 \text{ m/daq}$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.2 \cdot 445 \cdot 10 = 890 \text{ mm/daq}$$

Dastgoh pasportidan $S_M = 285 \text{ mm/daq}$ qabul qilamiz.

$$U \text{ xolda } S_z = 285 / (445 \cdot 10) = 0.064$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$R_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n = 1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p = 54.5, \quad x = 0.9, \quad y = 0.74, \quad n = 1, \quad q = 1, \quad w = 0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.7^{0.9} \cdot 0.064^{0.74} \cdot 60^1 \cdot 10}{60^1 \cdot 1360^0} \cdot 1.052 = \frac{32636.4}{60} \cdot 1.052 = 543.94 \text{ N}$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} = \frac{543.94 \cdot 154.5}{1020 \cdot 60} = 1.37 \text{ kVt};$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \text{ kVt.}$$

$$1.37 \leq 2.8$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 80 \text{ mm, } d = 60 \text{ mm, } y = 0.5 \cdot (D - (D^2 - B^2)^{1/2}) = 0$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 1 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = \frac{80 + 1 + 1}{285} = 0.29 \text{ daq}$$

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G'2 va G'1 yuzani B=5.5 mm, uzunligi l=80 mm o'lchamda qora frezalansin. Qo'yim miqdori h=1.5 mm

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material C4 18, HB= 200

Kesuvchi asbob barmoq freza D=160 mm, GOST 1671-77. Kesuvchi qismi materiali BK6 tishlar soni z=20 ta;

5. Kesish chuqurligi va frezalash enini aniqlaymiz.

$$6. t = h = 1.5 \text{ mm}$$

2. Surish miqdori

$$S_z = 0.15 - 0.30 \text{ mm/ayl } ([3], 2.80-j, 88-b) \text{ (Disk freza uchun (2.79-j, 87-b))}$$

$$S_z = 0.20 \text{ qabul qilamiz}$$

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

$$T - \text{frezani turg'unlik davri, } T = 180 \text{ daq } ([3], 2.85-j, 93-b)$$

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{nv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} ([3], 2.1-j, 34-b)$$

$$n_v = 1 ([3], 2.2-j, 35-b)$$

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{nv} = 0.8 ([3], 2.5-j, 37-b)$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 ([3], 2.6-j, 37-b)$$

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$$C_v = 445, q = 0.2, x = 0.15, y = 0.35, u = 0.2, p = 0, m = 0.32 \quad ([3], 2.84-j, 90-b)$$

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D}$$

$$n = 1000 \cdot 445 / 3.14 \cdot 160 = 850 \text{ m/daq}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n = 815$ ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000}$$

$$V_{xaq} = 3.14 \cdot 160 \cdot 815 / 1000 = 409$$

6. Tishlar bo'yichasurish tezligi

$$S_M = S_z \cdot z \cdot n = 0.20 \cdot 20 \cdot 815 = 3260$$

Dastgoh pasportidan $S_M = 285$ mm/daq qabul qilamiz.

$$U \text{ xolda } S_z = \frac{S_M}{z \cdot n} = 0.017$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$P_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p = 54.5, x = 0.9, y = 0.74, n = 1, q = 1, w = 0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 1.5^{0.9} \cdot 0.017^{0.74} \cdot 5.5^1 \cdot 20}{5.5^1 \cdot 815^0} \cdot 1.052 = \frac{4234}{5.5} \cdot 1.052 = 809.9 N$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} \text{ kVt};$$

$$N_e = 809.9 \cdot 75.36 / 1020 \cdot 60 = 0.997$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d = 2.8 \cdot 0.85 = 2.38 \text{ kVt.}$$

$$1.99 \leq 2.38$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 80 \text{ mm,}$$

$$y = 0.5 \left(D - \sqrt{D^2 - B^2} \right) = 0.5 \left(16 - \sqrt{16^2 - 10^2} \right) = 1.7 \text{ mm}$$

$\Delta=1.....5$ mm. $\Delta=3$ mm qabul qilamiz.

$$T_{as} = \frac{L}{S_M} = 0.29 \text{ daq}$$

20 G'_2 va G'_1 yon yuzlarni $B=5.5$ mm, uzunligi $l=80$ mm o'lchamda toza frezalansin. Qo'yim miqdori $h=0.7$ mm

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material Ч 18, HB= 200

Kesuvchi asbob barmoq freza $D=160$ mm, GOST1671-77. Kesuvchi qismi materiali BK6 tishlar soni $z=20$ ta;

5. Kesish chuqurligi va frezalash enini aniqlaymiz.

6. $t=h=0.7$ mm

2. Surish miqdori

$S_z=0.15-0.30$ mm/ayl ([3], 2.80-j, 88-b) (Disk freza uchun (2.79-j, 87-b))

$S_z=0.20$ qabul qilamiz

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v;$$

T – frezani turg'unlik davri, $T=80$ daq ([3], 2.85-j, 93-b)

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{nv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$n_v=1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$K_{nv}=0.8$ ([3], 2.5-j, 37-b)

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$K_{uv} = 1$ ([3], 2.6-j, 37-b)

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$C_v=445$, $q=0.2$, $x=0.15$, $y=0.35$, $u=0.2$, $p=0$, $m=0.32$ ([3], 2.84-j, 90-b)

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D}$$

$$n = 1000 \cdot 445 / 3.14 \cdot 160 = 885 \text{ m/daq}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=815$ ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000}$$

$$V_{xaq} = 3.14 \cdot 160 \cdot 815 / 1000 = 409$$

6. Tishlar bo'yicha surishtezligi

$$S_M = S_z \cdot z \cdot n = 0.20 \cdot 20 \cdot 815 = 3260$$

Dastgohpasportidan $S_M = 285$ mm/daq qabul qilamiz.

$$\text{U xolda } S_z = \frac{S_M}{z \cdot n} = 71.25$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$P_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p = 54.5, \quad x = 0.9, \quad y = 0.74, \quad n = 1, \quad q = 1, \quad w = 0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 0.7^{0.9} \cdot 71.25^{0.74} \cdot 5.5^1 \cdot 20}{160^1 \cdot 815^0} \cdot 1.052 = \frac{1021970}{160} \cdot 1.052 = 6719.4 N$$

8. Kesishdagiquvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} \text{ kVt};$$

$$N_e = 6719.4 \cdot 75.36 / 1020 \cdot 60 = 0.82$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \cdot 0.85 = 2.38 \text{ kVt.}$$

$$0.82 \leq 2.38$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$T_{as} = \frac{L}{S_M}$$

$$L = l + y + \Delta$$

$$l = 80 \text{ mm,}$$

$$y = 0.5 \left(D - \sqrt{D^2 - B^2} \right) = 0.5 \left(16 - \sqrt{16^2 - 10^2} \right) = 1.7 \text{ mm}$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 3 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} = 0.29 \text{ daq}$$

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X va N pazlar eni $B = 2$ mm, uzunligi $l = 80$ mm o'lchamda qora frezalansin. Qo'yim miqdori $h = 1.3$ mm

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material CЧ 18, HB = 200

Kesuvchi asbob barmoq freza $D = 2$ mm, GOST 1671-77. Kesuvchi qismi materiali BK6 tishlar soni $z = 40$ ta;

1. Kesish chuqurligi va frezalash enini aniqlaymiz.

2. $t = h = 1.3$ mm

2. Surish miqdori

$$S_z = 0.02 - 0.12 \text{ mm/ayl} \quad ([3], 2.80-j, 88-b)$$

$$S_z = 0.1 \text{ qabul qilamiz}$$

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u Z^p} \cdot K_v; = 178$$

T – frezani turg'unlik davri, T=80 daq ([3], 2.85-j, 93-b)

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{nv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$n_v=1$ ([3], 2.2-j, 35-b)

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{nv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{nv}=0.8 \quad ([3], 2.5-j, 37-b)$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \quad ([3], 2.6-j, 37-b)$$

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz

$$C_v=445, q=0.2, x=0.15, y=0.35, u=0.2, p=0, m=0.32 \quad ([3], 2.84-j, 90-b)$$

4. Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} \quad n = 1000 \cdot 210 / 3.14 \cdot 2 = 33439$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=2400$ ayl/daq qabul qilamiz.

5. Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} \quad V_{xaq} = 3.14 \cdot 2 \cdot 2400 / 1000 = 15$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.1 \cdot 40 \cdot 2400 = 9600$$

Dastgohpasportidan $S_M=285$ mm/daq qabul qilamiz.

$$U \text{ xolda } S_z = \frac{S_M}{z \cdot n} = 285 / (40 \cdot 2400) = 0.003$$

7. Kesish jarayonida ta'sir etayotgan kuch:

$$P_z = \frac{10 C_p t^x s^y B^u Z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsienti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p=54.5, x=0.9, y=0.74, n=1, q=1, w=0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 1.3^{0.9} \cdot 0.003^{0.74} \cdot 2^1 \cdot 40}{2^1 \cdot 2400^0} \cdot 1.052 = 394.5 \text{ N}$$

8. Kesishdagi quvvat :

$$N_e = \frac{P_z \cdot v}{1020 \cdot 60} \text{ kVt}; N_e = 394.5 \cdot 15 / 1020 \cdot 60 = 0.097$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \cdot 0.85 = 2.38 \text{ kVt.}$$

$$0.1 \leq 2.38$$

Demak ishlov berish mumkin.

9. Asosiy vaqt:

$$L = l + y + \Delta$$

$$l = 80 \text{ mm,}$$

$$y = 0.5 \left(D - \sqrt{D^2 - B^2} \right) = 0.5 \left(2 - \sqrt{2^2 - 1.6^2} \right) = 1.2 \text{ mm}$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 1.2 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} \text{ daq} = 82.4 / 285 = 0.3$$

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X va N pazlar eni $B = 2 \text{ mm}$, uzunligi $l = 80 \text{ mm}$ o'lchamda tora frezalansin. Qo'yim miqdori $h = 0.7 \text{ mm}$

Dastgoh 679 universal frezalash dastgohi. Ishlov berilayotgan material CЧ 18, HB = 200

Kesuvchi asbob barmoq freza $D = 2 \text{ mm}$, GOST 1671-77. Kesuvchi qismi materiali BK6 tishlar soni $z = 40$ ta;

1. Kesish chuqurligi va frezalash enini aniqlaymiz.

$$2. \quad t = h = 1.3 \text{ mm}$$

2. Surish miqdori

$$S_z = 0.02 - 0.12 \text{ mm/ayl} \quad ([3], 2.80\text{-j, } 88\text{-b})$$

$$S_z = 0.1 \text{ qabul qilamiz}$$

3. Kesishdagi asosiy harakat tezligini aniqlaymiz (m/daq)

$$v = \frac{C_v D^q}{T^m t^x \cdot S_z^y B^u z^p} \cdot K_v; = 196.14$$

$$T \text{ - frezani turg'unlik davri, } T = 80 \text{ daq} \quad ([3], 2.85\text{-j, } 93\text{-b})$$

K_v - To'g'rilash koeffitsienti

$$K_v = K_{mv} \cdot K_{nv} \cdot K_{uv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{HB} \right)^{n_v} \quad ([3], 2.1\text{-j, } 34\text{-b})$$

$$n_v = 1 \quad ([3], 2.2\text{-j, } 35\text{-b})$$

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{pv} - Ishlov berilayotgan yuza xolatini xisobga oluvchi koeffitsient;

$$K_{nv} = 0.8 \quad ([3], 2.5\text{-j, } 37\text{-b})$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \quad ([3], 2.6\text{-j, } 37\text{-b})$$

$$K_v = 0.95 \cdot 0.8 \cdot 1 = 0.76$$

Formuladagi koeffitsentlar va daraja ko'rsatkichlarini yozib olamiz
 $C_v=445$, $q=0.2$, $x=0.15$, $y=0.35$, $u=0.2$, $p=0$, $m=0.32$ ([3], 2.84-j, 90-b)

4.Shpindel aylanishlar chastotasini aniqlaymiz.

$$n = \frac{1000V}{\pi D} \quad n = 1000 \cdot 210 / 3.14 \cdot 2 = 33439$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib $n=2400$ ayl/daq qabul qilamiz.

5.Kesish jarayonida asosiy harakatning xaqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} \quad V_{xaq} = 3.14 \cdot 2 \cdot 2400 / 1000 = 15$$

6. Tishlar bo'yicha surish tezligi

$$S_M = S_z \cdot z \cdot n = 0.1 \cdot 40 \cdot 2400 = 9600$$

Dastgohpasportidan $S_M=285$ mm/daq qabul qilamiz.

$$U \text{ xolda } S_z = \frac{S_M}{z \cdot n} = 285 / (40 \cdot 2400) = 0.003$$

7.Kesish jarayonida ta'sir etayotgan kuch:

$$P_z = \frac{10 C_p t^x s^y B^u z}{D^q n^w} K_{mp};$$

K_{mp} - to'g'rilash koeffitsenti:

$$K_{mp} = \left(\frac{HB}{190} \right)^n \quad n=1 \quad ([3], 2.9-j, 38-b)$$

$$K_{mp} = \left(\frac{200}{190} \right)^1 = 1.052$$

$$C_p=54.5, \quad x=0.9, \quad y=0.74, \quad n=1, \quad q=1, \quad w=0 \quad ([3], 2.86-j, 94-b)$$

$$P_z = \frac{10 \cdot 54.5 \cdot 1.3^{0.9} \cdot 0.003^{0.74} \cdot 2^1 \cdot 40}{2^1 \cdot 2400^0} \cdot 1.052 = 394.5 N$$

8. Kesishdagiquvvat :

$$N_e = \frac{P_z v}{1020 \cdot 60} \text{ kVt}; \quad N_e = 394.5 \cdot 15 / 1020 \cdot 60 = 0.097$$

Dastgoh quvvati bo'yicha solishtiramiz

$$N_{shp} = N_d \cdot \mu = 2.8 \cdot 0.85 = 2.38 \text{ kVt.}$$

$$0.1 \leq 2.38$$

Demak ishlov berish mumkin.

9.Asosiy vaqt:

$$L = l + y + \Delta$$

$$l = 80 \text{ mm,}$$

$$y = 0.5 \left(D - \sqrt{D^2 - B^2} \right) = 0.5 \left(2 - \sqrt{2^2 - 1.6^2} \right) = 1.2 \text{ mm}$$

$$\Delta = 1 \dots 5 \text{ mm. } \Delta = 1.2 \text{ mm qabul qilamiz.}$$

$$T_{as} = \frac{L}{S_M} \text{ daq} = 82.4 / 285 = 0.3$$

P teshik Ø6.8 mm l=20 mm o'lchamda parmalansin .Zagotovka materiali SCH 18 bo'lib, uning qattiqligi,HV=200 MPa ga teng. Kesuvchi asbob va uning geometrik parametrlari: Spiral parma D=6.8 mm, kesuvchi qism materiali, tezkesar po'lat VK6. Geometrik o'lchamlari

$$2\varphi = 118^0; 2\varphi_0 = 70^0; \psi = 30^0; \alpha = 11^0 \text{ ([9] 203 bet, 44 jad)}$$

1. Kesish chuqurligini belgilaymiz.

$$t=20 \text{ mm.}$$

2. Surish qiymatini aniqlaymiz.

$$S_0=0.20-0.25 \text{ mm/ayl. ([3], 2.38-j, 62-b)}$$

Dastgoh pasporti bo'yicha korektirovkalab $S_0=0.2 \text{ mm/ayl}$ ni qabul qilamiz.

3. Parmani turg'unlik davrini aniqlaymiz.

$$T = 25 \text{ daqiqa qabul qilamiz. ([3],2.43-j, 66-b)}$$

4. Kesishda asosiy harakatni tezligini aniqlaymiz.

$$v = \frac{C_v \cdot D^q}{T^m \cdot S^y} \cdot K_v \text{ m/daq}$$

Formuladagi koeffitsentlar va daraja ko'rsatkichlarni yozib olamiz.

$$C_v=34.2, q=0.45, y=0.30, m=0.20 \text{ ([3], 2.41-j, 64-b)}$$

To'g'rilash koeffitsentini topamiz.

$$K_v = K_{mv} \cdot K_{uv} \cdot K_{lv}$$

K_{mv} - ishlovberilayotgan materialni xisobga oluvchi koeffitsent;

$$K_{mv} = \left(\frac{190}{NV} \right)^{n_v} \text{ ([3], 2.1-j, 34-b)}$$

$$K_l=0.8 \text{ ([3], 2.2-j, 35-b)}$$

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \text{ ([3], 2.6-j, 37-b)}$$

K_{lv} - Teshik uzunligini xisobga oluvchi koeffitsient

$$K_{lv}=1 \text{ ([3], 2.44-j, 67-b)}$$

$$K_v=0.95 \cdot 0.83 \cdot 1=0.78$$

$$V = \frac{34.2 \cdot 6.8}{25^{0.2} \cdot 0.2^{0.3}} \cdot 0.78 = \frac{81}{1.17} \cdot 0.78 = 74 \text{ m / daq}$$

5.Shpindelni aylanishlar chastotasini hisoblaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 74}{3.14 \cdot 6.8} = 3465 \text{ daq}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib xaqiqiy aylanishlar chastotasi $n=2400 \text{ ayl/daq}$ qabul qilamiz.

6.Kesish jarayonida asosiy harakatning haqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 6.8 \cdot 2400}{1000} = 51.3 \text{ m / daq}$$

7.Burovchi momentni aniqlaymiz:

$$M_{kp} = 10 \cdot C_m \cdot D^q \cdot S^y \cdot K_p;$$

Burovchi moment uchun:

$$C_m=0.021; q=2; y=0.8; \text{ ([3], 2.45-j, 67-b)}$$

$$K_{mv} = \left(\frac{190}{NV} \right)^{n_v} \text{ ([3], 2.1-j, 34-b)}$$

$$K_{mp} = 0.95$$

U xolda:

$$M_{kp} = 10 \cdot 0.021 \cdot 6.8^{2.0} \cdot 0.2^{0.8} \cdot 0.95 = 2.54 \text{ N}\cdot\text{m}$$

8. O'q bo'yicha kuchni hisoblaymiz:

$$P_0 = 10 \cdot C_p \cdot D^q \cdot S^y \cdot K_p;$$

$$C_p = 42.7; q=1.0; y=0.8; \quad ([3], 2.45-j, 67-b)$$

U xolda :

$$P_0 = 10 \cdot 42.7 \cdot 6.8^{1.0} \cdot 0.2^{0.8} \cdot 0.95 = 761.2 \text{ N}$$

9. Kesishdagi quvvat :

$$N_e = \frac{M_{kp} n}{9750} = \frac{2.54 \cdot 2400}{9750} = 0.625 \text{ kvt};$$

10. Asosiy vaqt:

$$T_{as} = 2 \cdot \frac{L}{n \cdot s} = 2 \cdot 0.083 \cdot 2 = 0.17 \text{ daq}$$

Bu yerda :

$$L = y + \Delta + l = 20 + 1 + 1 = 22 \text{ mm};$$

bu yerda: $y=1 \text{ mm}$, parmani botishi

$\Delta=1 \text{ mm}$, parmani chiqishi, $l=20 \text{ mm}$, teshik uzunligi.

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2ta P teshik $\varnothing 6.8 \text{ mm}$ $l=20 \text{ mm}$ o'lchamda zenkerlansin . Zagotovka materiali SCH 18 bo'lib, uning qattiqligi, $HV=200 \text{ MPa}$ ga teng. Kesuvchi asbob va uning geometrik parametrlari: Spiral parma $D=6.8 \text{ mm}$, kesuvchi qism materiali, tezkesar po'lat VK6.

1. Kesish chuqurligini belgilash.

$$t = \frac{D-d}{2} \text{ mm.}$$

2. Surish qiymatini aniqlash.

$$S_0 = 0.7-0.9 \text{ mm/ayl.} \quad ([3], 2.39-j, 63-b) \text{ (Razvyortkalash uchun ([3], 2.40-j, 63-b))}$$

Dastgoh pasporti bo'yicha korektirovkalab $S_0=0.8 \text{ mm/ayl}$ ni qabul qilamiz.

3. Zenkerni turg'unlik davrini aniqlash.

4. Kesishda asosiy harakatni tezligini aniqlash.

$$v = \frac{C_v \cdot D^q}{T^m \cdot t^x \cdot S^y} \cdot K_v \quad \text{m/daq} = 226/1.08 = 163.2$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz.

$$C_v = 16.3, q=0.30, x=0.2; y=0.50, m=0.30 \quad ([3], 2.42-j, 65-b)$$

1. To'g'rilash koeffitsientini topish.

$$K_v = K_{mv} \cdot K_{uv} \cdot K_{lv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{NV} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$$K_l = 0.8 \quad ([3], 2.2-j, 35-b)$$

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \text{ ([3], 2.6-j, 37-b)}$$

K_{lv} - Teshik uzunligini xisobga oluvchi koeffitsient

$$K_{lv}=1 \text{ ([3], 2.44-j, 67-b)}$$

$$K_v=0.95 \cdot 0.83 \cdot 1=0.78$$

5.Shpindelni aylanishlar chastotasini hisoblaymiz.

$$n = \frac{1000V}{\pi D} = 7644$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib xaqiqiy aylanishlar chastotasi $n=2400$ ayl/daq qabul qilamiz.

6.Kesish jarayonida asosiy harakatning haqiqiy tezligi:

$$V_{xak} = \frac{\pi D n}{1000} = 51.244$$

7.Burovchi momentni aniqlaymiz:

$$M_{kp} = 10 \cdot C_m \cdot D^q \cdot S^y \cdot K_p; \text{ zenkerlash uchun}$$

$$\text{Burovchi moment uchun: } M=10 \cdot 6.8^1 \cdot 0.8^{0.4} \cdot 1.03=64$$

$$C_m=64; q=1; y=0.4; \text{ ([3], 2.45-j, 67-b)}$$

$$K_p=K_{mp}$$

$$K_{mp} = \left(\frac{NV}{190} \right)^n \quad n=0.6 \text{ ([3], 2.9-j, 38-b)}$$

$$K_{mp} = \left(\frac{200}{190} \right)^{0.6} = 1.03$$

8. O'q bo'yicha kuchni hisoblash

$$P_0 = 10 \cdot C_p \cdot D^q \cdot S^y \cdot K_p;$$

$$C_p=0.196; q=0.85; y=0.7; \text{ ([3], 2.45-j, 67-b)}$$

9.Kesishdagiquvvat :

$$N_e = \frac{M_{kp} n}{9750} \text{ kvtt; } 64 \cdot 2400 / 9750 = 15.7$$

10.Asosiyvaqt:

$$T_{as} = \frac{L \cdot i}{n \cdot s} = 0.17 \text{ daq}$$

Bu yerda :

$$L = y + \Delta + l = 20 + 1 + 1 = 22 \text{ mm;}$$

bu yerda: $y=1$ mm, zenkerni botishi

$\Delta=1$ mm, zenkerni chiqishi

$l=20$ mm, teshik uzunligi.

P teshik Ø28 mm l=80 mm o'lchamda razvyotkalansin. Kesuvchi asbob: razvyo'tka D=28 mm, Zagotovka materiali SCH 18 bo'lib, uning qattiqligi, HV=200 MPa ga teng.

2. Kesish chuqurligini belgilash.

$$t = \frac{D-d}{2} \text{ mm.}$$

2. Surish qiymatini aniqlash.

(Razvyortkalash uchun ([3], 2.40-j, 63-b))

Dastgoh pasporti bo'yicha korektirovkalab $S_0=3.1$ mm/ayl ni qabul qilamiz.

3. Zenkerni turg'unlik davrini aniqlash.

$T=75$ daqiqa qabul qilamiz. ([3], 2.43-j, 66-b)

4. Kesishda asosiy harakatni tezligini aniqlash.

$$v = \frac{C_v \cdot D^q}{T^m \cdot t^x \cdot S^y} \cdot K_v = 13.5 \text{ m/daq}$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarini yozib olamiz.

$C_v=109$, $q=0.20$, $x=0$; $y=0.50$, $m=0.45$ ([3], 2.42-j, 65-b)

To'g'rilash koeffitsientini topish.

$$K_v = K_{mv} \cdot K_{uv} \cdot K_{lv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{NV} \right)^{n_v} \quad ([3], 2.1-j, 34-b)$$

$$K_l = 0.8 \quad ([3], 2.2-j, 35-b)$$

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \quad ([3], 2.6-j, 37-b)$$

K_{lv} - Teshik uzunligini xisobga oluvchi koeffitsient

$$K_{lv} = 1 \quad ([3], 2.44-j, 67-b)$$

$$K_v = 0.95 \cdot 0.83 \cdot 1 = 0.78$$

5. Shpindelni aylanishlar chastotasini hisoblaymiz.

$$n = \frac{1000V}{\pi D} = 153.3$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib xaqiqiy aylanishlar chastotasi $n=150$ ayl/daq qabul qilamiz.

6. Kesish jarayonida asosiy harakatning haqiqiy tezligi:

$$V_{xak} = \frac{\pi D n}{1000} = 13.188$$

7. Burovchi momentni aniqlaymiz:

$$M_{kp} = \frac{C_p t^x S_z^y D z}{2 \cdot 100};$$

razvyortkalash uchun: 0.06

Burovchi moment uchun:

S-razvyortkalash uchun surish miqdori; z-razvyortka tishlar soni.

$$C_m=0.196; q=0.85; y=0.8; x=0.75 \text{ ([3], 2.45-j, 67-b)}$$

$$K_p=K_{mp}$$

$$K_{mp} = \left(\frac{NV}{190} \right)^n n=0.6 \text{ ([3], 2.9-j, 38-b)}$$

$$K_{mp} = \left(\frac{200}{190} \right)^{0.6} = 1.03$$

8. O'q bo'yicha kuchni hisoblash

$$P_0 = 10 \cdot C_p \cdot D^q \cdot S^y \cdot K_p ; = 745$$

$$C_p = 46; y=0.4; \text{ ([3], 2.45-j, 67-b)}$$

9. Kesishdagi quvvat :

$$N_e = \frac{M_{kp} n}{9750} = 0.06 \cdot 153.3 / 9750 = 0.001 \text{ kvT};$$

10. Asosiy vaqt:

$$T_{as} = \frac{L \cdot i}{n \cdot s} 0.34 \text{ daq}$$

Bu yerda :

$$L = y + \Delta + l = 80 + 0.6 + 0.6 = 81.2 \text{ mm};$$

bu yerda: $y=0.6 \text{ mm}$, razvyo'tkani botishi

$\Delta=0.6 \text{ mm}$, razvyo'tkani chiqishi

$l=80 \text{ mm}$, teshik uzunligi.

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2 ta O teshik $\varnothing 6.8 \text{ mm}$ $l=20 \text{ mm}$ o'lchamda parmalansin .Zagotovka materiali SCH 18 bo'lib, uning qattiqligi, $HV=200 \text{ MPa}$ ga teng. Kesuvchi asbob va uning geometrik parametrlari: Spiral parma $D=6.8 \text{ mm}$, kesuvchi qism materiali, tezkesar po'lat VK6. Geometrik o'lchamlari

$$2\varphi = 118^\circ; 2\varphi_0 = 70^\circ; \psi = 30^\circ; \alpha = 11^\circ \text{ ([9] 203 bet, 44 jad)}$$

1. Kesish chuqurligini belgilaymiz.

$$t=20 \text{ mm.}$$

2. Surish qiymatini aniqlaymiz.

$$S_0=0.20-0.25 \text{ mm/ayl. ([3], 2.38-j, 62-b)}$$

Dastgoh pasporti bo'yicha korektirovkalab $S_0=0.2 \text{ mm/ayl}$ ni qabul qilamiz.

3. Parmani turg'unlik davrini aniqlaymiz.

$$T = 25 \text{ daqiqa qabul qilamiz. ([3], 2.43-j, 66-b)}$$

4. Kesishda asosiy harakatni tezligini aniqlaymiz.

$$v = \frac{C_v \cdot D^q}{T^m \cdot S^y} \cdot K_v \text{ m/daq}$$

Formuladagi koeffitsentlar va daraja ko'rsatkichlarni yozib olamiz.

$$C_v=34.2, q=0.45, y=0.30, m=0.20 \text{ ([3], 2.41-j, 64-b)}$$

To'g'rilash koeffitsentini topamiz.

$$K_v = K_{mv} \cdot K_{uv} \cdot K_{lv}$$

K_{mv} - ishlov berilayotgan materialni xisobga oluvchi koeffitsent;

$$K_{mv} = \left(\frac{190}{NV} \right)^{n_v} \text{ ([3], 2.1-j, 34-b)}$$

$$K_f=0.8 \text{ ([3], 2.2-j, 35-b)}$$

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \text{ ([3], 2.6-j, 37-b)}$$

K_{lv} - Teshik uzunligini xisobga oluvchi koeffitsient

$$K_{lv}=1 \text{ ([3], 2.44-j, 67-b)}$$

$$K_v=0.95 \cdot 0.83 \cdot 1=0.78$$

$$V = \frac{34.2 \cdot 6.8}{25^{0.2} \cdot 0.2^{0.3}} \cdot 0.78 = \frac{81}{1.17} \cdot 0.78 = 74 \text{ m / daq}$$

5.Shpindelni aylanishlar chastotasini hisoblaymiz.

$$n = \frac{1000V}{\pi D} = \frac{1000 \cdot 74}{3.14 \cdot 6.8} = 3465 \text{ daq}^{-1}$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib xaqiqiy aylanishlar chastotasi $n=2400$ ayl/daq qabul qilamiz.

6.Kesish jarayonida asosiy harakatning haqiqiy tezligi:

$$V_{xaq} = \frac{\pi D n}{1000} = \frac{3.14 \cdot 6.8 \cdot 2400}{1000} = 51.3 \text{ m / daq}$$

7.Burovchi momentni aniqlaymiz:

$$M_{kp} = 10 \cdot C_m \cdot D^q \cdot S^y \cdot K_p;$$

Burovchi moment uchun:

$$C_m=0.021; q=2; y=0.8; \text{ ([3], 2.45-j, 67-b)}$$

$$K_{mv} = \left(\frac{190}{NV} \right)^{n_v} \text{ ([3], 2.1-j, 34-b)}$$

$$K_{mp} = 0.95$$

U xolda:

$$M_{kp}=10 \cdot 0.021 \cdot 6.8^{2.0} \cdot 0.2^{0.8} \cdot 0.95 = 2.54 \text{ N} \cdot \text{m}$$

8. O'q bo'yicha kuchni hisoblaymiz:

$$P_0 = 10 \cdot C_p \cdot D^q \cdot S^y \cdot K_p;$$

$$C_p=42.7; q=1.0; y=0.8; \text{ ([3], 2.45-j, 67-b)}$$

U xolda :

$$P_0=10 \cdot 42.7 \cdot 6.8^{1.0} \cdot 0.2^{0.8} \cdot 0.95=761.2 \text{ N}$$

9.Kesishdagiquvvat :

$$N_e = \frac{M_{kp} n}{9750} = \frac{2.54 \cdot 2400}{9750} = 0.625 \text{ kv}$$

10.Asosiyvaqt:

$$T_{as}=2 \cdot \frac{L}{n \cdot s} = 0.17 \text{ daq}$$

Bu yerda :

$$L = y + \Delta + l = 15 + 1 + 1 = 17 \text{ mm};$$

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O teshikda M 8 rezba $l=15$ mm o'lchamda ochilsin . Zagotovka materiali SCH

18 bo'lib, uning qattiqligi, $HV=200$ MPa ga teng. Kesuvchi asbob va uning geometrik

parametrlari: Spiral parma $D=6.8$ mm, kesuvchi qism materiali, tezkisar po'lat VK6

Geometrik o'lchamlari :

$$\gamma=8^\circ, \lambda=0^\circ, \varphi=20^\circ$$

1. Kesish chuqurligini belgilaymiz.

$$t=1.2 \text{ mm.}$$

2. Surish qiymatini aniqlaymiz.

$$S_o=0.05-0.06 \text{ mm/ayl. (dastgoh pasportidan)}$$

3. Metchikni turg'unlik davrini aniqlaymiz.

$$T=70 \text{ daqiqa qabul qilamiz. ([3], 2.109-j, 108-b)}$$

4. Kesishda asosiy harakatni tezligini aniqlaymiz.

$$v = \frac{C_v \cdot D^q}{T^m \cdot S^y} \cdot K_v \quad 191.2 \text{ m/daq}$$

Formuladagi koeffitsientlar va daraja ko'rsatkichlarni yozib olamiz.

$$C_v=83, y=0, m=0.33 \text{ ([3], 2.109-j, 108-b)}$$

To'g'rilash koeffitsientini topami

$$K_v = K_{mv} \cdot K_{uv} \cdot K_{lv}$$

K_{mv} - ishlovberilayotgan materialni xisobga oluvchi koeffitsient;

$$K_{mv} = \left(\frac{190}{NV} \right)^{n_v} \text{ ([3], 2.1-j, 34-b)}$$

$$K_l=0.8 \text{ ([3], 2.2-j, 35-b)}$$

$$K_{mv} = \left(\frac{190}{200} \right)^1 = 0.95$$

K_{uv} - Kesuvchi asbob kesuvchi qismi materialini xisobga oluvchi koeffitsient;

$$K_{uv} = 1 \text{ ([3], 2.6-j, 37-b)}$$

K_{lv} - Teshik uzunligini xisobga oluvchi koeffitsient

$$K_{lv}=1 \text{ ([3], 2.44-j, 67-b)}$$

$$K_v=0.95 \cdot 0.83 \cdot 1=0.78$$

5. Shpindelni aylanishlar chastotasini hisoblaymiz.

$$n = \frac{1000V}{\pi D} = 7600$$

Dastgoh pasporti bo'yicha aylanishlar chastotasini korektirovka qilib xaqiqiy aylanishlar chastotasi $n=2400$ ayl/daq qabul qilamiz.

6. Kesish jarayonida asosiy harakatning haqiqiy tezligi:

$$V_{xak} = \frac{\pi D n}{1000} \quad 60.288 \text{ m/daq}$$

7. Burovchi momentni aniqlaymiz:

$$M_{kp} = 10 \cdot C_m \cdot D^q \cdot P^y \cdot K_p ; = 2.46$$

Burovchi moment uchun:

$$C_m = 0.0130; q = 1.4; y = 1.5; \quad ([3], 2.111-j, 112-b)$$

$$K_p = ([3], 2.110-j, 111-b)$$

8. Kesishdagi quvvat :

$$N_e = \frac{M_{kp} n}{9750} = 0.6 \quad \text{kvt};$$

9. Asosiy vaqt:

$$T_{as} = \frac{l + l_1}{n \cdot P} + \frac{l + l_1}{P \cdot n_1} = 0.012$$

Bu yerda :

$$l_1 = 4 \cdot P + 2 \cdot P$$

$$n_1 = 1,25 \cdot n = 3000$$

Oper.	O'tish	t, mm	s, mm/ayl	n, ayl/daq	V, m/daq	T _a , daq	T _a , daq
005	1	0,98	0,2	380.5	139.5	0,31	
005	2	0.58	0,2	1360	386	0,31	
005	3	0.8	0,2	516	139	0.33	
005	4	0,7	0,2	400	139	0.33	
005	5	1.5	0,2	445	139.7	0,33	
005	6	0.7	0,2	444.9	139.7	0,33	
005	7	1,2	0,2	1023.9	386.2	0,24	
005	8	0.7	0,2	1308	154.5	0,24	
005	9	1.2	0,2	1023.9	386.2	0,24	
005	10	0.7	0,2	1308.9	154.5	0,24	
010	1	0.8	0,2	388	154.5	0.37	
010	2	0,7	0,2	380	154.5	0,37	
010	3	1.2	0,05	14.2	75.4	0,07	

010	4	0.7	0,05	14.2	75.4	-	
010	5	1.2	0.05	14.2	75.4	-	
010	6	0.7	0.05	14.2	75.4	-	
010	7	0.8	0.2	488.5	154.5	0.29	
010	8	0.7	0.2	488.5	154.5	-	
010	9	1.5	0.2	850	409	-	
010	10	0.7	0.2	885	409	-	
015	1	1.5	0.1	334.4	51.3	0.17	
015	2	0.7	0.1	334.4	51.3	0.17	
020	1	1.627	0.8	3465	51.3	0.3	
020	2	0.628	0.8	7644	51.3	0.3	
020	3	0.528	0.8	153.3	13.2	0.34	
020	4	3.35	0.2	3465	51.3	0.17	
020	5	1.2	0.05	7600	60.3	0.012	

2.6. Vaqt me'yorini xisobi

005-Frezalash operatsiyasi uchun donaviy vaqt me'yorini hisoblaymiz. Texnik vaqtni me'yorlash seriyali va yalpi ishlab chiqarish sharoitlarida hisobiy analitik usul yordamida topiladi. Bizning holatga ko'ra ishlab chiqarish - o'rta seriyali. Partiyadagi detallar soni - 3200 dona. Detal og'irligi 2.8 kg.

Donaviy kalkulyasion vaqt $T_{d.k.}$ o'rta seriyali ishlab chiqarish sharoitida quyidagi formula yordamida aniqlanadi:

$$T_{d.k.} = \frac{T_t}{n} + T_d = T_0 + T_{yo} + T_{xiz} + T_d,$$

bu erda, T_t - ishlab chiqarishga tayyorlash vaqti, daq; n - partiyadagi detallar soni, dona; T_a - asosiy vaqt,

$$\begin{aligned} \sum T_0 &= T_{0_1} + T_{0_2} + T_{0_3} + T_{0_4} + T_{0_5} + T_{0_6} + T_{0_7} + T_{0_8} + T_{0_9} + T_{0_{10}} \\ &= 0,37 + 0,37 + 0,07 + 0,07 + 0,07 + 0,07 + 0,29 + 0,29 \\ &\quad + 0,29 + 0,29 + 0,3 + 0,3 = 2,78 \end{aligned}$$

T_{yo} - yordamchi vaqt,

$$T_{yo} = T_{o'.b.} + T_{q.e.} + T_b + T_{o'},$$

T_{yo} - zagotovkani o'rnatish va bo'shatish uchun sarflanadigan vaqt; $T_{q.e.}$ - zavgotovkani qotirish va echishga ketadigan vaqt; T_b - dastgohni boshqarish uchun vaqt; $T_{o'}$ - detalni o'lchash uchun sarflanadigan vaqt; T_x - ishchi o'ringa xizmat ko'rsatiladigan vaqt; T_d - dam olish uchun beriladigan tanaffuslar.

Ushbu frezalash operatsiyasi uchun yordamchi vaqtni topamiz

$T_{o'.b.} + T_{q.e.} = 0,1$ daq [1. 199-bet]; $T_b = 1.4$ [1. 5.21-jad] daq; $T_{o'} = 0,17$ [1. 6.1-jad] daq.

$$T_{yo} = 0.1 + 1.4 + 0,17 = 1.67 \text{ daq.}$$

Qo'shimcha vaqtni to'g'rilash koeffitsienti o'rta seriyali ishlab chiqarish sharoitida $k=6$ teng [1. 5.21-jad.]. U holda operativ vaqt asosiy va yordamchi vaqtlar yig'indisidan iborat

$$T_{op} = T_a + k \cdot T_{yor} = 2.78 + \frac{6 \cdot 3.08}{100} = 2.965 \text{ daq.}$$

Seriyali ishlab chiqarish sharoitida ishchi o'ringa xizmat ko'rsatish va dam olishga sarflanadigan umumiy vaqt quyidagicha olinadi

$$T_{xiz.dam.} = \frac{T_{op} \cdot P_{xiz.dam.}}{100} = \frac{2.97 \cdot 0.17}{100} = 1.8 \text{ daq.}$$

$$T_{d.k.} = T_{oper} + T_{x.d.} + \frac{T_t}{n} = 2.97 + 1.8 + \frac{18}{3200} = 4.78 \text{ daq.}$$

010-Gorizontal frezalash operatsiyasi uchun donaviy vaqt me'yorini hisoblaymiz.

Donaviy kalkulyasion vaqt $T_{d.k.}$

$$T_{d.k.} = \frac{T_t}{n} + T_d. = T_0 + T_{yo} + T_{xiz} + T_d,$$

bu erda,

$$\sum T_0 = T_{0_1} + T_{0_2} + T_{0_3} + T_{0_4} + \dots + T_{0_{10}} = 2.18$$

T_{yo} - yordamchi vaqt,

$$T_{yo} = T_{o'.b.} + T_{q.e.} + T_b + T_{o'},$$

T_{yo} - zagotovkani o'rnatish va bo'shatish uchun sarflanadigan vaqt; $T_{q.e.}$ - zavgotovkani qotirish va echishga ketadigan vaqt; T_b - dastgohni boshqarish uchun

vaqt; T_o' - detalni o'lchash uchun sarflanadigan vaqt; T_x - ishchi o'ringa xizmat ko'rsatiladigan vaqt; T_d - dam olish uchun beriladigan tanaffuslar.

Ushbu frezalash operatsiyasi uchun yordamchi vaqtni topamiz

$T_{o'.b.} + T_{q.e.} = 0,1$ daq [1. 199-bet]; $T_b = 1,4$ [1. 5.21-jad] daq; $T_o' = 0,17$ [1. 6.1-jad] daq.

$$T_{yo} = 0,1 + 1,4 + 0,17 = 1,67 \text{ daq.}$$

Qo'shimcha vaqtni to'g'rilash koeffitsienti o'rta seriyali ishlab chiqarish sharoitida $k=6$ teng [1. 5.21-jad.]. U holda operativ vaqt asosiy va yordamchi vaqtlar yig'indisidan iborat

$$T_{op} = T_a + k \cdot T_{yor} = 2,18 + \frac{6 \cdot 1,67}{100} = 2,28 \text{ daq.}$$

Seriyali ishlab chiqarish sharoitida ishchi o'ringa xizmat ko'rsatish va dam olishga sarflanadigan umumiy vaqt quyidagicha olinadi

$$T_{xiz.dam.} = \frac{T_{op} \cdot P_{xiz.dam.}}{100} = \frac{2,28 \cdot 0,17}{100} = 0,004 \text{ daq.}$$

$$T_{d.k.} = T_{oper} + T_{x.d.} + \frac{T_t}{n} = 2,37 + 0,004 + \frac{18}{3200} = 2,38 \text{ daq.}$$

015-Vertikal frezalash operatsiyasi uchun donaviy vaqt me'yorini hisoblaymiz.

Donaviy kalkulyasion vaqt $T_{d.k.}$

$$T_{d.k.} = \frac{T_t}{n} + T_{d.} = T_0 + T_{yo} + T_{xiz} + T_d,$$

bu erda,

$$\sum T_0 = T_{0_1} + T_{0_2} + T_{0_3} + T_{0_4} = 0,68$$

T_{yo} - yordamchi vaqt,

$$T_{yo} = T_{o'.b.} + T_{q.e.} + T_b + T_{o'},$$

T_{yo} - zagotovkani o'rnatish va bo'shatish uchun sarflanadigan vaqt; $T_{q.e.}$ - zavgotovkani qotirish va echishga ketadigan vaqt; T_b - dastgohni boshqarish uchun

vaqt; T_o' - detalni o'lchash uchun sarflanadigan vaqt; T_x - ishchi o'ringa xizmat ko'rsatiladigan vaqt; T_d - dam olish uchun beriladigan tanaffuslar.

Ushbu frezalash operatsiyasi uchun yordamchi vaqtni topamiz

$T_o'.b. + T_q.e. = 0,1$ daq [1. 199-bet]; $T_b = 1,4$ [1. 5.21-jad] daq; $T_o' = 0,17$ [1. 6.1-jad] daq.

$$T_{yo} = 0,1 + 0,04 + 0,17 = 0,3 \text{ daq.}$$

Qo'shimcha vaqtni to'g'rilash koeffitsienti o'rta seriyali ishlab chiqarish sharoitida $k=6$ teng [1. 5.21-jad.]. U holda operativ vaqt asosiy va yordamchi vaqtlar yig'indisidan iborat

$$T_{op} = T_a + k \cdot T_{yor} = 0,68 + \frac{6 \cdot 0,3}{100} = 0,7 \text{ daq.}$$

Seriyali ishlab chiqarish sharoitida ishchi o'ringa xizmat ko'rsatish va dam olishga sarflanadigan umumiy vaqt quyidagicha olinadi

$$T_{xiz.dam.} = \frac{T_{op} \cdot P_{xiz.dam.}}{100} = \frac{0,7 \cdot 1,4}{100} = 0,01 \text{ daq.}$$

$$T_{d.k.} = T_{oper} + T_{x.d.} + \frac{T_t}{n} = 0,68 + 0,01 + \frac{18}{3200} = 0,7 \text{ daq.}$$

020-parmalash operatsiyasi uchun donaviy vaqt me'yorini hisoblaymiz.

Donaviy kalkulyasion vaqt $T_{d.k.}$

$$T_{d.k.} = \frac{T_t}{n} + T_{d.} = T_0 + T_{yo} + T_{xiz} + T_d,$$

bu erda,

$$\sum T_0 = T_{0_1} + T_{0_2} + T_{0_3} + T_{0_4} + T_{0_5} = 1,122$$

Ushbu parmalash operatsiyasi uchun yordamchi vaqtni topamiz [1, 199 b.]:
 $T_o'.b. + T_q.e. = 0,11$ daq; $T_o' = 0,16$ daq.

$$T_{yo} = 0,11 + 0,16 = 0,27 \text{ daq.}$$

Qo'shimcha vaqtni to'g'rilash koeffitsienti o'rta seriyali ishlab chiqarish sharoitida $k=1,85$ teng [1, 101 b.]. U holda operativ vaqt asosiy va yordamchi vaqtlar yig'indisidan iborat [1, 102 b.]:

$$T_{op} = T_a + k \cdot T_{yor} = 1.122 + 1,85 \cdot 0,17 = 1.381 \text{ daq.}$$

Seriyali ishlab chiqarish sharoitida ishchi o‘ringa xizmat ko‘rsatish va dam olishga sarflanadigan umumiy vaqt quyidagicha olinadi

$$T_{xiz.dam.} = \frac{T_{op} \cdot P_{xiz.dam.}}{100} = \frac{1.381 \cdot 1.4}{100} = 0.02 \text{ daq.}$$

$$T_{d.k.} = T_{oper} + T_{x.d.} + \frac{T_t}{n} = 1.122 + 0.02 + \frac{18}{3200} = 1.05 \text{ daq.}$$

Umumiy vaqt me'yorlari					
N:oper	To	Tyor	Top	Tx.d	Td.k
005 Vertikal frezalash operatsiyasi	2.78	1.67	2.965	1.8	4.78
010 Gorizontal frezalash operatsiyasi	2.18	1.67	2.28	0.04	2.38
015 Gorizontal frezalash operatsiyasi	0.68	0.3	0.7	0.01	0.7
020 Vertikal parmalash					

operatsiyasi	1.122	0.27	1.381	0.02	1.05
Jami:	6.8	3.91	7.326	1.834	8.91

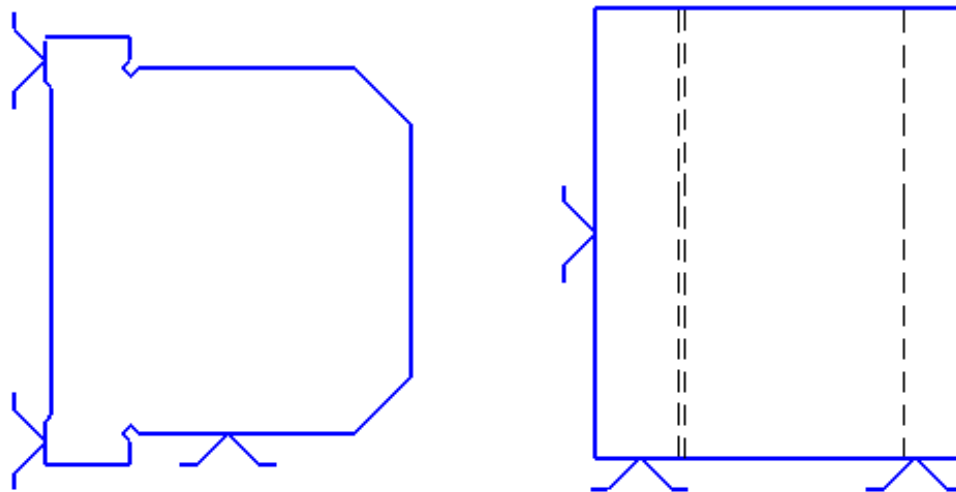
3.Konstruktorlik qism.

3.1. O'rnatish va mahkamlash usulini tanlash.

Zagatovkalar ishlov berish uchun moslamalarga o'rnatish elementlaridan foydalanib bazalanadi. O'rnatish elementlari (tayanchlar)ni asosiy va yordamchi turlari mavjud. Zagotovkani o'rnatilganda hamma yoki bir necha erkinlik darajasini yo'qotuvchi elementlar asosini tayanchlar deb yuritiladi va ular zagotovkani fazodagi xolatini aniqlaydi. Ular asosan qo'zg'almas bo'ladi.

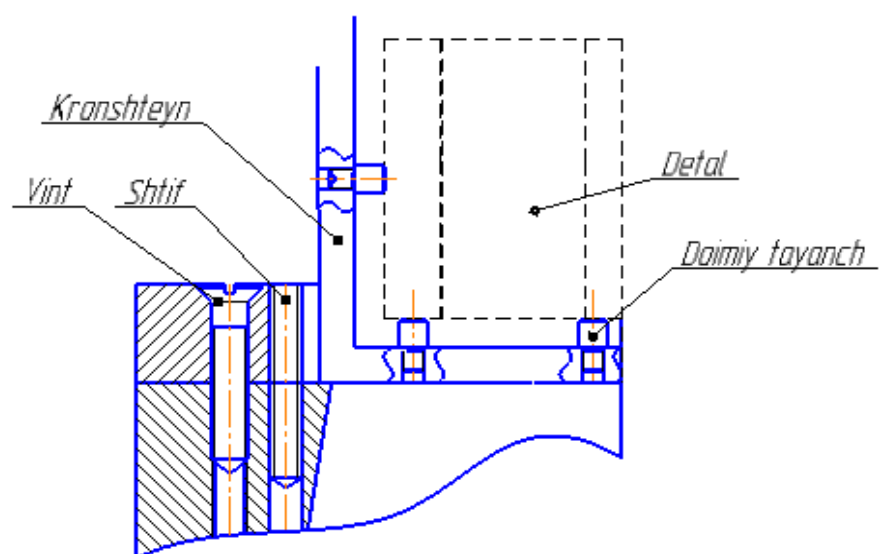
Detalimizni 1 ta teshigini parmalash uchun torets va yon yuzasidan o'rnatish maqsadga muvofiq. Torets yuzasidan bazalashda detalning 6 ta erkinlik darajasi

yo'qotiladi. Yon yuzalardan bazalashda yana 6 ta erkinlik darajasi yo'qatiladi..



2-rasm. Detalni bazalash sxemasi.

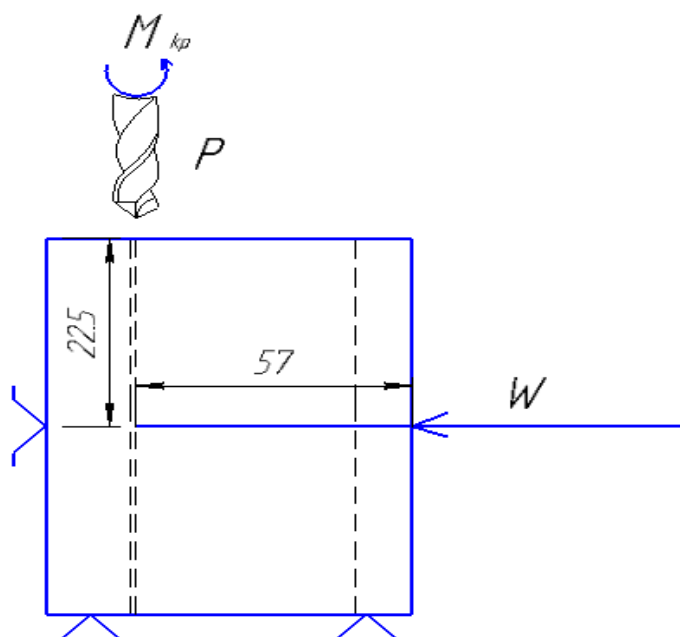
Zagotovkaning asosiy baza yuzasi moslamastolga o'rnatiladi. Yon yuzalardan baza sifatida GOST 13440-68 va GOST13441-68 bo'yicha tayyorlangan doimiy tayanchlardan foydalaniladi. Doimiy tayanchlar odatda ikki tomoni ochiq qilib tayyorlangan moslama tanasidagi teshiklarga o'rnatilib, yeyilgandan so'ng almashtiriladi. Bizning moslamamizda doimiy tayanchlar moslama stoliga maxkamlangan kronshteynlarga o'rnatiladi.



3-rasm Detalni o'rnatish sxemasi.

3.2 Moslamada detalni qisish kuchini hisoblash

Maxkamlash kuchi ishlov berish jarayonida xosil bo'ladigan kuchlarga qarshi turuvchi va zagotovkani muvozanat xolatini ta'minlovchi kuchdir. Maxkamlash kuchi ishlov berish jarayonida zagotovkaga ta'sir qilayotgan kuchlardan kelib chiqib aniqlanadi.



4-rasm. Maxkamlash kuchini hisoblash sxemasi.

Parmalash jarayonida xosil bo'layotgan o'q bo'yicha kuchga tayanchlardagi reaksiya kuchlari qarshilik qiladi.

$$\sum P = \sum R$$

Shuning uchun 4-rasmda ko'rsatilgan xolatda maxkamlash kuchini hisoblashda parmalashda xosil bo'layotgan buruvchi moment e'tiborga olinadi.

Sxemadagi maxkamlash kuchi W quyidagi formuladan aniqlanadi:

$$W = \frac{K \cdot M_{kp}}{f_1 \frac{b}{2} + f_2 a}$$

$M_{kp} = 26,34 \text{ N}\cdot\text{m}$ – buruvchi moment.

$f_1 = f_2 = 0,16$ – ishqalanish koeffitsienti [(6), 10-jad. 85-bet].

Kesish kuchlarini o'zgaruvchanligini hisobga olgan xolda, maxkamlash kuchlarini hisoblash chog'ida kesish kuchlarini K xiyolat koeffitsient kiritish bilan ko'paytirib olinadi. Bu

bilan zagotovkani maxkamlash ishonchliligi oshiriladi. Bu koeffitsient kesish kuchlarini o' zgaruvchanligiga olib keluvchi omillarini hisobga oladi.

Buning uchun muayyan texnologik amal uchun K extiyot koeffitsientini differentsiallangan xolda aniqlanadi. K ni miqdorini quyidagi koeffitsientlar ko' paytmasi ko' rinishida yozish mumkin.

$$K=K_0 \cdot K_1 \cdot K_2 \cdot K_3 \cdot K_4 \cdot K_5 \cdot K_6$$

bunda, $K_0=1,5$ —kafolatlagan extiyot koeffitsienti; [(6), 85–bet]

$K_1=1$ texnologik bazalarni xolatini hisobga oladi. [(6), 85–bet]

$K_2=1,1$ —kesish asbobini o' tmaslanishini hisobga oladi. [(6), 9–jad. 85–bet]

$K_3=1,2$ —kesish asbobiga ta' sir etuvchi zarbiy kuchlarni hisobga oladi.

[(6), 85–bet]

$K_4=1$ —kuch yuritmasidagi kuchlarni barqarorligini hisobga oladi.

[(6), 85–bet]

$K_5=1$ —qo' lda ma' kamlash mexanizmini xarakterlaydi. [(6), 85–bet]

$K_6=1,5$ kontakt zonasi chegaralanmagan bazaviy yuzaga o' rnatilganda. [(6),85–bet]

$$K= 1,5 \cdot 1 \cdot 1,1 \cdot 1,2 \cdot 1 \cdot 1 \cdot 1,5 = 2,97$$

Loyixa hisobi bajarilganda zagotovkani o' rnatish va maxkamlash sxemasi xamda uni siljituvchi kuchlarni qiymati, yo' nalishi va ta' sir nuqtalari ma' lum bo' lishi kerak. Qisish kuchlari qiymatini aniqlash zagotovkani barcha ta' sir qiluvchi kuchlar natijasidagi muvozanat shartini ko' rib chiqish statika masalasiga keltiriladi. Ko' p uchraydigan o' rnatish va maxkamlash sxemalari uchun zagotovkalarni qisish kuchlarini aniqlash zarur.

$$M_{kp}=2,54 \text{ N}\cdot\text{m}=254 \text{ kGs}$$

$$W = \frac{K \cdot M_{kp}}{f_1 \frac{b}{2} + f_2 a} = \frac{2,97 \cdot 254}{0,16(10 + 57)} = 70 \text{ N}$$

$$b=20\text{mm}, a=57\text{mm};$$

Loyixalanayotgan moslamadaporshenli pnevmoslindrdanfoydalanamiz. Bizga kerak bo'lgan $W=70 \text{ N}$ kuchni xosil qilish uchun porshenning zaruriy diametrini quyidagi formuladan aniqlaymiz:

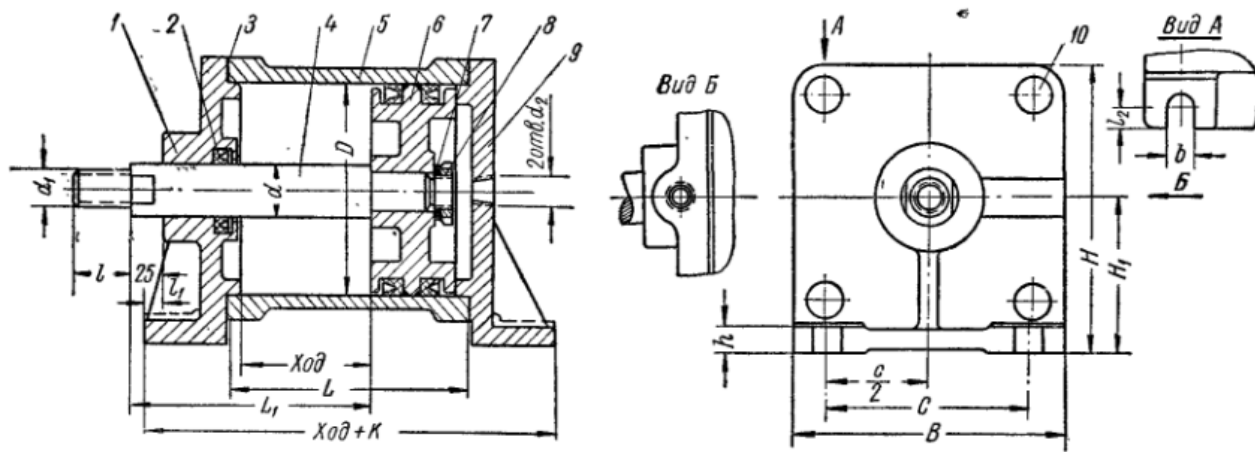
$$D = \sqrt{\frac{4 \cdot Q}{\pi p n}} = \sqrt{\frac{4 \cdot 70}{3,14 \cdot 0,04 \cdot 0,9}} = 49,8 \text{ mm}$$

$D=50 \text{ mm}$ qabul qilamiz. ([4]; 4-j;182-bet);

$\rho =$ havo bosimi , $\rho=4 \text{ kg/sm}^2$

$n=$ yo'qotish ko'ffisenti, $n=0.9$

Moslamamiz uchun GOST 15608-81 bo'yicha standartlashtirilgan statsionar porshenli pnevmoslindrdan foydalanamiz.



5-rasm. GOST 15608-81 bo'yicha standartlashtirilgan statsionar porshenli pnevmoslindr.

Pnevmoyuritma o'lchamlari.

3.1-jadval.

D	B	S	K_t	d	d_1	d_2	D_1	l	l_1
50	180	10-500	143	18	M12x1.5	M16X1.5	52	32	24
l_2	m	h	K	L	L_1	Xod			
25	12.5	12	106	Xod+65	Xod+75	80			

3.2-jadval.

Oldi qoppoq	Monjet GOST 6969-54	Prodladka	Shtok	Silindir	Porshen	Gayka	Shayba	Orqa qoppoq	Vint
50	35x55	150	30xL ₁	50xL	50	M12×1,25	24	50	M16×1.5

3.3 Moslamani aniqlikka hisoblash.

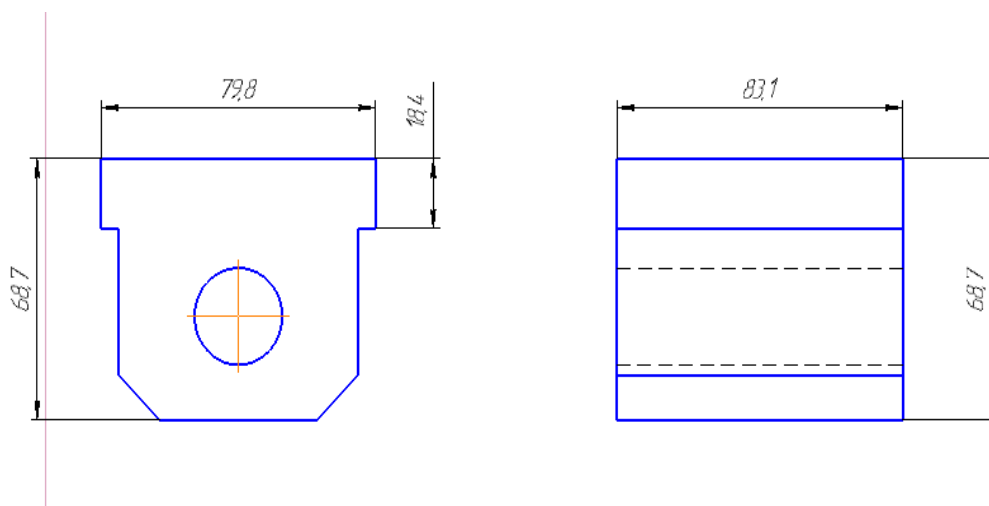
Moslamani aniqlikka hisoblash zagotovkani moslamada o'rnatishning eng afzal sxemasini tanlash maqsadida bajariladi. Moslama talablarga javob berishi uchun quyidagi shart bajarilishi kerak.

$$\varepsilon \leq [\delta]$$

Umumiy xatoligini hisoblaymiz

$$\varepsilon = \sqrt{\varepsilon_{\delta}^2 + \varepsilon_3^2 + \varepsilon_{HP}^2}$$

ε_{δ} - bazalash xatoligi;



6-rasm. Bazalash xatoligi.

Bazalashning o'rnatish xatoligi.

$$\varepsilon = \frac{\delta}{2} + x,$$

Bu yerda; x – radial tebranish, buni biz 0 deb qabul qilamiz, shunda shart quyudagiga teng bo'ladi:

$$\varepsilon = \frac{0,12}{2} + 0 = 0,06_{mm} = 60_{\mu m}$$

$\delta=0,12$ mm- h10 uchun dopusk;

ε_3 -maxkamlash xatoligi;

$\varepsilon_3 = 90\text{mkm}$ ([4];4.12-jad;79-bet);

$\varepsilon_{\text{ИП}}$ - moslamani qolgan boshqa xatoliklari.

$$\varepsilon_{\text{ИП}} = \sqrt{\sum s^2 + \sum e^2 + \sum \varepsilon_{\text{И}}^2}$$

s =zazor;

e =konstruksion vtuka dopuski;

$\varepsilon_{\text{И}}=0$ asboblarni siljish xatoligi;

$$\sum s = (s_1 + s_2) \cdot 0,5 = (0,018 + 0,006) \cdot 0,5 = 0,012\text{mm} = 12\text{mkm}$$

$$\sum e = e_1 + e_2 = 0,005 + 0,005 = 0,01\text{ mm} = 10\text{mkm}$$

$\varepsilon_{\text{И}}$ =asboblarni siljish xatoligi;

$$\varepsilon_{\text{И}} = \varepsilon_{\text{И}} + \varepsilon_{\text{Y}} + \varepsilon_{\text{C}}$$

$\varepsilon_{\text{Y}}=0$ moslamani stanokka o'rnatish xatoligi;

$$\varepsilon_{\text{И}} = \text{moslamani yeyilishi}; \varepsilon_{\text{И}} = \text{И} = \beta_2 N = 0.002 \cdot 15000 = 30\text{mkm} = 0,03\text{mm}$$

$$\beta_2 = 0.002$$

N =yillik norma;

ε_{C} – moslamani dastgohga o'rnatish xatoligi, $\varepsilon_{\text{C}}=0,1 - 0,2\text{ mm}$.

Qabul qilamiz $\varepsilon_{\text{C}}= 0,02\text{ mm} = 20\text{ mkm}$,

$$\varepsilon_{\text{И}} = 30 + 0 + 20 = 50\text{ mkm}$$

$$\varepsilon_{\text{ИП}} = \sqrt{12^2 + 10^2 + 50^2} = 52\text{ mkm}$$

$$\varepsilon = \sqrt{\varepsilon_{\delta}^2 + \varepsilon_3^2 + \varepsilon_{\text{ИП}}^2} = \sqrt{60^2 + 90^2 + 52^2} = 118\text{ mkm}$$

Demak texnologik qoyimlar to'g'ri o'lchamda bajarilishi 120 mkm va boshqa muxim umumiy xatolik $\varepsilon_{\text{доп}} > \varepsilon_{\text{общ}}$, shunday qilib $120 > 118$ – loyixalanayotgan moslama (konduktor)da talab etilgan aniqlikdagi teshik olish mumkin.

3.4. Kesuvchi asbobni bayoni va hisobi

Polzun korpusi detail yassi yuzasi $D=60\text{ mm}$ da frezalash. Material turi ЧЧ 18 bo'lganligi uchun $HV= 190$ frezadan foydalanamiz. Uzunligi $l=80\text{ mm}$. $h=1\text{mm}$. Aniqlik: $Ra=1,6$ gacha

Echish:

1.GOST 9473-80 bo'yicha yuza frezalash diametrini topamiz.

$V=60$ mm Standartga keltirish maqsadida jadvalga asosan $D=1.6V=1.6*60=96$ mm

2. Kesish maromlarini (17 18) normativdan aniqlaymiz:

a) surish: $S=0.2-0.29$ mm/ayl;{0.29 }

tishlar soni: $z= 10$

b)geometric patrametrlari:

$N_d=2.8$

$\gamma=0$, $\lambda=+20$, [chugun uchun esa] $\psi=45'$ $\psi_0=20'$ $\psi_1=5'$

3.Freza davrini jadvalga asoslanib [tab 40.s 290] $T=180$ chunki bizning diametrimiz 60 bilan 100 ni orasida.

$$V_i = \frac{C_v D q_v}{T_m T_{xv} S_{vz} V_{uvz} p_v} * K_v = ((445*96^{0.2}) / (180^{0.32} * 1 * 0.29^{0.35} * 60^{0.2} * 10^0)) * 0.73 = (1108.7 / 7.75) * 0.73 = 104.4 \text{ M/mm} = 1.74 \text{ m/s}$$

(jad.39) dan foydalanib VK6, CЧ 190NV uchun qiymatlar:

$C_v=445$ $q_v=0.2$ $x_v=0.15$ $y_v=0.35$ $u_v=0.2$ $P_v=0$ $m=0.32$

(jad. 1, bet 261) ga ko'ra: $K_{m_v}=(190/NV)n_v$ $n_v=1.25$ (jad.2 bet 262)

$K_{m_v}=1$

$$5. n = \frac{1000v}{nD} = 346.4 \text{ min}^{-1} \quad n_d=285 \text{ ni qabul qilamiz.}$$

$$6. V_d = (3.14 * D * n_d) / 1000 = 85.9 \text{ m/min} = 1,43 \text{ m/s}$$

$$7. \text{Aniq tezlik ni hisoblaymiz: } v_s = S_M = S_{Zz} n_d = 0.29 * 10 * 285$$

=826mm/min Umumiy stanok jadvaliga asosan 800 qabul qilamiz:

Haqiqiy tishning tezligi sifatida:

$$S_{Zd} = 800 / (10 * 285) = 0.28 \text{ mm/tish}$$

8. Aniq asosiy kesish kuchi uchun formula:

$$P_Z = \frac{9.81 C_P t^{x_P} S_Z^{y_P} B^{u_P} Z}{D^{q_P} n^{e_P}} K_P = ((9.81 * 54.5 * 1 * 0.29^{0.74} * 60 * 10) / 96) * 1.11 = 1484 \text{ H}$$

Kerakli qiymatlarni jadvaldan olamiz(41)

$C_p=54.5$ $X_p=0.9$ $Y_p=0.74$ $U_p=1$ $W_p=0$ $Q_p=1$

Formulaga ko'ra: $K_{m_p}=210/190=1.11$

9. Aniq kuch hisobi:

$$N_{haqiqiy} = \frac{P_z v_d}{60 \cdot 102} = (150 \cdot 85.9) / (60 \cdot 102) = 2.1 \text{ kvt}$$

10. Dastgoh ishlov bera olish uchun tekshirish:

$$N_{haq} \leq N_{mn}; \quad 2.1 \text{ kvt} \leq 2.8 \text{ kvt}$$

Demak ishlov bersa bo'ladi.

11. Aniq vaqt me'yorini hisoblash:

$$L = l + y = \Delta = 80 + 80 + 3 = 163 \text{ mm}$$

Torets freza uchun: $y = 0.5(D - \sqrt{D^2 - B^2}) = 80$

$$T_O = 163 / 800 = 0.2 \text{ min.}$$

12. Torets frezani tishlarini geometrik elementlarini analitik usul bilan hisoblaymiz.

13. Topilgan o'lchamlar bo'yicha frezani tishlarini quramiz.

14. Frezani ishchi chizmasini eskizini chizamiz. CHizmada frezaga qo'yilgan asosiy texnik talablar ko'rsatiladi.

4. IQTISODIY BO'LIM

Sex bo'limlarida texnologik jarayonlarni loyihalashda uning samaradorligini aniqlaydigan asosiy ko'rsatkich - bu ishlab chiqarilgan mahsulot tannarxi hisoblanadi. Texnologik jarayonlarning biron-bir operatsiyasi uchun qo'shimcha nostandart qurilma, moslama mexanizm qo'llangan holda operatsiyaning texnologik tannarxini aniqlash uchun keltirilgan sarf-xarajatlarni aniqlash talab etiladi. Buning uchun quyidagi boshlang'ich ma'lumotlar zarur bo'ladi.

4.1. Yillik ishlab chiqarish dasturi

Flanets detalining yillik ishlab chiqarish dasturi – $N=3200$ dona.

4.2. Asosiy jamg'armalar xarajatlari

4.2.1. Bino-inshoatlar qiymatini aniqlash

$$S_B = 1,3 Q_{um} h_B q_B,$$

bu erda,

1,3 – bino usti (qo'shimcha hajmi)ni hisobga oluvchi koeffitsient;

Q_{um} – binoning umumiy maydoni (tashqi o'lcham bilan), $Q_{um} = 156$ m² (5.4-bo'lim);

h_B – bino balandligi, $h_B = 8,5$ m;

q_B – binoning 1 m³ bahosi, $q_B = 39401$ so'm

$$S_B = 1,3 \cdot 156 \cdot 8,5 \cdot 39401 = 67919443,8 \text{ so'm}.$$

4.2.2. Dastgoh, jihoz va asbob-uskunalar qiymati.

a) Dastgohlar qiymati ularning soni, preyskurant bahosi, transport xarajatlari, montaj va sozlash xarajatlaridan kelib chiqib hisoblanadi va 4.1 jadvalga yoziladi.

№	Dastgohning nomi	Modeli	Quvvati	Narxi	Soni	Summasi
1	Universal freza dastgohi	679	2.8	13000000	1	13000000
2	Universal freza dastgohi	679	2.8	13000000	1	13000000
3	Universal freza dastgohi	679	2.8	13000000	1	13000000
4	Parmalash dastgohi	2AM5	4,5	15000000	1	15000000

	JAMI:					54000000

b) Asbob uskuna va moslamalar qiymati:

Ularning qiymati dastgohlar balans qiymatining 15% ga teng deb olinadi:

$$S_{as} = 15\% \cdot C_{dast} = 0,15 \cdot 54000000 = 8100000 \text{ so'm.}$$

v) Ishlab chiqarish inventarlari qiymati:

Ishlab chiqarish inventarlari qiymati dastgohlar balans qiymatining 1,5% ga teng deb olinadi:

$$S_{as} = 1,5\% \cdot C_{dast} = 0,015 \cdot 54000000 = 8100000 \text{ so'm.}$$

4.3 Asosiy fondlarning tarkibi va tuzilishi

4.2-jadval

Ko'rsatkichlar nomi	Boshlang'ich (balans) qiymat, so'm	Umumiy amortizatsiya me'yori, %	Yillik amortizatsiya miqdori, so'm
Bino-inshoatlar	67 919 443.8	3,3%	2 241 341.65
Dastgohlar	54 000 000	10,0%	5 400 000
Asbob-uskunalar, moslamalar	8 100 000	20,0%	16 200 000
Ishlab chiqarish inventarlari	8 100 000	8,3%	672 300
JAMI	138 119 443.8	10,2%	24 513 641.65

Material sarfi hisobi

Asosiy ishlab chiqarish uchun zarur xom-ashyo - zagotovka uchun sarf xarajatlar quyidagicha hisoblanadi:

$$S_{MS} = N \cdot S_{zag} = 3200 \cdot 8900 = 89000000 \text{ so'm.}$$

KELDIK

YOrdamchi material sarfi

$$S_{YOM} = 0,02S_{MS} = 0,02 \cdot 89000000 = 1780000 \text{ so'm.}$$

4.4 Ishchilarning ish haqi fondi hisobi

Mukofot puli asosiy va yordamchi ishchilar uchun oylik ish haqining mos ravishda 35% va 25% ulushiga teng. Barcha ishchilar uchun yagona ijtimoiy sug'urta to'lovi 25%.

Asosiy va yordamchi ishchilar soni 5-Tashkillash bo'limida hisoblangan (q. 5.3-bo'lim).

$$S_{IH} = \Sigma N \cdot T_s,$$

bu erda, T_s -5 razryadli ishchining soatbay ish haqi, $T_s=2860,27$ so'm/soat;

$$S_{IH} = 10000 \cdot \frac{1,66}{60} \cdot 2860,27 = 791341,37 \text{ so'm};$$

$$S_{IH} = 10000 \cdot \frac{1,66}{60} \cdot 2860,27 = 791341,37 \text{ so'm};$$

$$S_{IH} = 10000 \cdot \frac{1,66}{60} \cdot 2860,27 = 791341,37 \text{ so'm};$$

$$S_{IH} = 10000 \cdot \frac{0,75}{60} \cdot 2860,27 = 357533,75 \text{ so'm};$$

$$S_{IH} = 10000 \cdot \frac{0,85}{60} \cdot 2860,27 = 405204,92 \text{ so'm};$$

Jami ish haqi: 3136762,78 so'm.

Jami mukofot puli: 1097866,97 so'm.

Jami yagona ijtimoiy to'lov: 1097866,97 so'm.

Asosiy ishchilarning jami ish haqi fondi: 5332496,72 so'm.

YOrdamchi ishchilarni ish haqi:

4.3-jadval

№	Xizmatchilar kategoriyasi va lavozimi	Soni	Oylik maoshi, so'm	Yillik ish haqi, so'm	YAgona ijtimoiy sug'urta to'lovi, so'm	Yillik mukofot puli
1	MTX	2				
1.1	Bo'lim boshlig'i	1	1249365	14992380	3748095	2998476
1.2	Katta usta	1	864945	10379340	2594835	2075868
1.3	Usta	0	672735	0	0	0
2	OIX	1				
2.1	Omborchi	1	672735	8072820	2018205	2018205
3	KXX	1				

3.1	Farrosh	1	288315	3459780	864945	864945
	JAMI	4		36904320	9226080	7957494

YOrdamchi ishchilarning jami ish haqi fondi: 54087894 so‘m.

4.5 Jihozlarni tutish va ulardan foydalanish xarajatlarini aniqlash

Dastgohlarni ekspluatatsiya uchun sarf-xarajatlar asosiy ishchilar ish haqining 150% ga teng deb olinadi:

$$S_{eks} = 1,5S_{IH} = 1,5 \cdot 3136762,78 = 4705144,17 \text{ so'm.}$$

4.6 Umumiysexsarf-xarajatlarinianiqlash

Sexsarf-xarajatarasosiyishchilarishhaqining 120% nitashkilqiladi:

$$S_{sex} = 1,2S_{IH} = 1,2 \cdot 3136762,78 = 3764115,34 \text{ so'm.}$$

Umumkorxonasarf-xarajatarbarchaishchilarishhaqining 90% initashkilqiladi:

$$S_{kor} = 0,9\S_{IHi} = 0,9 \cdot (3136762,78 + 36904320 = 36036974,5 \text{ so'm.}$$

4.7 Tana detalining tannarxi kalkulyasiyasi

4.4-jadval

№	Sarf xarajatlar	Bir dona maxsulot uchun, so‘m	Yillik dastur uchun, ming so‘m
1	Asosiy material sarfi, tashish tayyorlash xarajatlari bilan (chiqindi kiritilmaydi)	8900	89000000
2	YOrdamchi materiallar sarfi, tashish tayyorlash xarajatlari bilan	178	1780000
3	Asosiy ishchilarning ish haqi fondi (yillik maosh, mukofot va YAIT bilan birga)	533,25	5332496,72
4	YOrdamchi ishchilarning ish haqi fondi (yillik maosh, mukofot va YAIT bilan birga)	5408,79	54087894
5	Dastgohlarni tutish bilan bog‘liq	470,51	4705144,17

	xarajatlar		
6	Sex xarajatlari	376,41	3764115,34
7	Umumiy korxona xarajatlari	3603,7	36036974,5
8	Ishlab chiqarishdan tashqari xarajatlar (umumiy korxona xarajatining 0,5%)	18,02	180184,87
9	Mahsulotning tannarxi	19488,68	194886809,6
10	Mahsulotning ulgurji bahosi	24000	224119831

Mehnat unumdorligi:

Korxonadagi mehnat unumdorligini hisoblashda quyidagi oddiy formuladan foydalanamiz:

$$MU = \frac{YMX}{AI} = \frac{194886809,6}{12} = 16240567,47 \frac{so'm}{ishchi}$$

bu erda, YMX - korxonada ishlab chiqarilgan yillik mahsulot xajmi, so'm;
AI - ishlab chiqarishda faoliyat ko'rsatayotgan ishchilar soni, dona.

4.8 Loyihaning iqtisodiy samaradorligini aniqlash

Yillik iqtisodiy samaradorlik quyidagi formula bilan topiladi:

$$E_y = F_y - N_s * SX_y = 29233021 - 0,1 \cdot 224119831,04 = 6821038 so'm.$$

bu erda,

Ky – yillik kirim, Ky= so'm;

Xy – yillik sarf xarajatlar, Xy= so'm;

N_s – me'yoriy samaradorlik koeffitsienti, N_s=0,1.

4.9 Kapital xarajatlarning qoplanish muddati

$$T_{Qop} = KX/YF = 121415718/29233021 = 4,2 yil.$$

bu erda, KX-barcha kapital xarajatlar qiymati; YF - yillik foyda.

4.10 Texnik iqtisodiy ko'rsatkichlar tahlili

Korxonaning amaldagi va loyihaning iqtisodiy ko'rsatkichlari tahlili

4.5-jadval

№	Ko'rsatkichlar	Qiyoslash	Farqi
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		Korxon a	Loyiha	
1	Yillik dastur, dona	24500	25000	500
2	Korxonaning foydasi, ming so‘m	18900000	2923302 1	1033302 1
3	Ishlab chiqarish rentabelligi, %	9%	19%	10%
4	Asosiy ishchilarning haqi, ming so‘m	5716917	5332497	-384420
5	Mehnat unumdorligi, ming so‘m	15161538	1624056 7	1079029
6	Yillik iqtisodiy samaradorlik, ming so‘m	8100000	6821038	-1278962
7	Kapital xarajatlarning qoplanish muddati, yil	5,8	4,2	-1,6

