

Basis of Overall equipment effectiveness

Week 1. Total Preventive Maintenance

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Jihozning umumiy samaradorligi asoslari

1 Mavzu. Umumiy profilaktik xizmat ko'rsatish

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1-Mavzu: Umumiy profilaktik xizmat ko'rsatish

Reja:

1. Umumiy profilaktik xizmat ko'rsatishga kirish
2. Umumiy profilaktik xizmat ko'rsatishning qisqacha tarixi
3. Umumiy profilaktik xizmat ko'rsatishning maqsadlari va faoliyati
4. Tejamkor ishlab chiqarish kontseptsiyasining umumiy ko'rinishi.



I. Umumiy profilaktik xizmat ko'rsatishga kirish

Har doim mahsuldorlik va samaradorlikni anglab etadigan zamonaviy dunyomizda biz o'lchovning muhimligini juda yaxshi tushundik. Ushbu bobda samaradorlik va samaradorlikni o'lchash va oshirish bo'yicha ba'zi asosiy tushunchalar keltirilgan

Biz aniqlagan ko'rsatkichlar jami profilaktik xizmat ko'rsatish (TPM), uskunaning umumiy samaradorligi (OEE), tejamkorlik, 5S va virtual zavoddir. Har doim mahsuldorlik va samaradorlikni anglab etadigan zamonaviy dunyomizda biz o'lchovning muhimligini juda yaxshi tushundik. Ushbu bobda samaradorlik va samaradorlikni o'lchash va oshirish bo'yicha ba'zi asosiy tushunchalar keltirilgan.

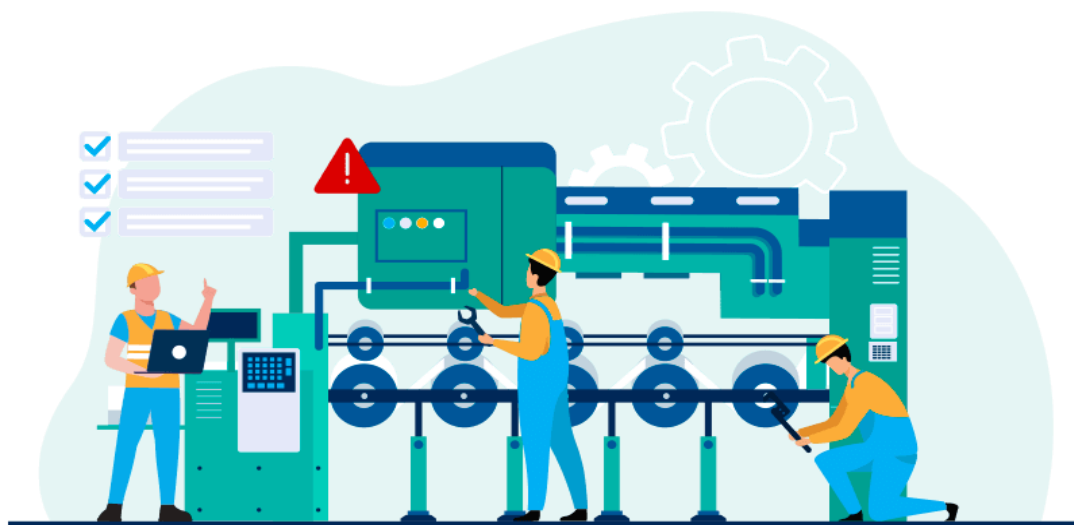


SSDSI Blog. (2020). *What is OEE?*. Illustration. SSDSI
<https://sixsigmadsi.com/wp-content/uploads/2022/05/120-What-is-OEE.jpg>



Quality Gurus. (2020). *5S for Workplace Improvement*. Illustration. Quality Gurus
<https://cdn.qualitygurus.com/wp-content/uploads/2022/12/5S-Methodology-scaled.jpg?compress=true&quality=80&w=800&dpr=1.3>

Umumiy profilaktik xizmat ko'rsatishda mexanizatorlar muntazam texnik xizmat ko'rsatish vazifalarining ko'p qismini va ba'zan hammasini o'zlari bajaradilar. Ushbu avtomatik texnik xizmat ko'rsatish mos va samarali harakatlarni ta'minlaydi, chunki mashina butunlay bir kishi yoki jamoaning mulki hisoblanadi.



CMMS. (2022). *Total Productive Maintenance (TPM)*. Illustration.
https://cmmssoftware.leantransitionsolutions.com/assets/images/cmms_images/work-order-management/what_is_work_order_management.png?ver=0.8



Jonathan Trout. (2022). *Total Productive Maintenance: An Overview*. Illustration. Noria Corporation
https://media.noria.com/sites/Uploads/2019/8/15/4a36574b-7c3e-4f9a-ad27-3dd5739804be_TPM_Social_680x357_081420191_extra_large.jpeg

Umumiy profilaktik xizmat ko'rsatish, hech bo'lmaganda, yuzaga kelishidan oldin har qanday bo'shshaslikning oldini olishga qaratilgan proaktiv yondashuvdir.

Umumiy
profilaktik
xizmat shiori



Umumiy
profilaktik
xizmat
maqsadi



"nol xato, nol
ish bilan
bog'liq baxtsiz
hodisa va nol
yo'qotish"

II. Umumiy profilaktik xizmat ko'rsatishning qisqacha tarixi

Umumiy profilaktik xizmat ko'rsatish dastlab Ford g'oyasi bo'lib (1900-yillarning boshlarida Genri Fordga borib taqaladi)

1950-yillarda Yaponiyaga AQShdan profilaktika xizmati joriy etildi. U yaponiyaliklar tomonidan yaxshi o'zlashtirildi.



Image of How to Improve Warehouse Processes: 3 Lessons from Henry Ford retrieved from <https://wareteka.com.ua/en/blog/warehouse-processes-by-henry-ford/> on April 27, 2023

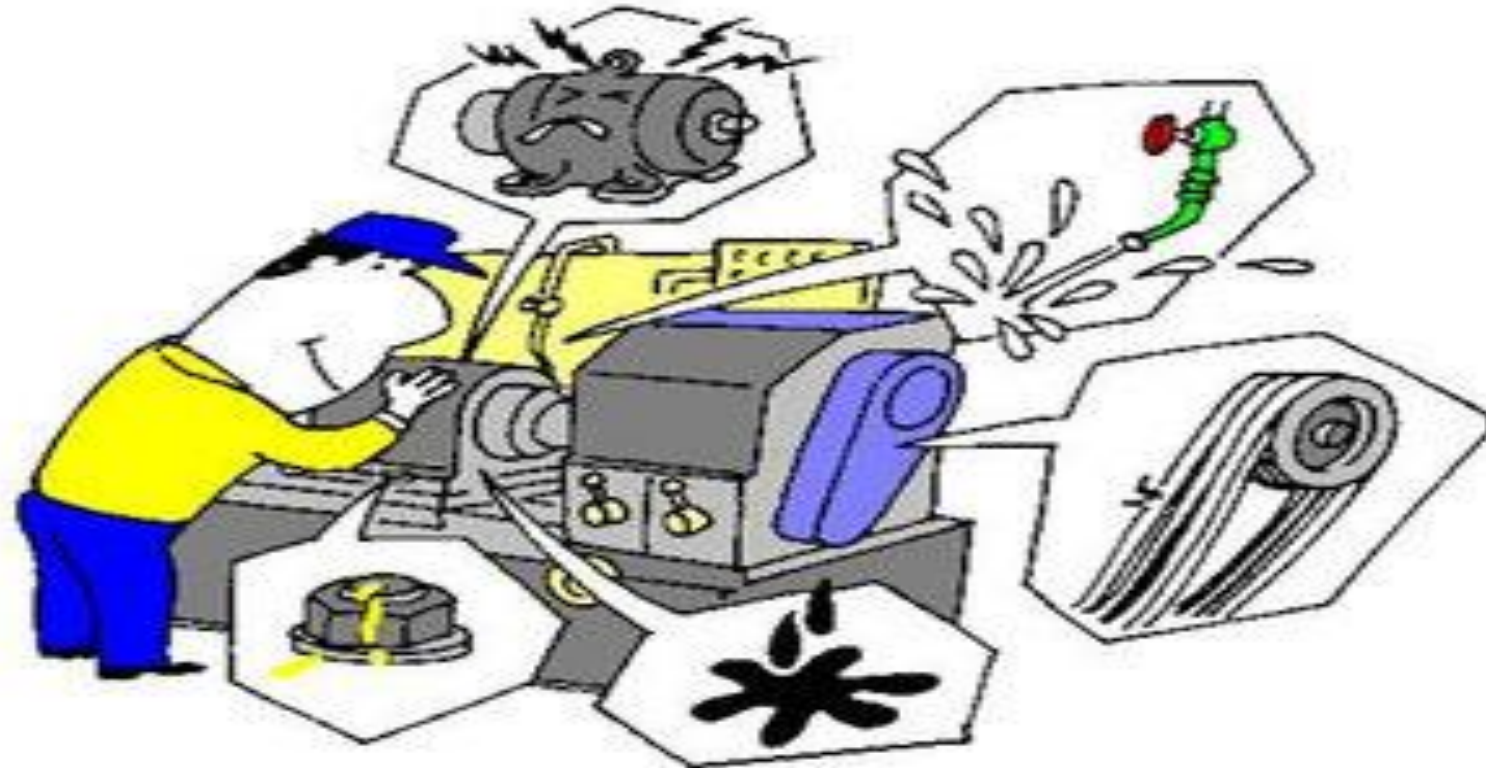
Toyota tarkibiga kiruvchi Nippondenso 1960 yilda Yaponiyada birinchi bo'lib zavod bo'ylab profilaktik xizmat ko'rsatishni joriy qilgan.

Profilaktik ta'mirlashda operatorlar mashinalar yordamida mahsulot ishlab chiqargan va texnik xizmat ko'rsatish guruhi ushbu mashinalarga texnik xizmat ko'rsatish ishiga bag'ishlangan.



Khaletskaya A (1950). Toyota Industries. Photo
https://www.toyota-industries.com/company/items/1950_10.jpg

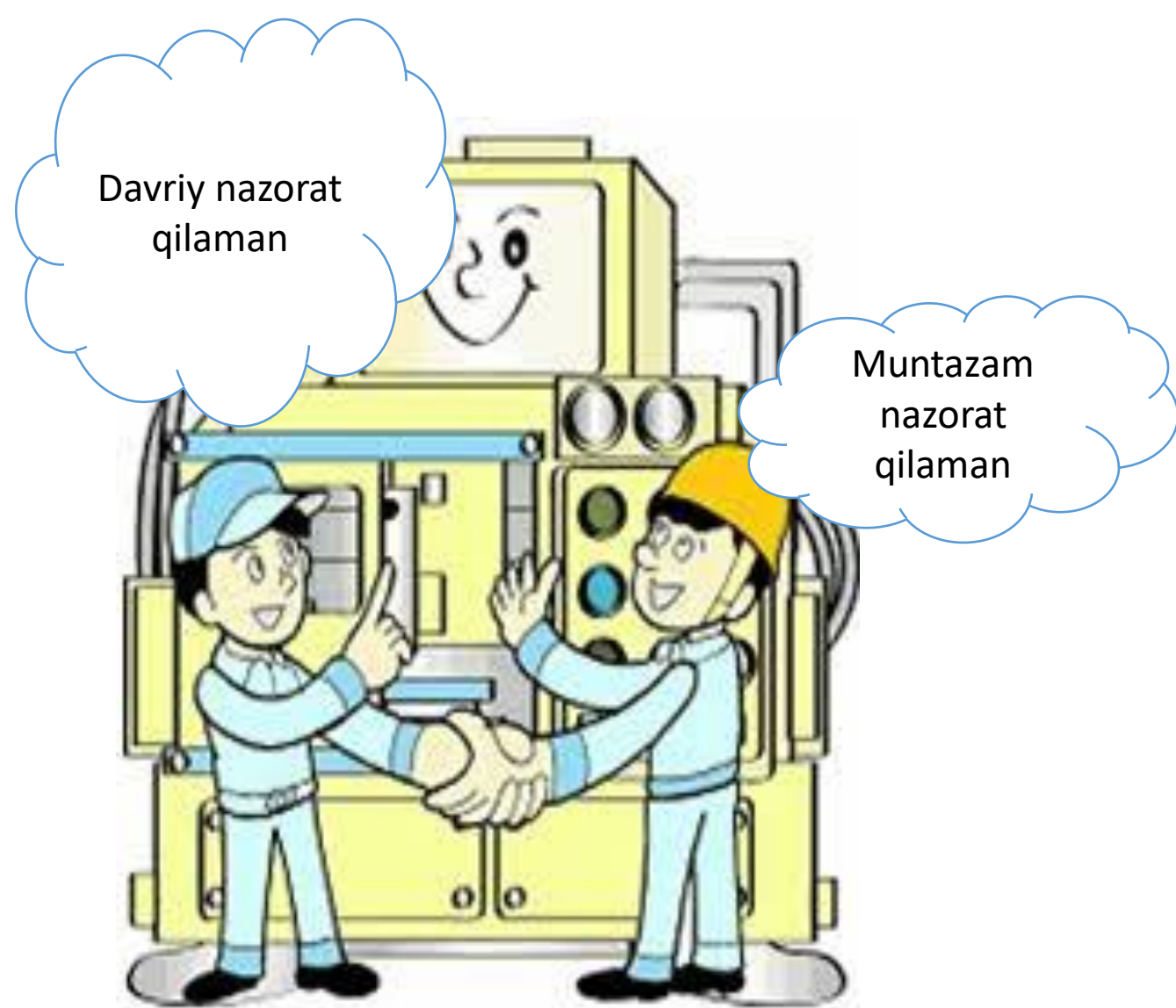
Biroq, Nippondenoning yuqori darajadagi avtomatlashtirilganligi bilan, texnik xizmat ko'rsatish muammoga aylandi, chunki endi ko'proq texnik xodimlar kerak edi.



Sysom. (2020) TPM Background. Illustration.

<https://image.jimcdn.com/app/cms/image/transf/dimension=316x10000:format=jpg/path/s957edda4cfbd9459/image/i51701508a33b2556/version/1434340878/image.jpg>

Shunday qilib, rahbariyat endilikda uskunaga muntazam texnik xizmat ko'rsatishni operatorlarning o'zlari amalga oshirishga qaror qildi. (Bu avtonom texnik xizmat, umumiy profilaktik xizmat ko'rsatish xususiyatlaridan biri.) Keyin texnik xizmat ko'rsatish guruhi faqat yangilanishlar uchun "xizmat ko'rsatish" ishlariga e'tibor qaratdi.



Gemba K. (2018). *TPM factory in Japan*. Illustration.

<http://www.takuminotie.com/English/Illustration/Illustration%20page40/TPM/image161.gif.png>

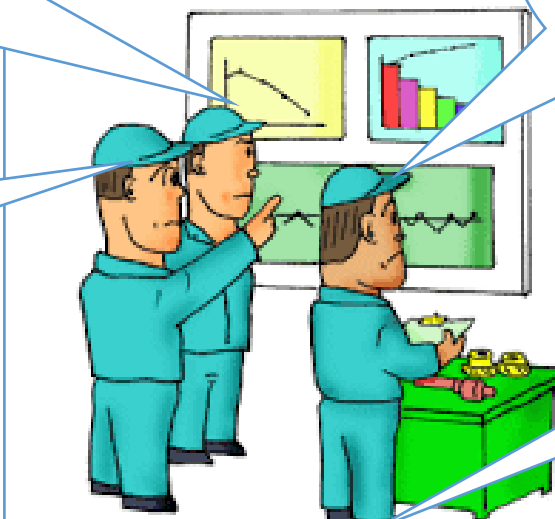
Texnik xizmat ko'rsatish guruhi uskunaning ishonchliligini oshiradigan modifikatsiyani amalga oshirdi. Keyinchalik bu o'zgartirishlar amalga oshirildi yoki yangi jihozlarga kiritildi. Ta'minot guruhining ishi keyinchalik parvarishlashning oldini olishga olib keladigan o'zgarishlarni amalga oshirishdir.

Jihozlarni samarali ishlash usullarini taklif qilaman

Jihozlarni kerakli extiyot qisimlar bilan ta'minlayman

Jihozga muntazam xizmat ko'rsataman

Maqsadimiz doimiy sifatli mahsulot ishlab chiqarish



Carlos A. (2019). *Meeting Factory Business*.
Illustration.

<https://i.pinimg.com/564x/0e/ae/eb/0eae7b35e2ca2bba63531c922da1ac.jpg>

Samarali texnik xizmat ko'rsatishning maqsadi ishlab chiqarish uskunasining ishlash muddatining optimal qiymatiga erishish uchun zavod va uskunarlar samaradorligini oshirishdir



Andrés C. (2021). Total Productive Maintenance. Illustration.
<https://www.setec.com.ar/wp-content/uploads/2021/06/tpm-2.jpg>

Yaponiya zavod muhandislari instituti (JIPE) Nippondensoga umumiy profilaktik xizmat ko'rsatishni ishlab chiqish va amalga oshirish uchun taniqli zavod mukofotini berdi. Shunday qilib, Toyota guruhining Nippondenso Umumiy profilaktik xizmat ko'rsatish sertifikatlarini olgan birinchi kompaniya bo'ldi.

Nippondenso 1961 yil Sifatni nazorat qilish bo'yicha eng nufuzli mukofotlardan biri bo'lgan Deming mukofotini oldi.



Denso.N. (1953). *Concluded a technical cooperation agreement with Germany's Robert Bosch regarding electrical components.*[Photo]. Denso
<https://www.denso.com/global/en/-/media/global/about-us/corporate-info/profile/heritage/heritage-img-history1949.jpg?la=en&rev=b4b2d03deb3e4b07b604738b3c78f5a9&hash=68A413DC51A29104A4CBBDAE238BB010>

III. Umumiy profilaktika ishlarining maqsadlari va faoliyati

Umumiy profilaktik xizmat ko'rsatishning beshta maqsadi bor:

Uskunaning samaradorligini oshirish

Uskunaning ishlash muddati davomida samarali xizmat ko'rsatish tizimini ishlab chiqish

TPMni amalga oshirishda uskunani rejalashtiruvchi, loyihalashtiradigan, ishlatadigan yoki texnik xizmat ko'rsatadigan barcha bo'limlarni jalb qilish

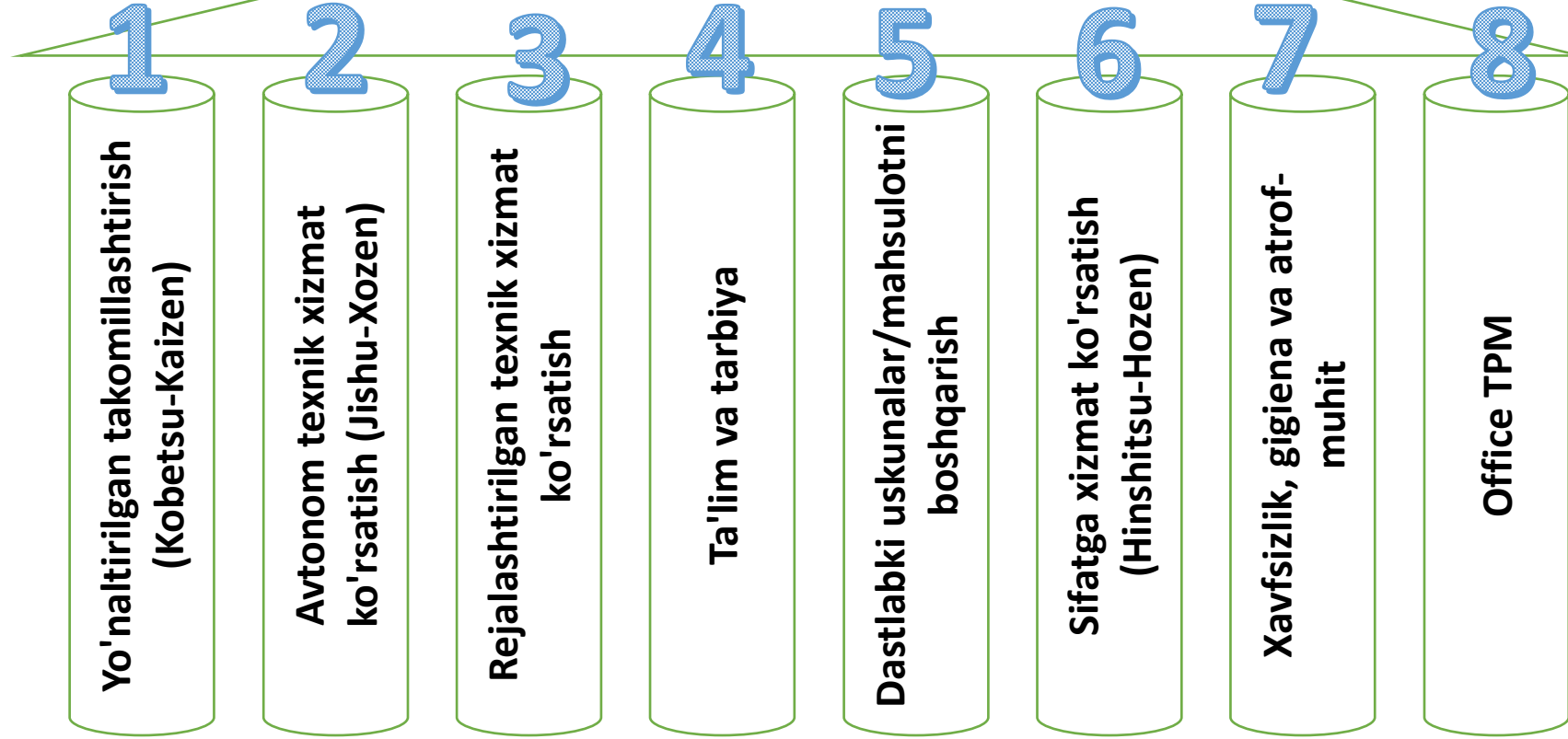
Barcha xodimlarni faol jalb qilish

Motivatsion boshqaruv orqali TPMni targ'ib qilish

Umumiy profilaktik xizmat ko'rsatishda yo'qotishlarning yetti turi mavjud bo'lib. Bu Muda deb yuritiladi. (Muda yaponcha so'z bo'lib, "behudalik", "foydasizlik" yoki "isrofgarchilik" degan ma'noni anglatadi.



Jihozga profilaktik xizmat ko'rsatishning sakkizta faoliyat ustuni.



1. Yo'naltirilgan takomillashtirish (Kobetsu-Kaizen)

Bu yo'qotishlarni yo'q qilishga qaratilgan g'oyadir. Asosiy yo'qotishlar materiallarni keraksiz tashishdir.

- Mutlaq minimumdan oshib ketadigan zahiralar
- Xodimlarning harakatlari
- Jarayonning keyingi bosqichini kutish
- Talabdan oldin ortiqcha ishlab chiqarish
- Qismlarga haddan tashqari ishlov berish
- Ishlab chiqarishdagi nuqsonli qismlar

2. Avtonom texnik xizmat ko'rsatish (Jishu-Xozen)

Avtonom texnik xizmat ko'rsatishda operator asosiy o'yinchi hisoblanadi. Bu operatorlarning o'zlari tomonidan amalga oshiriladigan kundalik parvarishlash tadbirlarini o'z ichiga oladi, bu esa uskunaning buzilishini oldini oladi.



Mursyid U. (2020). *Maintenance System* [Illustration] Pro Vector
<https://www.vecteezy.com/vector-art/6944241-maintenance-system-illustration>

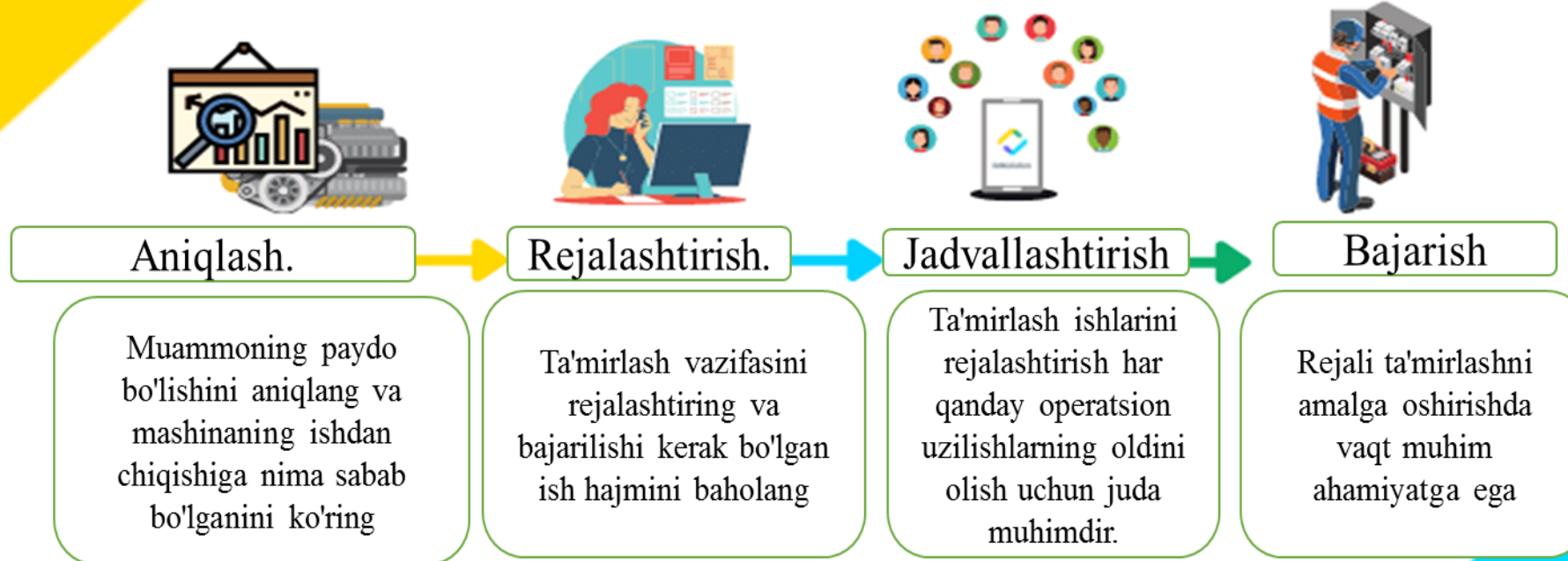
2. Avtonom texnik xizmat ko'rsatish (Jishu-Xozen)

Avtonom texnik xizmat ko'rsatish bosqichlari

- Barcha ifloslanish manbalarini tuzating.
- Kirish mumkin bo'lmagan barcha joylarni tuzating.
- Mumkin bo'lgan standartlar uchun tozalash, tekshirish va moylash uchun barcha tartiblarni ishlab chiqing va sinab ko'ring
- Oldingi vazifaga asoslanib, tekshirish tartib-qoidalarini o'tkazish va ishlab chiqish.
- Tekshiruvlarni mustaqil ravishda o'tkazing.
- Ilgari bajarilgan tekshirish tartib-qoidalarini standartlashtirishni qo'llang va iloji boricha mashina yaqinida vizual boshqaruvni qo'llang.
- Doimiy takomillashtirish uchun avtonom texnik xizmat ko'rsatishni davom ettiring.

3. Rejalashtirilgan texnik xizmat ko'rsatish

Rejalashtirilgan texnik xizmat ko'rsatish bosqichlari



4. Ta'lim va trening



Amna K. Jeffrey A.S. (2021). *Don't Mistake Training for Education* [Illustration]. IHE https://www.insidehighered.com/sites/default/files/styles/max_650x650/public/media/GettyImages-1314362542.jpg?itok=573cohGr

Hodimlar malakasini oshirib borish korxonaga yuqori samaradorlik keltiradi

O'z ishini to'g'ri anglash

O'z ishiga nisbatan javobgarlikni oshishi

O'z ishini yangi mutahassislarga o'rgata oladigan hodim

5. Dastlabki uskunalar/mahsulotni boshqarish



Jihozlarni oldindan boshqarish

O'z vaqtida texnik xizmat ko'rsata olish

Foydalanuvchanlikni oshishi

Ergonomik ko'rsatkichlarni o'sishi

Jarayonni oldindan ko'rish

Kelajakdagi havfsizlikni ta'minlanishi

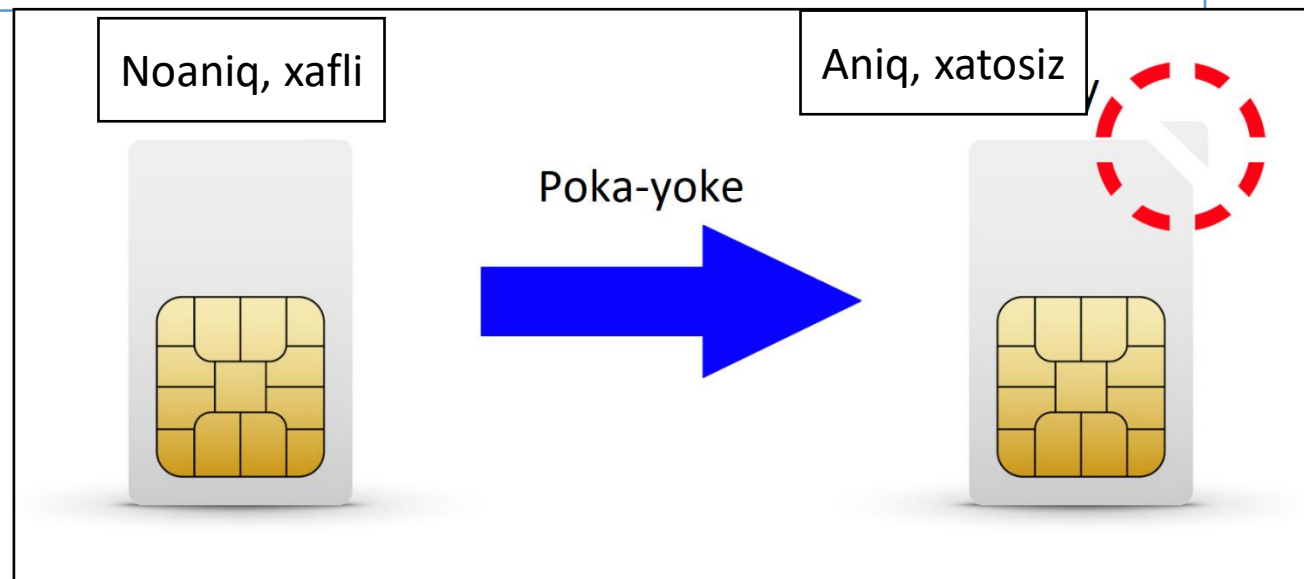


Dastlabki uskunalar/mahsulotni boshqarish maqsadi - yangi mashinani joriy qilish yoki yangi mahsulotni ishlab chiqarish jarayonida yuzaga keladigan yo'qotishlarni kamaytirish.

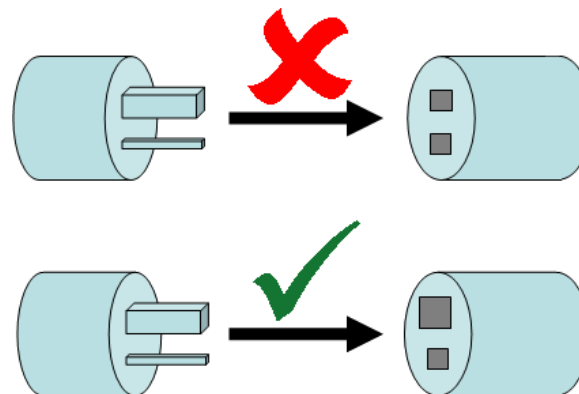


6. Sifatga xizmat ko'rsatish (Hinshitsu-Hozen)

Bu aslida "sifatga xizmat ko'rsatish". U TPM ning eng samarali sifatli vositasini o'z ichiga oladi: Poka-yoke (bu xatoni tekshirish yoki xatolarni tekshirishni anglatadi), u dizayn yoki ishlab chiqarishga yoki hatto ikkalasiga ham inson aralashuvi tufayli yo'qotishlarning oldini olish uchun zarur choralarni ko'rish orqali nol yo'qotishga erishishga qaratilgan.

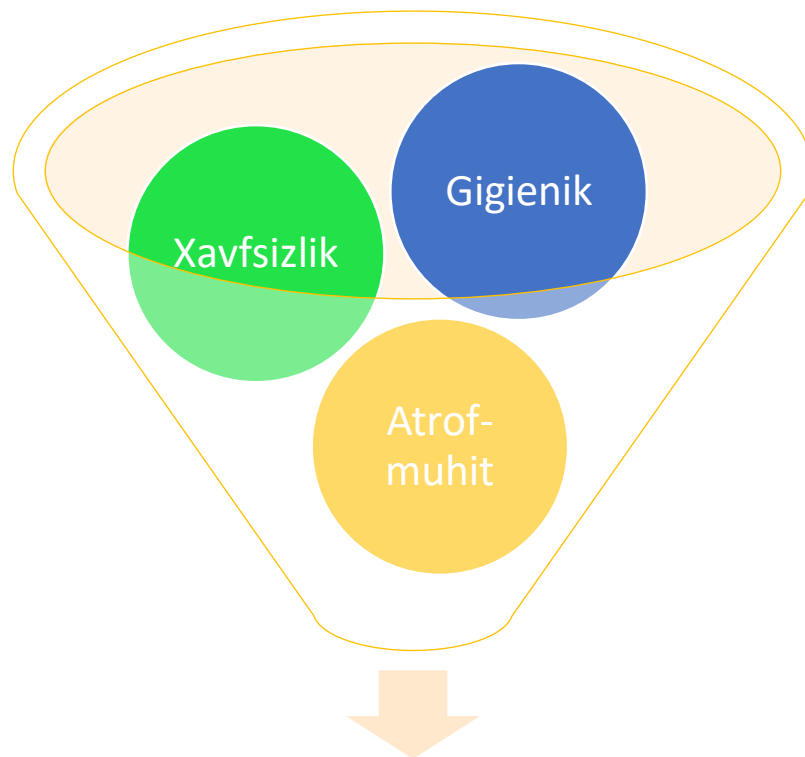


Andreas V. (2020). *Poka-Yoke in Manufacturing* [Photo]. Fractory
<https://fractory.com/wp-content/uploads/2020/12/poka-yoke.png>



Gemba K. (2015). *Error proofing* [Photo]. Takuminotie
<https://takuminotie.com/english/2015/10/21/error-proofing-device/>

7. Xavfsizlik, gigiena va atrof-muhit



“0” baxtsiz hodisa

Maqsad: nol ish bilan bog'liq baxtsiz hodisalarga erishish va atrof-muhitni muhofaza qilish.

8. Office TPM

TPMga barcha tomonlarni jalb qilish uchun, chunki ofis jarayonlarini ham xuddi shunday tarzda yaxshilash lozim.

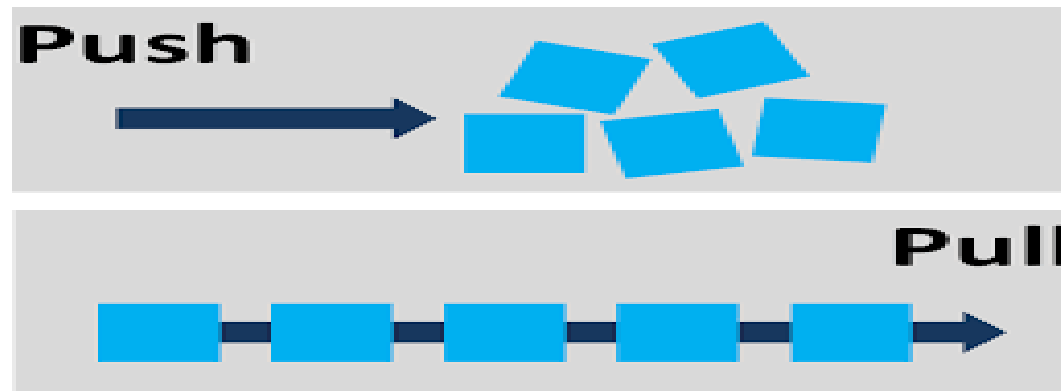


Iryna Alex. (2021). Cleaning in the office. [Illustration]. Stock Illustration
<https://www.shutterstock.com/image-vector/cleaning-office-there-caution-wet-260nw-1024899706.jpg>

IV. Tejamkor ishlab chiqarish kontseptsiyasining umumiy ko'rinishi.

Tashkilotlar uchun xarajatlarni samarali boshqarishning yagona yo'li:

- Mahsulot oqimini surishdan tortib olishga o'zgartirish - operatsion darajadan boshlab va tashqariga cho'zilgan haqiqiy tejamkor korxonaga aylanish uchun,
- Qo'shilgan qiymat operatsiyalarining aylanish vaqtini qisqartirish, ya'ni mahsulot yoki xizmatni mijozga yetkazib berish tezligini oshirish.



Christoph R. (2015). Illustration of push and pull [Photo]. Allaboutlean.
<https://www.allaboutlean.com/push-pull/>

Qiymat oqimi xaritasini yaratish

Qiymat oqimini xaritalash kompaniyalarga yaxshilanish sohalarini oldindan aniqlash va ustuvorligini aniqlash hamda takomillashtirish bo'yicha o'lchanadigan maqsadlarni belgilash imkonini berib, tasodifiy o'zgarishlardan qochishga yordam beradi.

Qiymat oqimini xaritalash uch bosqichda amalga oshiriladi

1-bosqich: Kompaniyaning bugungi kunda o'z mijozlariga qanday xizmat ko'rsatishini ko'rsatadigan joriy holat xaritasini yarating.

2-bosqich: Chiqindilarni kamaytirish va o'zgarishlarning ta'sirini ko'rsatadigan kelajak-davlat xaritasini tuzing.

3-bosqich: kelajak holatiga erishish rejasini ishlab chiqish va amalga oshirish.

Kompaniya o'z qiymat oqimini aniqlashdan oldin, quyidagilarni aniqlashi kerak:

Mijoz to'lashga tayyor bo'lgan jarayondagi qiymat

Mahsulot yoki xizmatni mijozga yetkazib berish uchun zarur bo'lgan qadamlar

Ularning har birida nima ahamiyatga egaligini aniqlash

Jarayonning qiymat oqimini xaritalashning uch qadami




















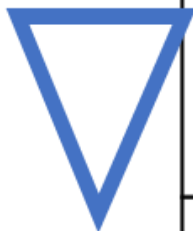
1-qadam:

Mahsulotlar ro'yxatini tuzing va ularni oilalarda guruhlang

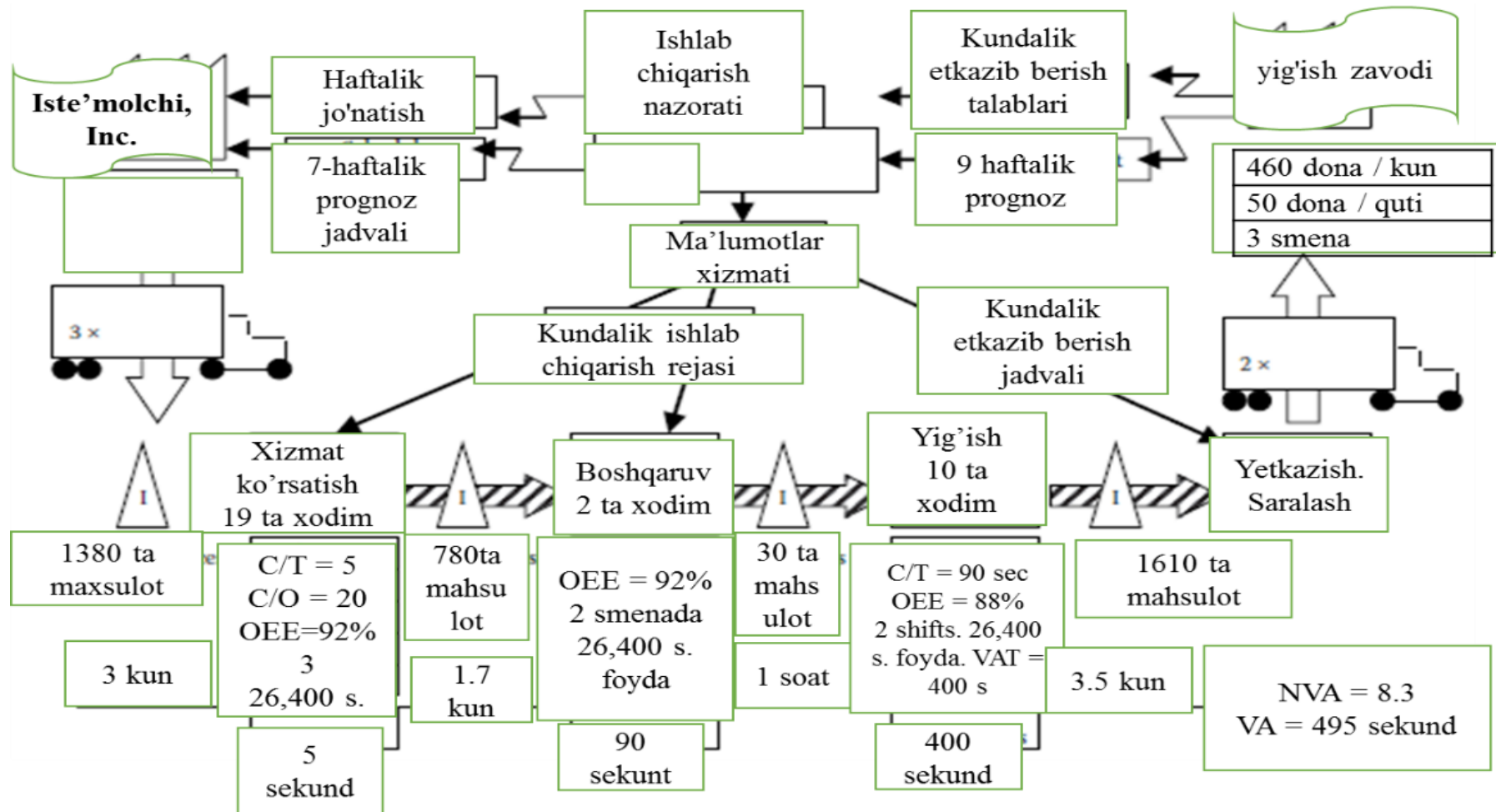
2-qadam: Qaysi mahsulot, mashina yoki xizmat asosiy ekanligini aniqlang

3-qadam: Jarayon bosqichlarini hujjatlashtiring

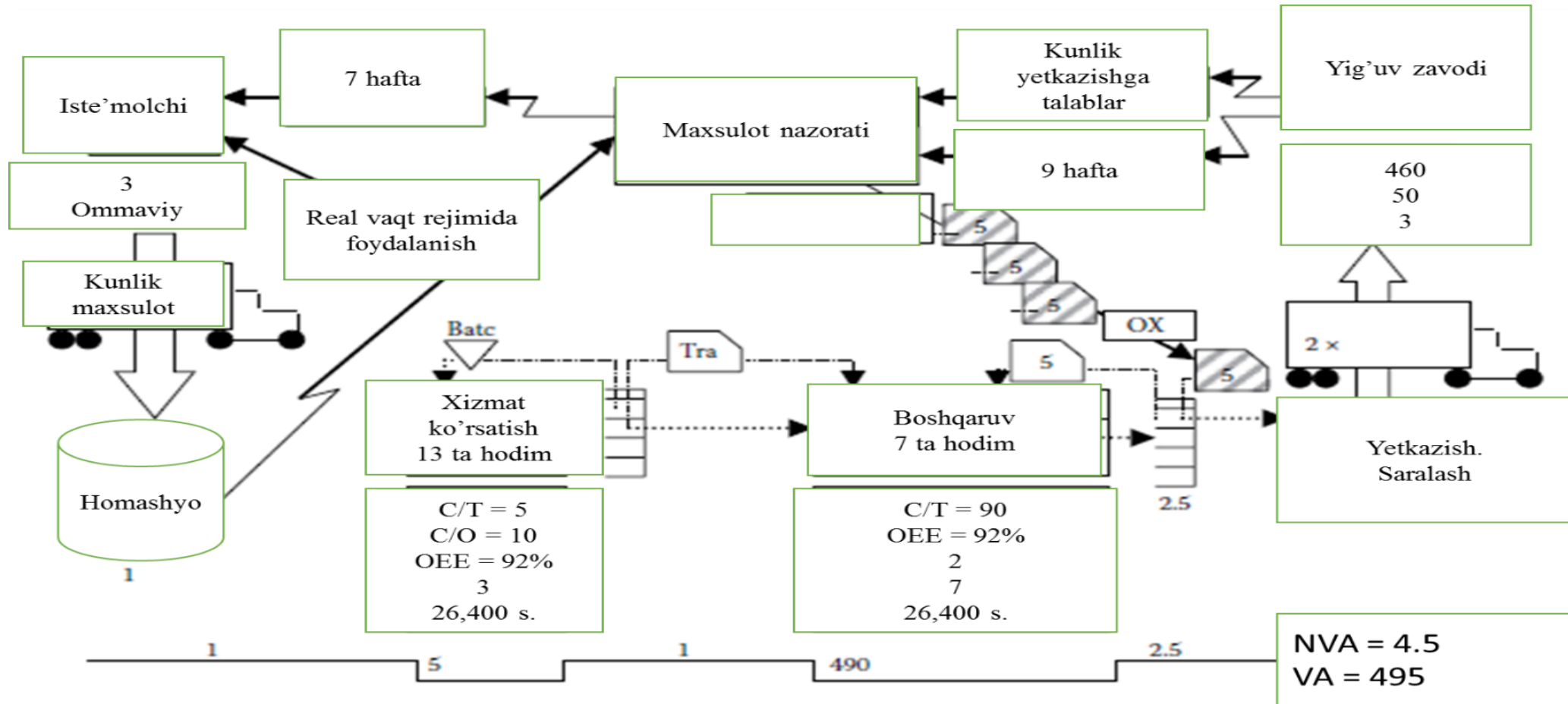
Oddiy jarayon sxemasiga misol

 Hom ashyoni qabul qilish.	 Tarozi stansiyasiga yuborish.	 Tarozi stansiyasida kutish	 Tortish	 Qoliplashga yuborish	 Qoliplash	 Tekshirishga yuborish
 Maxsulotni tekshirish	 Bo'yashga yuborish	 Bo'yoqdan oldingi bosqichda tozalash	 Bo'yashga yuborish	 Bo'yash	 Jarayonni tugatish	 Maxsulotni tekshirish
 Qadoqlashga yuborish	 Qadoqlash	 Omborga yuborish	 Omborda saqlash	 Yukni rasmiylashtirish	 Tashish	Qiymat qo'shadigan operatsiyalar - 2 ta
						Qiymat qo'shmaydigan operatsiyalar -18 ta

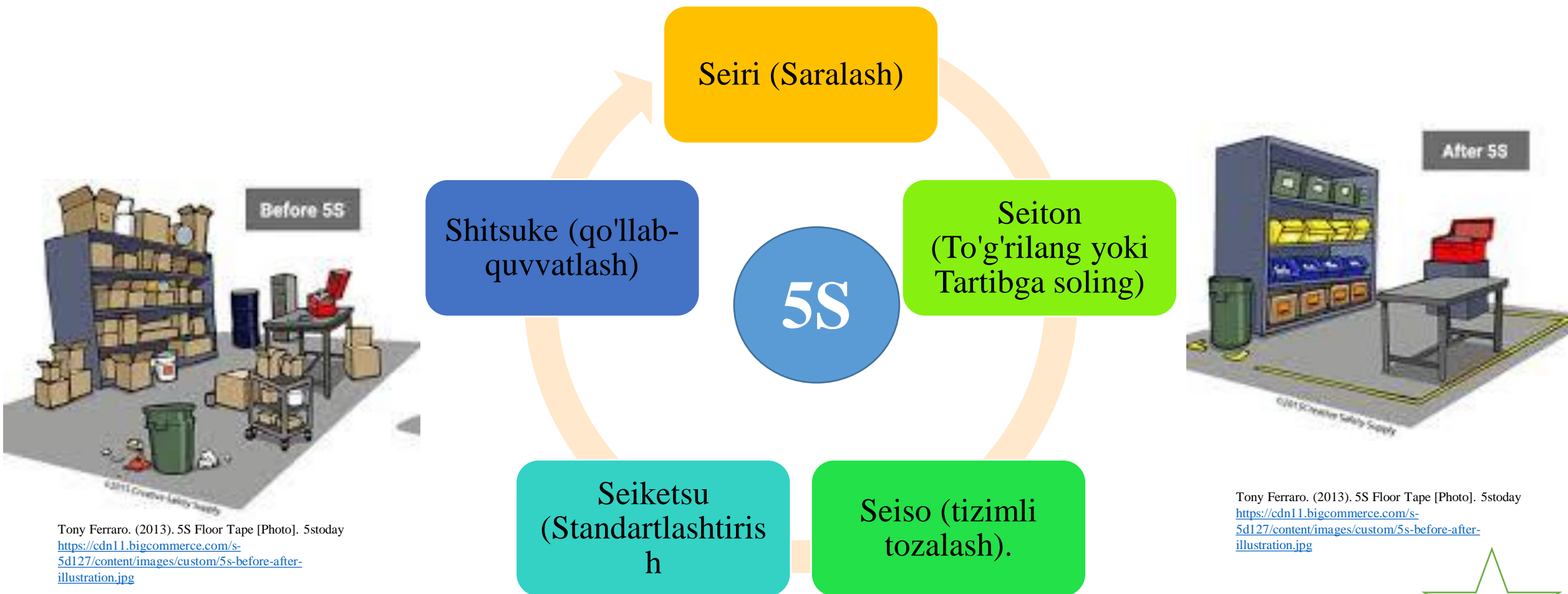
Qiymat oqimini xaritalash misoli - joriy holat



Qiymat oqimini xaritalash misoli - kelajakdagi holat



Ish maydonini tashkil etishning "5S" metodologiyasi



Tony Ferraro. (2013). 5S Floor Tape [Photo]. 5stoday
<https://cdn11.bigcommerce.com/s-5d127/content/images/custom/5s-before-after-illustration.jpg>

Tony Ferraro. (2013). 5S Floor Tape [Photo]. 5stoday
<https://cdn11.bigcommerce.com/s-5d127/content/images/custom/5s-before-after-illustration.jpg>

Foydalanilgan adabiyotlar

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2. "Juran's Quality Handbook", Joseph M. Juran, A. Blanton Godfrey,McDraw-Hill, 2015
3. "OEE Guide to Smart Manufacturing", Dr. Jill A O'Sullivan, Dr. Theresa Nick, Sandy Abraham, DMMSI, Associates Inc, 2016
4. "Understanding, Measuring, and Improving Overall Equipment Effectiveness: How to Use OEE to Drive Significant Process Improvement", Ross Kenneth Kennedy, Productivity Press, 2017
5. Overall Equipment Effectiveness, Robert C. Hansen, Industrial Press, 2011
6. <https://www.oee.com/>
7. <https://www.leanproduction.com/oee/>
8. <https://sixsigmadsi.com/what-is-oee/>

**E'tiboringiz
uchun rahmat!**

