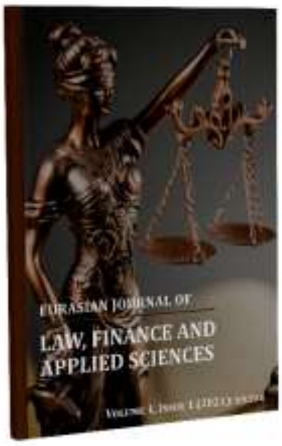
EURASIAN JOURNAL OF LAW, FINANCE AND APPLIED SCIENCES
Innovative Academy Research Support Center
www.in-academy.uz



PROGRESSIV SHTAMPLASH KONSTRUKSIYALARINI REJALASHTIRISH. PLANNING OF PROGRESSIVE STAMPING CONSTRUCTIONS

Rustam Karimov Jaxongir o'g'li[1], Polotov Karimjon Quranbaevich[2]

[1,2]Assistant, The Department of Descriptive Geometry and Engineering Graphics Fergana Polytechnic Institute, Republic of Uzbekistan

https://doi.org/10.5281/zenodo.5716080

MAQOLA TARIXI

Qabul qilindi: 05-noyabr 2021
Ma'qullandi: 10- noyabr 2021
Chop etildi: 15- noyabr 2021

KALIT SO'ZLAR

Nosimmetrik progressiv shtamplash, shtamp ko'prigini rejalashtirish

ANNOTATSIYA

Murakkab presslashni talab qiladigan shtamplangan qismlarni ommaviy ishlab chiqarish uchun doimo progressiv shtamplar to'plamidan foydalanish tavsiya etiladi. Agar shtamplangan qismlarni chuqur olish kerak bo'lsa, ayniqsa assimetrik bo'lsa, progressiv qoliplar to'plamini tanlash qiyin. Asimmetrik chuqur chizilgan qismlar keyingi bosqichga o'tish paytida og'irlik ta'siriga juda sezgir bo'lgani uchun ularni matritsaning yuzini yuqori aniqlikda aniqlash qiyin.

Recently, the adoption of high-strength steel plates has increased to reduce vehicle weight and improve collision safety performance [1], and body parts are also being changed to highly difficult shapes for reasons of simplification of parts [2]. Most automobile body and chassis parts are manufactured by thin plate press molding, but in the case of parts with a deep drawing depth and complex curved shape, it contains complex deformation conditions that combine various individual processes, so a high-level press forming method is required.

The progressive method is a technology that can combine various processes within a single mold, and can realize unmanned operation through automation as well as reducing production time and increasing efficiency through mass production [3, 4]. However, the applied parts are simply symmetrical or limited to small parts, and high-level process design and mold making technology are required to secure stable quality for complex parts.

The car seat side cushion panel of Fig 1 supports the structure of the seat frame and is a major part that is repeatedly affected by the occupant's riding comfort and irregular behavior to be.

Fig. 1 3D model of seat side cushion panel

EURASIAN JOURNAL OF LAW, FINANCE AND APPLIED SCIENCES
Innovative Academy Research Support Center
www.in-academy.uz

The automobile seat side cushion panel is molded from a thin plate of 0.8t, and has a drawing depth of 80 mm or more and a complex curved shape asymmetrically. Therefore, in order to apply the progressive method, it is necessary to solve the problems such as twisting, shaking, and jamming of the panel during the strip transport process due to the asymmetric shape and high height [5].

In this study, in order to apply the progressive method of automobile seat side cushion panel products, which are body parts with asymmetric deep-drawing complex curved shapes, the product was formed by preventing the product from shaking up and down when attaching and detaching the product during the strip transfer process between each process. We would like to present a design proposal for a strip bridge with better rigidity so that it can be accurately seated in the mold of the next process.

1. Drawing process molding analysis

For the bridge design for the progressive molding of the seat side cushion panel, which is an asymmetric deep-drawing product, a self-weight deflection analysis was performed after the drawing process forming analysis. When transferring the panels between processes, the strength for stabilizing the mold and maintaining the balance of the panel In order to derive a design for a reinforcing bridge, the amount of panel deformation after molding and self-weight deflection analysis was compared.

1.1 Forming analysis condition setting

For molding analysis, after one-step blanking, two-step drawing analysis was performed. Fig. 2 shows the analysis model of the panel and drawing process after the blanking process.

For the drawing process mold, the upper mold is the master, the panel material is SPRC440, the panel thickness is 0.8t, and the molding type is drawing. The friction coefficient between the panel and the mold was 0.1, and the element was set to 1 mm from the initial size of 8 mm to the final 1 mm by applying the 4-step adaptive mesh [6].

In the forming order, the upper die comes down first to hold the holder, and the final product is formed by forming as much as 70 mm of punch stroke while maintaining the holding force of 3 tons.

2.2 Forming analysis result of drawing process

2.2.1 Initial Bridge Forming Analysis Results

Fig. 3 shows the molding process of the drawing process, and as a result of the molding analysis, the bridge part is molded and the flesh is insufficient

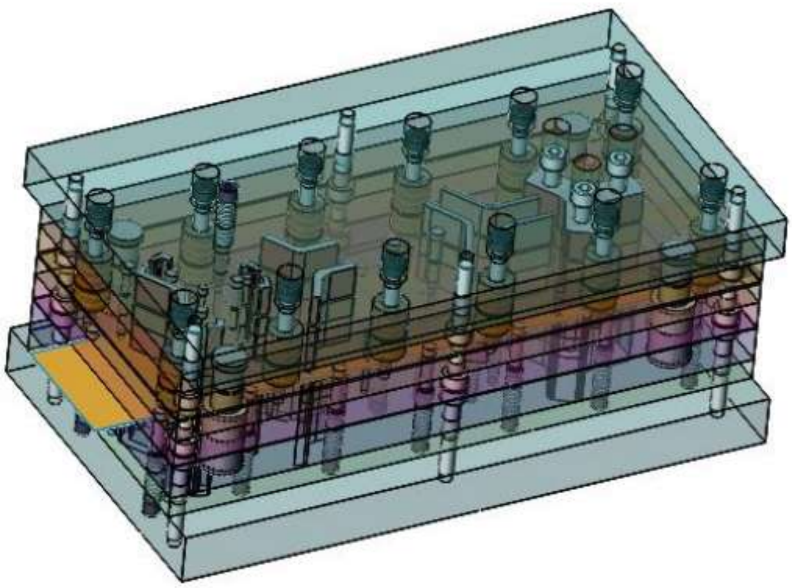


Fig. 2 Blanking shape and tool setting for stamping

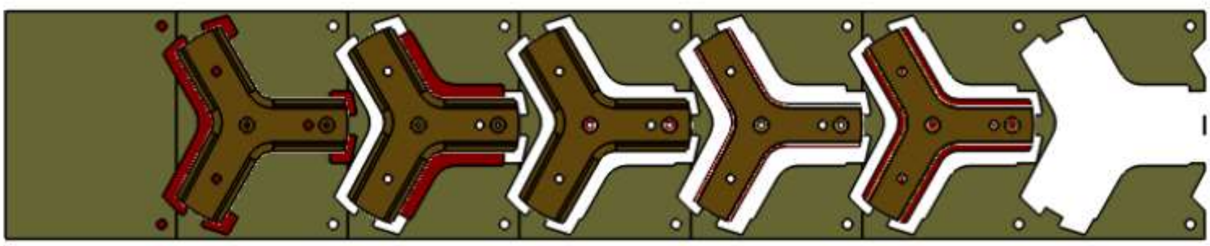


Fig. 3 Drawing processes with initial bridge

The load could be checked, and as a result of the formability analysis through the Forming Limit Diagram (FLD), it was possible to predict that the burst would start 50 mm before the completion of forming. Therefore, the bridge was modified and designed to secure the initial flesh and rigidity.

2.2.2 Design of the shape of the bridge for securing and reinforcing strength

EURASIAN JOURNAL OF LAW, FINANCE AND APPLIED SCIENCES
Innovative Academy Research Support Center
www.in-academy.uz

To secure the flesh of the bridge part, Fig. As in Case 1 of 4, the bridge shape was modified and designed.

For comparison of deformation amount, molding analysis and self-weight deflection analysis were performed on the shapes of Cases 2 to 4, in which the front and rear bridges of Case 1 were separately arranged.

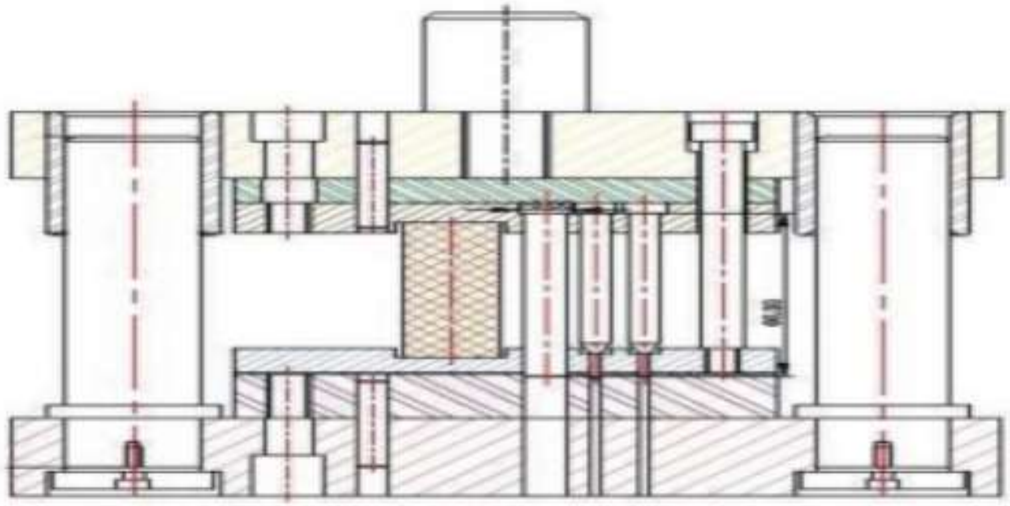


Fig. 4 Bridges for the comparison of panel deformation

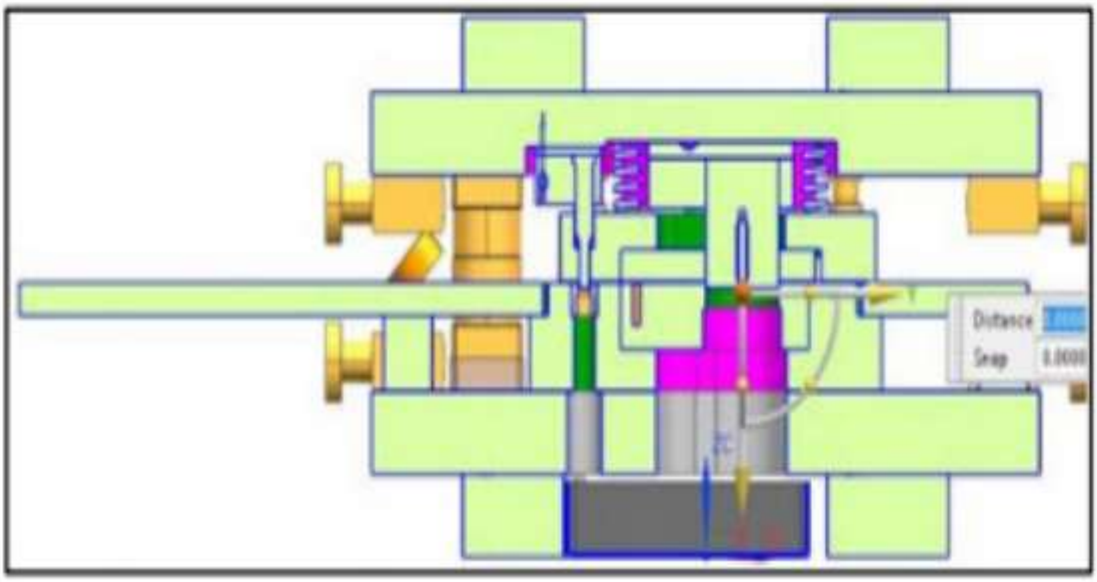


Fig. 5 Drawing processes with the bridge of case 1

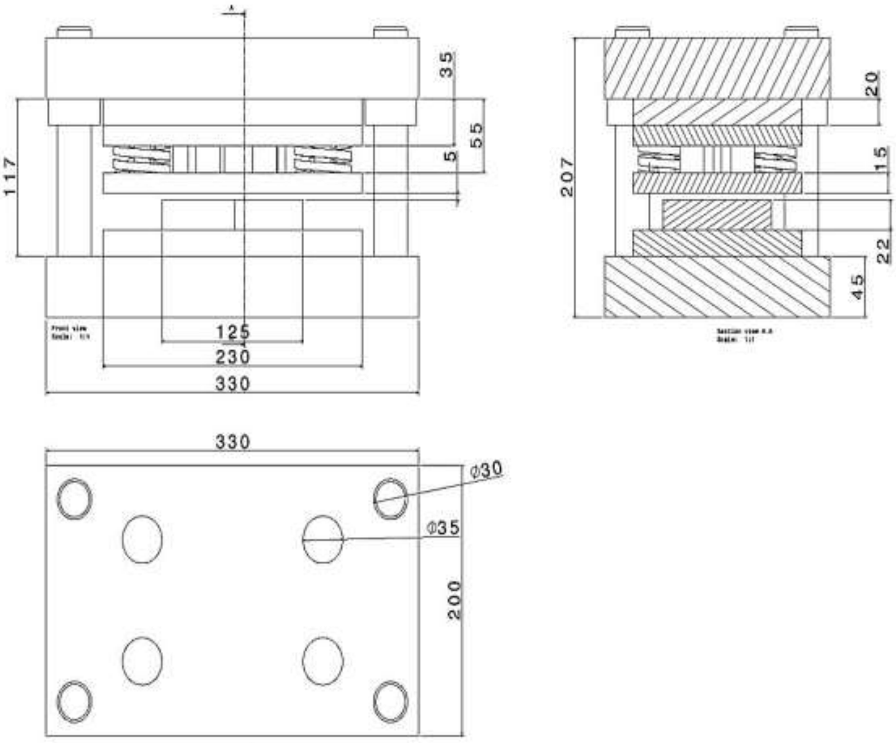


Fig. 6 Boundary conditions for gravity simulation

2.2.3 Drawing process forming analysis after bridge reinforcement

Fig. 1 shows the drawing process forming process for 4 is shown.

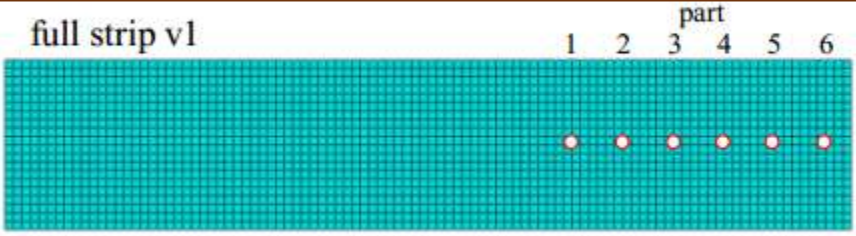
During the drawing process after reinforcing the bridge, there was no cracking of the panel on the molding limit diagram, and it was found that the shape of the bridge was twisted 40 mm before final molding.

2. **Analysis of panel deformation through self-weight deflection analysis**

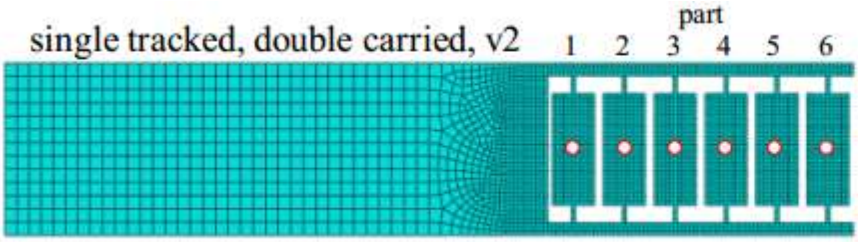
After the drawing process, self-weight deflection analysis [7] for 4 bridge cases was performed to verify the shape of strips and bridges that can be balanced during the process of moving up and down, moving the panel, and forming the product in the progressive mold. did.

The boundary conditions for self-weight deflection analysis are shown in Fig. As shown in Fig. 6, both rotation (R: rotation) and transfer (T: translation) movements were fixed in the same way as the constraint conditions of the panel in the actual progressive process.

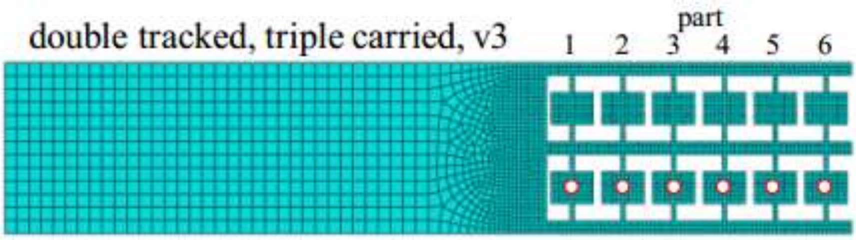
The results of the self-weight deflection analysis for the five bridge shape cases are shown in Fig. As shown in 7, in the progressive gradual forming process of a car seat side cushion panel with an asymmetric deep-drawing complex curved surface, when transferring, dismounting, and seating between processes, -2.93 to 2.89 mm in Case 1, -5.06 to 7.63 in Case 2 ㎜ , Case 3 was 7.97~32.60mm, Case 4 was -9.60~15.30mm, and Case 5 was -12.87~56.30mm.



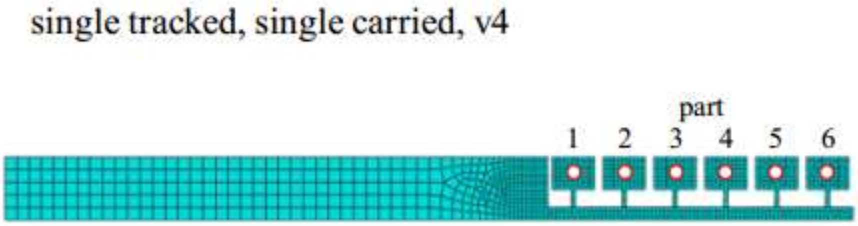
(a)Case 1



(b)Case 2



(c)Case 3



(d)Case 4

Fig. 7 Results of the deflection analysis by gravity in 4cases of belt bridge.

3. Conclusion

When press-molding asymmetric deep drawing products such as automobile seat cushion side panels by the progressive method, due to excessive inflow of panels due to deep drawing and an asymmetric center of gravity, a typical strip bridge is used to remove the upper and lower parts of the product from the mold and provide stable separation. song is difficult In this study, a bridge with flesh reinforcement and strength reinforced on the existing bridge was designed through the analysis of the drawing process.

(1) As a result of drawing forming analysis, it was found that the existing strip bridge started to burst 50 mm before forming completion.
(2) The modified strip bridge with flesh reinforcement and strength reinforcement did not burst during the drawing process analysis, and it was found that the twisting phenomenon occurred 40 mm before the completion of molding.
(3) As a result of performing self-weight deflection analysis with the same boundary conditions as the constraint conditions in the progressive forming process of the actual panel, the maximum deformation was 2.89 mm and the minimum -2.93 mm in Case 1 (a bridge shape that holds both left and right). In case 4 (a shape that holds only the left side in a plan view), the maximum deformation was 56.30 mm, and the minimum deformation was -12.87 mm.

Therefore, in the case of the seat side cushion panel, which is an asymmetric deep-drawing body part, it was confirmed that a strip bridge with a shape that holds both left and right sides when press-molding with the progressive method is most suitable.

Foydalanilgan adabiyotlar:

1. Karimov, R. (2021). PLANNING OF BELT BRIDGE FOR UNSYMMETRICAL PROGRESSIVE STAMPING. Scientific progress, 2(2), 616-623.
2. Karimov, R. J. O. G. L., & Toxtasinov, R. D. O. (2021). FEATURES OF CHIP FORMATION DURING PROCESSING OF POLYMER COMPOSITE MATERIALS. Scientific progress, 2(6), 1481-1487.
3. Karimov, R. J. O. G. L., O'G'Li, S. S. D., & Oxunjonov, Z. N. (2021). CUTTING HARD POLYMER COMPOSITE MATERIALS. Scientific progress, 2(6), 1488-1493.
4. Jaxongir o'g'li, R. K., & Sobirovna, N. S. IMPROVING THE QUALITY OF LASER CUTTING OF METALS BY OPTIMIZING THE TECHNOLOGICAL PARAMETERS OF THE PROCESS.
5. Toshqo'zieva, Z. E., Nurmatova, S. S., & Madaminov, J. Z. (2020). FEATURES OF USING INNOVATIVE TECHNOLOGIES TO IMPROVE THE QUALITY OF EDUCATION. Theoretical & Applied Science, (5), 213-217.
6. Dostonbek, V., & Salimaxon, N. (2021). The effect of scraping and surface cleaning on the scraping of scraping to be dressing in the cutting of polymer materials. ACADEMICIA: An International Multidisciplinary Research Journal, 11(6), 717-721.
7. Xonkulov, S. X., & Nurmatova, S. S. (2020). THE ROLE OF THE UZBEK LANGUAGE IN THE HISTORY OF DEVELOPMENT IN THE WORK OF HAMZA HAKIMZODA NIYAZI. Scientific Bulletin of Namangan State University, 2(4), 164-169.
8. Хусанбоев, А. М., Тошкузиева, З. Э., & Нурматова, С. С. (2020). Приём деления острого угла на три равные части. Проблемы современной науки и образования, (1 (146)).
9. Khusanbaev, A. M., Madaminov, J. Z., & Oxunjonov, Z. N. (2020). EFFECT OF RADIATION ON PHYSICAL-MECHANICAL PROPERTIES OF SILK THREADS. Theoretical & Applied Science, (5), 209-212.

10. Арзиев, С. С., & Тохиров, И. Х. Ў. (2021). ФАЗОВИЙ ФИКРЛАШНИНГ БЎЛАЖАК МУҲАНДИС ВА АРХИТЕКТОРЛАР ИЖОДИЙ ФАОЛИЯТИДА ТУТГАН ЎРНИ. Scientific progress, 2(2), 438-442.
11. Kholmurzaev, A. A., & Tokhirov, I. K. (2021). The active participation of students in the formation of the educational process is a key to efficiency. ACADEMICIA: An International Multidisciplinary Research Journal, 11(4), 435-439.
12. Усманов, Д. А., Холмурзаев, А. А., & Умарова, М. О. (2020). Сохранение физико-механических свойств хлопка-сырца при хранении. Проблемы современной науки и образования, (3 (148)).
13. Khusanjonov, A., Makhammadjon, Q., & Gholibjon, J. OPPORTUNITIES TO IMPROVE EFFICIENCY AND OTHER ENGINE PERFORMANCE AT LOW LOADS.
14. Xusanjonov, A., Qobulov, M., & Ismadiyorov, A. (2021). AVTOMOBIL SHOVQINIGA SABAB BO'LUVCHI MANBALARNI TADQIQ ETISH. Academic research in educational sciences, 2(3).
15. Khusanjonov, A., Siddiqov, B., & Asqarov, J. (2021). CALCULATION-EXPERIMENTAL METHOD OF RESEARCH OF EFFICIENCYADORLIK INDICATORS IN ITS MANAGEMENT BY CHANGING THE WORKING CAPACITY OF THE ENGINE USINGSALSAL CHARACTERISTICS. Экономика и социум, (4-1), 161-164.
16. Xusanjonov, A. S., & Otaboev, N. I. (2018). IMPROVING OF STEERABILITY OF AUTOMOBILES WITH ROTATION OF X-TYPE OF HIS REAR WHEELS RELATIVELY OF FRONT WHEELS. Scientific-technical journal, 22(2), 131-133.
17. Xusanjonov, A., Qobulov, M., & Abdubannopov, A. (2021). AVTOTRANSPORT VOSITALARIDAGI SHOVQIN SO'NDIRUVCHI MOSLAMALARDA ISHLATILGAN KONSTRUKSIYALAR TAHLILI. Academic research in educational sciences, 2(3).
18. Xodjayev, S., Xusanjonov, A., & Botirov, B. (2021). TRANSPORT VOSITALARI DVIGATELLARIDA DIMETILEFIR YOQILG'ISIDAN FOYDALANISH. Scientific progress, 2(1), 1531-1535.
19. Xodjayev, S., Xusanjonov, A., & Botirov, B. (2021). GIBRID DVIGATELLI AVTOMOBILLARDAN FOYDALANIB ICHKI YONUV DVIGATELLARI ISHLAB CHIQARGAN QUVVAT SAMARADORLIGINI OSHIRISH VA ATROF-MUHITGA CHIQARILAYOTGAN ZARARLI GAZLARNI KAMAYTIRISH. Scientific progress, 2(1), 1523-1530.
20. Абдуллаева, Д. Т., Каримов, Р. Х., & Умарова, М. О. (2021). МАКТАБ ТАЪЛИМ ТИЗИМИДА ЧИЗМАЧИЛИК ФАНИНИ РИВОЖЛАНТИРИШ ВА БИЛИМ БЕРИШ ЖАРАЁНИНИ ТАКОМИЛЛАШТИРИШ. Scientific progress, 2(1), 323-327.
21. Валихонов, Д. А. Ў., Ботиров, А. А. Ў., Охунжонов, З. Н., & Каримов, Р. Х. (2021). ЭСКИ АСФАЛЬТО БЕТОННИ КАЙТА ИШЛАШ. Scientific progress, 2(1), 367-373.
22. Xusanov, Y. Y., & Valixonov, D. A. O. G. L. (2021). POLIMER KOMPOZITSION MATERIALLARDAN TAYYORLANGAN DETALLARNI PARMALASHNI ASOSIY KO 'RINISHLARI. Scientific progress, 1(6), 1169-1174.
23. Холмурзаев, А. А., Алижонов, О. И., Мадаминов, Ж. З., & Каримов, Р. Х. (2019). Эффективные средства создания обучающих программ по предмету «Начертательная геометрия». Проблемы современной науки и образования, (12-1 (145)).
24. Турғунбеков, А. М. Ў. (2021). НОТЕХНОЛОГИК ЮЗАНИНГ ТЕШИКЛАРИГА ИШЛОВ БЕРИШДА ДОРНАЛАШ УСУЛИНИ ТАДБИҚ ЭТИШ. Scientific progress, 2(1), 4-10.

25. Холмурзаев, А. А., Тохиров, И. Х. У., & Охунжонов, З. Н. (2019). Движение летучки хлопка-сырца в зоне от вершины колка до отражающего козырька. Проблемы современной науки и образования, (11-2 (144)).
26. Polotov, K. K. (2020). FEATURES OF TEACHING ENGINEERING AND COMPUTER GRAPHICS. Theoretical & Applied Science, (6), 573-576.
27. Zulfiya, B., Rakhmonali, S., & Murodjon, K. (2021). A BRIEF HISTORY OF THE DEVELOPMENT AND TEACHING OF DRAWING SCIENCE IN UZBEKISTAN.
28. Abdumajidxon Murodxon O‘G‘Li Muxtorov, & Axmadbek Maxmudbek O‘G‘Li Turg‘Unbekov (2021). VAKUUM XALQALARI UCHUN SILIKON MATERIALLARNI TURLARI VA ULARNING TAHLILI. Scientific progress, 2 (6), 1503-1508.
29. Ахмадбек Махмудбек Ўғли Турғунбеков (2021). НОТЕХНОЛОГИК ЮЗАНИНГ ТЕШИКЛАРИГА ИШЛОВ БЕРИШДА ДОРНАЛАШ УСУЛИНИ ТАДБИҚ ЭТИШ. Scientific progress, 2 (1), 4-10.
30. Kholmurzaev, A. A., & Polotov, K. K. (2020). METHODS OF USING MEDIA EDUCATION IN THE LEARNING PROCESS. Theoretical & Applied Science, (5), 205-208.