Control of Design Documentation

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ABSTRACT

This article analyses the management of the correct sequence of work performed in the development of design documentation, the organization of work on the inspection of developed drawings, diagrams, etc.

Keywords: drawings, design documentation, control, quality, production, maintance

Poor quality of parts, assembly units and the product as a whole, caused by errors in the design documentation, non-compliance with the necessary requirements, leads to overspending of materials and an additional increase in the complexity of manufacturing. All this disorganizes production and causes moral and material damage to the designer. In order to avoid unnecessary material costs, a check of drawings and other design documentation is introduced, which should be fully completed by the end of development. Checking the design documentation of the product — assembly drawings, diagrams, operational documentation-gives an answer about the quality of the product design.

Analysis of technical solutions and verification of their graphic designs is an integral part of the development. The constructor constantly checks itself at all stages of development and during the execution of each design document. In order to avoid a subjective approach, the final check of the design documentation is carried out by another person, which is provided for in GOST 2.104—68*. These functions are most often performed by the lead designer or the head of the department. All sheets of design documentation are subject to verification. It should start with the simplest assembly units containing only parts, and then move on to more complex ones. Checking the design solutions of parts and assembly units should be carried out taking into account the design of the assembly unit, the complex or kit in which they are included and the entire product as a whole. There are two methods for checking drawings: analytical and graphical.

The analytical method of checking design documentation is the generally accepted and most common method. It is reduced to checking the design solution and recalculating the dimensional chains, taking into account the permissible deviations.

The main criteria for checking the design solution and the issues to be checked are discussed below.

Compliance of the design with the requirements of the technical specification is reduced to determining the conformity of the product to its intended purpose. The restrictions concerning the operating conditions (the environment in which the product operates, the features of starting, adjusting, stopping, etc.), the compliance of the technical characteristics of the product (performance, mechanical, electrical and other parameters) with the requirements of the technical specification are checked. Checking the functioning of the product and its circuits is reduced to checking the possibility of manufacturing, assembling and controlling the product, to checking the operability of kinematic, electrical, pneumatic and other circuits-each separately and their joint work. Checking the strength, reliability and wear resistance of the product is expressed in determining the influence of dynamic and static loads, stress concentration, the influence of friction in the interfaces and comparing these indicators with the available ones.

Occupational safety requirements, requirements for ease of maintenance — criteria used to determine the degree of operator safety, protection of service personnel from harmful influences (noise, vibration, temperature, chemical exposure, etc.), compliance with the principle of unity of the external shape of the product and its functional purpose, etc. Checking the cost-effectiveness of a product is reduced to checking the economic indicators of products that determine the labor intensity of manufacturing, the amount of materials and energy used in the manufacture and operation.

Analytical verification of drawings of assembly units and parts is primarily aimed at verifying the correctness of the product image. The correctness of the image, the correct application of dimensions, their permissible deviations and technical requirements in the drawings is the basis for high-quality manufacturing of the product. During the analytical verification of drawings of assembly products and parts, it is checked:

- selecting the scale and matching the size to the scale;

- correct drawing of details; sufficient views, sections, sections, no unnecessary images;

- compliance of the design of the drawing with the requirements of the standards the system of design documentation;

- the need to issue additional drawings;

- the presence in the drawing of the dimensions necessary for manufacturing, assembly and control;

- the presence of repeated dimensions and designations;

- the correct choice of design bases that affect the performance of the product of its functions;

- the maximum coincidence of the technological bases with the design;

- the correctness of the drawing of the permissible deviations of dimensions;

- the shape and relative position of surfaces; the correctness of the calculation of dimensional chains taking into account the permissible deviations;

- correct application of all necessary designations and technical requirements in the drawing;

- determination of surface roughness parameters;

- selection of heat treatment depending on the functional requirements for the part and the technological capabilities of the selected material;

- correctness of the selected surface coating.

The graphical method of checking drawings involves re-drawing the drawing of a part, assembly unit or product as a whole in a strictly defined, sustained scale according to completed, verified working drawings of parts. In order to better detect errors, it is advisable to apply a zoom scale. This method is time-consuming and is used in cases where the use of the analytical method is difficult. The graphical verification method is the only method for verifying product drawings with complex surfaces. It seems to reproduce the process of manufacturing the product and answers the question whether all the necessary dimensions for manufacturing are put down in the drawing, as well as errors that occur in the work of the designer. A characteristic error is the lack of space between the surfaces necessary for the assembly of the mechanism and its normal functioning. This may lead to the impossibility of assembly or failure to provide the stroke value of the mechanism elements. The graphical check is performed taking into account the extreme positions of the moving parts of the mechanism and any intermediate value that may be limited to the elements of the adjacent parts.

Often, the thickness of complex bridges and walls of the product can not be determined by the analytical method. In these cases, especially if the lintels and walls are thin, it is advisable to perform a graphical check. To do this, the place of interest is drawn on an enlarged scale, taking into account the maximum size deviations, and the most unfavorable position of the element to be checked is established.

The control of design documentation can significantly affect not only the quality of documentation (this goal is mostly pursued by normalized control), but also the quality of the manufactured product.

Control of the design documentation allows you to identify inaccuracies, errors and errors in the design that can cause a decrease in the quality or defect of the product manufactured according to the design documentation being checked.

Errors not detected during the design control are eliminated during the test and directly in the production process. The number of these errors and omissions is indicated by the number of changes made to the design documentation after its approval. Based on the analysis of notifications of changes in the design documentation, it is possible to judge the types of errors missed by supervisors and the reasons for their occurrence (the main reasons for errors that are the reason for issuing notifications of changes, as a percentage of the total number of errors):

- shallow pre-project study of the topic-30 %;
- carelessness and inattention in the work of performers — 14 %;
- lack of verification calculations for strength, reliability-12 %;
- use of original parts and assemblies in the presence of standard (low coefficient of unification) - 11 %;
- incomplete compliance of design and engineering works with the technical task — 7 %;
- non-compliance of test methods with real operating conditions — b %;
- poor control of the work of performers due to irregular work-6 %;
- low qualification of the developer-5 % , etc.

References

1. Mamadjanov, A. M., & Sadirov, S. (2021). Analysis of design errors in mechanical engineering. *Scientific progress*, *2*(1), 1648-1654.
2. Mamadjanov, A. M., Yusupov, S. M., & Sadirov, S. (2021). Advantages and the future of cnc machines. *Scientific progress*, *2*(1), 1638-1647.
3. Рубидинов, Ш. Ғ. Ў. (2021). Бикрлиги паст валларга совуқ ишлов бериш усули. *Scientific progress*, *1*(6), 413-417.
4. Тешабоев, А. Э., Рубидинов, Ш. Ғ. Ў., Назаров, А. Ғ. Ў., & Ғайратов, Ж. Ғ. Ў. (2021). Машинасозликда юза тозалигини назоратини автоматлаш. *Scientific progress*, *1*(5), 328-335.
5. Nomanjonov, S., Rustamov, M., Rubidinov, S., & Akramov, M. (2019). STAMP DESIGN. *Экономика и социум*, (12), 101-104.
6. Qosimova, Z. M., & RubidinovSh, G. (2021). Influence of The Design of The Rolling Roller on The Quality of The Surface Layer During Plastic Deformation on the Workpiece. *International Journal of Human Computing Studies*, *3*(2), 257-263.
7. Рубидинов, Ш. Ғ. Ў., & Ғайратов, Ж. Ғ. Ў. (2021). Штампларни таъмирлашда замонавий технология хромлаш усулидан фойдаланиш. *Scientific progress*, *2*(5), 469-473.
8. Рубидинов, Ш. Г. У., & Ғайратов, Ж. Г. У. (2021). Кўп операцияли фрезалаб ишлов бериш марказининг тана деталларига ишлов беришдаги унумдорлигини тахлили. *Oriental renaissance: Innovative, educational,*

natural and social sciences, *1*(9), 759-765.

9. Рубидинов, Ш. Ғ. У., Ғайратов, Ж. Ғ. У., & Райимжонов, Қ. Р. Ў. (2021). ИЗНОСОСТОЙКИЕ МЕТАЛЛОПОДОБНЫЕ СОЕДИНЕНИЯ. *Scientific progress*, *2*(8), 441-448.
10. Рубидинов, Ш. F. У. (2021). Акбаров КИУ Машинасозликда сочилувчан материалларни ташишда транспортер тизимларининг ахдмияти. *Scientific progress*, *2*(2), 182-187.
11. Рубидинов, Ш. Ғ. У., & Раимжонов, Қ. Р. Ў. (2022). Изменение микрорельефа поверхности и шероховатости допусков деталей после химичке-термический обработки борирования. *Scientific progress*, *3*(1), 34-40.
12. Мадаминов, Бахром Миродилович, et al. "АНТИКОРРОЗИОННЫЕ КОМПОЗИЦИОННЫЕ СИЛИКАТНЫЕ МАТЕРИАЛЫ ДЛЯ ЗАЩИТЫ ОБОРУДОВАНИЙ ХИМИЧЕСКОЙ ПРОМЫШЛЕННОСТИ." *Universum: технические науки* 10-3 (91) (2021): 61-66.
13. Тешабоев, А. М., Рубидинов, Ш. Ғ. У., & Ғайратов, Ж. Ғ. У. (2022). АНАЛИЗ РЕМОНТА ПОВЕРХНОСТЕЙ ДЕТАЛЕЙ С ГАЗОТЕРМИЧЕСКИМ И ГАЛЬВАНИЧЕСКИМ ПОКРЫТИЕМ. *Scientific progress*, *3*(2), 861-867.
14. Тешабоев, А. М., & Рубидинов, Ш. Ғ. У (2022). ВАКУУМНОЕ ИОННО-ПЛАЗМЕННОЕ ПОКРЫТИЕ ДЕТАЛЕЙ И АНАЛИЗ ИЗМЕНЕНИЯ ПОВЕРХНОСТНЫХ СЛОЕВ. *Scientific progress*, *3*(2), 286-292.
15. Рубидинов, Ш. Ғ. У., Қосимова, З. М., Ғайратов, Ж. Ғ. У., & Акрамов, М. М. Ў. (2022). МАТЕРИАЛЫ ТРИБОТЕХНИЧЕСКОГО НАЗНАЧЕНИЯ ЭРОЗИОННЫЙ ИЗНОС. *Scientific progress*, *3*(1), 480-486.
16. Рубидинов, Ш. Ғ. У., Ғайратов, Ж. Ғ. У., & Ахмедов, У. А. У. (2022). МАТЕРИАЛЫ, СПОСОБНЫЕ УМЕНЬШИТЬ КОЭФФИЦИЕНТ ТРЕНИЯ ДРУГИХ МАТЕРИАЛОВ. *Scientific progress*, *3*(2), 1043-1048.
17. Юлчиева, С. Б., Негматов, С. С., Негматова, К. С., Мамуров, Э. Т., Мадаминов, Б. М., & Рубидинов, Ш. Г. У. (2021). ПОВЫШЕНИЕ КОРРОЗИОННОСТОЙКОСТИ КОМПОЗИЦИОННЫХ МАТЕРИАЛОВ С ДОБАВЛЕНИЕМ ПОЛИМЕРНЫХ ДОБАВОК. *Universum: технические науки*, (10-1 (91)), 48-52.
18. Yulchieva, S. B., Olimov, A., & yusuf Yunusov, M. (2022). Gas Thermal and Galvanic Coatings on the Surface of Parts. *International Journal of Innovative Analyses and Emerging Technology*, *2*(2), 26-30.
19. Мадаминов, Б. М., Юлчиева, С. Б., Негматова, К. С., Кучкаров, У. К., Рубидинов, Ш. Г. У., & Негматов, С. С. & Мамуров, ЭТ (2021). *АНТИКОРРОЗИОННЫЕ КОМПОЗИЦИОННЫЕ СИЛИКАТНЫЕ МАТЕРИАЛЫ ДЛЯ ЗАЩИТЫ ОБОРУДОВАНИЙ ХИМИЧЕСКОЙ ПРОМЫШЛЕННОСТИ. Universum: технические науки,(10-3 (91))*, 61-66.
20. Mamirov, A. R., Rubidinov, S. G., & Gayratov, J. G. (2022). Influence and Effectiveness of Lubricants on Friction on the Surface of Materials. *CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES*, *3*(4), 83-89.
21. Mamatov, S. A. (2022). Paint Compositions for the Upper Layers of Paint Coatings. *Middle European Scientific Bulletin*, *23*, 137-142.
22. Teshaboyev, A. M., & Meliboyev, I. A. (2022). Types and Applications of Corrosion-Resistant Metals. *CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES*, *3*(5), 15-22.
23. Мадаминов, Б. М., Юлчиева, С. Б., Негматова, К. С., Кучкаров, У. К., Рубидинов, Ш. Г. У., Негматов, С. С., ... & Мамуров, Э. Т. (2021). АНТИКОРРОЗИОННЫЕ

КОМПОЗИЦИОННЫЕ СИЛИКАТНЫЕ МАТЕРИАЛЫ ДЛЯ ЗАЩИТЫ ОБОРУДОВАНИЙ ХИМИЧЕСКОЙ ПРОМЫШЛЕННОСТИ. *Universum: технические науки*, (10-3 (91)), 61-66.

24. Тешабоев, А. Э., Рубидинов, Ш. Ғ. Ў., Назаров, А. Ғ. Ў., & Ғайратов, Ж. Ғ. Ў.(2021). Машинасозликда юза тозалигини назоратини автоматлаш. *Scientific progress*, *1*(5).
25. Юсуфжонов, О. Ғ., & Ғайратов, Ж. Ғ. (2021). Штамплаш жараёнида ишчи юзаларни ейилишга бардошлилигини оширишда мойлашни аҳамияти. *Scientific progress*, *1*(6), 962-966.
26. Мамуров, Э. Т., Косимова, З. М., & Собиров, С. С. (2021). Разработка технологического процесса с использованием cad-cam программ. *Scientific progress*, *2*(1), 574-578.
27. Мамуров, Э. Т., Косимова, З. М., & Джемилов, Д. И. (2021). Повышение производительности станков с числовым программным управлением в машиностроении. *Science and Education*, *2*(5), 454-458.
28. Мамуров, Э. Т., Косимова, З. М., & Гильванов, Р. Р. (2021). Использование программ для расчетов основного технологического времени. *Scientific progress*, *2*(1), 918-923.
29. Косимова, З. М., Мамуров, Э. Т., & угли Толипов, А. Н. (2021). Повышение эффективности средств измерения при помощи расчетно-аналитического метода измерительной системы. *Science and Education*, *2*(5), 435-440.
30. Мамуров, Э. Т., & Джемилов, Д. И. (2021). Использование вторичных баббитов в подшипниках скольжения на промышленных предприятиях. *Science and Education*, *2*(10), 172-179.
31. Мамуров, Э. Т. (2021). Металлларга кесиб ишлов беришда контакт жараёнларнинг виброакустик сигналга таъсири. *Science and Education*, *2*(12), 158-165.
32. Мамуров, Э. Т. (2021). Кесувчи асбоб ҳолатини ва кесиш жараёнини виброакустик сигнал асосида ташхислаш. *Science and Education*, *2*(12), 133-139.
33. Мамуров, Э. Т., & Одилжонов, Ш. О. Ў. (2021). Разработка рекомендаций по выплавке и заливки переработанного баббита в подшипники скольжения. *Scientific progress*, *2*(6), 1617-1623.
34. Mamurov, E. T. (2022). Study of the Dependences of Specific Energy Consumption on the Elements of the Cutting Mode as an Informative Parameter of the Cutting Process. *Middle European Scientific Bulletin*, *24*, 315-321.
35. Mamurov, E. T. (2022). Metal Cutting Process Control Based on Effective Power. *CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES*, *3*(5), 238-244.
36. Mamurov, E. T. (2022). Control of the Process of Cutting Metals by the Power Consumption of the Electric Motor of the Metal-Cutting Machine. *Eurasian Scientific Herald*, *8*, 176-180.
37. Таджибаев, Р. К., Гайназаров, А. А., & Турсунов, Ш. Т. (2021). Причины Образования Мелких (Точечных) Оптических Искажений На Ветровых Стеклах И Метод Их Устранения. *CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES*, *2*(11), 168-177.
38. Tadjibaev, R. K., & Tursunov, S. T. (2022). Scientific Research and Study Behavior of Curved Pipes Under Loads. *CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES*, *3*(3), 81-86.
39. Акрамов, М. М. (2022). Краткая Характеристика Горячих Цинковых Покрытий. *CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES*, *3*(5), 232-237.

40. Косимова, З. М. (2022). Анализ Измерительной Системы Через Количественное Выражение Ее Характеристик. *CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES*, *3*(5), 76-84.