

DESIGN REVIEW AS AN ELEMENT OF THE QUALITY PLANNING PROCESS TO ELIMINATE NONCONFORMITIES IN TECHNICAL PROJECT DOCUMENTATION

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This paper aims to present a concept of “Design Review” process, developed and implemented based on research conducted in a manufacturing company in the automotive industry, as one of the quality planning instruments. The analyses define in a structured way who and in what phase of the project is reviewing the project documentation and for which documents compliance with the client’s requirements should be checked. The process output is a structured description of the identified nonconformities used to develop and implement corrective actions as a part of the continuous improvement process.

Key words: automotive industry, manufacturing company, quality planning, development process, mistake proofing.

INTRODUCTION

Technical documentation describes the technical parameters necessary to make a product. Based on the data contained in the technical documentation, you can estimate the time required to produce the product and its cost. The completeness and consistency of technical documentation translate into the effectiveness of project implementation and customer satisfaction.

The correctness of the technical documentation is a prerequisite for the implementation of each project, which is additionally hindered by the increased complexity of the product and the limited time allocated to its development. This forces the organization to implement additional quality planning instruments to avoid nonconformities arising during the development of technical documentation or their early detection [1-3].

DESIGN REVIEW AS A PART OF THE APQP PROCESS

The factor affecting the effectiveness and efficiency of technical documentation reviews is the determination of a moment during the project in accordance with the APQP (Advanced Product Quality Planning) when the review should be planned and carried out.

Based on research and analyses carried out in an automotive manufacturing company, a process defines the conditions under which a documentation review should be planned and carried out. Figure 1 shows the relationship between the occurrence of technical documentation reviews, the output of which is the input to the de-

sign technical reviews as a part of the validation of the project, which is necessary to leave one phase of APQP and enter the next [4].

DESIGN REVIEW CONCEPT

The main idea behind the Design Review process is to create a group of internal auditors from the Product Engineering and CAD departments who will conduct regular reviews of the documentation. The person that is checking the documentation cannot be a part of the development team of the project that is under review.

The Product Engineer of the project is responsible for initiating the Design Review process and is the one who notifies the Design Review coordinator of the need for a review and establishes a schedule; this person also provides the review inputs, the component numbers to be reviewed, and the customer requirements, thus forming a basis on which the review will be conducted.

The purpose of the Design Review is to check all available technical documentation for a given project, including the client’s technical documentation, internal technical documentation, the correctness of the materials used and individual parts of the assembly (BOM - Bill of Material and Material Master) as well as specifications and technical drawings that are attached to each assembly component. Verifying the compliance of 2D documentation with 3D models is also important.

Before the Design Review, design documentation is printed and reviewed on-site; online reviews have proven less effective.

Figure 2 shows a diagram of the Design Review process, the output of which is a report with listed nonconformities or elements that require clarification by the Product Engineer. The review results are discussed in a

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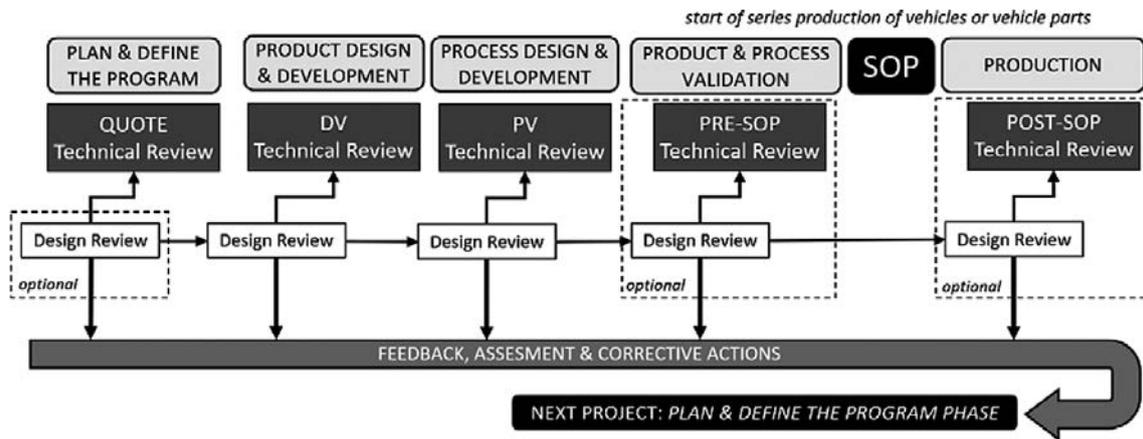


Figure 1 Design review as a part of the APQP process (own elaboration based on [4, 5])

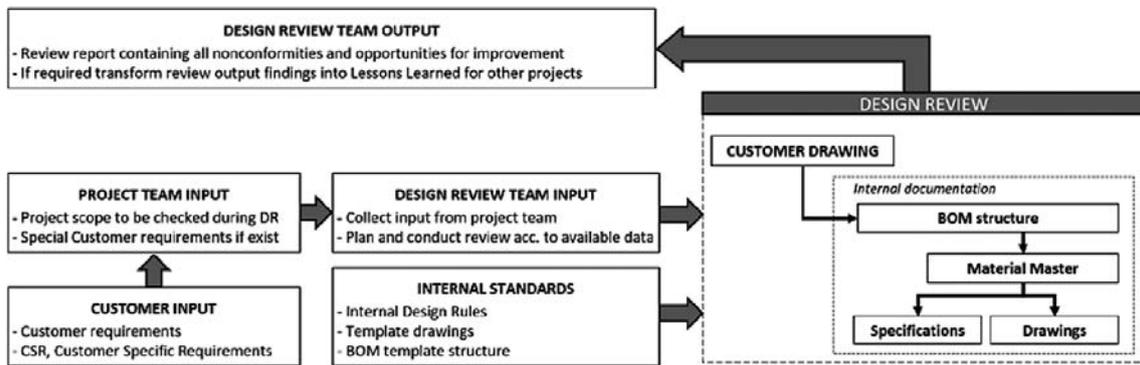


Figure 2 Design review process flow (own elaboration based on [5])

Table 1 Assessment of requirements fulfilment, during Design Review (classification based on VDA 6.3 manual)

Amount of points	Evaluation of meeting the requirements
10	Requirements met in full, no additional remarks
8	Small nonconformities not affecting final product function
6	Requirements partially met, nonconformities that potentially can affect final product function
4	Requirements insufficiently met, serious nonconformities, high risk to affect final product function
0	Requirement not met, high risk to affect final product function

debriefing meeting between the people who reviewed the documentation and members of the project team responsible for the project. After analysing the nonconformities, project team members develop a schedule and an action plan on how to avoid nonconformities and what impact they have on the project, whether they can disrupt the project schedule or its profitability.

DESIGN REVIEW OUTPUT

During the Design Review, 100 % of the content of technical drawings, the correctness of the bill of materials (BOM) and the list of specifications attached to each component and assembly are verified.

Each of the checked parameters is assessed in terms of meeting a specific requirement and the existence of a risk of potential impact on the function of the final product (in the case of shock absorbers, the final product is a car).

The classification of nonconformities is similar to the one used during the process audit according to the requirements of the VDA 6.3 manual (VDA – Verband der Automobilindustrie is a standard defining how to conduct an audit in an organization dedicated to suppliers who are a part of the supply chain for Germany). Table 1 shows how nonconformities are classified during Design Reviews; it is necessary when developing a plan on how and when to correct nonconformities after the review. the priority is to correct inconsistencies that could potentially affect the function of the final product [6].

CONCLUSIONS

The Design Review process was implemented in the organization in 2022. Since then, a documentation review has been carried out for 12 programmes. Considering all reviews, 80 % of detected nonconformities relate to aspects that do not affect the function of the final product, and these are minor nonconformities (acc. to Table 1, the nonconformity rating is 8). 10 % of nonconformities are classified as 6. 5 % are nonconformities which, due to incomplete fulfilment of the require-

ments, may hurt the final product, are classified as 4, acc. to Table 1. 5 % of detected nonconformities relate to not meeting a specific requirement.

The high effectiveness of the Design Review confirms the validity of implementing this tool as one of the organization's quality planning elements. An additional aspect confirming the above statement is that after each Design Review, the identified nonconformities and corrective actions are verified for implementation in the Continuous Improvement process.

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