



Documentation of nonconforming products and its optimization

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The automotive industry is a specific industrial sector where quality of products is very important. It is therefore necessary to use a unified and internationally accepted structure of documentation. This requirement is especially evident in the issue of nonconforming products. A form called an 8D Report is most often used for recording nonconforming products. The structure of this form contributes to a fast resolution and also contributes to finding the cause of the problem. Because today's business environment is focused on quality products, and also on their minimum price, it is necessary to constantly seek new ways of reducing costs. It is therefore necessary to seek not only savings in production technologies and, develop new materials, but also to find savings in documentation. Documentation offers many possibilities for optimization and for reducing dead time and thereby reducing costs. For effective optimization of documentation it is possible to use MS Excel with advanced features such as macros.

Keywords: ISO 9001:2008, nonconforming products, 8D Report, MS Excel, macros

1 Quality in the automotive industry

The automotive industry is currently one of the fastest growing industries with a multi-billion annual turnover and it is in many respects specific. One of the specificities is lean production. Thanks to this type of production a company is able to decrease costs. A second specificity is cooperation. This is characteristic of the automotive industry and plays a crucial role in the quality of production.

Approaches to quality have evolved through many changes. In the very beginning the aim was to ensure hundred percent needs and expectations of customers. Thanks to development of the industry and of the market trend the requirement for hundred percent quality products was expanded by the requirement to reduce prices of products. This was primarily due to globalization, through increased competition in the various fields of industry and increasing the purchasing power of customers.

Cooperation is an especially effective way to compete in the market focusing on quality products at minimum prices. It gives companies the opportunity to target their business in a specific production area, making it possible to reduce the cost of production. The production is then highly specialized and technology and processes are perfectly managed.

1.1 Cooperation and quality of products

Cooperation is not the only way to reduce the cost of production but it can bring many problems too. A very special problem arising from cooperation is the possibility of poor quality deliveries. The customer does not perceive the share of cooperation in the product. The customer evaluates the quality of the product only with regard to companies that place their product logo on the product, or how the product is presented put on the market. That is why every business should evaluate how suppliers can influence the quality of their products. Therefore, it is currently necessary to perform the selection of suppliers based on the selected parameters.

The automotive industry mostly focuses on quality for its basic selection of suppliers. This focus is expressed by certification on the basis of the internationally accepted standard ISO 9001: 2008. It is a certificate that declares the suitability of the management system to produce quality products. But because the standard is very general, the automotive industry uses ISO 9001:2008 in combination with ISO / TS 16949: 2008. This standard extends and toughens the requirements of ISO 9001: 2008. A system based on these standards is then able to produce quality products repeatedly over a long period. The certificate is allocated based on the verification of the quality management system of the organization by an independent company. This makes it an internationally accepted mark of quality. Certificates ISO 9001:2008 and ISO/TS 16949: 2008 are requirements for the opportunity to participate in the supplier chain in automotive industry.

1.2 Occurrence of nonconforming products

Even with all the efforts to ensure the quality of products and ensuring a perfect selection of suppliers, the possibility of the occurrence of nonconforming products cannot be eliminated. However, quality management focused on the requirements and recommendations of standards ISO 9001: 2008 and ISO / TS 16949: 2008, significantly contributes to elimination of the occurrence of nonconforming products. It is important to note that nonconforming product does not automatically mean unrepairable component. The term "nonconforming product" is specified in standard ISO 9001: 2008 as: "The material, semi-finished product, part, assembly kit, finished product which does not conform to specifications." [1]. This is why nonconforming products are graded in several categories. These may be products that are unrepairable and they must be identified, separated from perfect pieces and disposed of. In the next category are products that are unrepairable, but which can be offered to another customer for another purpose. This means that they do not have to

be liquidated but can be sold at lower prices. And in the last category are products which do not conform to specifications but are repairable. If a nonconforming product is detected a very fast reaction is required. Urgent reaction is important in any industrial sector but in the automotive industry this requirement is most striking. This is caused mainly because of the high degree of cooperation and the terms of contracts such as sanctions which may be implemented for stopping a car maker's production line. Every stoppage of production due to nonconforming products can cause liquidation of the supplier which is responsible for these products. Therefore, problems and disagreements must be resolved quickly, efficiently and uniformly. In the automotive industry the 8D Report is most often used for solving nonconforming products. It is a very simple, easy and effective form.


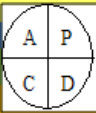
 8D-Report				No.		
1). TEAM:		PURPOSE OF NONCONFORMITY			Following of PDCA	
Chief		Customer/Plant	Name of the part:		P	
Participant:		Claim of customer	Date of the claim:		D	
Participant:		Internal mistake	Repeated mistake		C	
Participant:		Supplier mistake	Others (in detail):		A	
Comments : P = Plan, D = Do, C = Check, A = Act						
2) Description of the problem (who, what, where, when, how, how many, why)						
Part No:		Quantity:		Production charge:		
Date:		Signature:				
3) Short-term actions					Responsibility	Date of start of short-term action
Date:		Signature:				
4) Analyse of reasons			5) Actions for elimination		Responsibility	Term
						Closed

Fig. 1 Part of 8D Report [2]
Obr. 1 Část 8D Reportu [2]

2 Management of nonconforming products

Working with a nonconforming product includes identification, recording and final resolution. Nonconforming products are specified by the standard ISO 9001: 2008 as an issue with mandatory documented procedures. It is a fundamental issue for a company and it is therefore necessary to have this area perfectly managed and mapped. It is necessary not only to record nonconforming products in the relevant documentation, but to keep this documentation in adequate condition. It is essential to make an effort to search for the causes of the problems too.

If companies do not pay sufficient attention to the issue of nonconforming products, they can never achieve continuing minimization of such products. It is necessary to focus on finding the main causes of nonconformity. Without detection of the main causes and implementation of adequate corrective actions and precautions, it is not possible to decrease the numbers of nonconforming products. The 8D report is an effective tool for this purpose.

2.1 Structure of 8D Reports

The 8D Report has a clearly defined structure. Its philosophy is based on a systematic solution of nonconformities with the aim of maximum efficiency, time savings, clarity and a focus on eliminating the main cause of the problem. This whole process is carried out in the 8D Report in eight steps, called 'disciplines', which gives the form its name.

The 8 disciplines of the 8D Report :

- D1 - Team
- D2 – Problem description
- D3 – Containment action (s)
- D4 – Analyze and main cause (s)
- D5 – Chosen permanent corrective action (s)
- D6 – Implementation of permanent corrective action (s)
- D7 – Design of precaution (s)
- D8 – Team evaluation

D1: In the first step should be chosen the team that will be responsible for solving the problem. The team should contain experts who are from different departments.

D2: In the second step is described the nonconformity with all details and information about the problem.

D3: In the third step are suggested containment actions which are targeted at eliminating the effects of nonconforming products. The aim of this section is also to gain time to analyze the problem. This analysis should find permanent corrective actions. An important aspect is to set deadlines, dates of implementation and dates of removal of these actions. Containment actions should be in effect only as long as necessary.

D4: To be able to design permanent corrective actions it is necessary to find the main cause of the problem. This is the purpose of step four. In this step methods such as "5x why", Ishikawa diagram, etc., are used.

D5: After finding the main cause permanent corrective action must be specified that removes it and prevents a recurrence of the problem.

D6: When the main cause is known, it is important to eliminate containment actions and replace them with a specialized permanent corrective action. It is important to determine the deadlines, responsibilities and deadlines control of the effectiveness of these actions.

D7: The seventh step is focused on prevention. Precaution may be described that have been proposed during the problem solving.

D8: In the last step the team and its success should be evaluate. The aim of this step is motivation.

As can be seen from the structure of the 8D report, it is a purely systematic and organized tool. The main goal is not only to resolve the problem as quickly as possible, but also to identify and eliminate the main cause of the problem. Only then is it possible to prevent the recurrence of similar nonconformities. Only then is it possible to prevent the recurrence of similar problems.

Although the 8D Report is effective, possibilities for further improvement can be found. An effective tool in this area is MS Excel with its advanced features.

2.2 The possibility of increasing the efficiency of the 8D Report

MS Excel with its advanced tools can be used to increase the efficiency of working with an 8D report. It offers not only the standard option of working with a spreadsheet program, but also the use of developer features such as macros, or form controls. These can be used for programming specific actions.

Thanks to macros and other advanced tools of MS Excel the user can remove repetitive activities and can save a lot of time. Time is very significant in the automotive industry, especially in solving problems and nonconforming products. Macros allow the programming of repetitive activities in code through the programming language VBA (Visual Basic for Application). Then it is possible to work with the 8D Report as with a program. The user can place a series of control buttons around 8D Report, or create a user menu. This will help fill the 8D Report intuitively step by step.


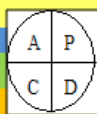
X36													
A	B	C	D	E	F	G	H	I	J	K	L	M	
		ČESKY		ENGLISH		DEUTSCH		ПО-РУССКИ					
										8D-Report		No.	
1). TEAM:			PURPOSE OF NONCONFORMITY							Following of PDCA			
Chief		Customer/Plant:		Name of the part:				P					
Participant:		Claim of customer		Date of the claim:				D					
Participant:		Internal mistake		Repeated mistake				C					
Participant:		Supplier mistake		Others (in detail):				A					
<small>Comments : P = Plan, D = Do, C = Check, A = Act</small>													
2) Description of the problem (who, what, where, when, how, how many, why)													
Part No:		Quantity:		Production charge:									

Fig. 2 Button layout around the 8D Report [2]

Obr. 2 Rozmístění tlačítek okolo 8D Reportu [2]

Macros and form controls can also be used for activities such as changing the language versions of the 8D Report. Programming the appropriate functions gives the user choice between several versions of the form by pressing the appropriate button. The program then switches the form into the selected language version. All labels and texts can then be recorded, for example, from a hidden sheet, thus reducing the amount of documentation.

Macros can also completely eliminate unnecessary actions such as filling in the number of the 8D report. This number can be generated automatically using the program. For example, it may be in the format "8D-year-serial number". „8D” is specified as a constant in the program code, which is always filled. The year is loaded automatically from the system date and the serial number is generated based on the number of recorded entries. The resulting number can then be automatically generated, e.g. as "8D-2014-3" and automatically written in the form header.

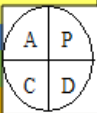
astro KOVO PLZEŇ s.r.o.										8D-Report External		No.	8D - 2014 - 03
1). TEAM:			PURPOSE OF NONCONFORMITY							Following of PDCA			
Chief		Customer/Plant:		Name of the part:		Striker Pin 432103		P					
Participant:		Claim of customer		Date of the claim:		5.5.2014		D					
Participant:		Internal mistake		Repeated mistake				C					
Participant:		Supplier mistake		Others (in detail):				A					
<small>Comments : P = Plan, D = Do, C = Check, A = Act</small>													
2) Description of the problem (who, what, where, when, how, how many, why)													
Part No:		Quantity: 40		Production charge: V14000111									

Fig. 3 Autofill number of 8D Report [2]

Obr. 3.: Automatické vyplňování čísla 8D Reportu [2]

MS Excel provides many possibilities for streamlining working with documentation. Every company should be interested in how They can make the documentation more efficient and should search for the optimal form of documentation. The only requirement for using macros is a minimum knowledge of the programming language VBA.

3 Conclusion

For effective management of nonconforming products it is not enough to use standard known methods, but it is necessary to search for optimization solutions for savings. These savings can be quantified as saving time, which brings financial savings. Any reduction of the amount of time which is required for working with documentation means increasing the time fund of the worker for other processes. Reducing the amount of time needed for work with nonconforming products can be achieved using the 8D report and its optimization in MS Excel through macros. 8D reports are most frequently used for their simplicity, transparency and efficiency.

Every step that needs to be carried out in the 8D report helps to minimize the time required for problem solving and especially for finding their main causes and their elimination. Using advanced functions of MS Excel such as macros may reduce the time wasted on repetitive activities. These activities can be efficiently programmed and then assigned as a function into the document.

4 References

- [1] NENADÁL, Jaroslav et al. *Moderní management jakosti: principy, postupy, metody*. Vyd. 1. Praha: Management Press, 2008. 377 s. ISBN 978-80-7261-186-7.
- [2] ZÍDKOVÁ, Karolína. Optimalizace řízené QMS dokumentace v podniku ASTRO KOVO Plzeň s.r.o. Plzeň, 2014. Diplomová práce (Ing.). Západočeská univerzita v Plzni, Fakulta strojní. Vedoucí práce Martin Melichar.

Abstrakt

Název: Dokumentace neshodných produktů a její optimalizace

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Klíčová slova: ISO 9001:2008, neshodné produkty, 8D Report, MS Excel, makra

Automobilový průmysl je velice specifickým oborem, kde je kladen značný důraz na kvalitu produkce. V této oblasti průmyslu se v současnosti projevuje značná míra kooperace, která s sebou nese nejen příležitosti ale také značné riziko možnosti snížení kvality produktů. Celý dodavatelsko-odběratelský řetězec je postaven na přesném načasování dodávek. Jakmile se ale vyskytne neshoda, může být celá časová linie narušena. Je proto třeba řešit neshody efektivně, rychle a jednotně, k čemuž přispívá využívání zavedené a mezinárodně uznávané struktury dokumentace. Pro záznam neshodných produktů se nejčastěji používá formulář zvaný 8D Report. Ten se vyznačuje předdefinovanou strukturou členěnou do osmi základních činností, takzvaných osmi kroků. Kroky jsou členěny logicky v přesně stanoveném sledu. Postupuje se od ustanovení týmu, popisu neshody, přijmutí základních opatření, hledání příčiny neshody až po činnosti které zavádějí nápravná opatření, vyhodnocují potřeby preventivních opatření a monitorují jejich účinnost. Díky této struktuře přispívá 8D Report k rychlému řešení neshody ale především k nalezení kořenové příčiny problému.

Jelikož je ale dnešní tržní prostředí zaměřeno nejen na kvalitu produktů, ale i na jejich minimální cenu, je třeba hledat neustále nové možnosti zlevňování. Je proto třeba hledat nejen úspory ve výrobních technologiích, vyvíjet nové materiály, ale také hledat úspory v oblasti podnikové dokumentace. Tato oblast nabízí velký prostor pro optimalizaci a snížení ztrátových časů. Tím pádem lze nalézt příležitosti i ke snižování nákladů. Efektivní optimalizace je možná za použití kancelářského programu MS Excel s využitím pokročilejších funkcí, jako jsou makra či formulářové ovládací prvky. Díky nim lze naprogramovat opakující se činnosti, vytvořit plně automatické události operující nad dokumentací či vytvořit pro uživatele přehlednou aplikaci, která mu pomůže co nejvíce zjednodušit práci s dokumentací. Právě oblast dokumentace neshodných produktů je možné pomocí MS Excel a maker podstatně zefektivnit.

