

## APPLICATION 8D METHOD FOR PROBLEMS SOLVING

<sup>1</sup>M. Korenko, <sup>1</sup>V. Kročko, <sup>2</sup>M. Žitňák, <sup>1</sup>D. Földešiová, <sup>1</sup>M. Adamik, <sup>1</sup>Š. Álló  
*Faculty of Engineering, Slovak university of agriculture in Nitra, Trieda Andreja  
Hlinku 2, 949 76 Nitra, Slovakia*

**L. Kuzenko**

*Lviv National Agrarian University in Dubliany, Ukraine*

**Key words:** method 8D, team approach, root cause, corrective measure

Process management is one of the most important functions in the manufacturing organizations. If the organizations want to be successful they must quickly adapt to changing conditions in a competitive environment. The organization must be flexible and be able to quickly solve occurring problems. To solve these problems are used various tools and methods. One of these methods is 8D, which has structured process of problem solving. This method allows solving the problem on time and correctly. It is used when the cause of the problem is unknown or in the case when the solution of this problem exceeds the capacity of one worker. This method is also used to improve processes and products.

**Introduction.** Rapid development and innovations in process management is powered by process of continual improvement and coping with competition. The basic model of process management is stated in the standards ISO 9000 and ISO/TS 16949. One of the most important processes in the organization is satisfying customer needs. [LESTYÁNSZKA ŠKŮRKOVÁ, K 2010; LESTYÁNSZKA ŠKŮRKOVÁ, K. - KUDIČOVÁ, J. 2011]

Quality tools are an active part of the process measurement in the application, development and continuous improvement of the quality system effectiveness. [SAVOV, R. - DŽUPINA, M. 2007]

In application, development and continuous improvement of the effectiveness of the quality system are an active part of this the analysis of instruments capabilities, the analysis of production equipment and process capability. These tools are an active part of the process measurement in the application, development and continuous improvement of the quality system effectiveness.

8D method is a tool, the essence of which is a standardized process with an emphasis on facts, it also serves to improve products and processes. The method focuses on the origin of the problem and determine its root cause. In practice, 8D methodology often referred to as Global 8D, 8D and Ford TOPS 8D. [ŠURINOVA, Y. 2008.]

This method was first implemented by the United States Government that it standardized as 8D process during World War II. Methodology to apply to military standards and was referred to as the Army Directive 1520 "Remedies and disposal of nonconforming material." [RAMBAUD, L., 2006]

In the sixties and seventies of the twentieth century Global 8D method popularized organization of Ford Motor Company, that this method of problem solving revise the new methodology 8D. [PLURA, J. 2001.]

In 1987 the course was set up "team-oriented problem solving." This course was established at the request of top management organizations automotive industry, who needed to find an effective way to eliminate recurring problems. 8D method, in addition to automotive assembly and became the norm wherever necessary comprehensive and structured approach to problem solving. [8D Problem Solving, 2013; BUJNA, M. et al., 2010]

**Materials and Methods.** Organizations that use a method of addressing problems such as method 8D gain significant competitive advantage. They can:

- Faster identify root causes and implement permanent corrective actions.
- In the event of a problem it is easy to ensure lasting customer satisfaction.
- Prevent reoccurrence.
- Learning through shared information to be re-used. [RAMBAUD, L., 2011]

8D method consists of several parts, which could be called as a follow-8D report. These steps are:

**D1 - Team approach - setting up the team.** The purpose of this step is to establish a team with adequate knowledge about the product or process, where the problem occurred, and experience in technical disciplines needed to solve the problem and remedial action. This should be large enough to cover all the necessary knowledge and experience, and small enough to work effectively. It is recommended to assemble a team composed of 4-10 members. The composition of the team may vary.

**D2 - Problem Description.** This step identifies the problem to be solved and detail specified by quantifiable parameters. Well worded description of the problem is clear and precise definition of the problem, created with the help of information from as many sources so that this definition is as objective as possible.

**D3 - Draft interim remedial measures to prevent damage.** The application of this step depends on the nature of the matter. Its purpose is to establish and verify a safeguard measure that would prevent the impact of the problem on the customer, unless made permanent corrective actions.

**D4 - Define and analyze the root of causes.** The purpose of this step is to isolate and verify the root cause of the problem defined and identify the location of the leak in the process. Determination of the root cause of the problem should be performed by testing all possible causes based on the collected data.

There are a number of methods by which it is possible to determine the underlying cause.

**D5 - Determination of permanent corrective actions.** The essence of this step is to select the best permanent corrective action to eliminate the root cause and the best remedy for the permanent location of the leak. Place leakage in the process is seen as the earliest point in the process, which is closest to the root cause, which was to be unveiled problem, but was not. For both of these measures should be verified their effectiveness and should also be verified whether their introduction would not have any adverse effect cover.

**D6 - Implementation and validation of permanent corrective actions**

The purpose of this step is to plan, implement and validate selected permanent corrective actions. If that were implemented interim measures of protection is usually necessary before the implementation of permanent corrective actions to remove these temporary measures.

**D7 - Preventing a recurrence of the problem.** In this step, modifying the necessary systems, operating conditions and procedures in order to prevent a recurrence of the problem or similar. At the same time should be given recommendations for further systematic improvement.

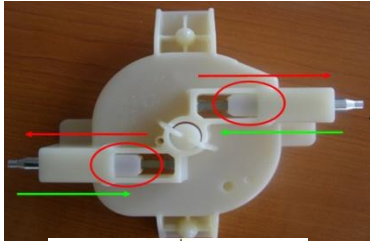
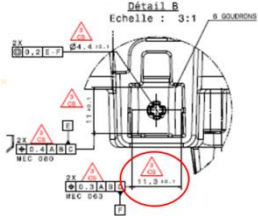

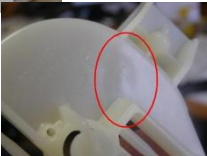
**D8 - Conclusion of the problem and appreciation of team and individual merit.** The purpose of this step is to summarize all the experience and knowledge of the team and complete documentation processed in 8D report. It is good to appreciate the merits and which had its individual members to resolve the issue.

**Results and Discussion.** In his own work, we have focused on the use of 8D method to solve the various problems encountered in organizations. In our case it was a problem that occurred during assembly of individual components sliding armrest mechanism (center console) in an automobile. During installation, it was found that the individual parts supplied (base distributor) have defects, causing blocking closing (insurance) pins for the return movement. This problem was solved by using an 8D report.

Table 1. 8D report form

<b>LOGO</b>		<b>8D REPORT</b>		<b>Initiated Date :</b> <b>Updated:</b>	
<b>General Info:</b>					
<b>Number of claim:</b>	<b>124041</b>	<b>Part name</b>	<b>Stand of distributor</b>		
Type of Claim:	Poor quality parts	<b>Severity</b>	<b>Medium</b>	<b>Part number:</b>	<b>105700 7</b>
Customer Name:		Supplier		<b>Number of non-conforming parts:</b>	<b>100</b>
Customer place:		place:		<b>Number of suspect parts:</b>	<b>4680</b>
Customer address		Supplier address			
<b>Claim reason:</b>	Components supplied by the supplier are non-compliant with the desired quality of supplied parts. Bases dividers (support repartiteur) have surface defects and surface roughness, bubbles, bulges, which may in some cases result in blocking the closing pin (doigt verrouillage). These parts are unusable during installation, because they meet the required function.				
<b>Notes:</b>	The dimensions in the drawing are in the range of $11.3 \pm 0.1$ mm. The measured values are outside the prescribed tolerance, causing malfunction closing pin (doigt verrouillage) in the base manifold (repartiteur support).				
<b>Next steps:</b>	Recasting parts [enlarge the hole for the pin (doigt verrouillage) on the base manifold (support repartiteur)], or the supply of spare parts to the required dimensions.				
<b>D1 - Set up the team, team approach</b>					
<b>Team members and interested</b>	<b>Role in team</b>	<b>Post - title work</b>	<b>Contact</b>		
			<b>Phone, mobil</b>	<b>Email</b>	

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D2 - DESCRIPTION OF THE PROBLEM		
   	<p><b>Name of problem (symptom)</b> Dimension beyond tolerance (blocking closing pins in the base manifolds).</p>	
	<b>Description of the problem:</b>	
	<p>The individual components (base manifold) supplied by the supplier are non-compliant with the desired quality of supplied parts. After injection of pins (locking pin) inside the hole is prescribed regression pins, spring secured, blocked. Readings holes on some pedestals distributor are outside the prescribed tolerance. Some bases have manifold surface defects and surface roughness, bubbles, bulges, which may in some cases result in blocking the closing of pins or other violation function areas where defects occur. These parts (stand) for mounting components are unusable because they do not meet the required function.</p>	
	<b>Type of damage, failure</b>	<b>Functional</b>
	What is the problem?	Supplied parts do not meet the required quality.
	What is tolerance?	On the surface of the parts appear surface roughness. Readings holes for the pins are outside the prescribed tolerance.
	Where the problem occurs?	The problem occurs in the production of parts suppliers.
	When the problem occurs?	The problem arises in the manufacture of parts for injection press.
Who is affected?	Operation, assembly, quality control, production, purchasing department of materials, logistics, marketing, customer, supplier	
What is the scope of the problem?	When checking and subassembly components have been found non-compliant parts. The production line was not shut down, but it caused a slowdown in production.	

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D3 – PROPOSAL OF TEMPORARY REMEDIES TO DAMEGE AVOIDING								
Title of temporay remedy	Description of temporary remedy	Symptom	Responsibility	Verification of maturity	End of verification	Validation of maturity	End of validation	Yes/No
Repair parts inventory in stock at supplier	Repair parts because locking pins	Bad dimension						<input checked="" type="checkbox"/>
Repair parts at customer	Repair parts because locking pins	Bad dimension						<input checked="" type="checkbox"/>
D4 - DEFINING AND ANALYZING OF THE ROOT CAUSES								
<b>Possible cause:</b>		<b>Blocking the movement of coolant, bad venting forms - poor appearance, bubbles</b>						
Category of reason - occurrence		<input checked="" type="checkbox"/>						
Category reasons - escape								
1. Why?		Mold injection was not well chilled (ensuring of a uniform mold temperature), the mold cavity was not vented.						
2. Why?		Injection mold had blocked cooling channels						
3. Why?		Cooling form channels were not cleaned and modified.						
4. Why?		Preventive control of injection molding was not carried out thoroughly.						
5. Why?		Worker failed to mold control.						
<b>Possible cause:</b>		<b>Nedostatočne vysušený materiál (PA 66) - povrchové nerovnosti a bubliny na funkčných častiach dielov</b>						
Category of reason - occurrence		<input checked="" type="checkbox"/>						
Category reasons - escape								
1. Why?		Material (PA 66), from which the parts are made was not ready for further processing.						

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2. Why?	PA 66 material was not dried before injection molding (max. moisture suitable for injection molding, PA 66 should be less than 0.2% relative humidity).					
3. Why?	Responsible worker for preparing materials before processing, failed to sufficiently drying of the material (PA 66).					
4. Why?	The control plan is not listed the measurement of material moisture (PA 66) that the worker would be carried out.					
<b>Possible cause:</b>	<b>Weak control - opening dimensions outside the tolerance</b>					
Category of reason - occurrence						
Category reasons - escape	<input checked="" type="checkbox"/>					
1. Why?	Inspection undetected on stands for distributors that holes for locking pins have a bad size.					
2. Why?	Worker in the control parts, did not confirm a mutual operation of the relevant parts.					
3. Why?	In control plan does not include checking the functional dimension of the hole with counterpart (pins).					
<b>D5 - DETERMINATION OF PERMANENT CORRECTIVE ACTIONS</b>						
Name and description of measure	Notes to measure	Cause	Responsibility	Approved Yes / No	The period end	Completion date
Cleaning up mold cooling channels		Blocking of movement - blocked cooling channels form		<input checked="" type="checkbox"/>		
Preventive cleaning mold cooling channels	When preventive inspection forms (every 50000 cake) make adjustments and cleaning mold cooling channel	Blocking movement - blocked cooling channels form		<input checked="" type="checkbox"/>		

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To control plan add functional testing openings with counterpart (pins)		Weak control – in the plan does not include checking the functional dimensions		<input checked="" type="checkbox"/>		
To control plan add material moisture measurement (PA 66) every 4 hours		Bubbles on functional parts of parts - insufficiently dried material (PA 66)		<input checked="" type="checkbox"/>		
<b>D6 - Implementation and validation of permanent corrective actions</b>						
Name and description of the measures	Notes to measure	Cause	Responsibility	The period of implementation	Validation	
				Deadline of implementation		
Cleaning up mold cooling channels						
Cleaning up mold cooling channels	When preventive inspection forms (every 50000 cake) make adjustments and cleaning mold cooling channel	Blocking movement - blocked cooling channels form				
Required documentation	Action		Responsibility	The deadline for implementation		
Drawings	<input checked="" type="checkbox"/>	Security, correction and update of required documentation and other necessary documents.				
Plan and list of controls	<input checked="" type="checkbox"/>					
Procedural guidelines	<input checked="" type="checkbox"/>					



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D7 - PREVENTING RECURRENT PROBLEM					
Name of action - prevent recurrence of the problem	Cause	Category causes	Responsibility	The period of implementation	Poka Yoke
				Deadline implementation	Yes / No
To control plan add functional testing openings with counterpart (pins)	Weak control - the plan does not include checking the functional dimensions	escape			<input checked="" type="checkbox"/>
To control plan to add material moisture measurement (PA 66) every 4 hours	Bubbles functional on parts of parts - insufficiently dried material (PA 66)	occurrence			<input checked="" type="checkbox"/>
D8 – Conclusion OF THE PROBLEM AND AWARDS teams and individual merits					
<p>Created team procedured by a systematic step by step of 8D report. Team members came up with plenty of ideas rather in the team, if problem solved itself. How to avoid the multiple pitfalls and managed to uncover the root causes of the problem. The problem was eliminated by the introduction of appropriate corrective measures, for which the team and its individual members deserve praise and proper valuation.</p>					
Status of 8D report:		Enclosed	Notes to the 8D report:		
Were removed temporary measure?		<input checked="" type="checkbox"/> Yes			
Start date of 8D report:					
Date of completion of 8D report:					
Approved:		<input checked="" type="checkbox"/> Yes			

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**Conclusion.** 8D report is practical and simple sheet, which use isn't allways easy. The 8D method is a basic problem solving technique, which is often used at complaint solving, especially in automotive industry. It is a tool for complex prblem solving – the problems, which solving isn't possible for individuals and their solution requires more time and costs. When solving a complaint, 8D reports are always demanded form suppliers. Principles of 8D methodology are used by global automotive producers and thier suppliers. These global organizations have their own software systems to support problem solving. These programs are based on the principle of the 8D and in some cases they are extended by additional informations, but the solution procedure remains the same.

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