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Management of Customers' Complaints within SC COMPA SA Sibiu. Case Study for a Topical Complaint

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***Abstract* – This scientific work consists of a case study made up from solving a complaint from the company SC COMPA SA in Sibiu, by using established methods such as the Eight Disciplines of Problem Solving or, in technical words, - the 8D report. This work was drawn up based on observations, monitoring, understanding of the entire 8D process, but also on active participation in the stages having implied collecting the data necessary for solving the entire report.**

Solving the complaint has as final purpose the identification and treating of the causes having led to producing a piece with D0.87 NOK and delivering it to the client. Throughout solving the complaint, quarantine actions have been implemented, microscopic tests have been performed both on the piece's subject to complaint, but also on the drill having made the hole of the piece, brainstorming and using an Ishikawa diagram, plus the implementation of a series of corrective actions which would prevent in the future the apparition of other defective parts.

Keywords- complaint, corrective actions, 8D report, established methods.

I. INTRODUCTION

Although companies should aim at keeping their customers by ensuring high customer satisfaction in the quality of the products and services, there are many cases where customers file complaints.

However, this can still be harnessed by any company by implementing complaint management as an important element of a customer oriented activity. Complaint management can be defined as the totality of the measures of analysis, planning, performance and control that a company adopts in order to solve the complaints arising from customers or other reference groups [1].

II. PROBLEM STATEMENT

Processing the complaint "Shape of the hole for D0,87 NOK".

The workshop S770 Compa Rail is a workshop where various common rail parts references are treated.

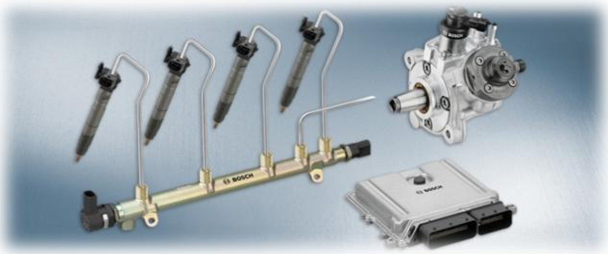


Figure 1. Common Rail

Common Rail (Figure 1.) is a direct injection system used for the internal combustion engines, namely for compression-ignition engines. The most important aspect of an engine with the common rail system is the fact that the fuel distribution to the injectors is made from a high pressure common pipe to each injector separately. The basic idea of the system is that the injection pressure is produced independently of the engine speed, so that, even for reduced engine speeds, the fuel pressure is maximal in the common rail.

The common rails being processed in Workshop 770 Compa Rail undergo a 200% visual check, the first check being made by the Quality staff from Compa and the second one by the customer's Quality staff, before final packaging of the product.

Following the visual check made by the customer, workshop's Quality Department was notified concerning the identification of a product presenting one of the D 0.87 holes as being NOK (3-HP3 high-pressure hole). Upon Go/No Go gauge check this nonconformity was confirmed.

Figure 2. Gauge check of good piece

In the image (Figure 2.) above we have a D 0.87 conformity check of a high-pressure nozzle, a check performed with the No Go tool of the gauge. It is noticeable that between the face of the high-pressure nozzle and the body of the Go/No Go gauge there is a distance of several mm.

Figure 3. Gauge check of the piece subject to complaint

The image above (Figure 3.) shows confirmation for the D0.87 nonconformity of the piece subject to complaint by the fact that there is no distance between the face of the high-pressure nozzle and the No Go part of the gauge.

The client has requested treating this nonconformity based on the 8D method and sending the appropriate 8D report.

Enforcement of the 8D method leads to improving products and processes. The method is structured in eight disciplines (8 stages), emphasising on the synergy of the team. 8D method has provided many companies with solutions for solving some rather difficult problems. The original 8D method, known by the name of TOPS (Team-Oriented Problem Solving, 1987) was improved and renamed “Prevent Recurrence” in November 1992, with the support of Ford. Small companies can benefit from the advantages of the 8 Disciplines method by using a team-oriented approach. 8D generates excellent guidance, allowing companies to discover the primary cause of the problem and check correct functioning of the discovered solutions.

III. THE STEPS OF 8D METHOD

The customer has requested treating the appeared nonconformity by using the 8D method. Thus, step 1 of this method was initiated, namely setting up the team. The team is made up of people who are familiar with the process and the product and have the authority and necessary technical experience in the treated matter, so as to have it solved. A person from the team was named team leader and responsible with carrying out the analysis and drafting the 8D report.

Our own role was rather passive inside this team, a surveillance role of understanding the entire 8D process, but also of actively participating in the stages having involved collecting the data necessary for the subsequent stages.

The next step of the 8D method has the purpose of presenting how the described problem affects the internal processes, as well as the external ones and their implications with the client. In order to define the problem, quantifiable terms are to be used, such as: who, what, when, where, why, how and how many. A thorough description of the situation is to be made and facts are to be collected, facts which are to be structured and analysed, obtaining the clearest, comprehensible and transparent possible situation.

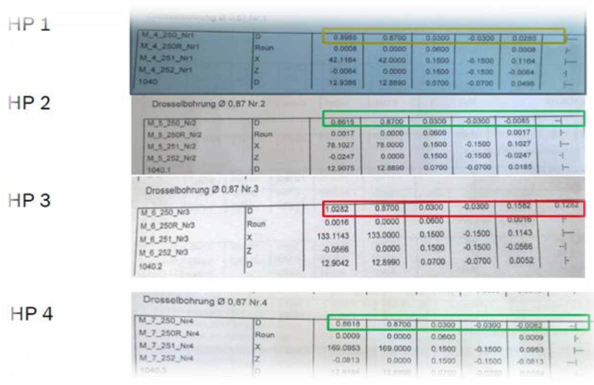
In as far as the presented case is concerned, the piece in cause was analysed. The customer identified the defective part through the visual check in firewall, and distributed it to the workshop for analysis.

The Compa workshop took over this part (Figure 4.) and based on the analysis on the marking of the piece, traceability was reconstructed, which, according to ISO 9000:2005 consists in presenting the requirements to which an organisation must respond in order to be able to identify a product/service launched for fabrication and throughout its entire production.

Figure 4. Identification data of the piece

The following step consisted in measuring the piece on a 3D measuring machine in order to find out the values of the NOK ratio, but also the other D0.87 holes existing on that piece.

The 3D measurements report (Figure 5) showed that the hole subject to complaint as being NOK was part of a chain of conform 0.87 holes, as follows: HP1 hole with the value of 0.8965 (conform but towards the upper limit), HP2 hole with value 0.8615 (close to nominal), HP3 hole with the value of 1.0282 (out of the tolerance range) and HP4 hole with the value 0.8618 (close to nominal) (Figure 5.).



HP 1

M_4_250_Nr1	D	0.8965	0.8700	0.0300	-0.0300	0.0265	
M_4_250R_Nr1	Roun	0.0008	0.0000	0.0600		0.0008	
M_4_251_Nr1	X	42.1164	42.0000	0.1500	-0.1500	0.1164	
M_4_252_Nr1	Z	-0.0064	0.0000	0.1500	-0.1500	-0.0064	
1040	D	12.9386	12.8890	0.0700	-0.0700	0.0496	

HP 2

Drosselbohrung Ø 0,87 Nr.2

M_5_250_Nr2	D	0.8615	0.8700	0.0300	-0.0300	-0.0085	
M_5_250R_Nr2	Roun	0.0017	0.0000	0.0600		0.0017	
M_5_251_Nr2	X	78.1027	78.0000	0.1500	-0.1500	0.1027	
M_5_252_Nr2	Z	-0.0247	0.0000	0.1500	-0.1500	-0.0247	
1040.1	D	12.9075	12.8890	0.0700	-0.0700	0.0185	

HP 3

Drosselbohrung Ø 0,87 Nr.3

M_6_250_Nr3	D	1.0282	0.8700	0.0300	-0.0300	0.1582	0.1282
M_6_250R_Nr3	Roun	0.0016	0.0000	0.0600		0.0016	
M_6_251_Nr3	X	133.1143	133.0000	0.1500	-0.1500	0.1143	
M_6_252_Nr3	Z	-0.0566	0.0000	0.1500	-0.1500	-0.0566	
1040.2	D	12.9042	12.8990	0.0700	-0.0700	0.0052	

HP 4

Drosselbohrung Ø 0,87 Nr.4

M_7_250_Nr4	D	0.8618	0.8700	0.0300	-0.0300	-0.0082	
M_7_250R_Nr4	Roun	0.0009	0.0000	0.0600		0.0009	
M_7_251_Nr4	X	169.0953	169.0000	0.1500	-0.1500	0.0953	
M_7_252_Nr4	Z	-0.0813	0.0000	0.1500	-0.1500	-0.0813	
[illegible]	D	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

Figure 5. Extract of the dimensional analysis (3D measurements report) for the D 0.87 holes

The effect of this nonconforming hole (HP3) is that the respective final product would produce a high level of pollution once assembled on the engine.

Following these checks a series of actions were implemented to keep things under control.

In theory, until enforcing the corrective actions, quarantine actions are installed and they are to be fulfilled immediately, in order to limit the internal damage or the damage incurred by the customer. Quarantine actions are checked in order to ensure their efficiency.

On a practical level the results of the 3D measurements report were analysed and the position of the NOK hole was determined (OK hole – OK hole – NOK hole – OK hole – OK hole) on the piece subject to complaint. These actions prove the fact that the defect is random.

After having noted that the defect of the hole is random, the next step was implementing sorting actions for 100% of the production existing in stock. After having sorted 100% of the existing production two other pieces have been identified with different references. All pieces were checked individually in order to expand sending other defective parts to the customer.

Immediately after installing the quarantine measures, the customer was also informed in order to check whether the rest of the received pieces were OK.

After resuming the production, a 100% gauge check of all pieces and HPs was performed in order to avoid sending the customer potential defective pieces.

The following step was to determine the cause and effect of the analysis, why the problem could appear and why it has not been detected (non-detection) in time, based on the fundamental issue.

Based on Brainstorming and the Ishikawa diagram the potential causes for nonconformity of the D0.87 hole have been identified as: insufficient tool cooling (deposition of material on the edge of the tool), insufficient evacuation of the chip generated in the process, CNC program inappropriate for the type of processing.

After having collected these possible causes, the following step was to thoroughly analyse these possible causes, in order to eliminate or confirm them.

The next step was to analyse in detail two of the three pieces found to be nonconforming in the workshop (the first piece, the one subject to complaint, the other two, pieces found later, after the 100% check of the manufactured pieces and which were inside the workshop when the complaint was made).

IV. Case Studies and Discussions

The first piece analysed was the piece subject to complaint having nonconforming D0.87. Below, a cross-section of the piece from the complaint - under microscope (Figure 5.). After the microscopic analysis, it was noted that the hole from the complaint presented two distinct sectors, with different properties, as follows:

- the upper sector of the hole (first half) has a "V"-shaped conicity and on the basis of this conicity there is an elevated degree of marked scratches.

- the lower sector of the hole subject to complaint is cylindrical in shape and has a better roughness of the surface compared to the upper sector.

However, on both sectors can be identified screw scratches on the entire cylindrical part of the hole (Figure 6.).

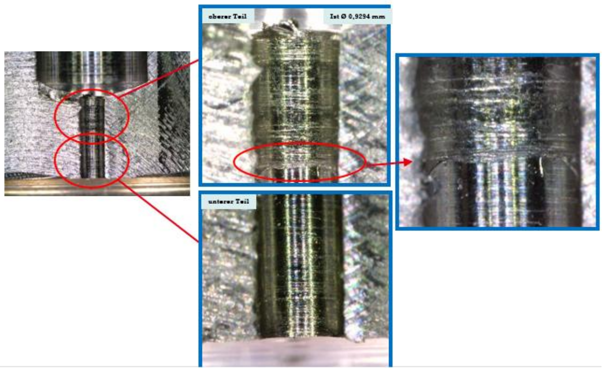


Figure 6. Microscope analysis HP4 with D0.87

The same type of analysis was performed for the third part identified as being NOK (Figure 7.).

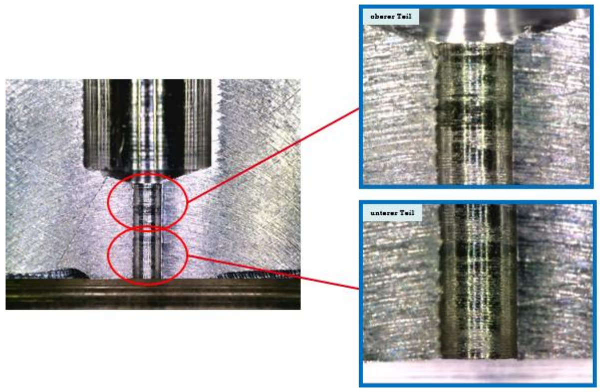


Figure 7. Microscope analysis of NOK piece

Unlike the first piece, the shape of the hole is cylindrical, there is no shape deviation (Figure 7.). However, on this hole too there are screw scratches. Another difference compared to the first piece was represented by the fact that on this third piece, ALL HP holes were outside tolerance range (holes were larger).

A simulation of the CNC program was not necessary, as making holes through this type of piece is made "classically", with one go. We note that the CNC drilling program varies from the one on the first piece (various drilling advancements), but also the types of drills are different (suppliers with various geometries).

Thus, after this analysis a series of preliminary conclusions were generated, namely:

- on different pieces, on different cells, made by different types of drills, with different regimes, there are the same type of defects, namely, screw scratches and outside tolerance holes.

This preliminary conclusion has led to the analysis of the drills from the perspective of the deposition of material on the edge.

Therefore, several drills were sampled from the two types on different stages of the predefined life cycle and were analysed under microscope.

The same types of phenomena could be identified on the majority of the checked drills, namely, deposition of material on the edge and chippings of these edges. The chippings are predominantly on the main metal removing edges, towards the intersection with the secondary metal removing edges (Figure 8.)

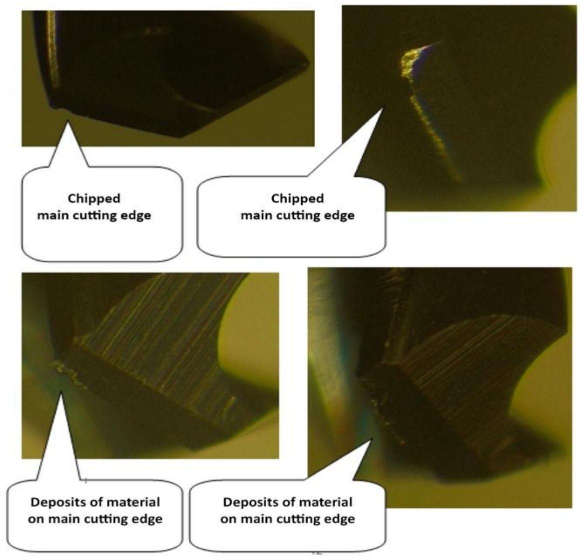


Figure 8. Analysis of the drills under microscope

V. CONCLUSIONS

The analysis of these drills led to the conclusions:

-the depositions on the edges were generated by insufficient removal of the chips generated in the process;

-during processing, a high level of heat is generated, which is amplified by inefficient cooling at the level of the tool's edge;

-the work advancement is insufficiently choosing (the drill presents a higher level of friction with the material because of the work advancement which is too low F0.04, F0.03 respectively for the two types of drills).

After having identified the causes for the apparition of the nonconformity, the 5-Why Analysis was started, based on which were identified the corrective actions to implement in order to prevent the recurrence of this type of defect.

Consequently, from the TRC (cause/technical causes) that were behind the apparition of the complaint, the following corrective actions were identified:

Implementation of a cooling notched sleeve in order to direct more efficiently the flow of cooling liquid towards the metal removing area (see photo);

Increase of pressure of the cooling liquid through the two broaches of the CNC machine;

The increase of the work advancement to F0.055 from F0.04, F0.03 respectively for the two types of drills D0.87.

From the point of view of the MRC (cause/ management cause), causes behind the non-detection of the defect by the Quality check of the company, given the very low chances to detect this type of defect through previously defined methods (visual check), it was concluded that a 100% checks with Go/No Go gauge is to be maintained for all holes processed for a period of 60 days.

The defined corrective measures have led to changing the specific internal documentation, changes having the role of preventing recurrence of the defect.

Identification and implementation of the corrective actions was carried out within 14 days after the complaint, according to rule 2-14-60.

100% checks with Go/No Go gauge was the method through which was checked the efficiency of the implemented corrective technical actions. After 60 days following the implementation of the corrective actions, as no other piece has been identified having this type of defect, the customer decided to close the complaint.

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