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ANALYSIS OF PRODUCTION PROCESS AND COMPLAINTS IN AN AUTOMOTIVE COMPANY

11.1 INTRODUCTION

This article presents the diagnosis of particular production process, which is realized in automotive company. At the beginning the extrusion process has been generally described and then risks and quality points are presented. The diagnosis embraces problems connected with complaints and potential defects.

11.2 EXTRUSION PROCESS

A large number of companies closely monitor their production processes, because they would like to provide high – quality products and minimize the bad quality costs. The way to achieve this aim is very difficult. Each process should be identified and analyzed for risks which could handicap production and have incorrect influence on the product [7]. The process of extrusion consists in drawing the plastic material through a special nozzle at appropriate temperature. It consists of few phases. First phase is connected with preparing products and loading them manually. Then the upper edge of product is subjected to the plasma and the product is positioned on a rotary table where successive operations are performed (Fig. 11.1) – second phase.



Fig. 11.1 Rotary table where extrusion process is performed

Source: Own elaboration based on: [4]

These operations are the most important and they include:

- activation of product performed by using cleaner,

- placing a prime coat which makes it possible to join the pressed profile with the product,
- pressing the profile into the proper shape.

Third phase is linked with auxiliary operations such as: gluing different kind of brackets, removing a machining allowance of pressed profile, gluing of spacers, soldering, mounting assembly frames, injection and treatment of corners. These operations depend on a produced model of product [4], [5], [8].

11.3 THE IMPORTANCE OF COMPLAINTS FOR COMPANIES

A base to analysis processes in company is complaints received from customers. Each complaint is different and its character depends on the type of business that is provided by the company. The common denominator of each complaint is dissatisfaction or non-acceptance situation that occurred. There are several types of complaints, from observation to serious claims. So the company could receive [9], [12]:

- external unofficial complaint in the form of comments about a product or delivery,
- external official complaint requiring immediate actions,
- internal complaint.

Complaints should not be treated as threats. This is a very important element of system, because it gives information about what is going wrong in processes. This information also gives the company opportunities to improve processes. Of course complaints generate additional problems for company, but employees should solve them by taking appropriate actions which could develop production [1], [2], [11].

11.4 ANALYSIS OF COMPLAINTS IN EXTRUSION PROCESS

In this part of article will be presented quality approach and quantification of complaints, which occurred this year in extrusion area. The Tab. 11.1 shows 13 different kinds of products defects which were identified in January, February, March and April in 2015: defects of primer, incorrect position or lack of brackets, improperly glued tape, incorrect or lack of barcode, incorrect labeling of racks, scratches, smudge, incorrect packaging, incorrect position or lack of spacers, defects of assembly frame, defects of seal position, defects of extruded profile and not removed logo. This table contains also information about amount of complaints and amount of defects in particular months. The biggest number of complaints was in March, the amount of them is 19 but the most defective products occurred in February, the amount of them is 5064 pcs [4].

Based on the above table Pareto Chart was prepared. The aim of Pareto Chart is to highlight the most substantial set of factors. The diagram clearly depicts the gradual downslide in presented value. First Pareto Chart is connected with amount of complaints (Fig. 11.2) and second with amount of defective products (Fig. 11.3).

During four months Extrusion Department received the most complaints (12 complaints) for incorrect position or lack of brackets. This is the most popular and difficult quality problem which should be solved in the near future. On the second position in Pareto Chart are defects of primer, such as: not dried primer, spilled primer or spots

of primer. There were 7 complaints of that type. This proves the prominence of primer in the extrusion process. On the third position (4 complaints) equally are incorrect packaging, often connected with cracks of products and also incorrect or lock of barcode. Other segments of this diagram are less crucial. However, they generate financial loss. This analysis showed quality approach to complaints [4].

Tab.11.1 Amount of claims and amount of defective products in extrusion area

Complaints	Jan. 2015		Feb. 2015		Mar. 2015		Apr. 2015		Total	
	Amount of complaints	Amount of defective products	Amount of complaints	Amount of defective products	Amount of complaints	Amount of defective products	Amount of complaints	Amount of defective products	Amount of complaints	Amount of defective products
Defects of primer	1	1	1	1	4	139	1	1	7	142
Incorrect position/lack of brackets	3	14	2	2	5	54	2	3	12	73
Improperly glued tape							2	40	2	40
Incorrect/ lack of barcode			2	2	2	3			4	5
Incorrect labeling of racks					1	1	1	1	2	2
Scratches			1	5013	1	1			2	5014
Smudge			1	44					1	44
Incorrect packaging	1	1	1	2	2	45			4	48
Incorrect position/ lack of spacers					2	2	1	1	3	3
Defects of assembly frame	2	10							2	10
Defects of seal position	1	1			1	1			2	2
Defects of extruded profile					1	1			1	1
Not removed logo							1	42	1	42
Total	8	27	8	5064	19	247	8	88	43	5426

Source: Own elaboration based on: [4]

In regard to Fig. 11.3, it could be concluded that the most products, more than 5000 pcs. had scratches. This defect can occur everywhere but if it is detected in company, it will be repaired. Clearly the repair also depends on the size of the defect. Next in Pareto Chart are defects of primer (142 pcs.) and incorrect position or lack of brackets (73pcs.). This analysis showed quantification of complaints [4].

After recognition of extrusion process and identification complaints, a detailed analysis of the production process of paying attention to the risk points and control quality points was conducted. These quality points could be covered emerging threats. The Fig. 11.4 presents flow of extrusion process with particular operation realized by workers. In rectangles with red contours manual operations are marked. A manual operation included: loading of products, removing a machining allowance of pressed profile, gluing of spacers, soldering, mounting assembly frames and packaging.

In eight green rectangles occurred aspects which are controlled after particular operation – quality points. Only Black Primer presence and position are controlled automatically. Instead workers controlled shape of pressed profile, presence of LL Primer and also Black Primer, position of brackets, resistance, gap and adhesion of mounted frame, shape and adhesion of corners, labels used to mark the racks, way of packaging. In addition all products could be controlled one more time in terms of defined characteristics. It depends on customers. Sometimes they would like to control the final product with “their eyes”. Hence in the production there is a special place prepared only to this specific control [4].

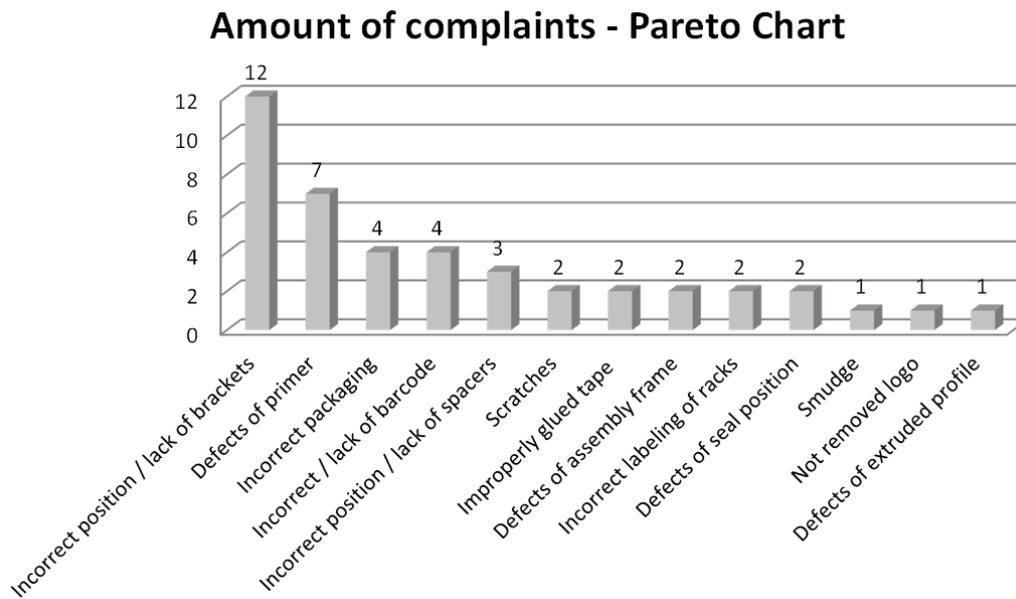


Fig. 11.2 Pareto Chart presented amount of complaints

Source: Own elaboration based on: [4]

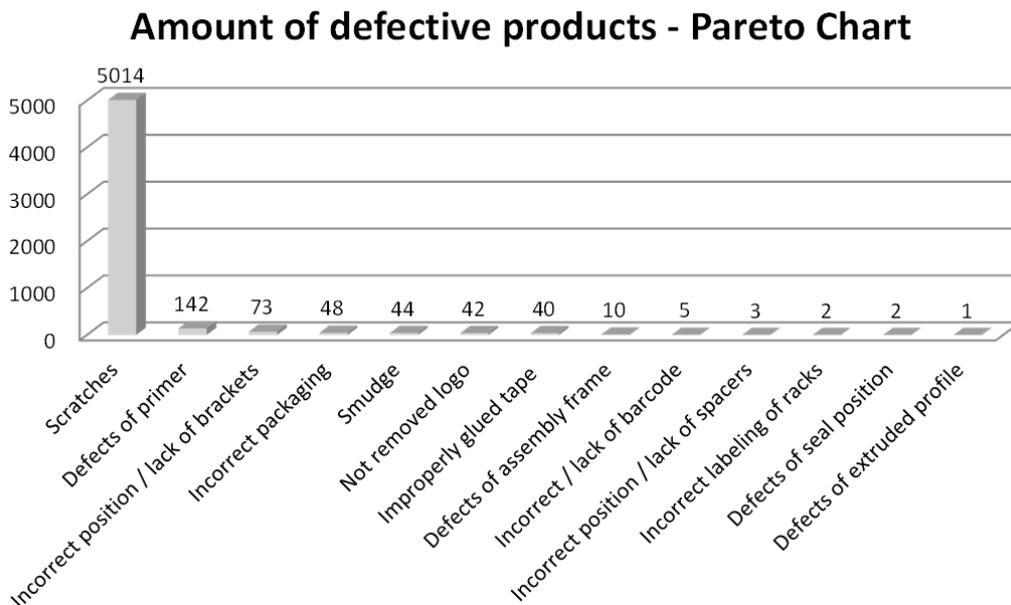


Fig. 11.3 Pareto Chart presented amount of defective products

Source: Own elaboration based on: [4]

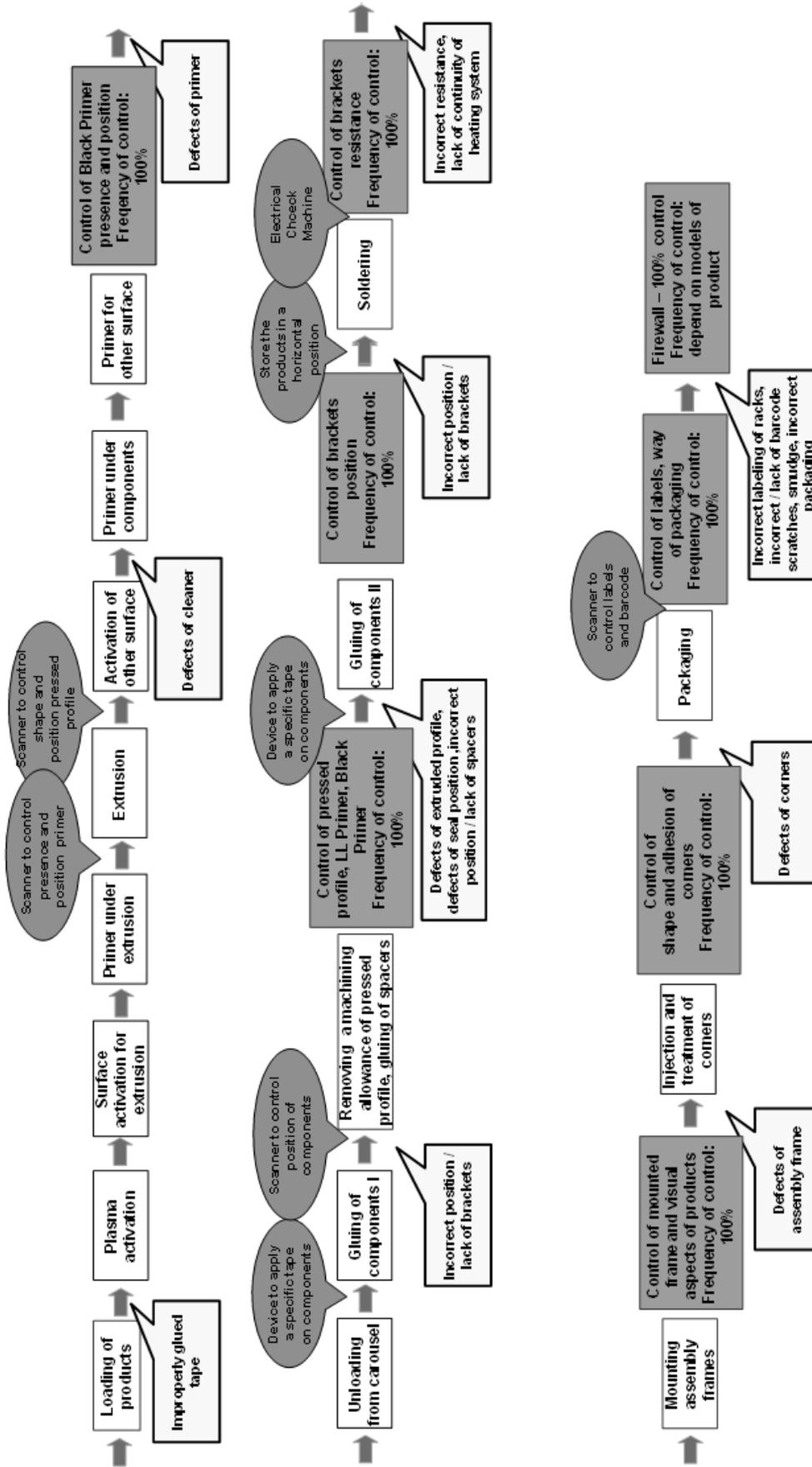


Fig. 11.4 Extrusion process map with risk and quality points

Source: Own elaboration based on: [4]

In yellow rectangular explanations risk points are identified, or defects that may have appeared in the described process, such as: improperly glued tape, defects of cleaner and primer (not enough/too much/lack of cleaner/primer, spots of primer, not dried primer), incorrect position/lack of brackets, defects of extruded profile or seal (incorrect position/shape, lack of adhesion), incorrect position/lack of spacers, incorrect resistance, lack of continuity of heating system, defects of assembly frame (incorrect gaps, lack of adhesion), defects of corners (incorrect position/shape, lack of adhesion), incorrect labeling of racks, incorrect/lack of barcode, scratches, smudge, incorrect packaging. At all phases of process could also have occurred scratches on the products [4].

CONCLUSIONS

Process improvement is very important from the point of view of each company. Indeed organizations must take care to maintain its high level of efficiency to be competitive in the market. Process development is related to improving the quality of products [3], [9]. The above analysis of the process showed that, despite a large number of controls, the company received repeated complaints. This situation testifies to the fact that the process is not quite stable, and the taken actions are not effective.

In the Fig. 11.4 proposed actions to improve extrusion process are also presented. They are marked in blue round explanations. To identify presence and position of primer used under extrusion special scanner has been proposed which will verify these aspects. The laser scanner could also be used to measure the height pressed profile. Other solution to improve process is implementation of a device which will be applying a specific tape to support correct position of components. This action is very important, because problem of components position is the first quality issue. To detect incorrect position or lack of brackets, the company could also use the laser scanner. This solution will be expensive in view of different kinds of brackets, but it gives clear information about conformance of position with requirements. In this case it will also help to store the products in a horizontal position. Additional proposed action is Electrical Check Machine. This is a device to automatically control resistance taking into account temperature of products and controlling also continuity of heating system. The last proposition is scanner to recognize if used labels and barcodes are correct.

All described actions lead up with automate the process. The company should also pay attention to the fact that the majority of controls are done manually by workers. Hence the company should look carefully at staff training system and implement the skills matrix based on the approved work instructions. Clearly the workers skills should be verified by prepared tests which results give the information about level of particular skill [6]. It is also necessary to have knowledge for employees in the field of dealing with non-conforming products. If workers detect the nonconformity they should react in defined way (procedure of dealing with non-conforming products). This knowledge is very important because it can allow to minimize effects of incorrectly realized actions or incorrect control. Procedure of dealing with non-conforming products is also a part of containment in case of both internal and external complaints.

A key aspect is proceedings in accordance with analyzed flow. Clearly the flow should be reflected in the Failure Mode and Effect Analysis, where risks in the process are precisely analyzed. Without such recognition is not possible to lead the process in a correct way. After each complaint the FMEA should be updated.

Proper analysis of production process guarantees the real benefits that result in the increase of productivity and efficiency of the process, as well as improvement the quality of produced products.

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ANALYSIS OF PRODUCTION PROCESS AND COMPLAINTS IN AN AUTOMOTIVE COMPANY

Abstract: Analysis of production process enabling to identify weakness points in the company. It should be used in all the spheres of the company. The article provides the theoretic description of extrusion process and complaints which the company received from internal and external customers. The authors also describe a case study based on gained experience.

Key words: Extrusion, complaint management, process improvement

ANALIZA PROCESU PRODUKCYJNEGO ORAZ WYSTĘPUJĄCYCH REKLAMACJI PRZEDSIĘBIORSTWIE Z BRANŻY MOTORYZACYJNEJ

Streszczenie: Dla każdego przedsiębiorstwa dokładna analiza procesu produkcyjnego, z uwagi na możliwość identyfikacji newralgicznych jego punktów, jest podstawą doskonalenia. Analiza ta swoim zasięgiem powinna obejmować wszystkie obszary przedsiębiorstwa. W artykule autorzy poddali analizie proces ekstruzji, a oceniając go uwzględnili zarówno własne doświadczenia jak i przesłanki teoretyczne. Dodatkowo przeprowadzili analizę reklamacji otrzymanych od klientów wewnętrznych jak i zewnętrznych. Wszystkie badania i analizy umożliwiły ocenę procesu i uszczegółowienie opracowanych zasad postępowania z wyrobem niezgodnym.

Słowa kluczowe: ekstruzja, zarządzanie reklamacjami, doskonalenie procesów

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