



CONTRIBUTIONS REGARDING NON-CONFORMITY MANAGEMENT OF TECHNOLOGICAL PROCESSES IN A WIRE DRAWING FACTORY

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Abstract: In order to demonstrate the way of meeting the quality requirements by electric cable manufacturers, different quality tools can be used to achieve the quality objectives imposed in the Quality Manual such as: SWOT Analysis, PEST Analysis, 8D methodology in handling complaints and methodologies Fishbone and 5Why in dealing with Critical Nonconformances. According to these, the article includes several types of analyzes that are carried out in a wire drawing factory, namely: the Swot analysis, which is a very good way of evaluating the general state of an organization so that a development plan in which to take into account its strong points, to eliminate the weak points, to efficiently exploit the opportunities that have arisen and to allow countering possible threats; Pest analysis that takes into account political factors, economic factors, social factors and technological factors. Within the Quality Management System, the guidelines and responsibilities for the correct management of non-conformities were officially defined by identifying their causes and implementing all the necessary actions for their final solution in all manufacturing processes.

Key words: wire, drawing, SWOT, PEST, Quality, Management

1. INTRODUCTION

The companies whose activity is carried out in the field of electric cable production are generally certified in accordance with international quality standards by recognizing the high-performing management due to the accreditation according to the following standards:

- Quality Management: ISO 9001:2015, ISO/IEC 17025:2017. This is an international quality standard by recognizing high-performing management due to accreditation according to the following standards:
- Occupational health and safety: OHSAS 18001:2008.
- Environmental management: ISO 14001:2015.

2. THE WAY IN WHICH THE QUALITY REQUIREMENTS ARE FULFILLED BY THE MANUFACTURERS OF ELECTRICAL CABLES. TECHNICAL AND TECHNOLOGICAL CRITERIA

In order to demonstrate the way of meeting the quality requirements by the electric cable manufacturers, the company Prysmian Cabluri si Sisteme S.A. was chosen as a case study. Prysmian Slatina uses different quality tools to achieve the objectives set in the Quality Manual such as: SWOT Analysis, PEST Analysis, 8D methodology in handling complaints and Fishbone and 5Why methodologies in handling critical non-conformities [1-3].

2.1. THE SWOT ANALYSIS

The SWOT analysis is a very good way to evaluate the general state of an organization so that a development plan can be drawn up in which its strengths are taken into account, its weaknesses are eliminated, and opportunities are effectively exploited and which allow countering possible threats. Characteristic to this are the following: S- Strong points; W- Weak points; O- Opportunities; T- Threats. Strengths and weaknesses refer strictly to the organization's internal environment, while opportunities and threats represent external factors.

Table 1. SWOT analyse

S	W
Strong brand good reputation among clients clients recognized worldwide quality products and services high production capacity advanced technology implemented SMC small stocks continuous improvement variety of products offered to the customer innovative promotion systems approved stable suppliers	high costs for research long increase in debt recovery
O	T
increasing purchasing power lack of international barriers brand image increasing sales ensuring the need for power cables and fiber optics for the national and international market the increase in the export of more than 80% of its products worldwide increasing alignment with the international requirements of the legislation increase the activity for the production of optical fiber cables	low growth rate due to purchasing power the instability of the political and legislative environment the decrease in the population's income new laws - laws of the European legislation that oblige the organization to make various changes that can lead to an increase in costs

2.2. PEST analysis

Regarding the swot analyse in a wire drawing factory the following table was elaborate (Table 1).

Table 2. PEST analyse for a wire drawing factory

P - POLITICAL FACTORS	E – ECONOMICAL FACTORS
regulations on environmental protection taxes and fees the rights and obligations of the organization employment contracts and wages employment contracts, salary	the price level for utilities Exchange rate the level of bank interest economic growth level
S – SOCIAL FACTORS	T – TECHNOLOGICAL FACTORS
consumer attitudes and opinions level of schooling degree of health publicity mass media opinions age pyramid	technological level of competition human activities taken over by robotic activity research funding technological innovation solutions production capacity innovation potential technology legislation

2.2.1. Political factors

Political factors have a major impact on attracting investors to free economic zones. An economy open to reliable cooperation positively influences the attraction of new ones investors of the Prysmian Cables SA organization and respectively the development of economic free zones. It is essential that the policy in the field of free economic zones is focused on optimization, legislation, delegation of responsibilities, elimination of deficiencies, improvement of the infrastructure and its alignment with the most advanced international practices.

3.3. Non-conforming product registration

All Prysmian Cables and Systems personnel, when they detect any kind of non-conformity, must inform the manager of the area where the non-conformity was detected, who is responsible for guaranteeing a prompt and adequate reaction in solving the problem. The registration is carried out in the SAP- NCR System, an IT tool in SAPIC aimed at recording internal / external non-conformities (complaints) and any other communications between Prysmian Group and the customer (e.g. customer request for improvement, Prysmian detects a defect and informs the customer). The Non-Conformity Reporting System (NCR) is an IT tool aimed at recording defects detected during production processes and the actions taken to resolve them. Defects and actions are reported on an NCR by process operators using a Intranet web page. Quality Managers or Authorized Personnel can check the NCR, decide the necessary tasks to correct the defects and close the NCRs (using a SAP application, Figure 2).

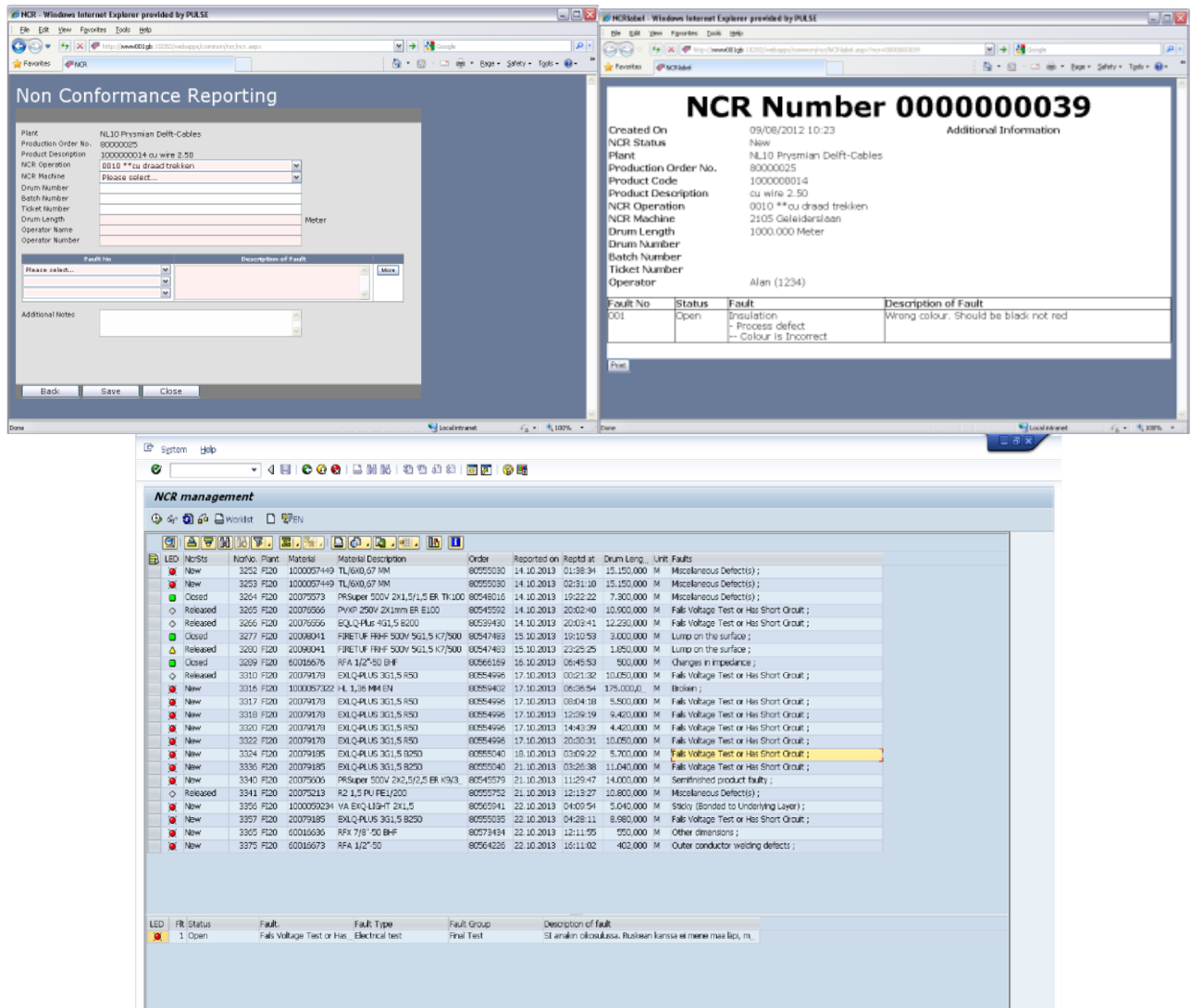


Fig. 2. SAP registration / non-compliant product management

3.4. The main types of defects segregated within the processes

Depending on the occurrence history and the type of defects in SAP, all the records made are entered. Deffect Code (DTCs) are assigned and the main screen is then updated. Changes are visible in the local presentation. Figure 3 shows several NC segregation zones.

Slatina NC Area – actual



Fig. 3. NC segregation zones

3.5. Quality tests on products before the final result

Products characteristics are monitored and measured through inspection and testing, at appropriate stage of production that means:

- incoming control – raw materials specifications and raw material control plan to ensure that purchase product meet the specified purchase requirements;
- in - process and final control – product quality control standard LV&MV cables, to identify the controls required for guaranteeing finished product conformity;
- characteristics to be checked;
- the frequency to be applied;
- the equipment and methods to be used;
- the responsible.

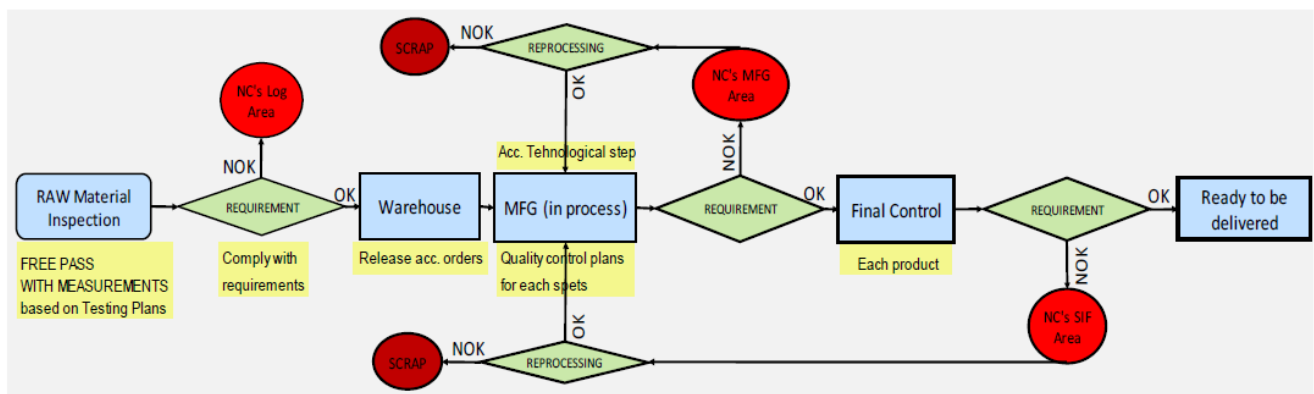


Fig. 4 Flow monitoring and measurement through inspection and testing

3.6. Analysis of non-conforming dimensions

Non-conforming lengths are those lengths that do not fall within the tolerances required by customers. The cables produced by Prysmian Slatina are divided into three categories in terms of length tolerances. Cables for stock, customer cables without mandatory lengths and cables with mandatory lengths (with tolerances of 0, 1, 2, 3 or 5%).

Nonconforming Lengths YTD 2020											
		ian.20		feb.20		mar.20		apr.20			
Total production length		1590		1540		1450		1452			
of which for stok		644	40,5%	406	26,4%	692	47,7%	573	39,5%		
for orders		946	59,5%	1134	73,6%	758	52,3%	879	60,5%		
Within tolerance		1339	84,2%	1249	81,1%	1232	85,0%	1281	88,2%		
Out of tolerance		220	13,8%	246	16,0%	202	13,9%	171	11,8%	Tolerance (%)	NA 0% 1% 2% 3% 5%
of which shorter		114	7,2%	95	6,2%	84	5,8%	78	5,4%	ian.19	710 5 861 14 1590
longer		106	6,7%	151	9,8%	118	8,1%	93	6,4%	Out of tolerance	0 4 216 0 220
		ian.20		feb.20		mar.20		apr.20			
Tolerance	NA	710		514		692		700		feb.19	514 74 950 2 1540
Out of tolerance		0	0,0%	0	0,0%	0	0,0%	0	0,0%	Out of tolerance	0 67 179 0 246
	0%	5		74		69		42			0,0% 90,5% 18,8% 0,0% 16,0%
Out of tolerance		4	80,0%	67	90,5%	38	55,1%	37	88,1%	mar.19	692 69 40 3 619 27 1450
	1%	0		0		40		10		Out of tolerance	0 38 2 0 162 0 202
Out of tolerance						2	5,0%	7	70,0%		0,0% 55,1% 5,0% 0,0% 26,2% 0,0% 13,9%
	2%	0		0		3		8		apr.19	700 42 10 8 681 11 1452
Out of tolerance						0	0,0%	4	50,0%	Out of tolerance	0 38 2 0 162 0 202
	3%	861		950		619		681			0,0% 90,5% 20,0% 0,0% 23,8% 0,0% 13,9%
Out of tolerance		216	25,1%	179	18,8%	162	26,2%	121	17,8%		
	5%	14		2		27		11			
Out of tolerance		0	0,0%	0	0,0%	0	0,0%	2	18,2%		

Fig. 5 Registration of non-conforming lengths

4. CONCLUSIONS

In approximately a few months after the implementation of the corrective actions and the process non-conformity management system, there was a significant increase in both the performance indicators and a decrease in the cost indicators. During this period, zero complaints were registered and significant savings were recorded compared to a similar period of the previous year. The implemented project contributed to maintaining the trust of the customers in the company and reducing other potential costs, reducing the time used for marking the cables, as well as reducing the interruption of the production flow.

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