

Case study: organizational aspects of the lean implementation at SOGEFI Filtration plant of Cerdanyola del Vallès, Spain

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Abstract

Lean management strategy is widely adopted by automobile industry companies –between many others- to achieve high performance standards. An in deep implementation of lean management involves organizational aspects. Some authors suggested as leading concepts of the organizational changes (1) focus the organization on the customer, and (2) to do that, focus the organization on the Value Stream. The present paper is part of a project aimed to diffuse successful applications of these ideas.

*The describe case corresponds to the lean transformation of the filter manufacturing plant of Sogefi Filtration at Cerdanyola del Vallès, Barcelona. Data was collected through an interview of the plant manager and a visit to the plant in December, 2010 and July 2011. The organizational solution adopted consists in (1) a pure functional hierarchical organization for the day to day functioning; (2) the setting up of continuous improvement groups in charge of Value Stream segments and with an important level of functions and support; and (3) a strong production control by using Value Stream based on indicators. This solution resulted to be highly successful in the described case.*¹

Introduction

Lean management strategy has been adopted by most of the manufacturing industry companies. In particular, it is widely used in the automobile industry to achieve high performance standards. The immediate consequence of the adoption of lean management is the use of their tools and the implementation of their practices. A deeper adoption requires organizational changes, based in principles as “waste reduction” and “customer focus”.

“Waste reduction” and “customer focus” are two principles that are broadly used in Operations management. These concepts may surprise somebody who does not know the business world, might be surprised by this and asks himself; “Is it possible that this happens?”, “Do organizations do things that are not needed instead of doing things that are from the customer interest?”. It is clear that, at least in general terms, this is not done in purpose. When a job is done, it is done because it is thought to be relevant, as we can deduce from the rationality of the persons

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involved. However, in complex value streams, the perceptions about what is needed and what will generate customer value are, in some cases wrong (Zokaei and Hines, 2007). In fact, not needed activities are performed and sometimes the needs of the final customers are not taken into account. This results in a massive disconnection between consumers and providers (Womack and Jones, 2005). To avoid these situations, the value stream is analysed. The Value Stream Mapping introduced by Hines and Rich, (1997) and further developed as a tool by Rother and Shook (1998), is defined as the sequence of activities that are made in order to deliver a service or product from the reception of the customer order to the delivery of the product or service (Womack and Jones, 1994).

Although the use of tools such as the Value Stream can help to increase customer focus by graphically representing all the flow from customer request to customer delivery. The literature reviewed below suggests that an enhanced customer focus is obtained by management elements, focusing permanently on the decisions in the Value Stream and customer needs by:

- Organising the enterprise around the Value Streams (Womack and Jones, 2005, Liker, 2006, Maskell and Katko, 2007).
- Establishing management objectives, and management indicators to the Value Streams (Baggaley, 2007).

The question that now remains is how these concepts perform in practice. The describe case corresponds to the lean transformation of the filter manufacturing plant of Sogefi Filtration at Cerdanyola del Vallès, Barcelona. Data was collected through an interview of the operations director and a visit to the plant in December 2010. The present working paper is part of a broader study about organizational changes in lean implementation.

Characteristics of the case

The company

SOGEFI Filter Division is one of the leading European developers and manufacturers of filters for automotive and heavy duty applications. 3,500 employees create in 2010 an annual output of 180 million filters. The filter division owns 18 sites worldwide with local presence in Europe, South America, USA, China and Egypt.

SOGEFI Filter Division, is part of SOGEFI, an Italian Group, specialized on the worldwide markets in two product lines: systems of engine and cabin filtration and suspensions components. The company has a global presence: 5 continents and 16 countries, with 46 plants. In its two divisions, filters (52 % of turnover) and suspension parts (48 % of turnover), the group employs 6,200 people worldwide in 2010. Leader in its core business in Europe and South America, SOGEFI is active on the markets of the first equipment and the original and independent aftermarket. SOGEFI stock is traded on the Milan Stock Exchange.

Products

The product range comprises oil, petrol, diesel, air motor and cabin air filter elements and complete modules for two product lines; first equipment and the original and independent aftermarket of filters for automotive and heavy duty applications.



Figure 1. Product structure. Source: own elaboration.

The production process is composed by an injection process, a media pleating process and an assembly process as can be seen in the process flow diagram.

In the process flow diagram it can be observed that all the products converge from injection and pleating process. After the injection and pleating process, the products go to different product lines for assembly i.e. the assembly process is a product/cell oriented meaning that there is one line per manufactured product. The two product markets: first equipment and aftermarket are manufactured through the same line product line.

The customers perform monthly orders that are pacified and scheduled in the assembly lines and injection and pleating process with a weekly schedule. The door to door lead time is 20 days whereas the process value added time is 1 minute. The main flow interruption, by process configuration, is the injection/pleating process and the assembly lines process and it is managed by a supermarket of maximum 15 days of material per product accounting for 75% of the process lead time.

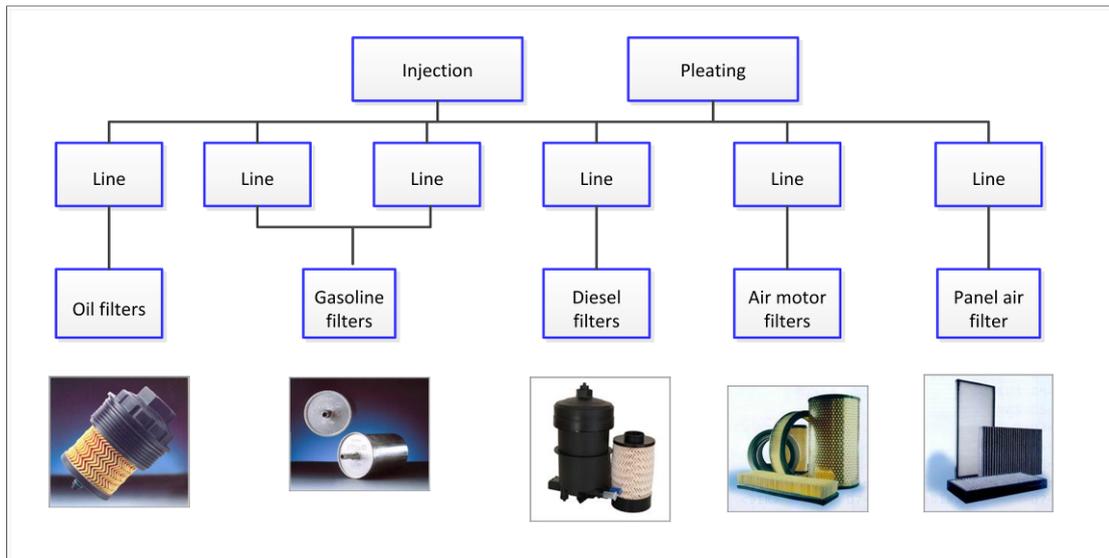


Figure 2. Process flow diagram. Source: own elaboration.

The lean implementation

In 2005, the interviewee, a former Valeo Autonomous Production Unit Manager joined SOGEFI filtration as plant Operations Director. The Sogefi Kaizen Way of Lean implementation was introduced in 2009 in a global level. In fact it was no more than an intensive continuation and formalisation of former lean management policies. The SOGEFI Kaizen Way focuses on six axis comprising cleanliness and safety, Total Preventive Management, zero waste, quality, employee involvement and visual management. All the plants in the group are measured by an annual audit made by the global Kaizen director. The group places a budget to improve these axes to a minimum level to the entire group. The studied plant was able to evolve from a result of the SOGEFI Kaizen Way from 48% in 2009 to 63% in 2010 and 70% in 2011, situating the plant in the 5th position out of 12 plants in the group. This evolution was possible according to the interviewee thanks to the focus on lean tools and lean organizational aspects. As pointed out in the introduction, this case study focuses on organizational aspects in terms of organization and management indicators.

The manager in charge of the lean implementation believes in the organization based in value stream. Effectively, he said that:

“I was professionally developed at Valeo, I have developed organizations in Autonomous Production Units. When I arrived I tried to do exactly the same here but it did not work, so I had to rethink about how to organize the teams following the principles of team work, policompetence and use of lean tools [...] We did not reach to create totally autonomous units with all the functions integrated [...] However the focus of the teams is the production line, not the Unit or the Group, in a completely transversal way, this is the main success factor”

Ghislain Audion, SOGEFI Plant Manager

In spite of this, an in depth reorganization of the plant was not considered possible when the process of implementation of lean management begins. The adopted

solution consists in maintaining a pure functional hierarchical organization, while the function of integrating the activity to the value streams was assigned to other organizational elements. These elements are continuous improvement groups and management indicators, which were appropriately designed to fulfil such a mission, as showed next.

Organization aspects

The hierarchy within SOGEFI consisted of four layers: general manager, plant manager, supervisors and operators. The production is organised in four units.

- (1) Line 1, line 6
- (2) Line 2, line 3, line 4, line 5
- (3) Injection
- (4) Pleating

SOGEFI is organized functionally. The resources of each function report to the function director and are placed in one or various units depending on the workload or assigned projects.

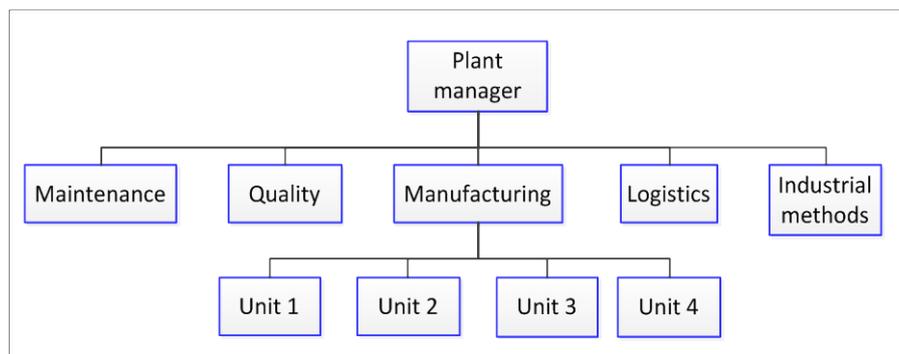


Figure 3. Plant organization. Source: own elaboration.

However, for continuous improvement, SOGEFI Filtration SA organizes the teams by Value Stream. These teams are called the “Continuous Improvement Teams” and were established in 2007. The general approach is characterized by a focus on step-by-step improvements and daily problem-solving. The organization focuses on many small improvements which were achieved by an interdisciplinary approach led by Kaizen engineers with full time dedication to one unit with the joint efforts of part-time resources for continuous improvement of quality engineers, method/Indus, maintenance and manufacturing. Line operators or other support functions are integrated in the teams when needed. The plant is organised in 8 manufacturing “Continuous Improvement Teams”. Logistics and maintenance are also organized as Continuous Improvement Teams.

The manager of the plant explained that:

“The continuous improvement of the different lines is leaded by the kaizen engineers. We have three kaizen engineers that are from industrialization/method department that are in charge of a certain number of lines, they are the leaders of the continuous improvement of those lines. They lead teams composed by quality, maintenance, production and other functions when needed [...]. Every group of lines has its own Continuous Improvement Group (GMC). The GMC acts in an autonomous manner, not just in the kaizen-continuous improvement but also in general problem-solving activities in terms of quality, efficiency, line stoppages and scrap. Here we do not have completely developed a structure in Autonomous Production Units, we have shared resources between different GMC, and however the teams work directly in the line in a very transversal way.”

Ghislain Audion, SOGEFI Plant Manager

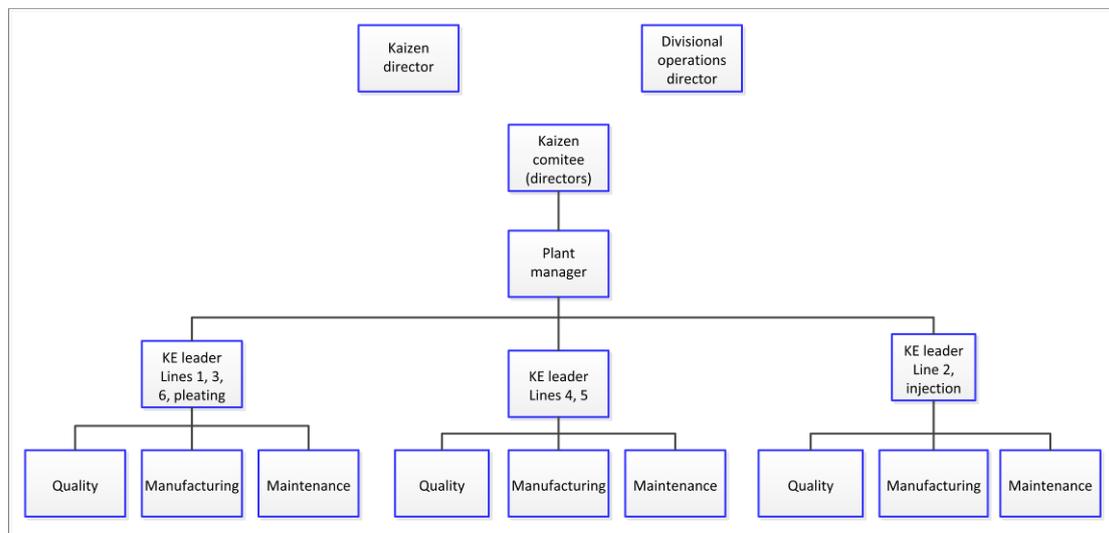


Figure 4. Organization of the Continuous improvement teams. Source: own elaboration.

The meetings and working sessions of the continuous improvement teams are highly standardized (see Figure 5 and Figure 6). The teams use problem solving tools in a ten minutes daily meeting in the shop floor for the daily problem-solving, called “Control Room”, and standard monthly meetings called “GMC” for middle term continuous improvement. More challenging problems are analysed with special workshops or task forces by all the team. The kaizen engineers report every week to the Plant Manager.

KAIZEN TEAMS STANDARD WORK

CONTROL ROOM

Duration < 10 mn

Place: line, in front of the line panel

JMN: Line 3 - Line 4

PC: INY - Line 6

BV: Line 1 - Line 2 - Line 5

EG: Maintenance

Who: Kaizen Eng, Quality, Maintenance, JE/Supervisor/Team Leader, Operators

Do the line stop or not?

Teach operators to write down problems or needs in the panel during the shift.

Improvement suggestions reception.

Maintenance: after control room in front of the panel.

GMC

Duration: < 2 horas

Who: same as control room + invited persons depending on the problems and actions.

Line 2 - Line 3 - INY - Line 6 - Line 2 - Line 1: monthly

Line 5: 2 per month

Analysis of the reject TOP3 and improductive (5 why), actions follow up, actions definition.

Implementation of the actions < 1 month

5S / TPM / IMPROVEMENT

Monthly audit with standard format with line stop or not (PC/JMN/BV/EG)

Emission of improvement suggestion (only imprvement, not maintenance activities)

Decide who can do the improvement: line operators, team leader or maintenance.

Cleanliness standard and maintenance 1st level: The Kaizen engineers must ensure that the line leaders fill up the sheets and do well the cleanliness and mainance 1st level

Monthly graphic follow up of the results of the audits with objectives (BV/JMN/PC/EG)

Graphic of the management of emitted improvement suggestions ond suggestions implemented (BV/JMN/PC/EG)

List of the suggestions emitted / implemented with actions, dates, and responsables (BV/PC/JMN/EG)

Recognition of the best improvement suggestion of hte month in the newsletter (GA)

PANEL REFRESHING

Customer CAC, 8D, indicator Green/Red: TP, reception CAC and clousure of the 8D

QCD: monthly results + comments: GA

M: monthly with comments: PC/JMN/BV

Productivity/Efficiency/Quality: GA, monthly

Rejects/TOP3: Line 3/Line 4/Line 6/Line 2 NM

INY: PC date of the industrial reporting

Line 1/Line 5: BV with Line 5 every two months

PDCA GMC: montly: PC/JMN/BV

Figure 5. Standards of the continuous improvement teams. Source: SOGEFI Filtration, translated from Spanish.

According the frequency of meetings Mr. Audion explained that:

“Four years ago, when we started with the GMC, the frequency was weekly. Currently and due to the improvement of the results, we do it monthly. When we have, for example, a new line, a new product or a specific task force, we do it every week, after every two weeks and after once per month, depending on the evolution of the results of the lines”.

Ghislain Audion, SOGEFI Plant Manager

At senior management level, the kaizen committee, leaded by the Plant Manager and formed by managers of the company, report to the Divisional Operations Director and the Group Kaizen Director. In order to extend the main concept of the

“Continuous Improvement Teams”, functional departments such as Finance or Human Resources are enrolled in one continuous improvement project per year.

PLANNING CONTROL ROOM 2011					SOGEFI KAIZEN WAY	
LINE	PILOTE	SHIFT	HOUR	LINE STOP	PARTICIPANTS	
Line 1	BV	TT	16h	YES	BV - FP - JRB - JP - OPE	
Line 2	BV	TM	10h15	NO	BV - NM - JLH - TP - CP	
Line 3	JMN	TM	8h30	NO	JMN - NM - JE INY - MR - CS - SN	
Line 4	JMN	TM	8h45	YES	JMN - NM - JP - OPE - SN	
INY	PC	TT	15h30	NO	PC - GT - JE INY - MR - EG - JLM	
PLEAT	BV	TM	9h45	NO	BV - JM - JP - EG	
Line 5	BV	TM	10h	NO	BV - JMR - FB - TP - EG	
Line 6	PC	TM	9h	YES	PC - NM - OPE - CP - JP	

PRODUCTION: GT - NM - JMR - JM
 LINE LEADERS: JLH - FP - CS - MM - DT - FB
 QUALITY: TP - MR - JP
 MAINTENANCE: EG - SN - CP - JRB - JLM

Figure 6. Standards of the continuous improvement teams meetings. Source: SOGEFI Filtration, translated from Spanish.

Management indicators

The management indicators are organized in three layers. The first layer used by plant direction measures results in a monthly basis. The second layer corresponds to the unit measurement reported every month. The third layer of indicators corresponds to the line indicators showed publicly to everyone and discussed every day in the continuous improvement daily meetings.

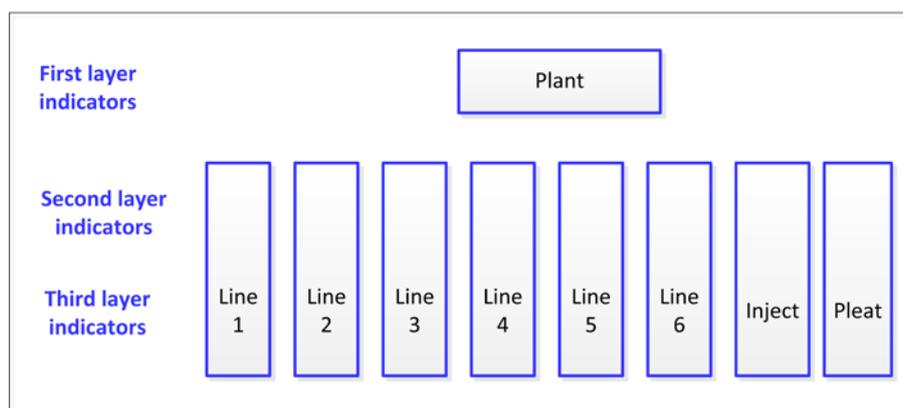


Figure 7. Organization of the indicators. Source: own elaboration.

The first layer of indicators measures monthly plant performance. These indicators are by nature result indicators. Examples of indicators are productivity, manpower efficiency, end of line quality measurement, customer ppms, machine OEE and % of

downtime due to machine breakdowns. Note these indicators are non-financial indicators. Additionally to these indicators there is a standard divisional Kaizen audit directed with 6 main focuses and measured every year. The investment needed for improving both result and process indicators are reported to the Divisional Kaizen Director. The focus of this audit is to measure not just result indicators but also process indicators, highlighting the importance for senior management on how the things are done to reach the results.

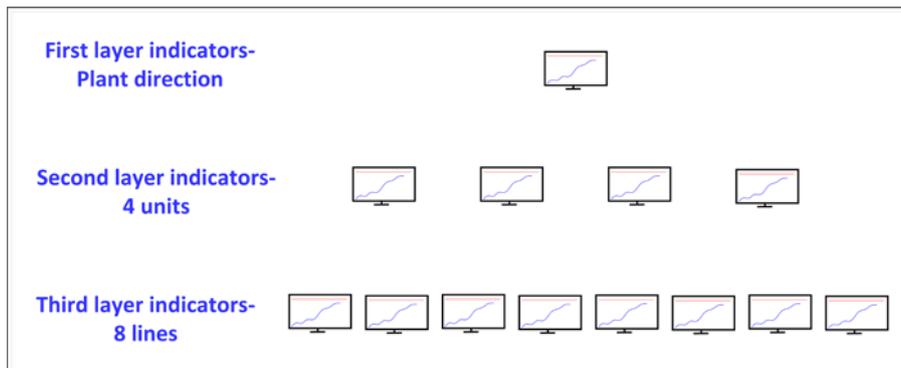


Figure 8. Organization of the indicators. Source: own elaboration.

PLANT RESULTS EVOLUTION 2006 - 2010					
Indicator	2006	2007	2008	2009	2010
Productivity	78,15%	81,30%	85,20%	79,30%	83,20%
DL Efficiency	87,60%	84,00%	88,60%	86,40%	87,80%
% Improductive hours	12%	8%	6%	9%	7%
ROPN	55,00%	58,38%	62,73%	62,49%	63,97%
Reject rate	1,87%	1,63%	1,03%	1,07%	0,88%
Nº CAC	46	50	35	28	16
Downtime			5,16%	6,19%	3,86%
OEE			79,00%	81,80%	89,10%
2009: complicated year due to the loss of sales and the integration of an old manufacturing line from other plant of the group that closed					

Figure 9. First layer indicators, Plant indicators. Monthly actualization. Source: SOGEFI Filtration, translated from Spanish.

MONTHLY KAIZEN NEWSLETTER AT SOGEFI CERDANYOLA

N° 7 NOVEMBER 2010

RESULTS OF THE MONTH OF OCTOBER

INDICATORS	2009	OBJ 2010	OCT 2010	2010	COMMENTS
Service level first equipment	98,9%	100,0%	99,8%	99,4%	
Inter trading service level	82,7%	98,0%	100,0%	98,9%	
N° customer complaints	35	30	3	16	
Internal reject level	1,07%	1,04%	0,85%	0,89%	
Productivity	79,3%	82,2%	84,0%	83,1%	
Direct labour efficiency	86,4%	87,0%	88,1%	87,6%	
Line performance (OEE)	81,8%	82,0%	90,5%	88,9%	
N° improvement suggestions	-	470	11	225	
Audits 5S / TPM	-	85%	85%	84%	

INFORMATION OF THE MONTH - VISITS - AUDITS

Visits information :

On the 28th of October, HONDa visited us to solve an issue of packaging.

On the 23rd of November, we will have a very important visit for the image of our company. We receive After-Market customers and collaborators of the Group.

On the 25th of November, we will receive a team of the Purchasing Division of the Group.

All this visits finish with a plant tour. So we want to thank you now for your collaboration.

Thank you.

IMPROVEMENT SUGGESTIONS

We would like to highlight 2 smart improvement suggestions proposed by X and Y:

With the aim of reducing the scrap when the paper 370082 is consumed, X proposes to monitor the first roll independently of the second roll. This allows to maintain the paper taut between both rolls, avoiding stoppages.

It exists a continuous problem with the filter BF-0034-15 in the curve of the convoyer belt at the exit of the oven, in the Filter Element line. Y proposes to install a photosensor to detect the presence of a problem and to build a special cylinder in order to separte the filters.

Congratulations to both !

Figure 10- First layer indicators. Monthly newsletter to communicate results to all the organization. Source: SOGEFI Filtration, translated from Spanish.

The first layer indicators or plant results are also communicated to all the organization through the publication of a monthly newsletter. The plant manager explained that:

“In order to communicate the results of the plant with indicators that all the organization can understand we have this newsletter. When one speak about operative result or operative performance it is difficult to communicate. The following indicators are simple and everybody understand, service level, intercompany service level, number of customer complaints, first time quality? , productivity, efficiency of manpower, the OEE, number of employee suggestions, the audit results in terms of 5S, TPM. We do not just put this information in the line panel; we also send this information to all the organization. Additionally, we communicate visits, trainings, some messages of the kaizen philosophy and we publish the recognition of the ideas of the operators highlighting two ideas per month.”

Ghislain Audion, SOGEFI Plant Manager

The second layer indicators, measure the performance of the process also in a monthly basis. It is important to note that these indicators are organized by value stream or process, not by product. For example injection process has its own process indicators measuring the performance of the Value Stream, not the performance of the different products go through this process. In this layer, the indicators are result indicators. They measure manpower efficiency and reject rate. Note that the indicators are not financial.

LINE RESULTS EVOLUTION 2006 - 2010						
LINE 1	2006	2007	2008	2009	2010	Comments
DL Efficiency	90,50%	93,80%	95,60%	95,70%	99,00%	2011: Up dating of manufacturing times
Reject rate	3,38%	2,12%	1,08%	0,83%	0,79%	
Productivity	83%	93%	98%	99%	100%	
LINE 2	2006	2007	2008	2009	2010	Comments
DL Efficiency	97,10%	96,30%	98,00%	99,50%	97,70%	2010: Up dating of manufacturing times
Reject rate	4,71%	3,22%	1,70%	1,01%	0,48%	
Productivity	87%	97%	99%	100%	97%	
LINE 3	2006	2007	2008	2009	2010	Comments
DL Efficiency	92,70%	94,30%	97,80%	99,60%	89,1%	2010: Up dating of manufacturing times
Reject rate	2,07%	0,74%	0,04%	0,01%	0,03%	
Productivity	92%	97%	96%	97%	97%	
Injection	2006	2007	2008	2009	2010	Comments
DL Efficiency	70,30%	72,30%	76,10%	85,80%	81,2%	2010: Start up of a new process with high DL content
Reject rate	2,85%	2,68%	1,69%	1,15%	0,92%	

Figure 11- Second layer indicators, unit indicators, organized by VSM. Monthly actualization. Source: SOGEFI Filtration, translated from Spanish.

The third layers of indicators are the line indicators used in a daily basis for the daily meetings of the continuous improvement teams. The indicators are showed visually to everybody in each line.

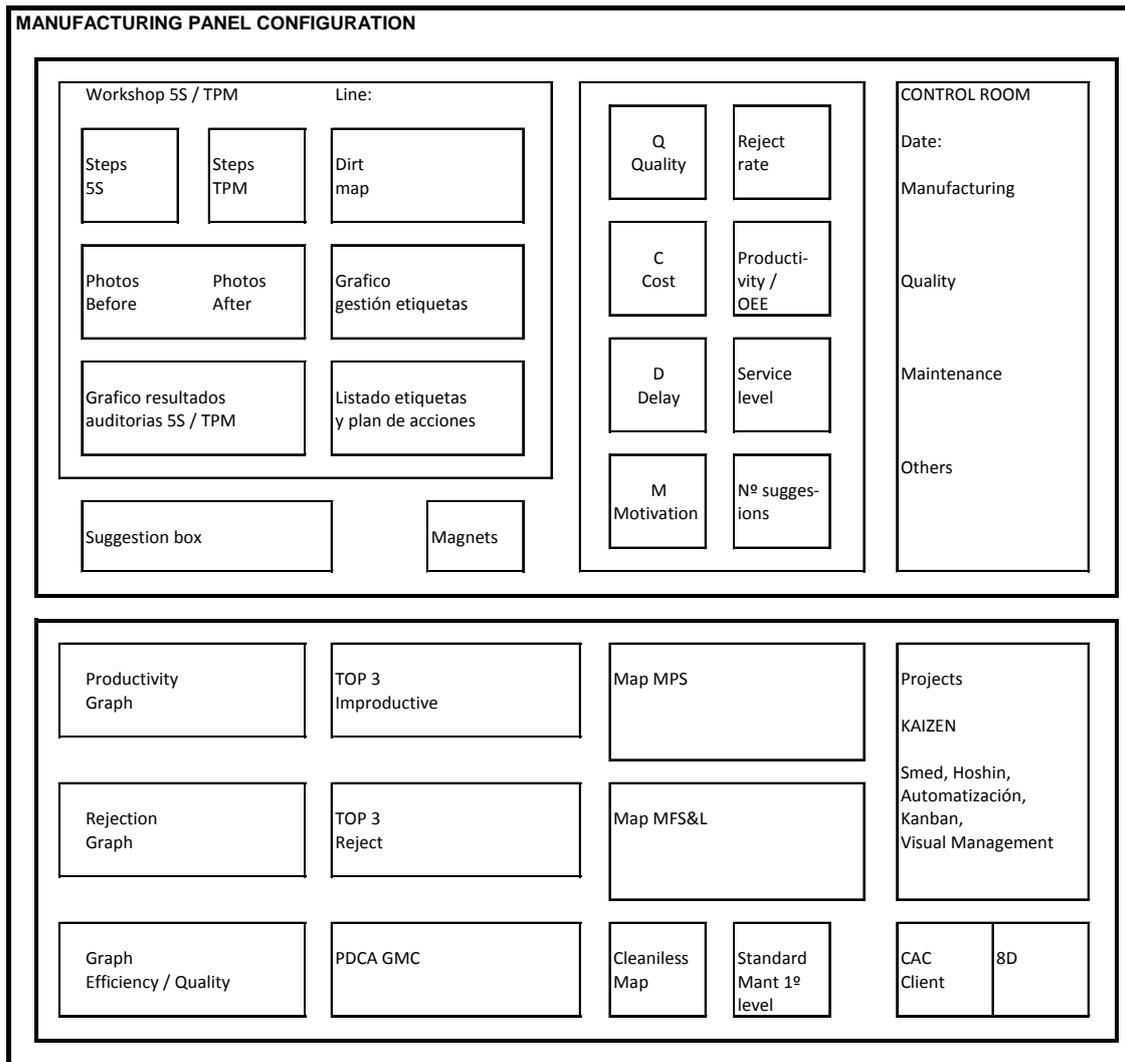


Figure 12- Third layer indicators, production tracking board. Source: SOGEFI Filtration, translated from Spanish.

Mr. Andion gave some details about the indicators they used and about the daily register of the losses that each line has:

“We have visual panels in each line. A part of the panel is dedicated to the last 5S and TPM workshop and the audit that is performed every month by the operators. When they cannot solve problems themselves, they have a part of the panel where they can write them or communicate improvement suggestions [...] We also track the monthly number of suggestions done [...] In the other part of the panel we have the QCDM of quality, cost, service level and motivation. As you can see there are typical productivity, quality and efficiency graphs. In this part we can see the top 3 of losses of efficiency and the associated PDCA’s, so everybody can see the work that the teams are performing and that the teams are working to solve their daily problems. When there is customer non-conformity, we put a red label, for us this is very important. We also display in the panel the 8D analysing the incident. In this area, we put concrete projects or one workshop to solve one systemic problem. Finally in this part of the panel, there is a space for the teams daily meeting (Control Room). The team discuss about the different problems that they had the previous day. And put actions. When they cannot solve the problem in daily basis they bring the problems to the monthly GMC.”

The production of the different lines is registered. For example, all the quality failure modes are registered in each line, and the reason of every line stoppage is also codified in the document and also in the system. All the lines have this standard system. This information is introduced every day. After that, once per week, we put visually this graph in the line panel. For example in this case, we can see registered week by week the causes of stoppage. After in the GMC, the teams work on the TOP3”

Ghislain Audion, SOGEFI Plant Manager

It can be seen that, distinctly to the other layer of indicators, the third layer is composed by more process-oriented indicators. In this case there is a focus on adherence to standards and gap reduction. They show the teams not just the result but how the things are done and how to improve. Note that these indicators are non-financial and are organised by process or Value-Stream.

Conclusions

Lean management strategy is widely adopted by automobile industry companies – between many others- to achieve high performance standards. An in deep implementation of lean management involves organizational aspects. Some authors suggested as leading concepts of the organizational changes (1) focus the organization on the client, and (2) to do that, focus the organization on the Value Stream. The present paper is part of a project aimed to diffuse successful applications of these ideas.

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The organizational solution adopted consist in (1) a pure functional hierarchical organization for the day to day functioning; (2) the setting up of continuous improvement groups in charge of Value Stream segments and with an important level of functions and support; and (3) an strong production control by using Value Stream based indicators.

This solution resulted to be highly successful in the described case. The result indicators show radical improvements. From 2007 to 2010 all the result indicators have improved dramatically, for example the line rejects have decreased by 45% and the customer rejects by 65%. The process indicators have increased dramatically as well, the divisional Kaizen audit results have increased from 48% to 70% from 2009 to 2011. One important benefit of the Continuous Improvement team’s organization is the increase of the cross-training of the employees, not measured but according to the interviewer very significant. Individuals obtained more knowledge in their own process, because they were better able to see the bigger picture.

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