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**TRABAJO FIN DE GRADO EN  
GRADO INTERNACIONAL EN ADMINISTRACIÓN Y DIRECCIÓN DE  
EMPRESAS**

**IMPLEMENTATION OF A NEW SYSTEM FOR ESTIMATING AND  
CONTROLLING LAUNCH COSTS IN VW-NAVARRA**

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## **ABSTRACT**

This paper analyses the implementation of a new system for estimating and controlling launch costs in VW-Navarra. It starts with the definition of a new strategic map, called “Mach 18 Factory”, which places particular emphasis on increasing profitability through greater control of costs. In line with these organizational goals, this project aims at optimizing the way of forecasting and managing launch costs, by creating a computer assisted tool which significantly improves the control of these costs. This tool was able to calculate total launch costs, assign them to specific areas and time them. In addition, it elaborates one budget per area, monitors and controls launch costs by obtaining and analyzing possible deviations and finally, it summarizes the information graphically. This new process and the computer assisted tool were put into practice for forecasting and managing launch cost for the new model VW270. The method implied in this project increased the coordination among areas and creates one responsibility post per area.

## **KEY WORDS**

Forecasting, Launch costs, Computer Assisted Tool, Coordination, Budget control

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## **PRESENTATION**

Volkswagen AG decided in 2013 the launch of a new generation of the Volkswagen POLO: the VW270; and selected the assembly plant located in Navarra for its production. This launch castles with the definition of a new strategic map, called “Mach 18 Factory”, which places particular emphasis on increasing profitability through greater control of costs. In line with these organizational goals, this project aims at optimizing the way of forecasting and managing launch costs, by creating a tool which significantly improves the control of these costs.

The process of forecasting launch costs used before was the following: applying a fix percentage to the previously approved inversions budget. It was not based on any necessity or estimation and served to finance all areas concerned with the assessment. This way of proceeding caused many problems of coordination and a lack of responsibility among the involved areas. In addition, the hierarchical structure of VW-Navarra delayed the granting of the funding requested by each department (or cost centre).

Once the situation was analysed, it was concluded that some measures must be taken. Firstly, the forecasting of launch costs should take into account the estimations of the necessities made by the management areas. In addition, the estimations must be managed in a way that the information needed for the decision-making process could be easily found. As a result, a computer assisted tool was created in order to encompass all those possible launch cost estimations derived from the launch of a new model and work with them to provide with essential information that will be used during the decision-making process. This tool was able to calculate total launch costs, assign them to specific areas and time them. In addition, it elaborates one budget per area, monitors and controls launch costs by obtaining and analyzing possible deviations and finally it summarizes the information graphically.

This new process and the computer assisted tool were put into practice for forecasting and managing launch cost for the new model VW270 which will be launch in January 2017. Once this new system was introduced in the factory of Landaben, the differences between both processes were outlined. The method implied in this project increased the coordination among areas by creating a multidisciplinary workgroup. Moreover it takes into account areas’ necessities. A specific budget for each area was created and one responsibility post per area too. Additionally, the budget was more real because it was

based on the necessities of the factory and it provides with accurate tools to control and limit the specific budget of each area.

This paper only represents the first step when forecasting and controlling launch costs. However, it represents an important step forward towards achieving the coordination among areas when preparing the launch costs' forecast and implementing the group strategy "Mach 18 Factory".

Throughout this paper, the objectives and results of this project will be assessed in detail. In the first instance, it will be explained the essential context and background necessary in order to understand the development of the paper. Then the design and development of the structure will be explained with all the carried out steps for its creation and implementation in the enterprise. Moreover, it will analyse how the implementation of the system for the new model VW270 is, and the benefits and improvement over the old model. Finally, the conclusions obtained after the implementation of this project will be discussed: problems encountered during the project developed, the potential limitations of the tool and the relevant recommendations for the future.

## **1. INTRODUCTION**

One of the most important problems that can be found in each enterprise is the forecasting and management of costs. No matter the size, sector or country where the enterprise is located. According to some studies, those enterprise which tries to forecast their future costs, works more efficiently than those which do not; efficiently with respect to costs.

In addition, the difficult economic situation that contextualizes this project has caused that nowadays, it is a trend among enterprises to increase the importance of costs management; both, the real ones of today and those of tomorrow.

This project has been developed in conjunction with Volkswagen Navarra. I have been working there for the last four months carrying out a standard procedure of forecasting and managing of launch cost. It will be executed by creating a computer assisted tool which will help in the decision-making process.

This project forms part of the package of measures taken by Volkswagen Navarra in order to implement the “Mach 18 Factory”; whose main goal is achieving economic and environmental leadership in the global automotive industry, reducing costs, increasing productivity and improving competitiveness by introducing more efficient products with less impact on the environment.

Firstly, the background that could help the reader to understand the context of this project will be explained. I will describe the enterprise and the department where I have been working for the four months’ internship period. In addition, the definition and types of vehicle launch will be discussed. Finally, the protocol of Volkswagen AG in order to recognize launch costs and what requisites must be fulfilled by them.

Once the background and the technical concepts will be explained, the previous situation in VW-Navarra will be showed; it will lead to the formal objectives and purposes of this project.

### **1.1. Background**

#### *1.1.1 Volkswagen AG and Volkswagen Navarra*

Nowadays, the automobile industry is one of the most important driving factors of the world economy. It has presence in almost every country in the world. It represents the 10% of the Spanish GDP and the 17,7% of the exports (RTVE.es, 2013). The automotive sector generates 300.000 direct job posts according to ICEX (Instituto Español de Comercio Exterior) data.

The automotive industry is characterized by intense competition, technological innovation, and is concentrated, with the ten leading vehicle manufacturers representing close to 80% of global production. Eventhough the severe competition in the automotive industry, Volkswagen A.G. is a strongly positioned player. It has a widely spread product range with a strong technical position. It has a varied portfolio of brands and services with a price premium for a volume brand and strong residual values. Volkswagen A.G. has a leading market share in Europe and is one of the most important global players.



Figure 1: Different brands which form Volkswagen Group.

The Group operates 106 production plants in 19 European countries and a further eight countries in the Americas, Asia and Africa. Every weekday, 572,800 employees worldwide produce some 39,350 vehicles, and work in vehicle-related services or other fields of business. Its headquarter is situated in Wolfsburg. In 2012, the Group increased the number of vehicles delivered to customers to 9.276 million (2011: 8.265 million), corresponding to a 12.8 percentage share of the world passenger car market.

Volkswagen Navarra belongs to Volkswagen Group. It is one of the 106 production plants of the group and the leading factory of the new Polo, also known as Polo "A05", the 5th generation Polo. *Annex 1: VW factories in the world.*

SEAT.S.A. holds the 100% of the shares of VW-Navarra. Moreover, SEAT.S.A is currently a wholly owned subsidiary of the German Volkswagen Group, since December 1990 when it became the first non-German wholly owned subsidiary of the group. Therefore the relationship that exists between Volkswagen Group and VW-Navarra is an indirect one. VW-Navarra is an indirect subsidiary of Volkswagen AG. However, the links between SEAT.S.A and VW-Navarra are inexistent. The factory of Landaben depends solely on Germany. It must be taken into account that VW-Navarra is only one assembly plat which produces around 1.524 vehicles per day and directly employs over 4.500 people. However, the factory is not involved in the designing process of new models; it only implements measures which came from the central in Wolfsburg. As a result, no R&D department will

be found in VW-Navarra, or any marketing one. These departments are located in Germany and encompass every member and factory of the group. Therefore, VW-Navarra is a very important enterprise in terms of production volume and employers; nevertheless, it is completely dependent mainly on the operational and strategic decisions made by the group.

However, it is important to note that the factory located in Landaben (Pamplona) has not always been a Volkswagen's car assembly factory.

The current Volkswagen plant in Navarre was set up in 1965. For a whole decade it belonged to AUTHI, until 1975. During this period, several models were assembled there: Morris 1.100, MG 1.100, Mini, Mini Cooper and Austin 1.300 among others.

In 1975, SEAT bought AUTHI. In this new period one of the most determinant models was the SEAT Panda, whose sales were gradually increasing. The factory belonged to SEAT until 1983, when Volkswagen acquired the assembly plant. In February 1984, after a total investment of 10 billion Pesetas, the Polo started to be manufactured in the new lines at Landaben.

Nowadays, the company count with 4374 direct employees, but indirectly it employs more than 9500 workers (taking into account supplier's staff).

Volkswagen Navarra is divided into seven Management areas: General Management, Technical Product, Production, Logistics, Quality Assurance, Human Resources and Finance.

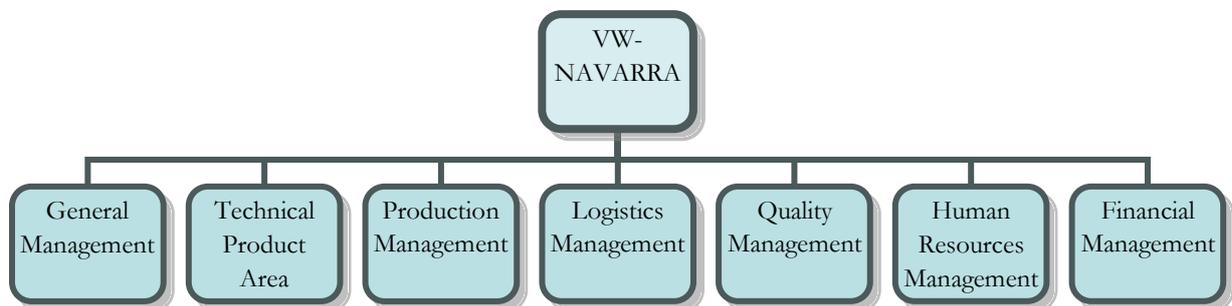


Diagram 1: VW-Navarra organizational chart.

The management area which is in charge of all the new models' launches is the Technical Product Area. This is the area specialized in the product: the Volkswagen Polo. It is divided into the following departments: Schablonenbau, Analysis Centre, Technical Office, Leading Factory and VW 250 GP.

The two main departments which have more influence on this project are: VW 250 GP and Leading Factory.

- VW 250 GP: is the area responsible for coordinating the Polo A05-GP project in Volkswagen Navarra. This department will be transformed according to the different launches, for instance, in one or two years it will be renamed VW 270.

- Leading Factory: Is the area responsible for coordinating technical product support activities to other Polo producing plants (South Africa, India, Russia and China) as well as shipping CKD<sup>1</sup> pieces to various plants of the consortium and Original pieces to VW Kassel.

### 1.1.2. New vehicle launch

Firstly, it is important to understand what a vehicle launch means. The process by which a firm as Volkswagen launch a product is called product emergence process (PeP).

The common knowledge of a new vehicle occurs when the company start to include adverts in the media. However, the design and development of a new model starts around four years earlier. It is a standard in Volkswagen Group; all launches are managed in the same way, no matter the factory where the vehicles will be produced.

The activities in the Product Emergence Process are structured and controlled using software based in milestones. The following figure shows the complicated version out of the Volkswagen A.G. PeP manual (2003). It indicates the Product Emergence Process time overview.

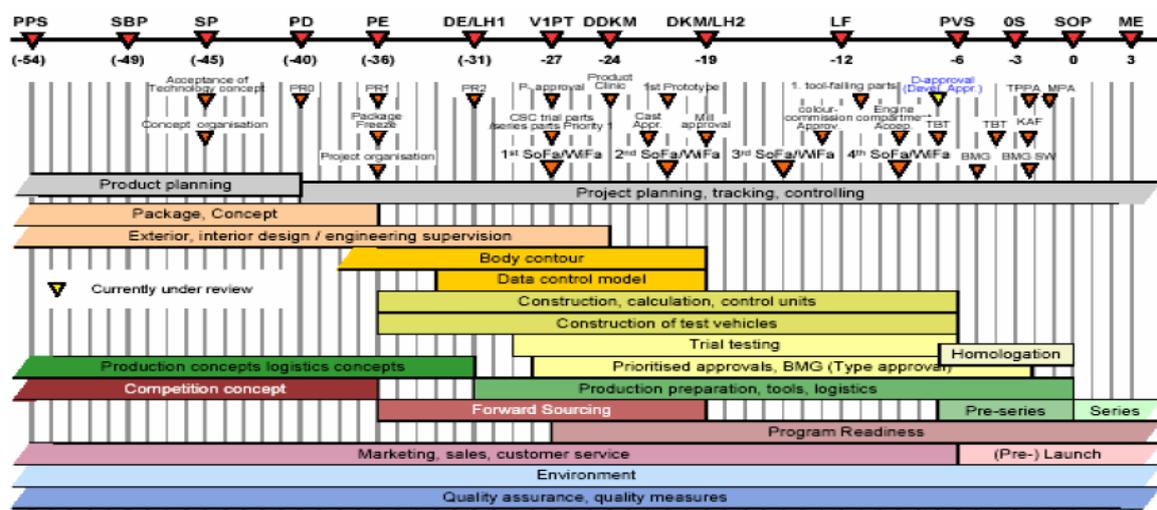


Diagram 2: PeP (Product emergence Process): milestones and phases. Source: PeP Manual (2003)

<sup>1</sup> Parts manufactured in Germany and assembled in Spain

The graph above is not user-friendly; therefore, a simpler version has been created. Diagram 3 shows the different five launch phases.



Diagram 3: Different phases of the PeP.

In each phase, different decisions are made however the major part of this process takes part in Wolfsburg, where the concept, design and first prototypes are developed.

Nowadays, and starting with the last launch (POLO A05), Volkswagen Navarra counts with diverse engineers and logistics that are currently living in Wolfsburg helping with the design of which will be the new assembled car in Pamplona.

However, it must be taken into account the fact that the factory starts suffering the changes and dilemmas of a new launch during the last two phases of the PeP: Series Launch and Series Production. Therefore, this project will focus on this two different phases and how they affect the factory.-

The factory located in Landaben has passed through different launches. However, due to data restrictions, this project focuses on last two launches (POLO A05 in 2010 and POLO A05 GP in 2014).

It is important to mention that, even though each new launch changes some parts of the car, there are some that transforms it completely, while others do not.



Figure 2. 1: corresponds to the A04 generation (2005/2009). 2: corresponds to A05 generation (2010/2013). 3: corresponds to A05 GP (2014/2017)

These images show the two main types of launches. The first one could be appreciate between the first and the second picture. The body of the second car is completely different, much more aggressive and with more defined lines. In contrast, the change that suffers the model from 2010 to 2014 is not as obvious as the first one. Some small changes

in the front part of the car: in the bumper and spoiler, and some others when talking about technology and visual appearance of the dashboard.

Therefore launches can be divided in two:

- The first one can be denominated as generation launch.
- The second one can be denominated as restyling launch.

A generation launch makes huge changes in the model. There have been four generation launches.



Figure 3: Five generations of POLO

These are the main five models of POLO that have existed, but some restyling models have been launched in the middle of these generations. The next one will be called POLO A07, and will be launched in January 2017.

### *1.1.3. Launch costs*

The next step is to know what launch costs means for Volkswagen AG and implicitly for VW-Navarra.

Volkswagen AG has a clear idea of what to consider as launch cost. Each factory has the same document which outlines all the different requisites that an expense must fulfil in order to be considered as a launch cost. (This document is confidential.)

Launch costs are each economic expense which comes from an activity related to the launch of a new vehicle for a concrete period. Twelve months before and after the predicted SOP.

Initially, it is essential to distinguish between investments derived from new launches and what is really considered a launch cost. In order to consolidate the idea I would like to illustrate it with some examples: confidentiality measures as covers to protect the exterior of new models are considered launch costs.

On the contrary, building up different industrial units that will be used for the launch and a posteriori will be considered as an inversion and will not be included in this project.

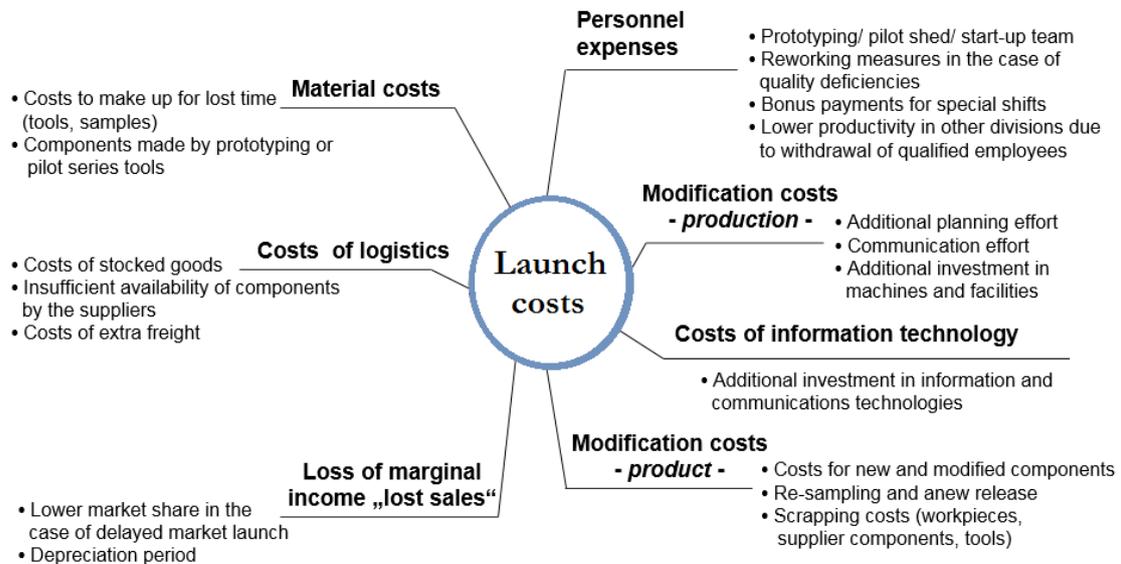


Diagram 4: Different launch costs. Source: Based on Wiendahl, Hegenscheidt, Winkler 2002, p. 653

*Annex 2* shows what Volkswagen Group considers as launch costs. On top of that, all launch expenses which are comprehended in this project fulfil these requirements.

Apart from differentiate them from investments; launch costs must fulfil one last requirement. It will only be recorded as launch cost those which affect the factory during a previous established period. However it is necessary to analyse deeply the PeP to understand why Volkswagen AG has fixed a period.

As I have said before, a vehicle launch last for more or less four years. However, the factory in which this new model will be launched starts suffering these costs during last two phases of the launch (Series Launch and Series Production).

It is important to remind that these costs are related to the preproduction cars assembling.

After completing the product development process (or sometimes "during" the product development process), pre-production samples (PPs) should be built. Pre-production samples are essentially an example of what will be produced during the manufacturing process. The pre-production samples are garments that are produced in the facility that is planning to manufacture the bulk order. The pre-pros should be an exact representation of what you intend to ship as final product. The concept is to present these garment examples to the buyer "before" production. However some different phases can be found in the preparation of pre-production samples.

Pre-production cars are vehicles that allow the automaker to find problems before a new model goes on sale to the public. They come after prototypes, or development mules which themselves are preceded by concept cars (they are not produced in VW-Navarra; instead, they are produced in Germany). Pre-production vehicles are followed by production vehicles in the mass production of them for distribution through car dealerships.

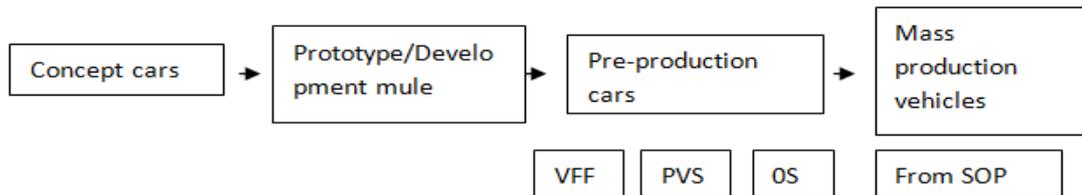


Diagram 5: Different phases before mass production vehicles

There are three different phases when producing pre-production cars:

- The first pre-series denominated VFF (Vorserienfunktionsfahrzeuge)
- Second phase, the PVS (Production of the Preparation Series)
- The OS (zero series) is the final phase prior to launch the new model.

Each phase is estimated to start its production in a concrete date/month, as can be seen in the graph.

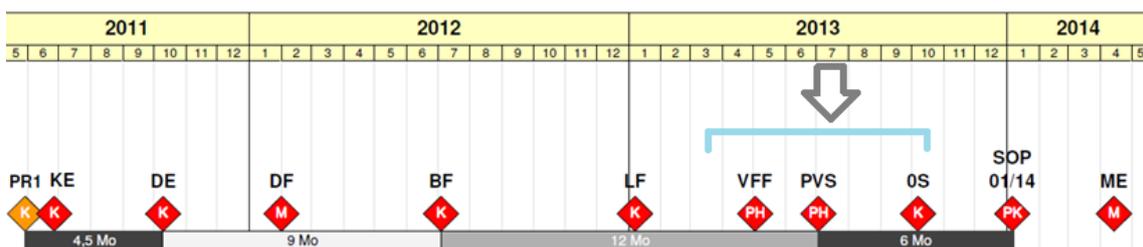


Diagram 6: This chronogram represents the pre-pros production with different milestones. Annex (3) shows the abbreviations meaning.

The graph shows how PPs’ production starts more or less 8 months before of the predicted SOP<sup>2</sup>. However, from Wolfsburg’s definition, launch costs can be recorded if they have taken place between one year before and after of the predicted SOP.

When talking about launch costs it is very important to have in mind that Volkswagen Navarra is the leading factory among the group (comparing with the rest factories which produce POLOS). Therefore, for every new launch of POLO (for instance the one of VW

<sup>2</sup> SOP: Start of Production

270 in 2017) will be the elected factory to launch the car first, 10 weeks before. Consequently, it will be the first POLO producer's factory in suffering from these costs.

Once that the definition of launch costs is a bit more clear, it is time to analyse how Volkswagen deals with these costs and what tools or measures are used to forecast them.

#### *1.1.4 Previous situation in VW Navarra*

There exists a formal acting protocol that every factory owned by Volkswagen AG follows when a new model launch is announced.

Normally each factory receives some information about the new model around three years before the predicted SOP. After all information is analysed it is turn to elaborate different budgets; depending on whose concern is. For instance, VW-Navarra must present a budget which encompass all required investments, another one for launch costs and a third one that comprise all costs that are related to quality department.

These budgets must be approved by the head-directors of the different departments of VW-group, located in Wolfsburg. The approval of these budgets is usually 3 years before the predicted SOP.

The protocol has been followed by the factory for each launch. However, the way of forecasting launch costs were not the optimal one. Previous the development and implementation of this support tool, launch costs and budgets were forecasted with little knowledge and consensus among all factory's departments. It did not exist any standard way of recollecting estimations of costs. There were not any group of people whose functions were analysing launch costs and controlling possible deviations from budget.

The previous process of estimating and calculating launch costs was applying a percentage to the previously approved investments budget. It did not imply any cooperation among the different areas involved in the factory. The total quantity of launch costs was obtained by applying a percentage to the previously accepted inversions budget. For the last launch, the one of the 250 GP, a new cost centre 621 was created to encompass all costs which had its origin on the change of model. Although this cost centre was created, it only assures that launch costs were correctly allocated. As a result, the factory had a sum of money which destiny was that specific cost centre 621. The responsible of the cost centre was the one that must accept or deny the different requests made by the departments. There was not any specific budget for each area. Moreover, no temporal budget was created.

This process of forecasting did not take into account any of the possible necessities of the specific areas. As a result, important deviations from budget were found. This deviation caused an increment in expenses that the factory should pay with their own budget and not with the one approved by Germany. In addition, the budget comprehends all possible launch cost that the factory could suffer for a period of two years. Though, there was not any control of time and before the end of the launch period, the total amount previously forecasted was nearly used.

The main reason of implementing the system that this project proposes is to avoid those deviations. They increment the expenses of the factory in a context when they are trying to reduce them. Moreover, it tries to increase the coordination among management areas in terms of estimation and control of launch costs.

## **1.2 Methodology**

Throughout this section the objective and purpose of this project will be outlined. Moreover the entire theoretical basis and the steps followed in order to accomplish the objective will be described.

### *1.2.1. Objective and purpose*

After analysing the previous situation in VW-Navarra, it is evident that some measures must be taken in order to improve the forecast of launch cost. Moreover the estimation procedural and monitoring of costs should be restated. This arrangement will improve the transparency of the procedure and will help head directors with the decision-making process.

The main objective of this project is to optimize the process of forecasting and controlling of launch costs, a strategic measure included in the Mach 18 Factory group strategy.

As a result, a computer assisted tool will be created in order to encompass all those possible launch cost estimations derived from the launch of a new model and work with them to provide essential information that will be used in the decision-making process. Moreover it will coordinate the different management areas in order to make it more reliable and efficient.

In order to provide this useful information the application must be able to:

- Obtain the total launch cost analysing some premises that the different departments of the enterprise will supply.
- Distribute the overall cost among those management areas in the factory.
- Temporalize those costs among the twenty-fourth months in which a launch cost can be recorded by nature. (According to Volkswagen AG indications.)
- Elaborate a specific forecast for each area: including the budget for the area and those cost temporalized.
- Finally the computer assisted tool must be able to monitor those costs: per area and per month, analysing the possible deviations.
- In addition, the information must be shown in a clear and visual way, and the tool must be user-friendly.

Moreover this tool must be developed in a standard way in order to be useful for future launches; it must be much easier to make the forecast and to monitor the costs.

### *1.2.2. Theoretical basis*

This project deal with the different launch cost which can arise during the introduction of a new vehicle in VW-Navarra. As I have explained before, this launch cost are previously defined by Volkswagen AG, in its headquarter in Wolfsburg. Therefore, theoretical applications of cost accounting will be used along this project. Moreover, this computer assisted tool will be developed according to process management theories; analysing and assigning cost depending on the processes that the different areas carry out.

In addition, it is important to understand the corporate strategy that defines the objective of the project; “Mach 18 Factory” is based on different process management theories. It implements a balance scorecard strategy. As defined by Kaplan and Norton (1996), “The Balanced Scorecard translates an organization’s mission and strategy into a comprehensive set of performance measures that provides the framework for a strategic measurement and management system”. It can be used by managers to keep track of the execution of activities by the staff within their control and to monitor the consequences arising from these actions. It has four different perspectives which try to answer one question each: financial (“How do we look to shareholders?”), customer (“How do customers see us?”), internal business processes (“What must we excel at?”) and learning and growth (“How can we continue to improve, create value and innovate?”).

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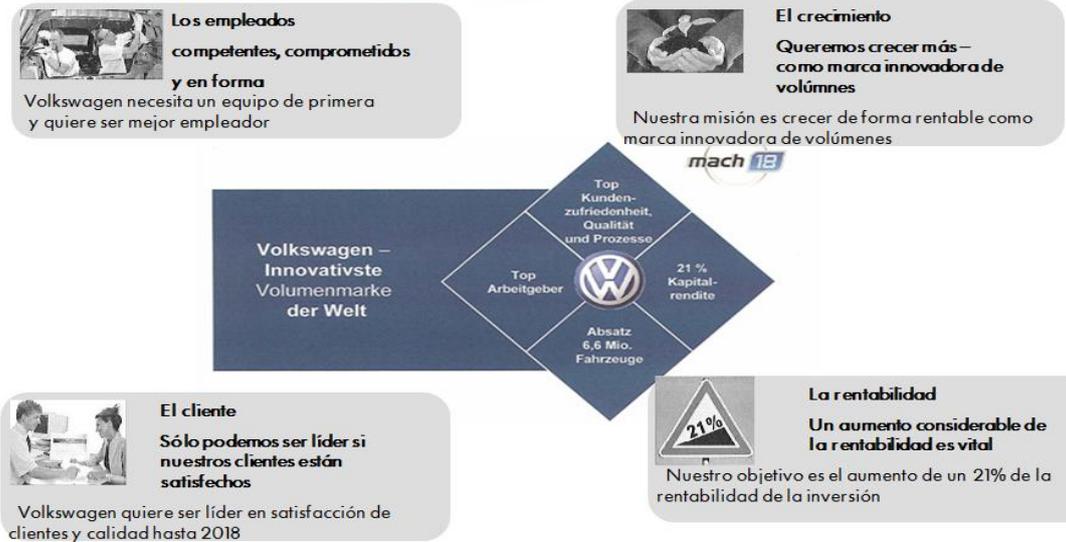


Figure 4: Volkswagen group corporate strategy "Mach 18 Factory". Source: internal documents.

Volkswagen AG tries to answer these questions by creating the corporate strategy “Mach 18 Factory”. The main goals of the strategy are (information obtained from the Volkswagen group web page):

- Volkswagen intends to deploy intelligent innovations and technologies to become a world leader in customer satisfaction and quality. We see high customer satisfaction as one of the key requirements for the Company’s long-term success.
- The goal is to increase unit sales to more than 10 million vehicles a year; in particular, Volkswagen intends to capture an above-average share of the development of the major growth markets.
- Volkswagen's aim is a long-term return on sales before tax of at least 8% so as to ensure that the Group’s solid financial position and ability to act are guaranteed even in difficult market periods. In addition achieve a ROE of 21%.
- Volkswagen aims to be the most attractive employer in the automotive industry by 2018. To build the best vehicles, we need the best team in the sector; highly qualified, fit and, above all, motivated.

This strategy was implemented in Volkswagen Navarra in 2008. Year by year, it tries to reach the objective by implementing different measures. One of the measures taken in 2014 is the realization of this project.

### *1.2.3. Project steps*

In order to accomplish the objectives and challenges that this project presents, I have followed some steps.

In the first place, it was necessary to understand what Volkswagen AG considers as launch cost. Therefore, previous documentation was needed. I carried out a research in order to get all possible information about previous launches.

After analysing all those documents it was necessary to create an extent list of costs: all costs that the factory has suffered in the past and all those ones that could suffer in future launches. For that objective, some meeting with head officers of all departments in the enterprise were needed.

Moreover, in order to accomplish the objectives, each cost must be represented by a label which identifies the type of cost (I will introduce the different type of cost that VW-Navarra manages in the second section of this project). For completing that task some meetings were hold with the controller of the area.

Once the background was clearly specified, the structure of the tool must be developed. In order to accomplish this objective I have use Excel as an application that made possible the display of the desired design of the computer assisted tool. (I will explain the structure and design of the tool in the second section of this project.)

Now that the tool is prepared and all possible errors have been solved it must be put into practice. The forecast of launch costs for the new model of 2017, the POLO VW270, have been forecasted using the tool. In order to get all necessary cost estimations, successive meeting with all the departments have been held.

After the compliment of the steps above some results of the usability and functionality of the tool were obtained. (The results obtained are described in the third section of this project.)

## 2. DESIGN AND DEVELOPMENT OF THE SYSTEM

In this section of the project I will describe how, based on the objectives to accomplish, I have design the structure of the computer assisted tool. Moreover, I will introduce how the developed structure helps to the decision-making process and to the distribution of responsibilities.

### 2.1 Structure of the tool

As I have said before, the design has been set on an Excel. The basic units of Excel are called spreadsheets, where I was able to develop the precise design that was needed in order to be able to accomplish the desired objectives.

Therefore, I have developed a structure of 14 spreadsheets which work in a cooperative way:

The first one is called premises, were all the data will be recorded. It is the only section that can be modified (the rest will be blocked to obey functions' destruction).

- The following 12 spreadsheets correspond to the different management areas and directly related departments that take part in the production process, directly or indirectly. The areas that have been taken into account represent the 100% of the enterprise. Thus, it can be outlined that people in representation of the whole factory have participated in this project. The areas in which total launch costs are distributed are:

Press Shop	Body Shop	Paint Shop	Assembly line	Engine line	Final Revision
Logistic	Industrial Engineering	IT	Process	Technical Area	HH.RR

Diagram 7: Management areas which are considered for this TFG

Analysing the areas above, it can be seen that the first six ones act directly on the product assembled by VW-Navarra; while the rest are determinant also for the final product, however they act indirectly.

- The last section corresponds to the one of monitoring costs. The budget will be monitored and controlled by recording also the real costs and calculating deviations from the forecasted budget.

This structure represents what this project is looking for. It must calculate total launch cost; moreover, the departments in this enterprise are kind of independent, therefore, each one control their one budget; apart from the responsible of the launch cost centre who will control total launch cost and specially distributes among areas ones.

## **2.2. Intern structure**

Now that the external structure of the device is explained, it is time to understand how it works: its methods, procedures and internal functioning. Each spreadsheet has a specific internal structure which makes possible obtaining the desired results.

I will present which I consider the heart of this project, the most elaborated part and the specific point where the decision-making process feed itself with the necessary information.

### *2.2.1. List of launch costs*

This is the first section of each spreadsheet. The whole project functionality is based in this sequence of costs.

This cost list represents all possible costs that the factory can have when launching a new vehicle. It tries to encompass in a standard way all the previous experience of the different departments of the factory; moreover, it tries to record other costs, that the factory has never had but there is a possibility for future launches.

It is essential to remember that VW-Navarra forms part of Volkswagen group, thus there is a standard protocol which must be followed when calculating launch costs. As I have mentioned before, there exists one specific list that comprehend what the group considers as launch costs. (The documentation that comes from Germany is written in German; this involved translating all official documents to English and Spanish in order to be able to prepare this project.) The official list can be seen in *Annex 2*.

However, that list does not deepen enough, thus additional research was needed. For that purpose I analysed previous documentation of different past launches, deeply those of the last one (VW 250 GP which was launch on February 2014). Once again, it is worth remembering that this project has been developed in consensus with all departments of the enterprise; hence, some meetings were hold with head directors of the factory in order to get as much as possible from their experience in previous launches.

Once all the documentation were taken into account and every new idea from the different head directors of the factory accepted the final list of cost comprehend over 600 different type of cost that the factory of Landaben can have.

The final list can be seen in *Annex 4*.

### 2.2.2. How to obtain launch costs

The second section and the most determinant one is where the cost is obtained. In other words, the list comprehends diverse type of costs; ones are related with additional personnel others with the purchase of confidentiality kits for pre-production cars. In any case, each cost is calculated differently.

Once the list of launch cost is complete, is time to analyse each one of the 600 and determine how to obtain the cost. For instance, in order to produce pre-production cars some blue collar workers should stay after working hours and will be compensate for that overtime with a surplus in their normal income. Thus, in the case of overtime the cost will be calculated by multiplying the number of extra hours by the price per hour.

<b>TYPE OF WORKER</b>	<b>€/HOUR</b>
<b>DIRECT WORKFORCE</b>	20
<b>INDIRECT WORKFORCE</b>	30
<b>EXTERN WORKFORCE</b>	40

Diagram 8: Cost premises taken into account in the project. Not real costs.

As the device must represent the launch costs of any future vehicle launch, it must be designed in a standard way. Due to that, most of the costs are divided depending on the how their cost will be calculated.

It is essential to remember that this estimations must be done 3 years before the real cost will be recorded. As a result, must of the cost are estimations based on previous launches. However, because of changes in the market and the inflation prices have risen. Therefore estimations come in the form of: 5 blue collar workers (direct workforce) hire for a period of 1 year.

As mentioned before, this is a cooperative project among every department of the factory; thus each department that will suffer from launch cost must prepare a set of estimations that will be introduced in the total launch cost forecast.

In order to be able to record those costs in the correct way, some information about actual cost was needed, which was supplied by the controller responsible of the department where my internship took place.

### *2.2.3. What type of cost they represent*

As a member of Volkswagen AG group the factory of Landaben record their income and expenditures with a specific nomenclature. The acting protocol of the group requires that each factory must apply these 4 types of costs:

- BNK: is the acronym of the procurement of components costs that the factory needs to be able to produce. This cost is much related with the logistic department of the factory. Moreover it encompasses two subgroups of costs inside: BNK-Transport and BNK-Logistics costs.
- FPK: Is the acronym of indirect personnel costs (white collar workforce). This cost comprehends all possible extra costs that the hiring of personnel or that they work overtime. Therefore this group can be divided into two subgroups: FPK-Additional Personnel and FPK- Overtime. These costs are related with those workers who work directly on the product, the first level of the responsibility pyramid. Most of them are blue-collar workers.
- IPK: This acronym represents Indirect Personnel Costs. It comprehends all possible cost that the factory can suffer when hiring or paying overtime for their indirect workforce. These costs are related to white collar workers. Moreover it can be divided into two subgroups: IPK- Additional Personnel and IPK- Overtime.
- SGK: This acronym represents Additional Expenditures. This group comprehends the rest of costs that cannot be recorded in the other three explained above. It can be divided into thirteen different SGKs: SGK-Power consumption, SGK-Maintenance, SGK-Consumption, SGK- Tools, SGK-Fleet costs, SGK- Loses and reworks, SGK- Trips, SGK- Training, SGK-Logistic expenditures, SGK-Group companies services, SGK- Third parties services, SGK- Miscellaneous, SGK-Rents.

In order to label each cost with a specific group nomenclature an abbreviations legend is definitely needed. *Annex 5* shows the legend that has been used in the computer assisted tool.

This kind of internal accountability is used by every factory and enterprise that forms part of the group. I would like to remark that by this measure Volkswagen AG can control and monitor each factory with the same procedure. Moreover, it does not matter where the factory is established or what legal rules must follow because all will manage internally their costs with this system. It is essential to differentiate the reports that the subsidiaries factories must submit to the correspondent public authorities in terms of income statement and balance sheet which will be obviously made according to the accounting law of the countries. However, as those factories are subsidiaries of the group and must submit their accounts. As a result, this system was created and make possible that no matter the place of the world where a factory is installed, they are going to record the cost the same way. This procedure makes easier the decision-making process among different factories and easier to compare those ones in the same segment.

Taking into account that this is an internal system, successive meeting with the controller of the department were needed in order to label each of the costs with a specific type.

#### *2.2.4. Split up costs among implicated areas*

Once the cost is obtained and labelled, it must be assigned to a specific area or department within the factory. As I have explained before, all the management areas, and more precisely some departments, have been asked and taken into account in order to elaborate a distinction per cost and area.

The areas that directly and indirectly act over the product are: Press Shop, Body shop, Paint Shop, Assembly Line, Engine Line, Final Revision, Logistics, Industrial Engineering, IT, Process, Technical Area and HH.RR.

It must be taken into account that it is an easier procedure to manage less information. As a result the total launch costs have been divided among the different areas. Thus, each area can have their own budget and will be easier to manage and control such costs. Moreover it is interesting for the factory to know which the most demanding department is; for instance, it would be interesting to know also, which is the department that needs more additional personnel.

The division per areas is done by the idea of “which area asks for the money”. The most accurate way of assigning cost per area will be by analyzing which area is the one which is going to use of enjoy the implicit cost. However in terms of usability and functionality of the information and the system, it is more interesting to know which area asks for the money.

I would like to illustrate the different levels when assigning cost to different areas with an example. For instance, during the first phase of the vehicle launch the exterior appearance of the new car is one of best kept secrets; thus, security guards are hire in order to avoid that employers of the factory could take a picture and give it to the media. As a result, the security department which forms part of HH.RR asks for some money to be able to recruit those guards. However, those security agents will work assuring the confidentiality of the new vehicle y the areas of Body Shop, Paint Shop and Assembly Line.

In terms of cost management and monitoring of budgets it is more interesting to control one budget per area and to know exactly how much each department can ask to the cost center. Therefore, as one of the objectives of this project is to generate the best information possible for the operational and strategic decisions that will be made according to the launch costs; it has not deepened until the last level of cost assigning.

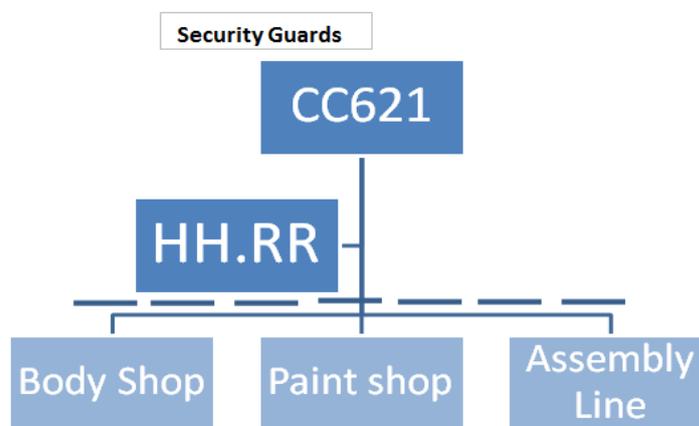


Diagram 9: Security guards example; assigning costs per areas.

*Annex 6* shows how each cost on the list is assigned to different areas.

#### 2.2.5. Split up launch costs among time

As I have previously explained, the launch of a new vehicle is a process which last around 4 years. However, launch costs can be only recorded during the last 2 years of the launch. Twelve months before the SOP and twelve months after. As a result, the device is able to distribute costs among twenty-four months.

Once again, the computer assisted tool must be done in a standard way. This implies that it is not known when the launch will be. In other words, 3 years before VW AG's headquarter located in Germany has not confirm when exactly will star the launch, in which month. Therefore, the distribution among time must be done in a blind way, from month -12 to month +12.

As can be seen in diagram 5, the date when the pre-production vehicles must be done are fixed. No matter when the launch will start. Production of VFF must start nine months before the predicted SOP, PVS six months before and S0 three months before.



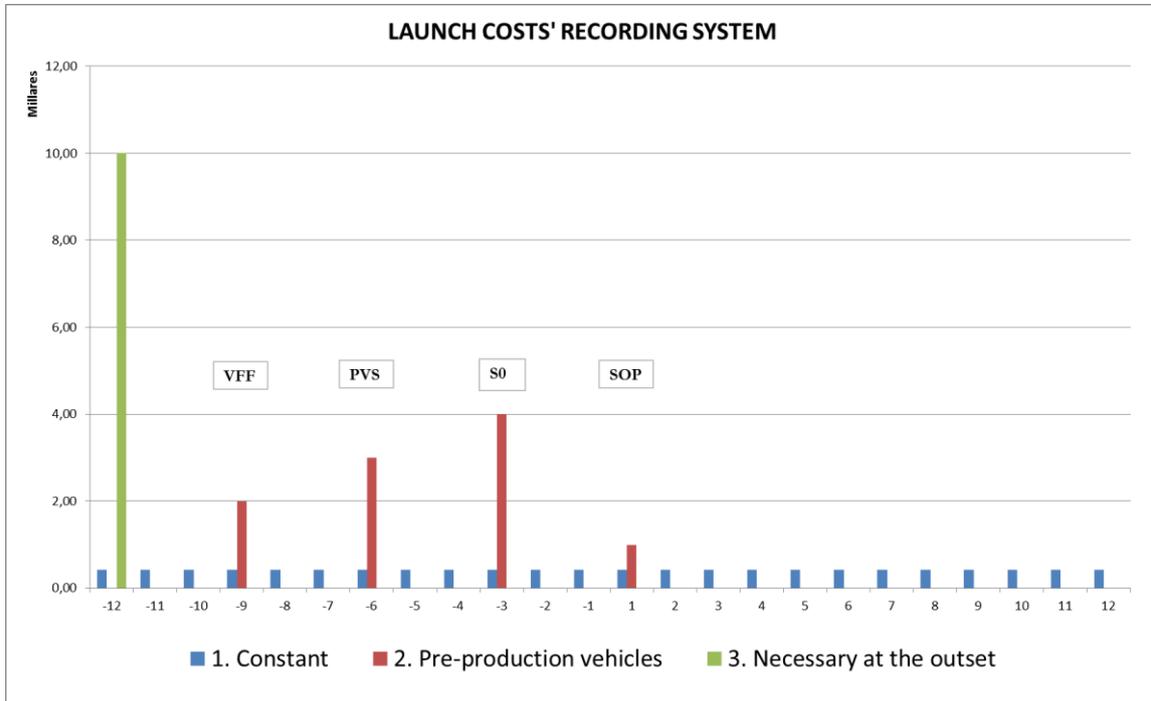
Diagram 10: Costs' distribution during the first year of launch. *Annex 3* shows the meaning of the abbreviations.

In order to complete the standard way of functioning of the device, a system of cost recording has been developed. It is important to understand which the real significance is of the recorded costs. In other words, if it is understood for what they are going to be used, analysing when the resource is needed; therefore, distribution of the total value of each cost among the twenty-four months that are managed for launch costs will be possible.

After analysing each and every launch cost on the list, the system was finally concreted. There are four possibilities:

- 1. The first possibility of cost recording is assuming that the cost will be constant among the twenty-four months that the launch last. Therefore, when “1” is selected the cost will be automatically recorded as a [1/24 of the total] in each month.
- 2. When “2” is selected, it is assumed that the cost represent an expenditure that will be made in order to be able to produce the pre-production vehicles. Launch costs are much related with the production of these types of prototypes. However, these prototypes are not produced in the same amount, VFF are the least numerous, until S0 that are the most numerous. Thus, the cost will be distributed by percentages: 20% in month -9 (VFF's production), 30% in month -6 (PVS' production), 40% in month -3 (S0's production) and 10% in month 1 (SOP).
- 3. When this option is selected, it is assumed that the necessity that represents the cost is completely necessary at the beginning of the launch. Therefore, the entire value will be recorded in month -12.
- 4. The last option is created, however only appears the label “manually” in each month. With this option, the user knows that the cost distribution is not possible to be predicted; it must be recorded by hand. There are plenty of costs that can be planned; on the contrary, some of them are collected because they can occur and

must be forecasted in some way, but it is not sure those situation will happened. For instance, some problems that can occur during the vehicle launch will force the factory to bring back certain number of vehicles in order to rework some spare components. This situation has happened before, it must be forecasted; although, it will not happen again.



Graph 1: Launch costs' distribution method.

This graph represents how works the cost distribution system and which are the possibilities of recording. *Annex 7* shows how it is recorded in the tool.

This section of the tool structure is nearly essential. Costs' distribution has never been done before. As it was introduced in the firsts section of this project, after applying a percentage to the total investment for the new model they estimated the total launch costs' quantity. The enterprise did not distribute among areas, even less the distribution among time. As a consequence, important deviations from forecasted budget were found in the last launch. As a result, the creation of this structure was clearly a must. It helps to reconsider previous operational decisions and helps monitoring and controlling costs.

### 2.3. Budget control structure

The budget control section is the last spreadsheet of the information system application. It is the most sophisticated section and the valued. It is able to analyse the information that the user wants to see and provide the results in a visual way.

It is important to know how it works in order to understand its real importance and how it can make a vital contribution by providing information that may assist in decision-making.

The ultimate objective of this project is to facilitate the exact information that the user wants to see in order to make operational or strategic decisions according to the new vehicle launch. For this purpose, it is essential to be able to monitor and control the costs; thus, this spreadsheet is the solution for this problem.

The usability and functionality of this section must be outlined. After applying complicated functions the user must only select the area and the month of which he/she wants to see the information.

It must be shown how it works, for instance month -9 (VFF production) of the area Press Shop will be outlined.

## Comparison with Budget

Press.Shop! -9

AREA	MONTH
Press.Shop!	-9

Concept	MONTH: -9			ACCUMULATED -9		
	Bud. Ajust.	Real	Desv.	Bud. Ajust.	Real	Desv.
BNK / Logistic Costs	0	0	0	0	0	0
FPK / Direct Labor	11.477	11.478	1	265.655	265.656	1
IPK / Indirect Labor	1.692	1.500	(192)	358.094	250.000	(108.094)
SGK / Net General costs	4.425	4.500	75	8.550	8.555	5
SGK / General Costs	4.425	4.500	75	8.550	8.555	5
SGK / Credits			0			0
<b>Total ( € )</b>	<b>17.595</b>	<b>17.478</b>	<b>(117)</b>	<b>632.300</b>	<b>524.211</b>	<b>(108.089)</b>

Diagram 11: Monitor spreadsheet. Press Shop month -9.

This section has been prepared to record and calculate the possible deviation that can arise during the launch. It is divided I four sections:

The first one outlined which type of cost is. Volkswagen AG has presented this format as the one demanded for monitoring costs.

The second section represents the budget that was forecasted three years before and wants to be compared with the real one with the purpose of obtaining the possible deviations.

The deviation from the forecasted budget is obtained and depending on the result the cell changes its colour. With this measure, the usability of the device increases because of the time savings and the simplicity that it provides. It has three different visual results: if the deviation is positive the cell will be green, however if the deviation is negative there exists two possibilities; yellow circle: it could be a negative deviation, but, less than a five per cent. Thus it will be considered as acceptable. Red circle: if the deviation is over the five per cent. When the circle is red some measures must be taken.

The monitoring and control of costs is one of the most important processes when managing an enterprise. VW-Navarra has estimated a 5% of acceptance related with those possible deviations that can arise during the launch.

On the other hand, it is important to know where the deviation comes from. The device is structured to allocate the costs depending on the necessities of the factory. However, if it was forecasted that the purchase of the covers would have been made in month -6 and at the end, they have been bought in month -5, a deviation in both months is created. In month -6 it would be positive while in month -5 it will be a negative one.

As a result, the monitoring of cost must be done in a proactive way in order to make the correct decisions.

#### **2.4. Visual graphic review**

According to some studies, it is estimated that human beings understand and retain better the information when it is transcribed into a visual graphic review. Moreover, this review helps with the functionality and usability of the device.

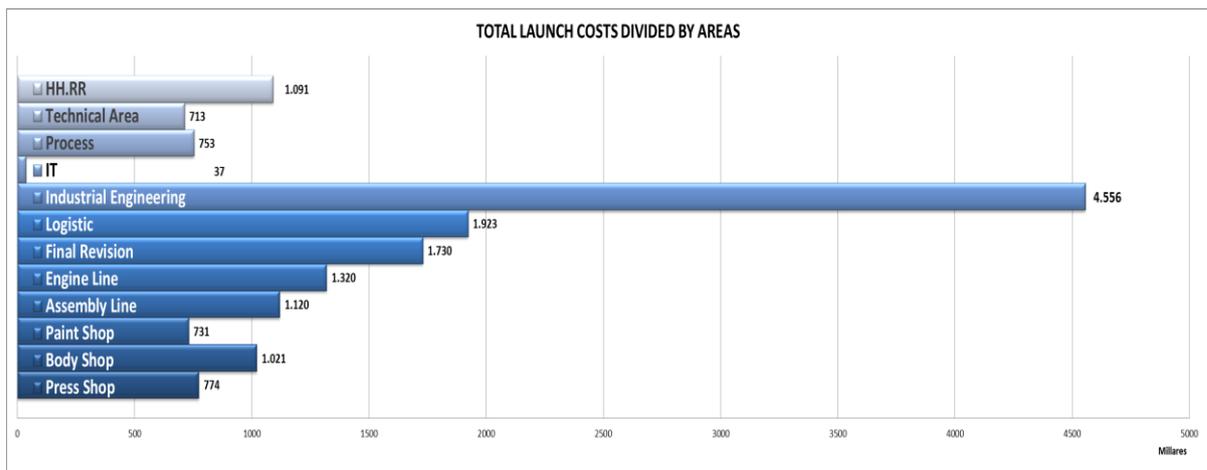
It must be taken into account that this tool is managing tables of around six hundreds rows; appreciate the results in such a big structure is not as easy as understand some graphs. As a result, each spreadsheet counts with a visual graphic review that will be the first thing appearing when moving around the computer assisted tool. This review represents in a very effective way all the information that the user may need in order to make operational decisions.

Annex 8 and Annex 9 show the visual graphic review that represents the premises section (annex 8) and every department of the enterprise (annex 9).

In order to understand the functionality of this section, it is essential to describe each and every graph that forms the section.

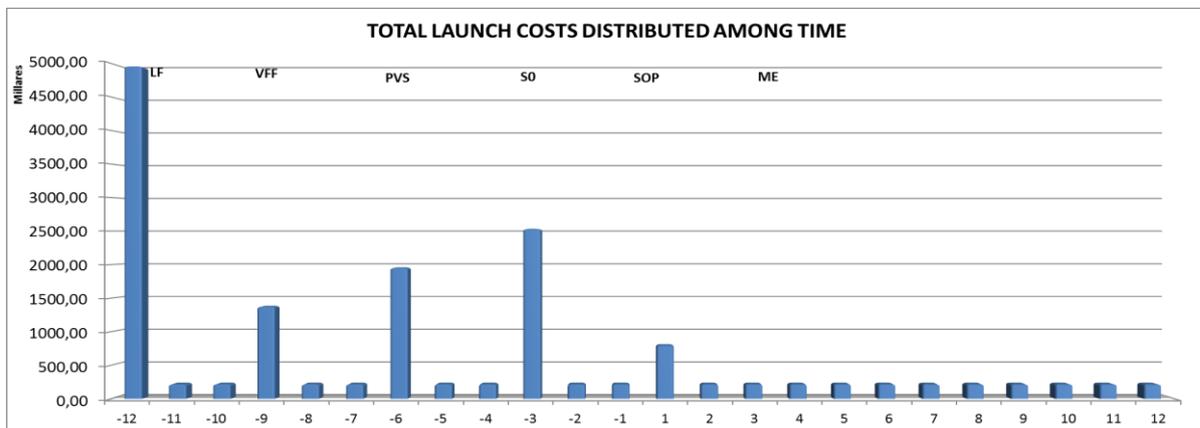
The premises' visual review is formed by four different graphs, each of them represents total launch costs but in different aspects:

-Total launch costs divided by areas. This graph represents how much money is estimated that the different areas will need. Moreover it gives the user a clear idea of which the most demanding area is. Moreover, it shows exactly the total quantity designated for each area.



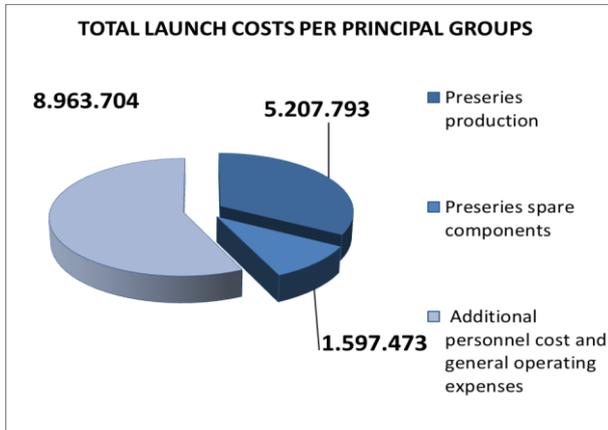
Graph 2. Total launch costs divided by areas.

-Total launch costs distributed among time. This graph represents the total launch cost, the sum of all the areas distributed among the twenty-four months that last the launch. In the visual review of the respective areas this graph represents only the total quantity designated for each area.



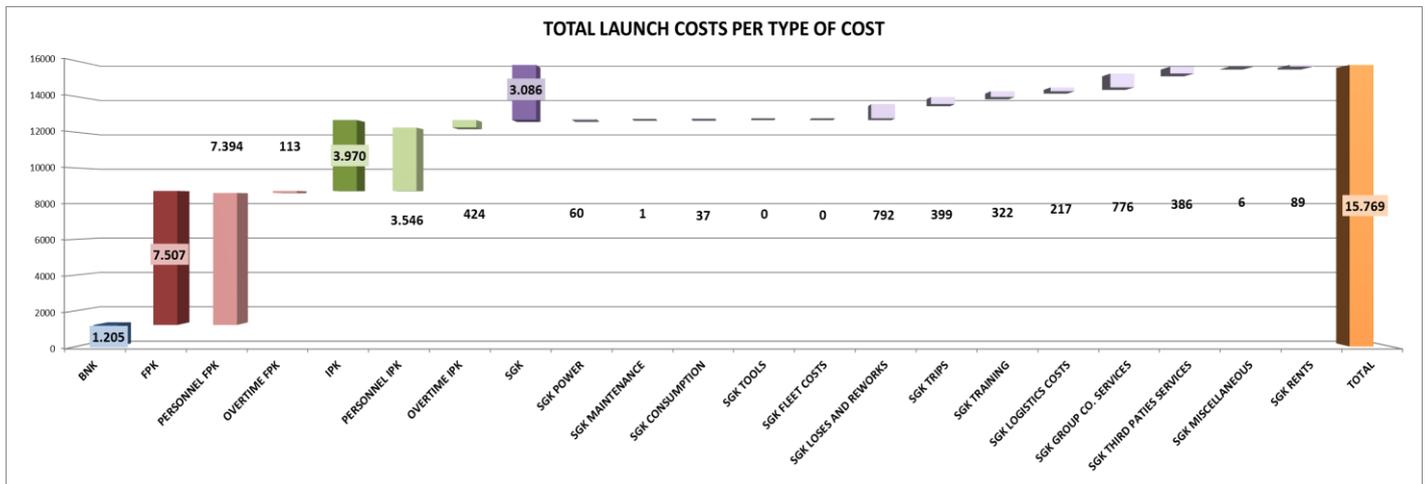
Graph 3. Total launch costs distributed among time.

-Total launch costs per principal groups. The protocol that comes from Volkswagen AG divides the cost in three different groups. Two of them are related to the pre-production vehicles: one is related with the production and assembly of these types of prototypes, the other encompass all the spare components needed for the preseries; the last one comprehends all general operating expenditures.



Graph 4. Total launch costs per principal groups

-Total launch costs per type of cost. This could be the most important graph. It applies the group nomenclature (BNK, FPK, IPK and SGK). It shows how the total launch costs are formed. The quantities used in the graph are not real however they are good estimations of reality. The major part of the budget is designed to hire additional personnel both direct and indirect one.



Graph 5. Total launch costs per type of cost.

It must be taken into account that the visual review of each area does not have the graph that represents the total costs per areas. Each area must be responsible of their own costs, and there will be a responsible who will control the budgets for each area and the total launch costs budget.

## 2.5. Technical functions used in order to help the usefulness of the system

This section of the project deal with the technical functions of the application used, Excel, which make possible to reach completely the purpose of the device. The computer assisted tool must assure that the final user would be able to use the tool without difficulties and in an easy way. In order to improve the user-friendliness of the tool, some software specific measures have been used:

- Grouping data. This option make possible to visualize the most important costs without their total expansion. There are four levels of grouping; in the first level the list that come given by Volkswagen AG can be seen. It contains the total quantities that have been calculated from the rest of costs that are contained in each of the principal voices. This option transforms the six hundreds rows' list in a much manageable one of only forty rows.

-Check cells. With this practical option, errors can be easily found. They are distributed all over the tool in order to facilitate its use. It contains specific rules; when those rules are not fulfil, the cell change its colour to an orange one. They act as vial warnings.

-Cells' dependencies. As I have said before, the tool is structured in fourteen different spreadsheets. If the information recording should be done in each of the spreadsheet, it will be much more difficult. As a result, all the spreadsheets depend on the data recorded in the first one, "Premises". With this procedure, the recording of data becomes simple, time saving, and cost efficient. The possibility of generating some errors has been minimized. The dependencies have been proved, whenever something changes its position in the tables the dependencies do not suffer and continue working. Because of these functions, when your data change, the results change automatically in every spreadsheet, so that the user does not have to rerun the procedure.

- Cells' protection. This option creates the possibility of eliminating the free access to each cell in order to change or actualize their content. Thus, with this measure the complicated functions used to create the structure will be secure from not-intentional deletes. The only cells which have not any protection are those which record the quantities or costs; those ones which will change in future launches.

### **3. RESULTS AND DISCUSSION**

This section deal with the results obtained after the developing of the project. It shows how the created computer assisted tool works and if it satisfied what was expected from it. This chapter outlines the improvements achieved when putting the device into practice in order to estimate, manage and control VW270 launch costs. Moreover it compares how costs were managed before and what improvements in terms of time consuming, errors and deviations can be found when using this new device for operational decisions.

#### **3.1. Put into practice of the device with new model of 2017, VW270.**

The next Volkswagen POLO will be launch on January 2017 (not an official date). According to the VW270 project plan, launch costs for the new model were estimated and sent to Wolfsburg in order to be approved on 10<sup>th</sup> June. This tool was created with the purpose of managing and operating launch costs, it was designed strategically in a standard way, in order to be used for future launches. For this purpose it was adapted with VW270 estimations.

The tool encompasses twelve different areas that must prepare their estimations for the new model. The recompilation of the information was not an easy job; it must be taken into account that this was the first time the departments were asked to prepare this information. Employers considered that they do not have enough information as there were not registers of previous launches. The head directors were used to ask for money to the 621 cost centre (the one designated for launch purposes) and obtain money to cover their departments' needs.

The device works as it was expected. Once the premises were recorded on the spreadsheet, it obtains the total cost, distribute costs per areas and during the twenty-four months. And as the premises section was fulfil, the rest sections of the device (areas' sections and control one) fulfil themselves because of cells' dependencies.

The real cost will be effectively recorded in 2 years, when the factory will start with the preparations for the launch of 2017. As a result the section whose purpose is monitoring and controlling the possible deviations has been fulfilled with non-real data.

### 3.2. Results

The results of this project can be analysed in three different ways. This section analyses the results obtained after the design and development of the device. Moreover, it will outline how the coordination among areas was during the course of the project. The final paragraph deals with the implementation of the corporate strategy “Mach 18 Factory” and how this project helps to accomplish its main goals.

From the outset, the tool works as expected. It calculates the total cost, distributed it among areas and time and it assigns the type of cost. Moreover, it creates the visual graphic review, one of the total cost and another for each area.

Even though the creation of the tool was not an easy job, the final user finds it easy and direct to manage. He/she must only introduce the premises of the costs that are estimated. For instance, 15 hours of a direct employer, 200 covers for pre-production vehicles, etc. The cost per unit has been recorded before, and if there is any doubt, the finance department will supply the data.

It prepares the specific information that the user need in order to make important decisions for the factory. The information is shown in a way that the user only needs to analyse several graphs. This point has not been proved because of the project planning. These operational decisions will be made when the real cost will be recorded on the tool. Depending on the possible deviations, and after understanding them, the responsible for each area will deal with the possible solutions. It is essential to understand that this information system does not make the decisions, only shows specific information that will be crucial for the decision-making process.

In the following tables the information sent to Germany can be seen. The real facts are not showed because of the confidentiality agreement. This is only a summary of the whole list of costs, however Volkswagen AG is interested on the final number (total launch costs), how the different management areas have forecast their necessities and their specific translation to BNK, FPK, IPK and SGK( logistic costs, direct labour force, indirect labour force and operating expenses).

<b>Anlaufkosten (Summe)</b>		<b>22.538.973</b>
<b>davon:</b>	Anlaufkosten BNK	<b>0</b>
	Anlaufkosten FPK	<b>9.263.340</b>
	Anlaufkosten IPK	<b>8.369.622</b>
	Anlaufkosten SGK	<b>5.006.189</b>

Table 1: Launch costs per type of cost

<b>Volumen</b>		<b>22.538.973</b>
<b>1.0</b>	<b>Fabricación coches preserie</b>	<b>3.240.013</b>
1.1	Construcción de preseries (VFF, PVS y 0S). Incluye confidencialidad	3.190.013
1.2	Manipulación, almacenamiento y control del sistema Logística de preseries (empleados)	50.000
<b>2.0</b>	<b>Piezas de Pre series</b>	<b>921.000</b>
2.1	Sobrecoste para piezas de prueba y muestra	171.000
2.2	Sobrecostes para garantizar el suministro de piezas de serie	0
2.3	Costos adicionales de transporte para garantizar la entrega de piezas de producción	0
2.4	Sobrecoste para las piezas de compras en casos especiales autorizados (COMPRAS)	0
2.5	Chatarreo de piezas sobrantes y obsoletas, tanto propias como de compra en las VFF, PVS, 0S incluidos los costos de transporte y embalaje así como retrabajos de material ya disponible.	500.000
2.6	Herramientas auxiliares así como suministro temporal de piezas para periodo de plazos ajustados	250.000
2.7	Ustillajes de serie corta para desviaciones de la planificación en casos especiales autorizados	0
2.8	Compensación para capacidades previstas pero no empleadas de los proveedores debido a aplazamientos en los plazos de introducción (COMPRAS)	0
<b>3.0</b>	<b>Coste de personal adicional y los gastos generales de funcionamiento</b>	<b>18.694.576</b>
3.1	Programas de formación específicos de producto (formación y capacitación del personal)	968.886
3.2	Fabricación de piezas propias y de compra para pulmones (costes de útiles en 2.7.1)	0
3.3	Tiempo de crédito adicional para lanzamiento	0
3.4	Costes adicionales para apoyo Pilotheile, instalaciones y herramientas	1.250.000
3.5	Homologación y apoyo a proveedores en las piezas de compra y hausteile. (Solo Q)	0
3.6	Pruebas funcionamiento de los vehículos de VFF, PVS y 0S (trabajo de auditoría, pruebas de conducción, comprobaciones de calidad, prueba de materiales). Incluido gastos para la liberación de los vehículos (seguros, impuestos y su depreciación (valor neto) (Solo Q)	0
3.7	Asesoría y acompañamiento de coches enviados a pruebas	26.000
3.8	Pruebas de rendimiento, consumo, emisiones, acústica y comportamiento en la carretera (Solo Q)	0
3.9	Planificación y trabajos de construcción en casos especiales en los que no es posible asignarles inversión	0
3.10	Apoyo temporal de puesta en marcha y proceso	10.813.253

Table 2: List of launch cost sent to Germany

In the tables above, it can be seen that the most important types of costs which dominate are FPK and IPK. These costs are related to the labour force, direct and indirect one. Both of them are divided between additional personnel and extra hours. Therefore it can be conclude that over a 75% of total launch costs are related to the labour force.

The benefits of this project must be outlined. To have a fully understanding of the usefulness of this project, the previous situation must be analysed in detail. Previously the forecast was obtained by applying a fixed percentage to the previous approved inversions budget. This measure was a standard in Volkswagen Navarra. As can be suspected, none of the areas in the enterprise took part on the decision of forecasting. There was not a research of the necessities of the different areas. Moreover, there was not a responsible for launch cost purposes in none of them. This budget was controlled by the responsible of the 621 cost centre. There were not any specific budgets for each area therefore there were not limits for none of them. Now, with the implementation of this project and the measures taken, the situation has changed. First of all, the necessities of the areas have been taken into account. This will lead to a more adjusted budget with fewer possibilities of huge deviations. Moreover several budgets are created, one for each area, controlling their limits and giving the possibility of analysing where the deviations are. In which one of the costs they have their deviation and why. In order to control these budgets some responsible posts must be created, one per area.

To sum up, the factory will be able to control deviations to the lowest level. Analysing in which necessity they have the cost and how it may impact in the launch and in the factory. It can be controlled not only by areas, if not it can be control by month and by type of cost.

The following table summarizes the differences between the previous system and the implemented by this project.

<b>POINTS ANALYZED</b>	<b>PREVIOUS SYSTEM</b>	<b>ACTUAL SYSTEM</b>
<b>Coordination among areas</b>	<b>NO</b>	<b>YES</b>
<b>Necessities taken into account</b>	<b>NO</b>	<b>YES</b>
<b>Specific areas' budget</b>	<b>NO</b>	<b>YES</b>
<b>Responsibility posts per area</b>	<b>NO</b>	<b>YES</b>
<b>Real budget according to necessities</b>	<b>NO</b>	<b>YES</b>
<b>Control and limits for areas</b>	<b>Not from the forecasting</b>	<b>From the outset</b>
<b>Deviations' control from the lowest level</b>	<b>NO</b>	<b>YES</b>

Table 3: Differences between previous system and the actual one.

Another important result was the coordination among management areas. It is not an easy job to coordinate such an amount of people; however, in order to analyse what the previous launch costs have been or which ones would have the factory in the future, all of them were needed. It was a first step towards the complete coordination among areas in terms of launch costs. There were two different series of meeting: the first one to create the list and the second one to complete the estimations for the VW270. A multidisciplinary working group which comprehends people from all the different management areas was created. It took place on 10<sup>th</sup> June.

In VW-Navarra different workshops are arranged for each important measure that must be taken of problems that could arise. These meetings are characterized by the presence of people from all the related areas. They form smaller groups of working. In the smallest group the problem is analysed and some measures are proposed. Once the different smaller groups have finished, all the measures are considered and analysed by the group as a whole. The creation of this specific workshop to deal with launch costs purposes has increased the coordination among areas and the efficiency of the measures taken.

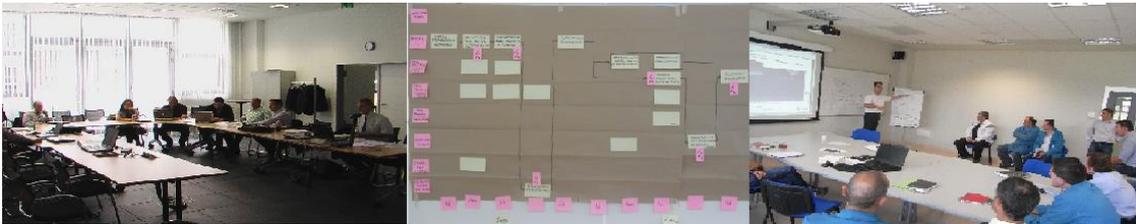


Figure 5: Workshop in VW-Navarra

Last but not least, it must be understood how the implementation of this project can help reaching the main objectives of the corporate strategy “Mach 18 Factory”. One of the main objectives of the strategy is to reduce costs, and with this measure it is estimated that less deviations will arise. It must be taken into account that when some deviations arose during the launch, there were two possibilities: Germany could pay those deviations or not. According to the previous experience, there were plenty of deviations that the factory was obeyed to pay adjusting other budgets. Volkswagen AG approves to VW-Navarra different budgets, each one with a different purpose. Therefore, if the deviations are not paid by the group, VW-Navarra must adjust the rest of the budgets in order to meet its payments.

#### 4. CONCLUSIONS

One of the most difficult barriers to implement this project was the magnitude of the enterprise. It must be taken into account that the factory comprehends seven different management areas; it has 4500 direct employees and more than 300 indirect ones. Therefore the coordination among such amount of people is not an easy job.

The decision-making process used by VW-Navarra requires the coordination of different management levels. VW-Navarra is characterised by a very hierarchical structure. Inside the factory there are different working-groups which must report to a superior, the superior to a higher superior, etc. As a result, when something must be approved, must pass by several management levels and the process can last several days.

Because of the implementation of this project, a working group was created. The main goal of the group was to deal with the different areas, as a result, the coordination among areas increased. It tries to estimate launch costs and after it will try to monitor and control them. By the moment, this group only comprehends two people who deal with the different areas, but there is not any multidisciplinary group with at least one responsible per area.

Apart from increase coordination among the areas, this project distribute clear responsibilities that before did not exist. It creates different responsibility posts among the areas. There must be at least one person per area in charge of monitoring and controlling launch costs once the specific budget will be distributed. This was the first time that the management areas were asked to prepare launch costs' estimations. There was not a standard reaction: there were some head directors that were able to fulfil the job demanded; others do not.

Moreover, the application used in order to introduce the desired structure is a powerful one. Excel is able to deal with a wide range of data and has been really helpful, however some limitations can be found. My knowledge of MACROS is reduced. This powerful tool of excel will have helped the system designed because of the functions that can be programmed. In addition, the list has been created in a standard way, it tries to encompass every possible cost that the factory can suffer when launching a new model, but, if once the factory tries to record a new cost that was not previously introduced, all the excel formulas must be updated in order to take into account this new cost.

By the moment, the tool is and will be effective for futures launches. However I would like to propose some recommendations which will increase the effectiveness and efficiency of the enterprise when forecasting and controlling launch costs.

In the first instance, I would like to propose the creation of a launch costs recording system. After one meeting with the finance department we came to the following conclusion: if the previous launch costs had been recorded, the areas would not have found so many complications to estimate their necessities for VW270 launch. In addition, if there was more information available of the new models this process would be easier. Moreover, the creation of a multidisciplinary group formed by at least one responsible of each area will help with the management of launch costs. The coordination between areas would be complete and the results would be more reliable. Once the budget will be approved I will recommend the preparation of a workshop to follow those launch costs and be prepare on time if some decisions must be made.

I would like to mention that I can see the enormous use of this new process. All the areas implicated in this project have worked together for a common goal; the same one as mine. We have worked all together in order to create a list and estimate the necessities of each of them for the next launch. I really appreciate the responsibilities and expectations that they have given to me. On 11<sup>th</sup> June, VW270 launch costs forecast was sent to Germany in order to be approved. I am very satisfied of the job done because I was able to see the results: how launch costs were estimated and managed with the tool I had created. This pays off all the effort employed during the development of this project.

Let me conclude by saying that this project only represents the first step when forecasting and controlling launch costs. However, it represents an important step forward towards achieving the coordination among areas when preparing the launch costs' forecast and implementing the group strategy "Mach 18 Factory".

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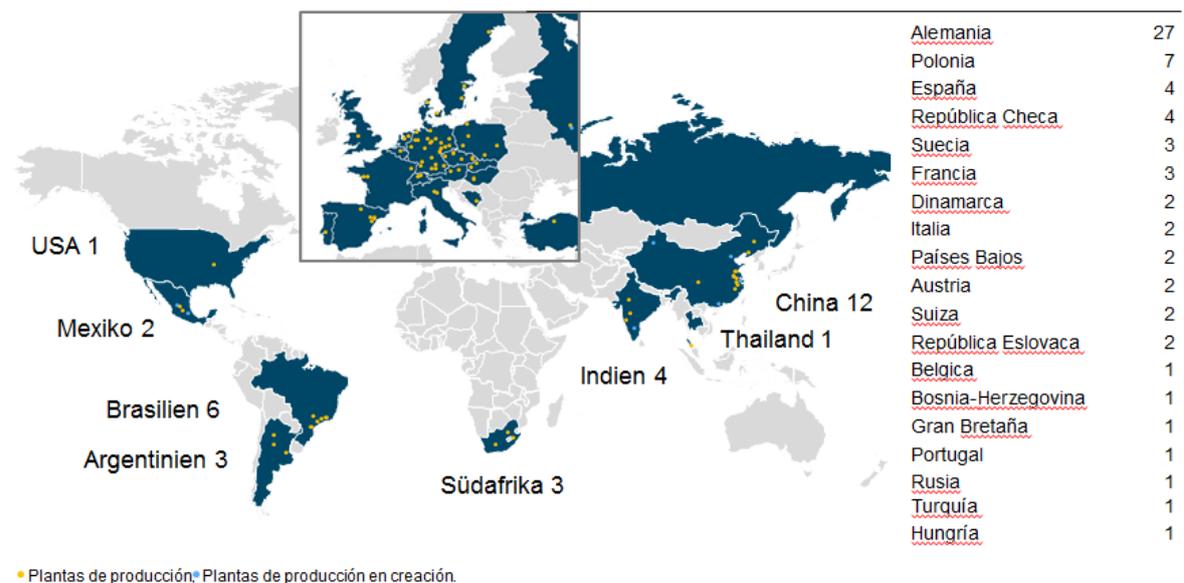
Annex 6. Launch costs assigned to each area.

Annex 7. Costs' distribution method

Annex 8. Premises visual review

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Annex 1. Volkswagen AG's factories in the world



Annex 2. Launch costs' principal groups.

1.0	Fabricación coches preserie	1.0	Build up Pre-Production cars	1.0	Erstellung Vorserienfahrzeuge
1.1	Construcción de preseries (VFF, PVS y OS). Incluye confidencialidad	1.1	Building up prototypes (VFF,PVS,OS). It contains confidentiality	1.1	Bau der Vorserien (VFF-, PVS- und Nullserienfahrzeuge sowie Karosserien, Aggregate, Komponenten, Emphasis Build- und Tryout-Fahrzeuge) inkl. Geheimhaltung (Sichtschutz)
1.2	Manipulación, almacenaje y control del sistema Logística de preseries	1.2	Handling, warehouse and control of the logistic system for pre-production cars	1.2	Handling, Lagerung und Steuerung Vorserienlogistik
2.0	Piezas de Pre series	2.0	Pre-production cars' parts	2.0	Vorserienteile
2.1	Sobrecoste para piezas de prueba y muestra	2.1	Sample and test parts overrun	2.1	Mehraufwand für Klapper- und Musterteile
2.2	Sobrecostos para garantizar el suministro de piezas de serie	2.2	Overrun to assure the supply of parts for pre-production cars	2.2	Mehraufwendungen im Rahmen der Sicherstellung der Lieferfähigkeit für Serienteile
2.3	Costos adicionales de transporte para garantizar la entrega de piezas de producción	2.3	Additional cost of transport to assure the delivery of production parts	2.3	Sonderfrachtkosten im Rahmen der Sicherstellung der Lieferfähigkeit für Serienteile
2.4	Sobrecoste para las piezas de compras en casos especiales autorizados	2.4	Overrun for buying parts in special authorised cases.	2.4	Mehrprijs bei Kaufteilen in genehmigten Sonderfällen
2.5	Chatarrero de piezas sobrante y obsoleta, tanto propias como de compra en las VFF, PVS, OS incluidos los costos de transporte y embalaje así como retrabajos de material ya disponible	2.5	Give away scrap and obsolete parts, bought or housemade from the VFF, PVS, OS. It includes transport expenses, packing and remanufacturing of already available material	2.5	Verschrottung von überschüssigen und veralteten Haus- sowie Kaufteilen aus VFF, PVS, OS einschl. Kosten für Fracht und Verpackung sowie Nacharbeit von bereits disponiertem Material
2.6	Herramientas auxiliares así como suministro temporal de piezas para periodo de plazos ajustados	2.6	Auxiliary tools and temporal delivery of parts in tights periods	2.6	Behelfswerkzeuge sowie temporäre Teileversorgung bei Terminengpässen in der Produktion
2.7	Utlillajes de serie corta para desviaciones de la planificación en casos especiales autorizados	2.7	Short-series equipment for deviations from planning in special authorised cases.	2.7	Kleinserienwerkzeuge bei Abweichungen zum Plantermin in genehmigten Sonderfällen
2.8	Compensación para capacidades previstas pero no empleadas de los proveedores debido a aplazamientos en los plazos de introducción	2.8	Compensation for supplier's foreseen capacity not spent because of delays on product launch's time limits	2.8	Abgeltung für bereitgestellte, aber noch nicht in Anspruch genommene Kapazitäten bei Lieferanten aufgrund von Einsatzterminverschiebungen
3.0	Coste de personal adicional y los gastos generales de funcionamiento	3.0	Additional personnel costs and general operational expenditures	3.0	Zusätzliche Personal- und Sachgemeinkosten
3.1	Programas de formación específicos de producto (formación y capacitación del personal)	3.1	Specific product formation programs (comprehensive and personnel training)	3.1	Produktspezifische Qualifizierungsmaßnahmen (Schulung und Einarbeitung Personal)
3.2	Fabricación de piezas propias y de compra para pulmones	3.2	Housemade production and buying parts for lungs.	3.2	Vorlaufertigung für Kauf- und Herstellteile
3.3	Préstamos adicionales, requisitos mínimos para lanzamiento	3.3	Additional loans; minimum requirements for new product launch	3.3	Zusatzkredite, anlaufbedingte Mindestbesetzungen;
3.4	Costes adicionales para apoyo Pilothalle, instalaciones y herramientas	3.4	Overrun to support Pilothalle, tools and facilities	3.4	Zusatzaufwand für Unterstützung aus Pilothalle, Vorrichtungs- u. Werkzeugbau
3.5	Homologación y apoyo a proveedores en las piezas de compra y hausteile. (Solo Q)	3.5	Official approval and suppliers supporting for housemade and bought parts	3.5	Bemusterung und Lieferantenbetreuung für Kauf- und Herstellteile
3.6	Gestión de los vehículos de VFF, PVS y OS (trabajo de auditoría, pruebas de conducción, comprobaciones de calidad, prueba de materiales). Incluido gastos para la liberación de los vehículos (seguros, impuestos y su depreciación (valor neto)	3.6	Arrangement of VFF,PVS,OS ( audit jobs, driving tests, quality control, materials checks). Including cars liberation expenses ( insurance,taxes and depreciation in net value)	3.6	Betrieb der VFF-, PVS- und Nullserien-Fahrzeuge (Prüftätigkeit, Absicherungsfahrten, Prüf- und Fahraktionen für begrenzte Qualitätsversprechen, Materialerprobung) inkl. Aufwand für die Zulassung der Fahrzeuge (Versicherung, teuern etc.) und deren Abschreibung (Restbuchwert)
3.7	Asesoría y acompañamiento de coches enviados a pruebas	3.7	Technical advice and accompaniment for cars that are sent to different checks	3.7	Betreuung des Breitenabsicherungsprogrammes
3.8	Pruebas de rendimiento, consumo, emisiones, acústica y comportamiento en la carretera (Solo Q)	3.8	Performance, consumption, emissions, acoustics and behaviour tests when being on the road	3.8	Feststellen Fahrleistung und Verbrauch, Abgas, Akustik und Fahrverhalten
3.9	Planificación y trabajos de construcción en casos especiales en los que no es posible asignarles inversión	3.9	Schedule and building works for special cases when it is not possible to allocate any type of investment.	3.9	Planungsleistungen und Konstruktionsarbeiten in genehmigten Sonderfällen sofern eine Zuordnung zu den Investitionen nicht möglich ist
3.10	Apoyo temporal de puesta en marcha y proceso	3.10	Temporal support when putting into operation	3.10	temporäre Anlauf- bzw. Prozeßunterstützung

*Annex 3. Abbreviations chronogram new launch*

DV (PR1)	
KE	Concept design
DE	Design Decision
DF	Freeze design
BF	Obtaining liberation
LF	Launch Liberation
VFF	First Preserie
PVS	Second Preserie
0S	Serie 0
SOP	Start of Production
ME	Launch into the market

Annex 4. Final launch costs list

<b>1.0</b>	<b>Fabricación coches preserie</b>	1.12.4	Horas extra para Baubarkeit (factor 1,3/1,75)
<b>1.1</b>	<b>Construcción de preseries (VFF, PVS y OS). Incluye confidencialidad</b>		Horas extra Presswerk
1.1.1	<u>CONFIDENCIALIDAD</u>		Horas extra Karosseriebau
1.1.1.1	Fundas coches VS		Horas extra Lackiererei
			Horas extra Montage
1.1.1.2	Protectores plásticos		Horas extra Motoren
			Horas extra Finishhalle
1.1.1.3	Medidas de confidencialidad (Servicios de terceros, Horas personal para pruebas de conducción)		Horas extra Logistik
	Cerramiento 1 (centro pruebas)		Horas extra Industrial Engineering
	Cerramiento 2 (zona retrajo)		Horas extra Planung
	Cerramiento 3 (almacenaje)		Horas extra Área Técnica
	Cerramiento 4 (vehículos de logística)		
	Camiones pruebas de conducción	1.12.5	Estudios de montabilidad virtuales y reales ( Estudios y coste de pruebas)
	Personal pruebas de conducción horas extra		Estudios virtuales a empresas del grupo
	Gasolina		Estudios virtuales a empresas externas
			Prueba de colisión 1
1.1.1.4	Personal de seguridad para confidencialidad		Prueba de colisión 2
1.1.2	<u>BAUBARKEIT</u>	1.1.3	<u>WORKSHOP 3P</u>
1.1.2.1	Licencias de programas informáticos para Baubarkeit	1.1.3.1	Personal de apoyo para Workshop 3P
	Programa 1: CONNECT		Presswerk FPK
	Programa 2: 3DVIA Composer		Presswerk IPK
	Programa 3		Karosseriebau FPK
			Karosseriebau IPK
1.1.2.2	Personal acompañamiento exterior en PNA por temas de Baubarkeit (proyectistas)		Lackiererei FPK
			Lackiererei IPK
1.1.2.3	Personal de apoyo Baubarkeit. Contratación de externos ( AUTOVISION) o con personal interno destinado a esas tareas (IPK).		Montage FPK
	Presswerk AUTOVISION		Montage IPK
	Presswerk IPK		Motoren FPK
	Karosseriebau AUTOVISION		Motoren IPK
	Karosseriebau IPK		Finishhalle FPK
	Lackiererei AUTOVISION		Finishhalle IPK
	Lackiererei IPK		Logistik FPK
	Montage AUTOVISION		Logistik IPK
	Montage IPK		Industrial Engineering FPK
	Motoren AUTOVISION		Industrial Engineering IPK
	Motoren IPK		Planung FPK
	Finishhalle AUTOVISION		Planung IPK
	Finishhalle IPK		Área técnica FPK
	Logistik AUTOVISION		Área técnica IPK
	Logistik IPK		
	Industrial Engineering AUTOVISION	1.1.3.2	Personal adicional externo Workshop 3P
	Industrial Engineering IPK		Personal externo
	Planung AUTOVISION		
	Planung IPK	1.1.3.3	Materiales para workshop 3P (SIN CONTAR CON VEHÍCULOS ENTEROS, PIEZAS, O CONJUNTOS)
	Área Técnica AUTOVISION		Material 1
	Área Técnica IPK		Material 2
			Material 3
			Material 4
			Material 5

1.1.4	<u>Personal de apoyo fabricación coches especiales (construcción de 5 coches especiales día en vez de 2 coches especiales día)</u>	1.1.7	<u>OTROS</u>
	Presswerk	117.1	Costes integración/sustitución colores pintura durante fabricación de preseries
	Karosseriebau	117.2	Actividades fábrica líder
	Lackiererei		Personal fábrica líder
	Montage		
	Motoren	1.2	<b>Manipulación, almacenamiento y control del sistema Logística de preseries</b>
	Finishhalle		
	Logistik	1.2.1	Personal adicional para Aprovisionamiento
	Área técnica	1.2.2	Personal adicional para Almacén especial preseries
		1.2.3	MA con suministro de revisión final durante cierre de fábrica
1.1.5	<u>Horas extra y trabajo durante cierre de fábrica para montaje de vehículos de preserie (fines de semana, vacaciones y prolongación jornada laboral de L-V)</u>	1.2.4	Costes adaptación de Supermercado para coches de preseries
	Horas extra Presswerk FPK	1.2.5	Participación en Teileteam. Desplazamiento personal estancia fija en Wolfsburg
	Horas extra Presswerk IPK		
	Horas extra Karosseriebau FPK	1.2.6	Alquileres naves/carpas para almacenaje logístico
	Horas extra Karosseriebau IPK		Alquiler nave externa para almacenaje logístico
	Horas extra Lackiererei FPK		Alquiler empresa de carpas para almacenaje logístico
	Horas extra Lackiererei IPK		Transportes adicionales ocasionados por la externalización del almacén
	Horas extra Montaje FPK		
	Horas extra Montaje IPK	1.2.7	Adaptación nuevas zonas provisionalmente para superficies logísticas (medios propios)
	Horas extra Motoren FPK		
	Horas extra Motoren IPK	1.2.8	Sobrecostes logísticos ocasionados por retrabajos desde SOP hasta ME (vuelta de coches a la fábrica)
	Horas extra Finishhalle FPK		
	Horas extra Finishhalle IPK	1.2.9	Personal externo para AWES, documentación piezas a mandar en cada coche y seguimiento de fechas de introducción de Ákos
	Horas extra Logistik FPK		
	Horas extra Logistik IPK	2.0	<b>Piezas de Pre series</b>
	Horas extra Área Técnica FPK	2.1	<b>Sobrecoste para piezas de prueba y muestra</b>
	Horas extra Área Técnica IPK	2.1.1	<u>VEHÍCULOS COMPLETOS</u>
		2.11	Vehículos enteros para formación
1.1.6	Personal para gestión y seguimiento del estado de las piezas, componentes y vehículos completos de las preseries VFF, PVS y S0.	2.112	Stückliste Kontrollfahrzeug. Slow Built Car
	Presswerk FPK	2.113	Coche para 3P
	Presswerk IPK	2.114	Coches especiales duplicados ( salón, KAF, etc.)
	Karosseriebau FPK	2.115	Coche para colores nuevos de pintura
	Karosseriebau IPK		
	Lackiererei FPK	2.1.2	<u>GRANDES CONJUNTOS COMPLETOS</u>
	Lackiererei IPK	2.12.1	Motores ZP4 / Cajas
	Montage FPK		Planung
	Montage IPK		Formación
	Motoren FPK		3P
	Motoren IPK		
	Finishhalle FPK	2.12.2	Carrocerías/ Grandes subconjuntos chapa
	Finishhalle IPK		Pintura
	Logistik FPK		Formación
	Logistik IPK		Chapistería
	Industrial Engineering FPK		Planung
	Industrial Engineering IPK		
	Planung FPK	2.12.3	Vordenwagen/Triebsatz muestra
	Planung IPK		Formación
	Área técnica FPK		Vorderwagen para Montaje
	Área técnica IPK		Triebsatz patrón
	RR.HH FPK		
	RR.HH IPK		

2.12.4	Conjuntos frontal y cockpit.	2.2.2	Necesidad adicional de contenedores para garantizar el suministro de piezas de serie
	Formación		Presswerk
	Conjuntos para prueba de instalaciones		Karosseriebau
	Conjuntos patrón para formación interna,		Lackiererei
			Montage
2.12.5	Adquisición prototipos		Motoren
	Prototipo MQB para pruebas eléctricas		Finishhalle
			Logistik
2.1.3	<u>PIEZAS SUELTAS</u>		
2.13.1	Piezas para actualizaciones de Meisterbock electrónico	2.2.3	Necesidad superficie extra por necesidades de (No hay sugerencias) (no incluye superficie logística para piezas o contenedores)
	Mesa de cableado		Prensas (Almacenaje de troqueles)
	Piezas simulador		
		2.2.4	Costes por envío de material a proveedores para garantizar el suministro de piezas de serie
2.13.2	Piezas Hausteile compradas a Pilothele		Prensas (desarrollos a proveedores de troqueles)
	Laterales		Chapistería
	Otras		Motores
	Pieza 3		Montaje
	Pieza 4		Revisión final
	Pieza 5		
		2.3	<b>Costos adicionales de transporte para garantizar la entrega de piezas</b>
2.13.3	Piezas y material para retrabajos o soluciones provisionales en preseries y fase de lanzamiento (p.e. anillos distanciales, fieltros, bridas cableados)		
	Área Técnica	2.3.1	Transportes especiales por falta de piezas o por estatus de piezas no adecuado en preseries
		2.3.2	Transportes especiales por falta de piezas o por estatus de piezas no adecuado en inicio de la serie
2.13.4	Piezas para presentaciones pilotarle		
		2.4	<b>Sobrecoste para las piezas de compras en casos especiales autorizados (COMPRAS)</b>
2.13.5	Piezas sueltas para paneles formación		
		2.5	<b>Chatarreo de piezas sobrantes y obsoletas, tanto propias como de compra, durante fase de preseries. Incluye costes adicionales si fueran necesarios (transporte, embalaje, retrabajos)</b>
2.13.6	Piezas destinadas a la prueba de instalaciones y prueba de contenedores	2.5.1	<u>Chatarreo de piezas sobrantes y obsoletas</u>
	Procesos	2.5.11	Chatarreo de piezas de compra
	Logistik		Acordadas en reuniones Teildteam en Almacén preseries
	Área Técnica		
		2.5.12	Chatarreo piezas Hausteile (prueba de instalaciones, 2-Tage Produktion, etc)
2.13.7	Piezas de prueba para simulación/comprobación futuras modificaciones		Procesos Prensas
	Área técnica		Procesos Chapa
	Planung		Procesos Pintura
			Otros casos
2.13.8	Piezas para actualización de Profi Raums		
	Montaje	2.5.2	<u>Retrabajos de material ya disponible</u>
	Motores	2.5.2.1	Coste de recuperación de piezas mediante empresas externas (p.e. flasheo de centralitas)
	Pintura		
	Chapa	2.6	<b>Utillajes auxiliares así como suministro temporal de piezas para periodo de plazos ajustados</b>
		2.6.1	Útiles, herramientas para fabricación de vehículos de preseries
2.2	<b>Sobrecostes para garantizar el suministro de piezas de serie</b>		Útiles necesarios comprados al exterior para el montaje de preseries
2.2.1	Embalajes alternativos para garantizar el suministro de piezas de serie		Útiles fabricación propia para el montaje de preseries
	Embalaje 1		Útiles necesarios de fabricación propia de Schablonenbau
	Embalaje 2		Útiles necesarios comprados al exterior de Schablonenbau
	Embalaje 3		Útiles necesarios comprados al exterior para el proceso logístico (no contenedores)
			Útiles necesarios de fabricación propia para el proceso logístico (no contenedores)

<b>2.7</b>	<b>Utillajes de serie corta para desviaciones de la planificación en casos especiales autorizados</b>	<b>3.2</b>	<b>Fabricación de piezas propias y de compra para pulmones (costes de útiles en 2.7.1)</b>
2.7.1	Piezas hausteile	3.2.1	Horas Extras por turnos adicionales fuera de horario laboral para creación de pulmones de piezas antes de cambio de instalaciones.
	Troqueles de serie corta en prensas al no llegar a tiempo con los troqueles definitivos.		Prensas FPK
	Mesas de geometría provisionales para fabricación de conjuntos de chapa		Prensas IPK
			Chapa FPK
<b>2.8</b>	<b>Compensación para capacidades previstas pero no empleadas de los proveedores debido a aplazamientos en los plazos de introducción (NO ABIERTO PARA P&amp;L, SOLO COMPRAS)</b>		Chapa IPK
			Pintura FPK
<b>3.0</b>	<b>Coste de personal adicional y los gastos generales de funcionamiento</b>		Pintura IPK
<b>3.1</b>	<b>Programas de formación específicos de producto (formación y capacitación del personal)</b>		
3.1.1	<u>Personal adicional para realizar sustituciones del personal de cadena que está en formación (Profi Raum, formación reglada, etc.)</u>	<b>3.3</b>	<b>Tiempo de crédito adicional para lanzamiento</b>
	Personal (prensas)	3.3.1	Personal adicional por necesidades de (No hay sugerencias)
	Personal (chapa)		Personal adicional Presswerk
	Personal (pintura)		Personal adicional Karosseriebau
	Personal (motores)		Personal adicional Lackiererei
	Personal(montaje)		Personal adicional Montage
	Personal (RF)		Personal adicional Motoren
	Personal (logística)		Personal adicional Finishhalle
			Personal adicional Logistik
3.1.2	<u>Impartición de formación técnica sobre producto en VW Academy (interna y externa)</u>		
3.1.2.1	Costes de impartición en formaciones de nuevas tecnologías de fabricación (ejemplo: VASS para A07/MQB) con medios internos	3.3.2	Personal adicional para fase de puesta en marcha y las medidas de ergonomía (puntos negros)
			Personal adicional Presswerk
3.1.2.2	Costes de impartición en formaciones de nuevas tecnologías de fabricación (ejemplo: VASS para A07/MQB) con medios externos		Personal adicional Karosseriebau
			Personal adicional Lackiererei
3.1.2.3	Costes de formación de formadores internos		Personal adicional Montage
			Personal adicional Motoren
3.1.2.4	Preparación de manuales de formación (documentación, traducción, maquetación,...)		Personal adicional Finishhalle
	Manual 1		Personal adicional Logistik
	Manual 2		
	Manual 3	<b>3.4</b>	<b>Costes adicionales por apoyo de Pilothe, instalaciones y herramientas</b>
3.1.3	<u>Formación en nuevas tecnologías de fabricación por parte de la central u otras plantas</u>	3.4.1	Personal de apoyo de Pilothe
	Presswerk		Personal de apoyo a grupo eléctrico
	Karosseriebau		Otros a especificar
	Lackiererei		Personal de apoyo a Schablonenbau
	Montage		Otros a especificar
	Motoren	<b>3.5</b>	<b>Homologación y apoyo a proveedores en las piezas de compra y hausteile. (Solo Q)</b>
	Finishhalle		
	Logistik	<b>3.6</b>	<b>Pruebas funcionamiento de los vehículos de VFF, PVS y OS (trabajo de auditoría, pruebas de conducción, comprobaciones de calidad, prueba de materiales). Incluido gastos para la liberación de los vehículos (seguros, impuestos y su depreciación (valor neto))</b>
	Planung	<b>3.7</b>	<b>Asesoría y acompañamiento de coches enviados a pruebas</b>
3.1.4	<u>Otros costes asociados a formación</u>	3.7.1	Costes organización eventos coches especiales
	Estimación 1	<b>3.8</b>	<b>Pruebas de rendimiento, consumo, emisiones, acústica y comportamiento en la carretera (Solo Q)</b>
	Estimación 2		
	Estimación 3		

3.9	<b>Planificación y trabajos de construcción en casos especiales en los que no es posible asignarles inversión</b>	3.10.14	Horas extra recuperación de circulante durante cierre de fábrica (fines de semana, vacaciones y prolongación jornada laboral de L-V)
	Caso especial 1		Horas extra Presswerk FPK
	Caso especial 2		Horas extra Presswerk IPK
	Caso especial 3		Horas extra Karosseriebau FPK
	Caso especial 4		Horas extra Karosseriebau IPK
	Caso especial 5		Horas extra Lackiererei FPK
3.10	<b>Apoyo temporal de puesta en marcha y procesos</b>		Horas extra Lackiererei IPK
3.10.1	<u>Personal de apoyo a la puesta en marcha y procesos</u>		Horas extra Montage FPK
3.10.11	Personal de apoyo mantenimiento		Horas extra Montage IPK
	Presswerk (ej.: puesta a punto troqueles)		Horas extra Motoren FPK
	Karosseriebau		Horas extra Motoren IPK
	Lackiererei		Horas extra Finishhalle FPK
	Montage		Horas extra Finishhalle IPK
	Motoren		Horas extra Logistik FPK
	Finishhalle		Horas extra Logistik IPK
		3.10.2	<u>Costes de material, reparaciones, y puesta en marcha de la maquinaria para nuevo modelo</u>
3.10.12	Horas extras personal de mantenimiento		Presswerk ( fresadoras, tornos, puesta a punto troqueles)
	Presswerk (ej.: puesta a punto troqueles)		Karosseriebau
	Karosseriebau		Lackiererei
	Lackiererei		Montage
	Montage		Motoren
	Motoren		Finishhalle
	Finishhalle		Logistik
			Planung
3.10.13	Personal de apoyo a puesta en marcha y procesos		Área técnica
	Presswerk FPK		
	Presswerk IPK	3.10.3	<u>Incremento coste de energía al usar más turnos las máquinas</u>
	Presswerk Externo		Prensas
	Karosseriebau FPK		Chapistería
	Karosseriebau IPK		Pintura
	Karosseriebau Externo		Montaje
	Lackiererei FPK		Motores
	Lackiererei IPK		R. Final
	Lackiererei Externo		
	Montage FPK	3.10.4	<u>Viajes destinados al lanzamiento de un nuevo modelo</u>
	Montage IPK		Presswerk
	Montage Externo		Karosseriebau
	Motoren FPK		Lackiererei
	Motoren IPK		Montage
	Motoren Externo		Motoren
	Finishhalle FPK		Finishhalle
	Finishhalle IPK		Logistik
	Finishhalle Externo		Industrial Engineering
	Logistik FPK		IT
	Logistik IPK		Planung
	Logistik Externo		Área Técnica
	Industrial Engineering FPK		RR.HH
	Industrial Engineering IPK		
	Industrial Engineering Externo	3.10.5	<u>Otros costes de apoyo temporal de puesta en marcha y proceso</u>
	IT FPK		Paradas /pérdidas producción por puesta en marcha de instalaciones
	IT IPK		DLV WOB (Planungsleistungen)
	IT Externo		Organización reuniones Pilothele (adecuación sala, Plotter, impresión libros)
	Planung FPK		
	Planung IPK		
	Planung Externo		
	Área técnica FPK		
	Área técnica IPK		
	Área técnica Externo		

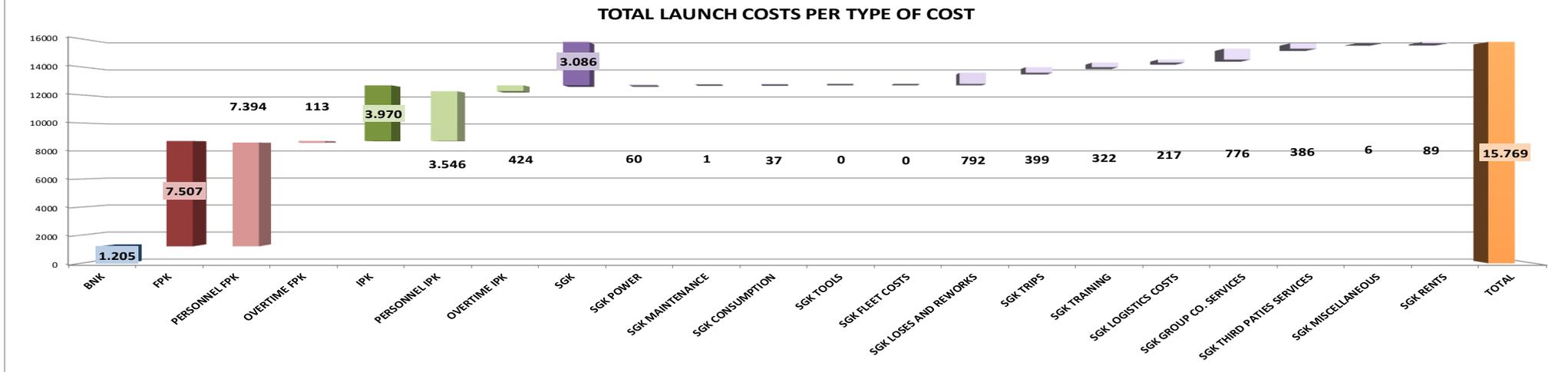
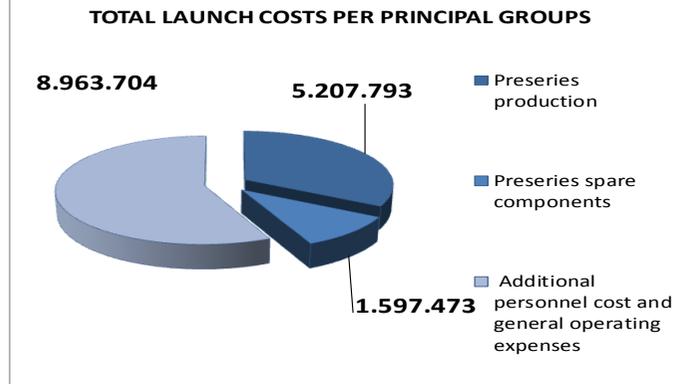
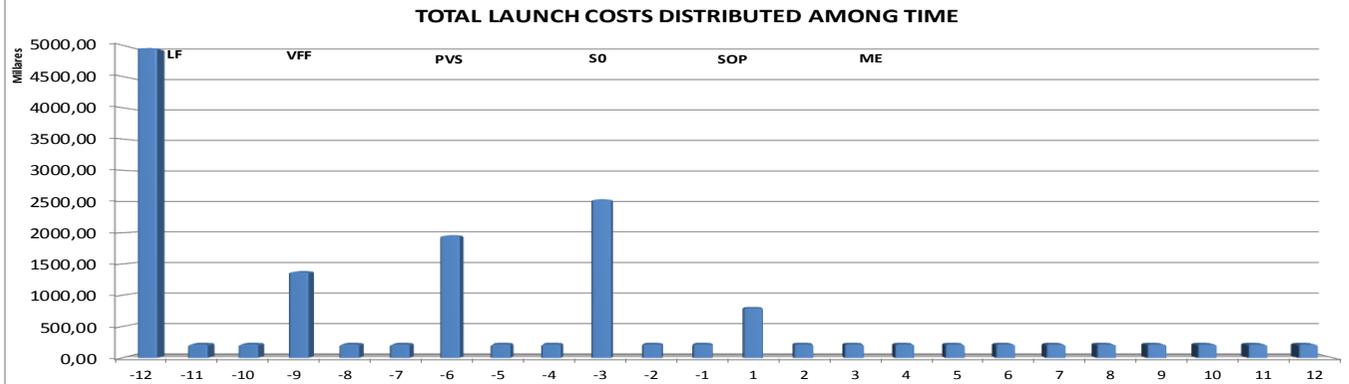
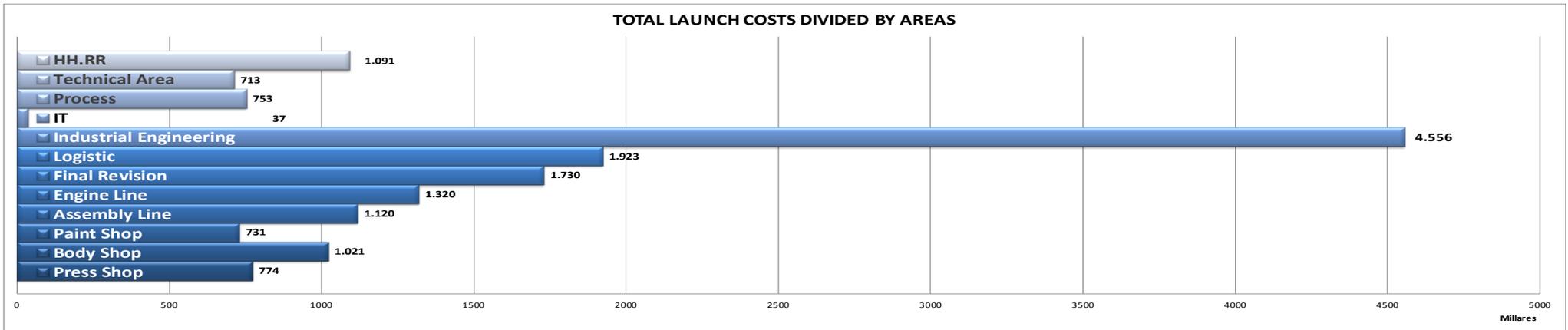
Annex 5. Type of costs. Nomenclature used by Volkswagen AG.

	<b>Project legend</b>	<b>English version</b>
BNK	TRANSPORTE	TRANSPORT
	ALQUILERES	RENTS
FPK	PERSONAL	PERSONNEL
	HORAS EXTRA	OVERTIME
IPK	PERSONAL	PERSONNEL
	HORAS EXTRA	OVERTIME
SGK	1- ENERGÍA	POWER CONSUMPTION
	2- MANTENIMIENTO	MAINTENANCE
	3- CONSUMOS	CONSUMPTION
	4- HERRAMIENTAS	TOOLS
	5- COSTES FLOTA	FLEET COSTS
	6- PERDIDAS Y RETRABAJOS	LOSES AND REWORKS
	7- VIAJES	TRIPS
	8- FORMACIÓN	TRAINING
	9- COSTES LOGÍSTICOS	LOGISTICS COSTS
	10- SERV. Empre. Grupo	GROUP COMPANIES SERVICES
	11- SERV. TERCEROS	THIRD PARTIES SERVICES
	12- VARIOS	MISCELLANEOUS
		ALQUILERES





## TOTAL LAUNCH COSTS OVERVIEW: BY AREA, TEMPORIZED AND BY TYPE OF COST



## PRESS SHOP LAUNCH COSTS OVERVIEW: TEMPORIZED AND BY TYPE OF COST

