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Pompes Grundfos France

01/03/2022 to 31/08/2022

INTERNSHIP REPORT

be
think
innovate

{EPITECH.}
LE FUTUR DE L'INFORMATIQUE
LE MEILLEUR DE L'INNOVATION

GRUNDFOS

Part1: Handover to my successor

This part’s goal is to describe my achievements during my internship to my successor.

I described:

- the company’s context
- the project’s context
- the project’s global architecture
- the work team’s context
- the work team’s organisation
- difficulties I had to face

The Grundfos company

Grundfos is a Danish group founded in 1945. Today, the group is one of the world leaders in the domain of hydraulic pumps. The group's global production in 2021 was 16 million units from all types with a sales revenue of 348 million euros and 18 500 employees all around the world split over 83 firms settled in 56 different countries.

Another ambition of the group is to respect some guidelines such as:

-  The sustainable development
-  Valorize the people
-  To have a tenacious ambition

To summarize these engagements, the group's motto is "Be think innovate", standing for:

- "Be" responsible: Always and under all circumstances act from a responsible manner.
- "Think" ahead: Anticipate with a view to face the future, be prepared for the next challenges.
- "Innovate": Innovate in all the domains.

The production department where I did my internship has been located in Longeville-lès-Saint-Avold since 1972. This location is a strategic choice for the European's exportation since it is near to Germany, Belgium, Luxembourg and Netherlands.
With a total surface of 20 000 square meters and 482 employees, the plant had a sales revenue of 45 million Euros in 2020.
Pompes Grundfos France is certified ISO 9001 (quality management) and ISO 14001 (environment management).
This plant is specialized in producing parts of the pump by injection molding and assembling these pumps.

Context of the project

Due to the never-stopping global warming, the awareness concerning ecology and the continuous improvement approach, a lot of companies all around the world tend to reduce their ecological impact. More recently, the COVID-crisis and the war in Ukraine had a big impact on the global energy and raw materials supply.

In this goal and driven by the group's strategy, PGF do their best to use more digital processes for the purpose of increasing efficiency and reliability.

In this context, the PGF started the digitalization of processes in order to improve the uses of the resources (energy, raw material, machines, personal, paper…) and, globally, to reduce the costs.

To this day, the training and work instructions, the reporting and the quality assurance were done manually and in a written form. These work instructions are used to train the new line's operators, show the client's return to heighten the operators' awareness on the non-quality risks or in order to judge the cleanliness of the workstation.

My project involves the digitalization of some reporting and quality processes in the assembly department for the production lines. The main goals are to replace all the paper sheets and manual reporting by digitalized documents, to reduce the risk of errors during the data reporting or during its reading and to centralize all the data in order to reuse them later to analyze them.

This project's context is to continue all the efforts made on the other domains and to reduce the amount of paper used on production line and the manual processes.

To do so, I asked the production workers what their needs and expectations were. After that, I did the same with the quality team and the team managers. Then, when all the expectations were clear, I made some prototypes to see if I understood them correctly. Once they all approved one proposition, I started coding the final solution.

Architecture of the project

In order to standardize, facilitate, ensure the data input and to simplify the data's collection, we've decided to create several Powerapps applications to overcome these issues.

The final solution consists of several Powerapps applications (one per sector). These applications collect the information entered by the users to fill a Word or Excel template via a Powerautomate Flow. Once the templates are filled, the script creates a file with all the information and saves it in a Sharepoint directory. Then, the file is available for anyone who needs to access to the data.

During the development, I frequently asked the quality team and the final users if I was still meeting their expectations and corrected the eventual flaws. I was also making sure that I was still following the group's guidelines.

Once the applications were done and the UI validated by everyone, I tested all the features to be sure that no bug was possible in production. A bug could mean that a production is not controlled or that the supervisors would have no feedback on what is happening in production which could cause a lot of improper production and cost a lot of time and money to correct.

Once the applications were tested and approved by everyone, I put them in production so the users could use them every day. I regularly went to see if there was any issue or bug, and I took their feedbacks into consideration to modify some features if needed.

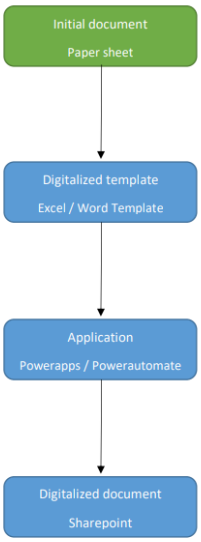

Figure 1:Project's architecture

Figure 2: Application's menu

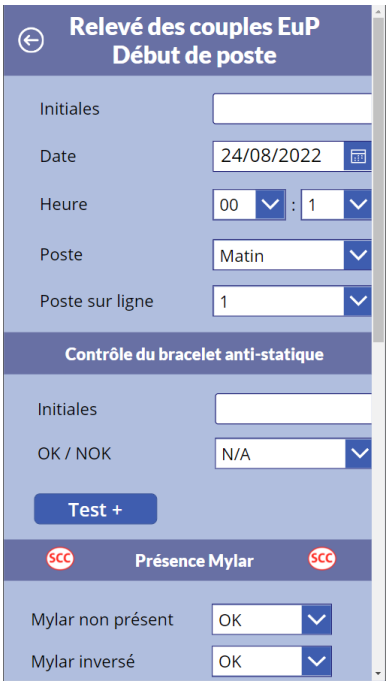

Figure 3: Application's view n°1

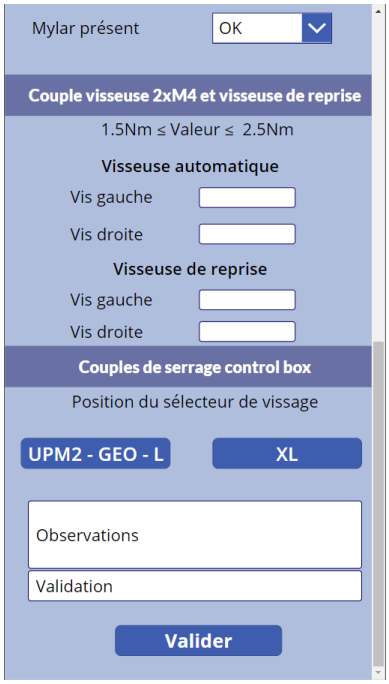

Figure 4: Application's view n°2

Figure 5: Powerautomate flow view n°1

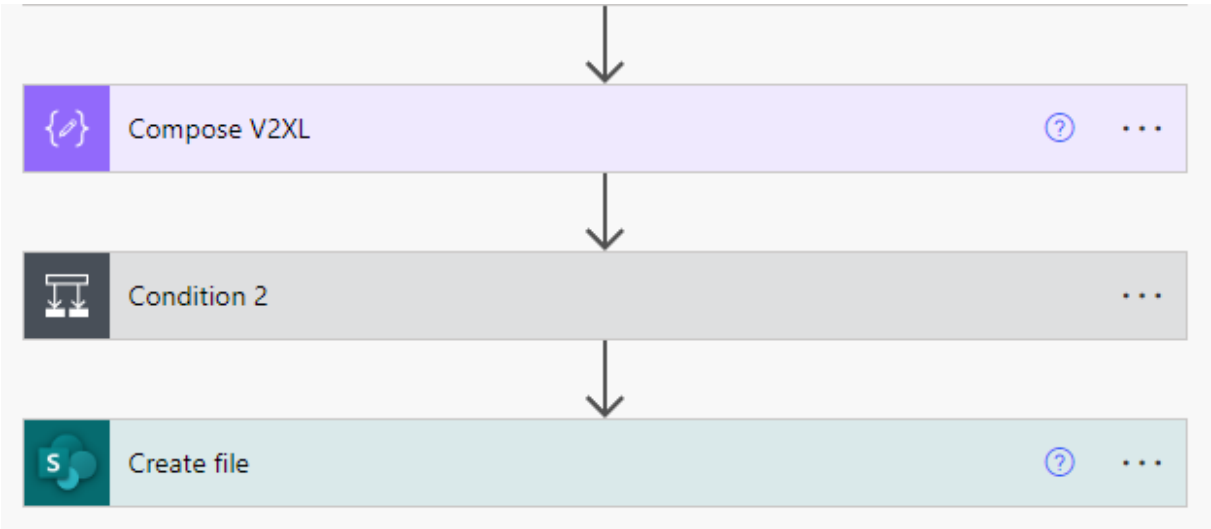

Figure 6: Powerautomate script view n°2

GRUNDFOS	FICHE DE RELEVES DES CONTROLES EUP	Référence : IP Eurl 1st 024-A1 Créé le : 27/08/2021 Màj le : 14/02/2022 Auteur : ANF

CONTRÔLES A EFFECTUER A CHAQUE DEBUT DE POSTE
Une case NOK → Prévenir superviseur ou service maintenance

Date	Click or tap here to enter text.	Initiales	Click or tap here to enter text.	Poste	Click or tap here to enter text.	Emplacement	Click or tap here to enter text.

CABLAGE CONTROL BOX	Contrôle bracelet anti-statique pour chaque opérateur (Initiales suivies de OK/NOK)							
	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Présence MYLAR DUMMY		
Mylar Non Présent	Mylar Inversé	Mylar Présent
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Figure 7: Template view n°1

	Vis gauche	Vis droite
Visseuse automatique	Click or tap here to enter text.	Click or tap here to enter text.
Visseuse de reprise	Click or tap here to enter text.	Click or tap here to enter text.

CABLAGE CONTROL BOX	Série de pompe	Tolérances	Couple VIS 1	Couple VIS 2
	• L • GEO • UPM2	1.5 ± 0.5Nm	1 ≤ Click or tap here to enter text. ≤ 2	1 ≤ Click or tap here to enter text. ≤ 2
	• XL	1.8 ± 0.5Nm	1,3 ≤ Click or tap here to enter text. ≤ 2,3	1,3 ≤ Click or tap here to enter text. ≤ 2,3

CHANGEMENT DE SERIE

CABLAGE CONTROL BOX	Série de pompe	Tolérances	Couple VIS 1	Couple VIS 2
	• L • GEO • UPM2	1.5 ± 0.5Nm	1 ≤ Click or tap here to enter text. ≤ 2	1 ≤ Click or tap here to enter text. ≤ 2
	• XL	1.8 ± 0.5Nm	1,3 ≤ Click or tap here to enter text. ≤ 2,3	1,3 ≤ Click or tap here to enter text. ≤ 2,3

Figure 8: Template view n°2

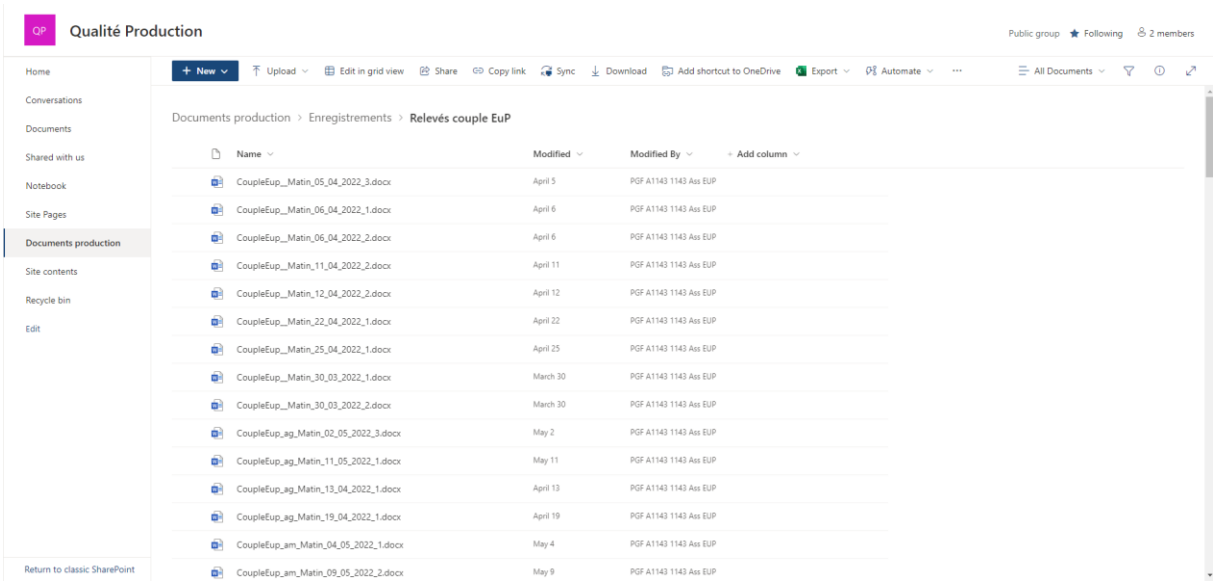

Figure 9: Sharepoint site

Team organization

The team that welcomed me was the one in charge of the Assembly sector. My training master, Mr. Alexandre ESTREICH, is the Autonomous Production Unit Manager of the assembly sector on the plant. He is in charge of the whole assembly sector from the machines to the people working on the lines. He is aware of what is happening on the line, which problems are encountered, if there are specific needs or rules to respect. He is responsible of the goal achievement and reports directly to the plant manager.

In the same office, there were the production supervisors in the persons of Messrs. Thierry DECOMPTE, Yann VAN DEN BULCK and Philippe THUMSER. They all were a great help for me to understand the lines' functioning. The fact that their office was really close to the production lines helped me a lot for my work. In fact, I was able to gather all the information I needed very easily; I could consult the operators about their needs and feedbacks whenever they were available.

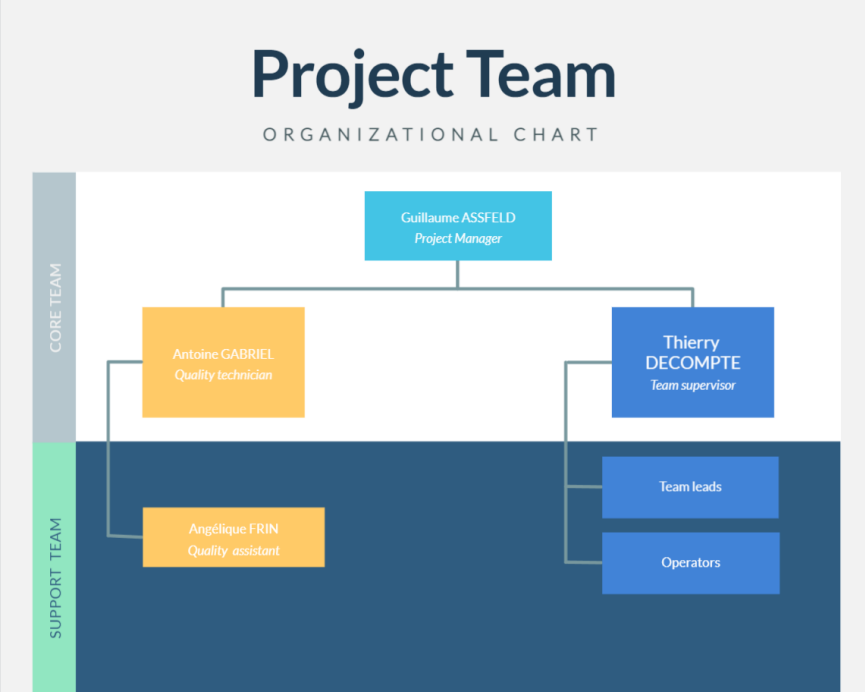

Figure 10: Team's organization

The combination or all these elements helped me to build several mobile applications sticking closely to their requests and the field reality. I used this proximity a lot in order to lose the less time possible while coding. It is a huge advantage working next to my final users.

Challenges and difficulties

The first difficulty appeared during the design brief's redaction. In fact, we had to find an agreement concerning the user interface so it's intuitive for the users (to reduce the time spent on the application). To face this issue, I proposed several UI and modified them to fit to the users' expectations.

Another technical issue was to find the right technology to develop the solution. I had to find the best way to copy all the input data and paste them in the text inputs in the word templates and to save the final result on a Sharepoint site.

And finally, the last difficulty was to successfully change the users' habits, so they have the reflex to use the new solution systematically and sustainably. To do so, I've put the users in the thinking process in the early stages of the project to produce the best solution that fits their IT knowledge and to write modus operandis describing the method to follow to correctly use the solution. In these methods of operating, I've put the most frequently asked questions and their answers. I managed to accompany the users during the whole conception's process to make them understand the utility and the interest of the project. Furthermore, some management routines were created to ensure the good use of the applications.

Today, the solutions are running smoothly. You can take these applications as an example to generalize the digitalization on other sectors. The best advice I can give you is to listen to the users' feedbacks in order to be the most efficient.

Part2: convince a senior manager to have a project's responsibility.

This part's goal is to negotiate with a manager the responsibility on the project I worked on during my internship.

I wrote this part as an email as if I was talking to my internship manager.

Hello Alexandre,

I'm wrinting you because I have a request that I want to formulate concerning the digitalization of the technical documentation on the Longeville's site.

In a purpose of continuous improvement of the fabrication's processes and increasement of their reliability, we digitalized the fabrication's and quality reporting's support processes on the assembly lines. In fact, these processes, were done manually on paper sheets. That's how, under the APU manager's drive, the documents' digitalization project is born on the "EUP" line.

This digitalization allowed the project's team to reach the objectives that are the continuous improvement of the production's efficiency, the optimization of the resources' usage, a better reliability of the surveyed data and systemization of the escalation procedure in case of quality drift and to reduce the risk of error during the data's input or data's collection.

For the company, it may be interesting to pursue this approach on other sectors and on other production lines. In fact, today, there are some production lines where the data survey is still done on paper sheets which means a risk of error, an efficiency loss and waste.

This would be to continue the achievements done during the project of the digitalization on the "EUP" line and standardize this one the other production line of the site. Beforehand, we could propose the solution adopted previously to the users to gather their feedbacks and to adapt the solution to their needs. The idea will be the same as on the "EUP" line which means to structure the production's data survey via Powerapps applications and to include a follow-up on the quality's indicators intersecting these informations with knowledge base (like SAP) or establishing precise templates to bring the most precision possible. The collected data will be hosted on a Sharepoint website so the team managers and quality technicians will be able to access them whenever they want (to follow some indicators for example).

The generalized digitalization would allow to multiply the gains recorded on the "EUP" project. To know that the documents' uniformization and the standardization would assure that the data surveyed by the operators would use the documents' latest versions, would reduce the error margin and it will make easier and systematic the drift's processing (a mail would be sent automatically when an error is reported) during the quality's tolerances report. The centralization of the information would drastically reduce the time spent by the quality technicians while collecting the data.

Throughout the elaboration of this solution, I had the opportunity to show my technical and social abilities. In fact, I managed to adapt myself to the final users' needs to deliver a solution satisfying all their expectations. This adaptability and capacity to auto form myself were acquired during my studies at Epitech where I learned to be operational the quicker possible even on a technology I didn't know. My studies taught me to work efficiently in group during a lot of group projects. These projects convinced me that it is important to grab the best of each group member, so everyone is feeling involved and is working fully on the tasks.

All these technical and interpersonal competencies added to my company's knowledge will allow me to lead the technical documents' digitalization's globalization to success if you agree to give me the responsibility.

For all these reasons, I propose to you to take the global responsibility of the project.

I'm available to answer your questions,

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Part3: convince the hierarchical supervisor to have my dream project's responsibility.

This part’s goal is to convince a high-placed hierarchic manager to give me the responsibility on my dream project.

I wrote this part as an email to be closer to the reality.

Good morning Mr. Director,

I'm sending you this email because I have a request to formulate to you.

In a purpose of continuous improvement of the fabrication processes and the increase of their reliability by digitalizing them, the search of products' quality and the best usage of the resources, it may be interesting to use the data collected by the winding machines. In fact, each winding machine collects the waiting time, the time stopped, and the quantity produced each shift. These information are gathered in an Excel file that isn't used yet.

This project's goal would be to exploit these data. It will allow the team managers to see which are the most used winding machines and it will allow the maintenance chief to see which are defective. According to them, this information would give them detailed feedback on the production's state and potential axis for improvement.

This solution will make the team manager gain between 10 to 15 minutes each shift. Transposed to a whole year it will be huge gains. This solution will reduce the scraps and the cost of poor quality by 5%, augment the production rate by 10% which allows to gain approximately 80 000€ per year.

A potential solution would be to gather all the Excel files in a database that could be connected to a PHP interface which would allow the users to consult the information, filter them to see the winding machine's evolution or to export the filtered data to Excel to exploit the information.

This project would be the perfect opportunity for me to use the skills I developed during my last projects and my Epitech studies. These studies made me develop my technical and interpersonal skills, my adaptability to unknown situations or to integrate myself quickly and efficiently in a variously skilled project team. This project would give me the opportunity to deepen my production lines' management knowledge, my lean management knowledge and my industrial world knowledge that I acquired during my last project in you company. Moreover, I'm by nature curious and motivated to discover new technologies or work method to be the most diversified possible.

Being part of this adventure, would be a huge opportunity for me on a personal and professional

level and it will be rewarding and prolific for the company who could greatly improve the maintenance and the split of the usage of its means of production. It will simplify the work for the concerned people who could the allow more time and means on unplanned incidents.

Waiting for your reply,

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