



Management Plan

Mold & Co in China

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Introduction

This document describes all aspects of the ChineseTooth project which the main goal is to install IT systems around the new production line in the eco-city of Taijin. This project includes a social and ecological aspect in order to fit to the requirements of Taijin city guidelines.

In this document, we describe what are the goals, the processes, the planning and the risk of such deployment in China.

Project description

The main goal is to install a toothbrush production line in the eco-city of Taijin in China. Our company is working for MOLD & Co. to make this production line a reality.

Our main guidelines in this project is to install a production line that can produce a great amount of toothbrushes within an eco-city. This project needs to be respectful of the surrounding environment and social aspects of the project's stakeholders.

2.1 Specifications

This project has to achieve the following specifications.

The production line must contain all the required machines to automate the production of toothbrushes. These machines include moulting machine, stamping machine, tufting machine, bristle cutter machine, bristle trimming machine and Packaging machine. These machines need to be bought and connected to each other in order to build the full product.

To connect all the machines in the assembly line, the project requires also a full digital connection to an internal network. This network groups all connected machines and database servers to store monitoring informations about the production. These informations need to represent the current production, the past production and potential errors in the production line.

The production line is fully automated through this network and the production is regulated to produce exactly what is needed. This automation brings many advantages including the environmental impact reduction, reduction of the storage requirement of finished products and 24/7 production in case of huge demand.

The informations collected need to be displayed to the employees in charge of the production line. These informations are displayed through an interface reading the monitoring data from the database. A master server has to be installed in order to control all machines and to control the production flow.

Several materials are required to produce toothbrushes. These materials are plastic, nylon, brass wire, paper box packing, plastic hard container packaging, high frequency blister packaging and Blister card packaging. The project must include a storage space for all these materials and human resources to load the resources in the appropriate machines.

All the production line machines, storage and digital network requires engineering to organise all these components depending on the space available and the shape of the building. Engineering human resources are required to create, configure and install monitoring system. Human resources may also be required to manipulate machines, connect

each machine to the other and install network.

2.2 Forces

The forces of the project are mainly focused on the high efficiency of the production line. This high efficiency is guaranteed by the monitoring system and the automatic management of the amount of product produced on the assembly line. This project represents a great opportunity to modernize the production of MOLD & Co. and automate the assembly line. By automating the assembly line, MOLD & Co. gain a lot of money on storage of manufactured products and human resources.

2.3 Weaknesses

This project have also small weakness that may have an impact on risks (Risk management will be covered in the section 6).

The main weakness are the important amount of advanced technologies that requires a great amount of high qualified employees in charge of the installing and maintaining the autonomous system of the assembly line. Another weakness is the requirement of heavy and pricy machines that can represent a major part of the project's costs.

2.4 Social & Environmental guidelines

As our project takes place in the eco-city of Tianjin, it must include proper social and environmental guidelines. These are guidelines and must be evaluated during the project to qualify if these are possible to set up with MOLD & Co. budget.

2.4.1 Social engagement for project human resources

These guidelines includes social engagements for the well being of employees and human resources during the project.

Working hours For employeee better productivity, it could be good to restrict to 8 hours the day of work to complete a full week withing 44 hours. We must audit regularly our employees about their opinion and well-being within the company through feedbacks.

Human rights and equity Our project must respect the human rights about children labor or unpaid employees. These are forbidden. Finally, our employees salary musn't depend on genre, race or physical ability.

Health Thus, our project is about health product. We must establish health requirements to reduce bacterial or viruses risks during toothbrushes production. We must include protection against noise and injury risks on the production line. That include collective equipments like protective foam, barrier, etc. But also personal equipment like hear protections, gloves, etc. And we could give an introduction to the handling of machines for all employees to avoid injuries.

2.4.2 Environmental guidelines

Waste and recycling We must establish a plan and write good practices about material waste in order to reduce our waste that have a huge environmental impact. Our automation system must optimise production in order to reduce waste. We could also collect rainwater in order to use it in bathrooms or for floor washing.

Efficiency We could invest in machines that are more profitable and resource-efficient to reduce the resources required to get the assembly line working. Moreover, it could be good to progressively invest in renewable energy in order to reduce our energy-related environmental impact. This includes solar panels, wind turbines or heat pumps that can be installed outside of the building or on employees parking.

Building optimizations The whole building could include some automations to reduce environmental impact and reduce energy waste. These automations includes auto-switch lights and computers when there are not used.

Machine repairs To reduce environmental impact and keep our machines as long as possible, it's possible to introduce a repair culture during the project and after. This repair guidelines include bying repairable machines, recycle spare parts of defective machines and train employees about machine repair.

Delivery guidelines Delivery is a huge part of our environmental impact. To reduce this environmental impact, we could group most of our delivery to reduce waste of space in polluting transports like trucks. We could also promote rail transport over truck transport. This transport method are way less polluting but more expensive. But High-speed train are developing in china and it could be reduced in the future.

2.5 Local investments & suppliers

Local investment It could be good, to participate in local project of Tainin. This investments could represent a good opportunity to communicate of the green engagement of MOLD & Co..

suppliers guidelines MOLD & Co. must audit it's suppliers in order to evaluate there social and environmental impact and be sure they fits with our own requirements.

Local implication Our factory is in a city and MOLD & Co. must communicate with local authorities about what it's happening in the factory. Local authorities include Tanjin City Hall and People's Republic of China government. MOLD & Co. must inform authorities about environmental risks and how we will manage in such case. We also require to be informed about local chinese health and sanitary requiremet in order to be consistent with it.

Actors and Stakeholders

We have assembled all the actors of the project in a clear and precise way in order to identify them. You will first find the different actors who have an impact on the project. Secondly, the stakeholders and their position in the project. Finally, the teams that need to be set up.

3.1 Actors impacting the project

You will find below a table containing all the actors having an impact on the project. All the stakeholders were identified and analysed according to the client's needs by the Cesi conseil team.

There are four columns :

Name : it is the name of the actor and stakeholder.

External or Internal to MOLD & Co. companie : The actor in question is internal or external to MOLD & Co.. This is its positioning within the project.

State : what type of domain is the actor affiliated.

Influence level : this is the level of importance of the actor in the project.

| Name | External or internal | Status | Influence level |
|--|----------------------|------------------------|-----------------|
| Mold and Co - HR department | Internal | Supervision | Important |
| Mold and Co - Production department | Internal | Manufacturation | Important |
| Mold and Co's direction | Internal | Client | Important |
| Cesi conseil | External | Provider | Important |
| Mold and Co's - It department | Internal | Supervision | Medium |
| Mold and Co's - Maintenance department | Internal | Supervision | Medium |
| Mold and Co's - Logistic department | Internal | Supervision | Medium |
| Tianjin city hall | External | Notice of construction | Important |
| People's Republic of China government | External | Supervision | Important |
| Suppliers | External | Supply | Important |

Figure 1 – Table of stakeholders

3.2 Setting up teams

Following the stakeholder analysis for this project, we set up teams to maximize the company's production and meet the Chinese company's standards.

These are three teams distributed as a service to ensure the proper functioning of the company Chinetooth.

| Name | Objective | influence level |
|---------------------------------------|--|-----------------|
| Human Resource department | Recruit new employees, retain them and develop their skills. | Important |
| Engineering department | Conception, resource planning, scheduling, recording and traceability of production activities | Important |
| Assembly line installation department | storage and installation of machines | Important |

Figure 2 – Table of teams working on the project

Human resource department :will help to maintain a stable workforce over the long term.

Engineering department :its objective is to continuously improve the management of flows and stocks included in the work chain that begins with suppliers and ends with intermediate or end customers. There are three engineer department, one for machine, second for network and the last for industrie 5.0.

Assembly line installation department : the role of the marketing department is to define a company's strategy by proposing products and services that will promote the development and sustainability of Mold & Co. There are three teams, one for resource installation, second for network installation and the last for IoT installation.

Project planning

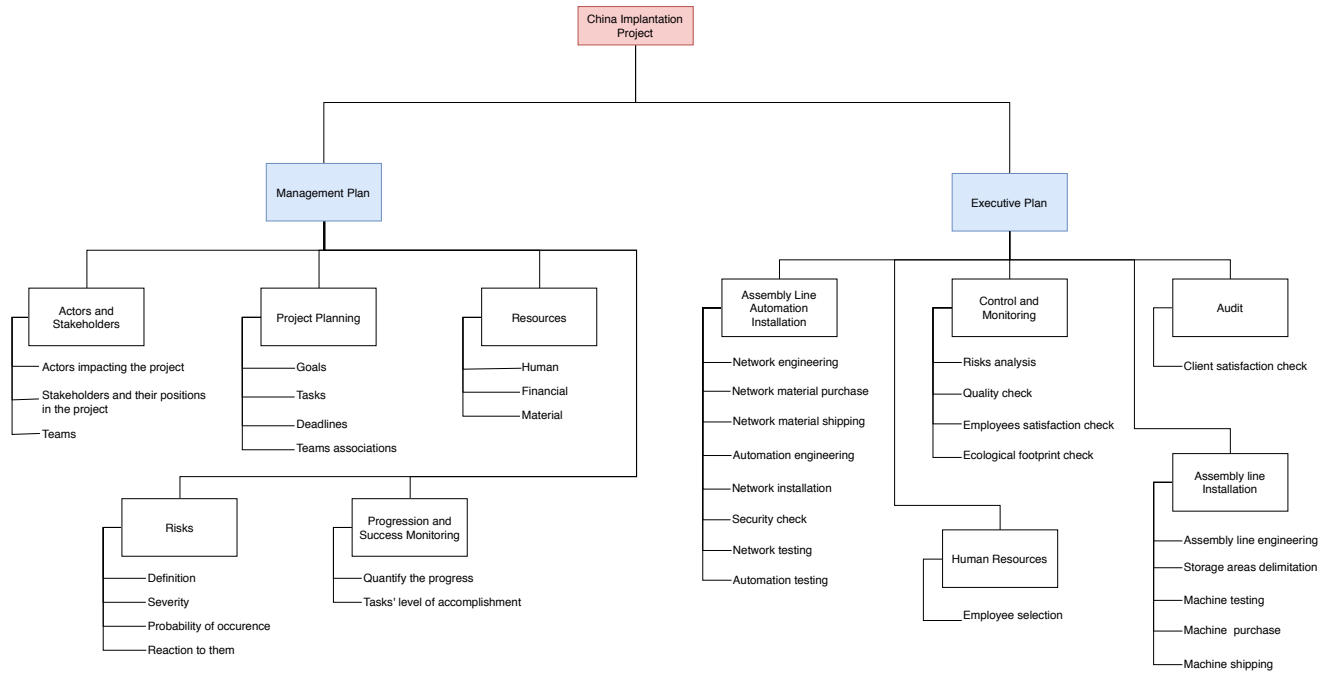


Figure 3 – Work Breakdown Structure of the project

4.1 Tasks

The project is separated in many tasks that represents all steps needed to reach the goal of the project. These tasks are separated in two categories : *Managment plan* in which all the tasks represents the redaction od the management plan of the project and *Executive plan* the represent the active part of the project in which the assembly line is installed.

4.1.1 Management Plan

The management plan is the part in which each step of the project is defined. The management plan is defined as a frame for the project and theses tasks must be achieved before all executive task. This part begins with a precise description of the project and goals followed by the 5 next parts.

Actors and Steakholders In this parts, we must think and describe all the avtors involved in the project. These actors are stakeholders and can interact in some way with the project. The description includes their position, their importance and the manner that they interact with the project. This task have also a goal of definition different teams that are required to bring this project to life.

Project planning Within this task, we must think and describe all the tasks required to finish the full project, the time and resources required to achieve each task and what are task dependencies. In this task, we must define what are deadlines and when to make debriefing and evaluate the progression of the project.

Resources In this part of the project, we must identify and write the required resources to achieve each task defined in the *Project planning* part. These resources include : human resources, financial resources and material resources.

Risks In this task, we must define the primary risks that can occur during the project and how to reduce the side effect of each risk. Each risk have a severity and probability rate that represent the criticality of it. Higher the criticality is, important the risk must be and planned with caution.

Progression and success monitoring Finally, in the progression monitoring we must identify what indicator can represent the progression or the success of each task and the whole project. These indicator will be used all along the project to define it's progression and if some task are taking late.

4.1.2 Executive Plan

The executive plan indicates all actions done after the work on the management plan. This category includes the installation of the assembly line and its automation, but also its control and monitoring, in addition of the human resources and an audit of the client.

Assembly Line Installation This part aims to identify the processes brought by the installation of the assembly line. After an assembly line engineering, in which we study the building disposal, where and how the machines will connect with themselves, we also study the place for the storage areas. We then test the machines after their purchase and their shipping.

Assembly Line Automation installation This part is about the automation of the assembly line, which includes a network engineering (the study of the disposal of the network in the building), the purchase of the material for this network (routers, switches, etc.) and their shipping to the building, before their installation and test. We also study the automation of the machines, how it will work, and how to put it in place, with also a testing session and a security check.

Human Resources The human resources part identify the employee selection process. Those employees must be fit to the required tasks of the executive plan. To the study of the

building and other engineering around the machines to the installation of the automation of those machines, and their control and monitoring.

Control and Monitoring After the installation of the machines and their automation set, we must control and regulate them. This includes the risks analysis process, which means a constant control and verification of the assumed risks but also an answer plan in the case of a crisis situation. We also check on the quality of the machines, their cleanliness and their working order, but also on the employee's satisfaction as we want to be sure they work in an environnement as comfortable as possible. In the same way, we want a constant control of the ecological footprint of the building to respect our environmental engagements.

Audit Finally, this task is required to retrieve some feedback from the client. These feedback can lead to an improvement process and can be added to our quality pipeline in order to continuously improve our practices.

4.2 Gantt diagram

The Gantt diagram of this project recapitulating all our planning is in the first Annex of this document. This is an export of Microsoft Project's file of this project.

Required resources

5.1 Human cost

The human cost we analyze represents the amount of work in days and the remuneration of everyone involved in the realization of, based on our project planning, the two parts (the initial part with the management plan, and the executive plan with the installation and monitoring of one assembly line, and the formation of the employees to the handling of the machines). The costs are based on the total number of days of work, the persons involved, and the average price cost of the employees which you can see in this table.

| | |
|---|--------------|
| Senior Engineer (french) | 35 000€/year |
| Junior Engineer (french) | 20 000€/year |
| Senior Engineer (local) | 26 000€/year |
| Junior Engineer (local) | 13 000€/year |
| Technician (french) -includes travel and cost of living | 6 500€/week |
| Technician (local) | 300€/week |

Figure 4 – Average employee cost

To calculate the cost we used the working rules in France and China :

- In France : 35 hours of work per week and 272 days of work per year.
- In China : 40 hours of work per week and an average of 345 days of work per year.

The next table will present the different type of actors (employees) of this project and how much they are paid per hour according to the average employee cost of the previous table and the working rules for each country.

| Title | Cost | Cost per hour (according to the working rights of the associated country) |
|--------------------------|--------------|---|
| Senior Engineer (french) | 35 000€/year | 18,38€/hour |
| Junior Engineer (french) | 20 000€/year | 10,5€/hour |
| Senior Engineer (local) | 26 000€/year | 9,42€/hour |
| Junior Engineer (local) | 13 000€/year | 4,71€/hour |
| Technician (local) | 300€/week | 7,5€/hour |

Figure 5 – Average employee costs per hour

With this data, we now analyze the number and type of the actors of each part and calculate the total cost.

5.1.1 Initial part

The initial part took place during 4 days and involved a team of five french engineers, one leader senior engineer and four junior engineers. The cost is calculated according to the french working rule of 35 hours of work a week, so 7 hours a day.

| Actors | Unit Cost for 4 days | Total Cost for 4 days |
|-----------------------------|----------------------|---------------------------|
| 1 Senior Engineer (french) | 514,64 € | 514,64 € |
| 4 Junior Engineers (french) | 1 176,00 € | 4 704 € |
| | | TOTAL : 5 218,64 € |

Figure 6 – Initial part cost

5.1.2 Executive part

According to the gantt diagram, the executive part is 102 days long, minus 80 days of equipment shipping (twice 40 days), it represents 22 days of work. During these 22 days, 7 chinese engineers and 10 chinese technicians/regular employees (counted as technicians), as you can see here, we estimated these numbers while partitionning the executive part (installation and monitoring/control) in different tasks.

| Tasks | Number of engineers | Number of technicians/employees |
|--------------------------------------|--|---|
| Assembly line automation and Network | 3 senior engineers - 1 junior engineer | 3 technicians - 1 employee |
| Control and Monitoring | 1 senior engineer - 1 junior engineer | X |
| Human Resources | X | 1 employee |
| Assembly line installation | 1 senior engineer | 4 technicians - 1 employee |
| TOTAL : 7 engineers | | TOTAL : 10 technicians/employees |

Figure 7 – Number of employees for the executive part

The cost is calculated according to the chinese working rule of an average of 40 hours of work a week, so 8 hours a day.

| Actors | Unit Cost for 22 days | Total Cost for 22 days |
|----------------------------|-----------------------|----------------------------|
| 5 Senior Engineers (local) | 1 657,92 € | 8 289,60 € |
| 2 Junior Engineers (local) | 828,96 € | 1 657,92 € |
| 10 technicians (local) | 1 320 € | 13 200 € |
| | | TOTAL : 23 147,52 € |

Figure 8 – Executive part cost

5.1.3 Formation

The 17 employees involved in the executive part need to be taught how an assembly line works, how to handle the machines, how they work and also their security rules.

We estimated the cost of such a formation of 3000 euros per person (a total of 51 000 euros for the 17 employees) and 5 days, also counted as 5 days of works for them.

| Actors | Unit Cost for 5 days | Total Cost for 5 days |
|----------------------------|----------------------|---|
| 5 Senior Engineers (local) | 376,80 € | 1 884,00 € |
| 2 Junior Engineers (local) | 188,40 € | 376,80 € |
| 10 technicians (local) | 300 € | 3 000 € |
| | | TOTAL (+ 51 000 €) : 56 260,80 € |

Figure 9 – Formation cost

With these three parts, we reach a total human cost of **84 626.96 euros**.

5.2 Material cost

This cost is about every material directly used in one assembly line and its cost. Our assembly line will include :

- Handle molds, to make the brush handle (an average of 2 per injection machine).
- An injection machine, to mold the shape of the toothbrushes.
- A tufting machin to tuft on brush holders.
- A trimming and end rounding machine to cut and shape the bristles to the manufacturers specification, and to round them to be softer and more comfortable to the teeth.
- A fully automated packaging machine to pack the toothbrushes.
- And of course conveyers belt which will link these machines together. We estimated an average of 4 meters between machines, so we would need around 16 meters of it.

All of it would be around 30 square meters.

We have access to two types of injection machines, a 50T and a 80T, which means it is a 50/80 ton servo-motor operated machine, the maximum clamping force with these machines is either 50 or 80 tons. Servo-motors are used for energy saving, so these machines give the highest energy saving in hydraulic machines. In this estimation we chose the 80T injection machine for a better energy saving.

To calculate the total cost, we used this table of average prices.

| | |
|-----------------------------------|-----------------|
| Handle Mold | 8 000€/piece |
| Injection Machine : 80T | 45 000€/machine |
| Injection Machine : 50T | 30 000€/machine |
| Tufting Machine | 20 000€/machine |
| Trimming and End Rounding Machine | 25 000€/machine |
| Fully Automated Packaging Machine | 60 000€/machine |
| Conveyer Belts | 1 000€/meter |
| | |
| Electrical/Hydraulic/Water Costs | 3 000€/post |

Figure 10 – Average machine costs

We have 5 machines in our assembly line. We decided, for the electrical/hydraulic/water costs, that there will be a maximum of 3 machines by post, so 2 posts for one assembly line, which will cost 6 000 euros.

| Machines | Cost |
|-------------------------------------|----------|
| Handle molds (2) | 16 000 € |
| Injection machine (80T) | 45 000 € |
| Tufting machine | 20 000 € |
| Trimming and end rounding machine | 25 000 € |
| Packaging machine | 60 000 € |
| Conveyers belt (16 m) | 16 000 € |
| TOTAL (+ 6000 €) : 188 000 € | |

Figure 11 – Machines costs for one assembly line

So, the total machine cost for one assembly line is **188 000 euros**.

We reach a total estimation cost of **272 626.96 euros** with both the human cost and the machine cost.

Risks management plan

Considering that Mold & Co's new production plant implies an important and complex system, we have to identify and evaluate all the risks inherent to this system in order to limit them the most possible. This risk analysis will allow us to help designing the new production system by establishing the most efficient preventive and correctives measures.

In order to deal with the risk management, we decided to use the FMECA Method on the means of production of Mold & Co company. This means that we consider all the risks related to the operation of the assembly line system.

6.1 Plan

For that purpose, we have to, as a first step, describe the overall production system. Then we will be able to identify all the threats. After this step, we will identify all the threats that could affects the system and assess them in order to define their criticality.

Ultimately, we will see how to compensate these eventual failure modes where appropriate.

6.2 Description of the system

The assembly line system is composed of two main parts : the mechanical system and the computing's one.

By the way, we estimate that these two systems are interdependent. In other words, we have to take into account that if the mechanical part of the assembly line fails, the entire system cannot work anymore and vice versa.

Actually, mechanical part of the production chain can work independently but if the computing system is not working, the mechanical will encounter problems about its regulation and monitoring.

6.3 Definition of the risk assessment

According to the FMECA Method, we have to assess three different values in the table of risk.

First of all, the Severity (S) which equals to the importance of the consequences that the risk could induce on the production of the factory. More the risk can affect the production line, more the Severity level is high as the following table shows :

Then we have to assess the Occurrence (O) of the risks. The occurrence enables us to

| Severity definition | Severity level | Associated color |
|---------------------|----------------|------------------|
| Insignificant | 1 | green |
| Minor | 2 | light green |
| Significant | 3 | yellow |
| Serious | 4 | orange |
| Major | 5 | red |

Figure 12 – Table of severity level

measure the likelihood of the risk. Mire the risk is potential, more the Occurrence value is high as we can see as below :

| Occurrence definition | Occurrence level | Associated color |
|-----------------------|------------------|------------------|
| Remote | 1 | green |
| Very low | 2 | light green |
| Low | 3 | yellow |
| Moderate | 4 | orange |
| Major | 5 | red |

Figure 13 – Table of occurrence level

Finally, the Detection (D) is measured according to the ease for the operators to discover a failure mode. As we can see on the below table, higher the value is, harder it is to detect the issue.

| Detection definition | Detection level |
|-----------------------|-----------------|
| Blatant | 1 |
| Easily identifiable | 2 |
| Discreet | 3 |
| Hard to identify | 4 |
| Very hard to identify | 5 |

Figure 14 – Table of detection level

6.4 Calculation of the criticality and risk priority numbers

In sum, Severity, Occurrence and Detection are arbitrarily assessed whereas Criticality and RPN are calculated from these same data.

Especially, we have the following relations :

- Criticality = Severity Occurrence
- RPN = Severity Occurrence Detection = Criticality Detection

These last two measures enable us to prioritize the risk in order to make the further effort in order to limit them and eventually resolve them if ever they occur.

Calculation of the criticality and risk priority numbers

In sum, Severity, Occurrence and Detection are arbitrarily assessed whereas Criticality and RPN (Risk Priority Number) are calculated from these same data.

Especially, we have the following relations :

$$Criticality = Severity \times Occurrence$$

$$RPN = Severity \times Occurrence \times Detection = Criticality \times Detection$$

These last two measures enable us to prioritize the risk in order to make the further effort in order to limit them and eventually resolve them if ever they occur.

| | | | | | | |
|----------|---|------------|----|----|----|----|
| SEVERITY | 5 | 5 | 10 | 15 | 20 | 25 |
| | 4 | 4 | 8 | 12 | 16 | 20 |
| | 3 | 3 | 6 | 9 | 12 | 15 |
| | 2 | 2 | 4 | 6 | 8 | 10 |
| | 1 | 1 | 2 | 3 | 4 | 5 |
| | | 1 | 2 | 3 | 4 | 5 |
| | | OCCURRENCE | | | | |

Figure 15 – Severity occurrences

After having defined all the measure required in order to assess the risks. We can now list them,

evaluate their Severity (S), Occurrence (O), Detection (D) and thus calculate for each one, their criticality (C) and their Risk Priority Number (RPN).

| Identifier | Failure mode | Failure causes | Failure effect | Detection method | Corrective actions | S | O | D | C | RPN |
|------------|----------------------------|------------------------------------|-------------------------------------|-----------------------------------|---|---|---|---|----|-----|
| A | Power outage | Equipment disfunction | Stop of the production | Beep | Inverter and external batteries | 5 | 4 | 1 | 20 | 20 |
| B | Noise pollution | Equipment disfunction | Employee's discomfort | Error message | Automatic measurement and earplugs | 1 | 2 | 2 | 2 | 4 |
| C | Inherent defect | Obsolescence | Slowdown or stop of the production | Error message | Periodic maintenance | 5 | 4 | 2 | 20 | 40 |
| D | Earthquake | Environment | Stop of the production | Sound and tremors | Earthquake protection | 4 | 1 | 1 | 4 | 4 |
| E | Fire | Overheat | Stop of the production | Beep (fire alarm), flames | Fire prevention system | 4 | 1 | 1 | 4 | 4 |
| F | Lack of raw materials | Desynchronization | Stop of the production | Alert message | Provider proximity and Daily stock's review | 4 | 2 | 1 | 8 | 8 |
| G | Short circuit | Equipment disfunction | Slowdown or stop of the production | Alert message | Circuit-breakers | 4 | 3 | 1 | 12 | 12 |
| H | Absence of a main operator | Leave | Relative stop of the production | Control presence of the employees | Control presence of the employees | 3 | 4 | 1 | 12 | 12 |
| I | Local network outage | Broken cable | Stop of the production | Error message | Network connection cable redundancy | 5 | 5 | 1 | 25 | 25 |
| J | Lightning | Environment | None | Lightning sound | Lightning rod | 1 | 1 | 1 | 1 | 1 |
| K | Flood | Water leak | Eventual stop of the production | Leak detectors | Water recycling system | 2 | 3 | 1 | 6 | 6 |
| L | Over-voltage | Insulation failure | Stop of the production | Alert message | Circuit-breakers | 4 | 2 | 1 | 8 | 8 |
| M | Vandalism | Human error | Slowdown or stop of the production | Cameras | Cameras and Intern investigation | 4 | 2 | 2 | 8 | 16 |
| N | Overload | Equipment dysfunction (disruption) | Slowdown or stop of the production | Error message | Regular control of the equipment's settings | 4 | 3 | 2 | 12 | 24 |
| O | Product quality defect | Human error | Slowdown of the production | Block of the equipment | Regular quality controls | 2 | 3 | 1 | 6 | 6 |
| P | Environmental pollution | Equipment dysfunction (disruption) | Penalty | Pollution traces | Regular analysis on the water and other resources | 3 | 3 | 3 | 9 | 27 |
| Q | Non respect of deadlines | Wrong estimation of the delays | Economic losses | Project management | Recursive estimation | 3 | 5 | 2 | 15 | 30 |
| R | Employee's injury | Accident | Eventual slowdown of the production | Complain | None | 3 | 1 | 1 | 3 | 3 |

Figure 16 – Risk table

| | | | | | |
|--|---|-------------------|--------------|-------|---|
| S E V E R I T Y | 5 | A + C I | | | |
| | 4 | D + E | F + L + M | G + N | |
| | 3 | R | | P H | Q |
| | 2 | K + O | | | |
| | 1 | J B | | | |
| | | 1 | 2 | 3 | 4 |
| | | OCCURRENCE | | | |

Figure 17 – Table of severity

7.1 Prevention and correction of the risks

What we can conclude from this table is that four risks : A, C, I and Q are particularly important as their criticality is in the red color so high priority.

Then we have to pay a special attention to these one and foresee strong corrective actions in order not only for prevention but also for correction.

Particularly, for these risk we decided to :

- Power outage (A) : provide external batteries while the failure is not resolved
- Inherent materiel defect (C) : plan periodic maintenance on all the different machine consisting in verifying all its functionalities
- Local network outage (I) : foresee a double connection on the machines for the local network so that if one is defaulting, the other will relay the connection
- Non respect of the deadlines (Q) :
 - foresee provisional timeline of 10% of the time required to achieve the project
 - daily checks of the projects progress

Indicators of progression and success

The planning and development of the installation of toothbrush production line in the eco-city of Taijin in China is guided by a comprehensive set of Key Performance Indicators (KPIs) covering its ecological, economic and social development.

There are seven quantitatives and three qualitatives KPIs.

8.1 Quantitatives KPIs

8.1.1 Developing a Dynamic and Efficient Economy

Use of renewable resources : using recycled resources to save money by 40%.

Control the production : Production control to avoid overproduction, which can be costly in terms of storage and resources.

Transportation : Use intelligent way of transportation in order to save money by 60%.

Client satisfaction : Gather user feedback to improve the product.

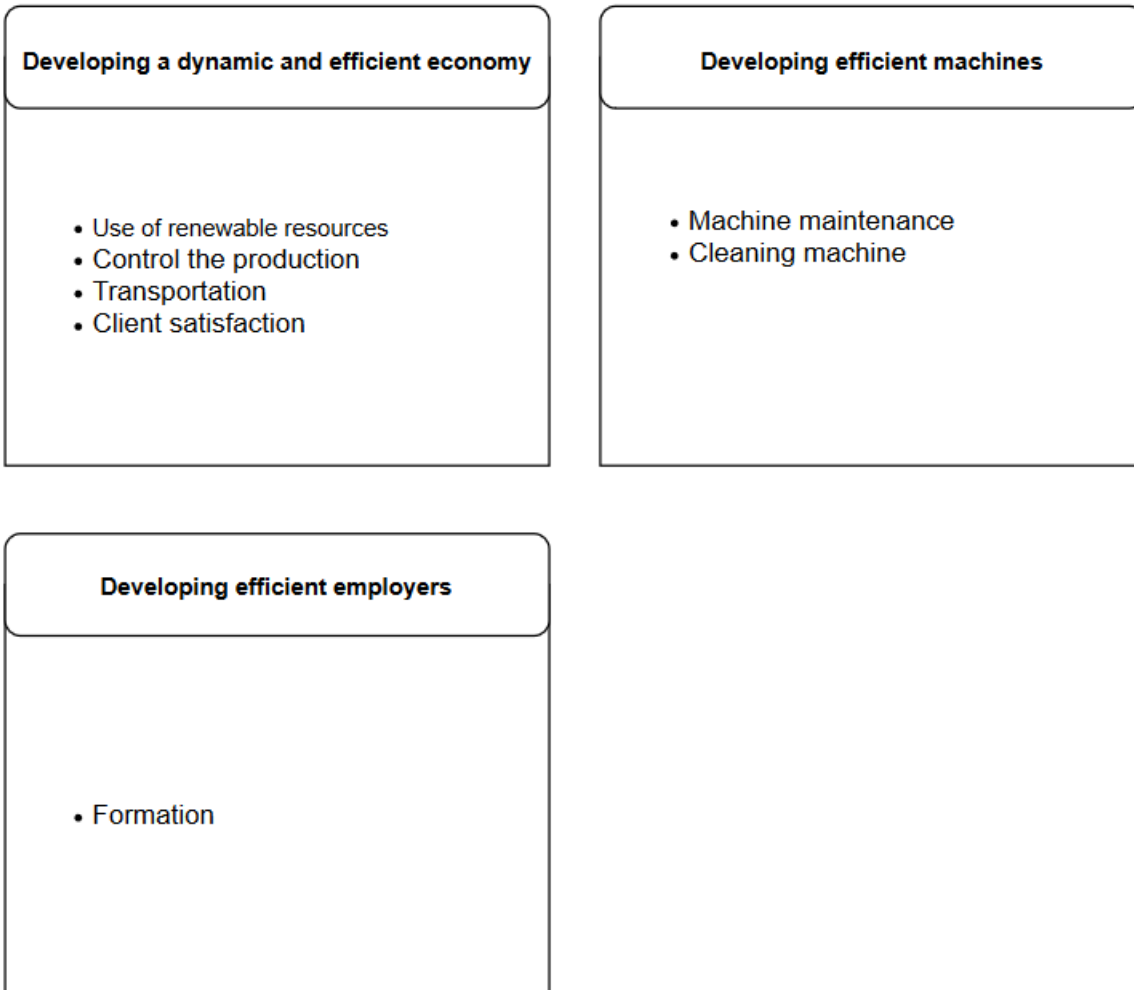
8.1.2 Developing efficient machines

Maintenance machine : machines must be operational at least 99% of the time.

Cleaning machine : the machines must not know any dirt that may impact the quality of the product.

8.1.3 Developing efficient employers

Formation : In order to improve the quality and productivity of employees by 70%.



8.1.4 Qualitative KPIs

- Maintain quality and safe production through careful monitoring of machines and production.
- Adopt safety policies for employees that will promote their well-being and the smooth running of production.
- Maintain the most eco-responsible production line by following the environmental standards in the factory.

Conclusion

The company Mold & Co called our company (Cesi conseil) to set up a 5.0 toothbrush production line. This production line is being set up in China, in Taijin. This city is known to be eco-responsible. It is therefore important to monitor social and ecological aspects in order to follow the city's standards.

The implementation of this production line will allow the company to benefit from an increase in turnover. However, with the different aspects of the installation, risks can arise. It is important to note the risk analysis in this document.


For the better of the organization of this project, the realization of a task schedule (WBS) was done. As a result, an analysis of the project's stakeholders concluded with the creation of three teams.




















The implementation of KPI makes it possible to know the performance and success indicators of the implementation of the production line.





Finally, thanks to the budget, our team studied the need for the necessary resources to carry out this project.




















Annex 1 : Project Gantt diagram

You can found our Gantt project in the following pages.

| N° |  | Mode Tâche | Nom de la tâche | Durée | Début | Fin | Prédécesseurs | Noms ressources | Travail | Coût | 9 | M | J | V | S |
|----|---|---|--|----------------|---------------------|---------------------|---------------|-----------------------|----------------|--------------------|---|---|---|---|---|
| 1 | |  | China Implementation Project | 140 jrs | Ven 11/10/19 | Jeu 21/05/20 | | | 9 631 h | 117 582,11€ | | | | | |
| 2 | |  | Agreement | 15 jrs | Ven 11/10/19 | Mar 05/11/19 | | | 568 h | 11 360,00€ | | | | | |
| 3 | |  | Contract | 1 jr | Ven 11/10/19 | Lun 14/10/19 | | Management Team[5] | 40 h | 800,00€ | | | | | |
| 4 | |  | creation of a draft technical data sheet | 2 jrs | Lun 14/10/19 | Mer 16/10/19 | 3 | Management Team[5] | 80 h | 1 600,00€ | | | | | |
| 5 | |  | Special features for customers | 3 jrs | Mer 16/10/19 | Lun 21/10/19 | 4 | Management Team[5] | 120 h | 2 400,00€ | | | | | |
| 6 | |  | Risk analysis | 3 jrs | Lun 21/10/19 | Ven 25/10/19 | 5 | Management Team[3] | 72 h | 1 440,00€ | | | | | |
| 7 | |  | Implementation, ergonomic aspect: safety | 2 jrs | Ven 25/10/19 | Mar 29/10/19 | 6 | Management Team[3] | 48 h | 960,00€ | | | | | |
| 8 | |  | Planning | 3 jrs | Lun 21/10/19 | Ven 25/10/19 | 5 | Management Team[2] | 48 h | 960,00€ | | | | | |
| 9 | |  | Kick-off meeting | 1 jr | Mar 29/10/19 | Mer 30/10/19 | 6;8;7 | Management Team[5] | 40 h | 800,00€ | | | | | |
| 10 | |  | Technical data sheet | 3 jrs | Mer 30/10/19 | Mar 05/11/19 | 9 | Management Team[5] | 120 h | 2 400,00€ | | | | | |
| 11 | |  | Study and classifications | 22 jrs | Mar 05/11/19 | Mar 10/12/19 | | | 1 272 h | 19 280,00€ | | | | | |












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|---|-------------------------|---|-----------------------------|--|----------------------|---|
| Projet : Management_plan Date : Jeu 10/10/19 | Tâche |  | Récapitulatif inactif |  | Tâches externes |  |
| | Fractionnement |  | Tâche manuelle |  | Jalons externes |  |
| | Jalon |  | Durée uniquement |  | Échéance |  |
| | Récapitulative |  | Report récapitulatif manuel |  | Avancement |  |
| | Récapitulatif du projet |  | Récapitulatif manuel |  | Progression manuelle |  |
| | Tâche inactive |  | Début uniquement |  | | |
| | Jalon inactif |  | Fin uniquement |  | | |




















| N° | Mode Tâche | Nom de la tâche | Durée | Début | Fin | Prédécesseurs | Noms ressources | Travail | Coût | 9 | M | J | V | S |
|----|---|--|-------|--------------|--------------|---------------|------------------------------|---------|-----------|---|---|---|---|---|
| 12 |  | Definition of the scope, references, manufacturing and logistics constraints | 3 jrs | Mar 05/11/19 | Ven 08/11/19 | 10 | Engineers[7] | 168 h | 2 520,00€ | | | | | |
| 13 |  | Analyzing and definition of the stakes | 6 jrs | Ven 08/11/19 | Mar 19/11/19 | 12 | Engineers[3] | 144 h | 2 160,00€ | | | | | |
| 14 |  | Identification of strengths, weaknesses, risks and threats | 6 jrs | Ven 08/11/19 | Mar 19/11/19 | 12 | Engineers[4] | 192 h | 2 880,00€ | | | | | |
| 15 |  | Quality definition | 5 jrs | Mar 19/11/19 | Mer 27/11/19 | 14;13 | Engineers[7] | 280 h | 4 200,00€ | | | | | |
| 16 |  | Definition of internal and/or external expertise | 4 jrs | Mer 27/11/19 | Mar 03/12/19 | 15 | Engineers[7] | 224 h | 3 360,00€ | | | | | |
| 17 |  | Define milestones | 3 jrs | Mar 03/12/19 | Lun 09/12/19 | 12;13;14;15 | Engineers[7] | 168 h | 2 520,00€ | | | | | |
| 18 |  | kick-off meeting 1 jr study | 1 jr | Lun 09/12/19 | Mar 10/12/19 | 17 | Engineers[7];Manager Team[5] | 96 h | 1 640,00€ | | | | | |

| | | | | | | |
|---|-------------------------|---|-----------------------------|--|----------------------|---|
| Projet : Management_plan Date : Jeu 10/10/19 | Tâche |  | Récapitulatif inactif |  | Tâches externes |  |
| | Fractionnement |  | Tâche manuelle |  | Jalons externes |  |
| | Jalon |  | Durée uniquement |  | Échéance |  |
| | Récapitulative |  | Report récapitulatif manuel |  | Avancement |  |
| | Récapitulatif du projet |  | Récapitulatif manuel |  | Progression manuelle |  |
| | Tâche inactive |  | Début uniquement |  | | |
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| N° | Mode Tâche | Nom de la tâche | Durée | Début | Fin | Prédécesseurs | Noms ressources | Travail | Coût | 9 | M | J | V | S |
|----|---------------|---|---------------|---------------------|---------------------|---------------|----------------------------------|----------------|-------------------|---|---|---|---|---|
| 19 | | Supply and manufacturing | 42 jrs | Mar 10/12/19 | Ven 14/02/20 | | | 1 984 h | 20 320,00€ | | | | | |
| 20 | | Production line | 42 jrs | Mar 10/12/19 | Ven 14/02/20 | | | 992 h | 10 160,00€ | | | | | |
| 21 | | Purchase order of the machinery | 2 jrs | Mar 10/12/19 | Jeu 12/12/19 | 18 | Engineers;Manageme Team | 32 h | 560,00€ | | | | | |
| 22 | | Reception and storage of machines | 40 jrs | Jeu 12/12/19 | Ven 14/02/20 | 21 | Engineers;Technician[| 960 h | 9 600,00€ | | | | | |
| 23 | | Network | 42 jrs | Mar 10/12/19 | Ven 14/02/20 | | | 992 h | 10 160,00€ | | | | | |
| 24 | | Purchase order of network equipments | 2 jrs | Mar 10/12/19 | Jeu 12/12/19 | 18 | Management Team;Engineers | 32 h | 560,00€ | | | | | |
| 25 | | Reception and storage of network equipments | 40 jrs | Jeu 12/12/19 | Ven 14/02/20 | 24 | Engineers;Technician[| 960 h | 9 600,00€ | | | | | |
| 26 | | Pull List | 5 jrs | Ven 14/02/20 | Ven 21/02/20 | | | 560 h | 8 800,00€ | | | | | |
| 27 | | Kick-off meeting assembly | 5 jrs | Ven 14/02/20 | Ven 21/02/20 | 18;22;25 | Management Team[5];Engineers[7]; | 560 h | 8 800,00€ | | | | | |

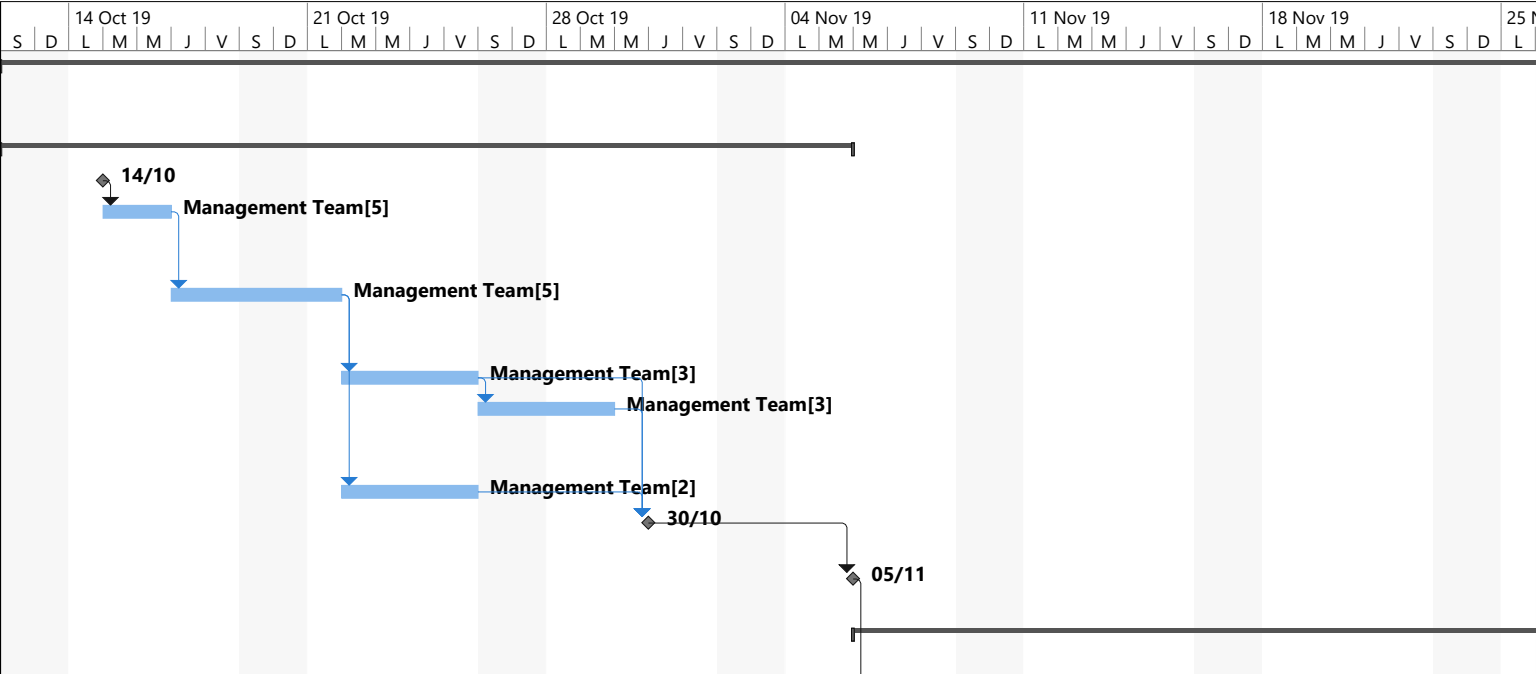
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| Projet : Management_plan Date : Jeu 10/10/19 | Tâche | | Récapitulatif inactif | | Tâches externes | |
| | Fractionnement | | Tâche manuelle | | Jalons externes | |
| | Jalon | | Durée uniquement | | Échéance | |
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| N° |  Mode Tâche | Nom de la tâche | Durée | Début | Fin | Prédécesseurs | Noms ressources | Travail | Coût | 9 | M | J | V | S |
|----|---|--|---------------|---------------------|---------------------|---------------|------------------------|----------------|-------------------|---|---|---|---|---|
| 28 |  | Assembly, Wiring | 40 jrs | Lun 24/02/20 | Lun 27/04/20 | | | 3 392 h | 35 520,00€ | | | | | |
| 29 |  | Production line installation | 26 jrs | Lun 24/02/20 | Ven 03/04/20 | | | 2 128 h | 21 960,00€ | | | | | |
| 30 |  | Environment preparation | 8 jrs | Lun 24/02/20 | Ven 06/03/20 | 27 | Engineers[4];Technicia | 640 h | 6 720,00€ | | | | | |
| 31 |  | Installation of the production line | 14 jrs | Ven 06/03/20 | Lun 30/03/20 | 30 | Engineers[4];Technicia | 1 232 h | 12 600,00€ | | | | | |
| 32 |  | Unit testing of machines | 4 jrs | Lun 30/03/20 | Ven 03/04/20 | 31 | Engineers[3];Technicia | 256 h | 2 640,00€ | | | | | |
| 33 |  | Network installation | 18 jrs | Lun 30/03/20 | Lun 27/04/20 | | | 1 264 h | 13 560,00€ | | | | | |
| 34 |  | Environment preparation | 4 jrs | Lun 30/03/20 | Ven 03/04/20 | 31 | Engineers[4];Technicia | 288 h | 3 120,00€ | | | | | |
| 35 |  | Installation of the network | 10 jrs | Ven 03/04/20 | Mar 21/04/20 | 34 | Engineers[4];Technicia | 720 h | 7 800,00€ | | | | | |
| 36 |  | Unit testing of network | 4 jrs | Mar 21/04/20 | Lun 27/04/20 | 35 | Engineers[3];Technicia | 256 h | 2 640,00€ | | | | | |
| 37 |  | Tests | 15 jrs | Lun 27/04/20 | Mer 20/05/20 | | | 1 384 h | 17 760,00€ | | | | | |

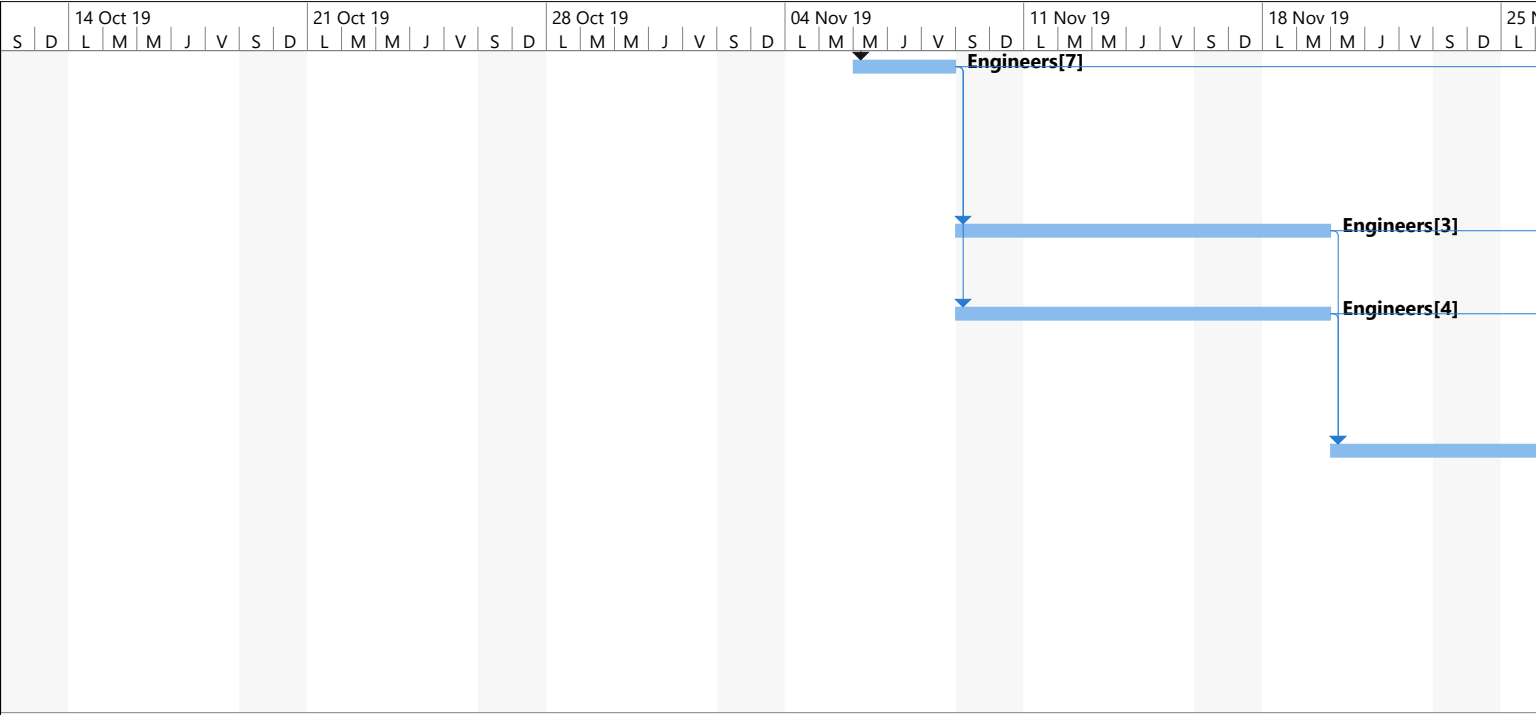
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| N° | Mode Tâche | Nom de la tâche | Durée | Début | Fin | Prédécesseurs | Noms ressources | Travail | Coût | 9 | M | J | V | S |
|----|---------------|--------------------------|------------------|---------------------|---------------------|---------------|---------------------------------|--------------|------------------|---|---|---|---|---|
| 38 | | Test of the installation | 12 jrs | Lun 27/04/20 | Ven 15/05/20 | 32;36 | Engineers[7];Technician[5] | 1 152 h | 13 680,00€ | | | | | |
| 39 | | Technical approval | 1 jr | Ven 15/05/20 | Lun 18/05/20 | 38 | Management Team[5];Engineers[7] | 96 h | 1 640,00€ | | | | | |
| 40 | | Top delivery meeting | 1 jr | Lun 18/05/20 | Mar 19/05/20 | 39 | Management Team[5];Engineers[7] | 96 h | 1 640,00€ | | | | | |
| 41 | | Customer pre-reception | 1 jr | Mar 19/05/20 | Mer 20/05/20 | 40 | Management Team[5] | 40 h | 800,00€ | | | | | |
| 42 | | Delivery | 1 jr | Mer 20/05/20 | Jeu 21/05/20 | | | 8 h | 120,00€ | | | | | |
| 43 | | Production line locking | 1 jr | Mer 20/05/20 | Jeu 21/05/20 | 41 | Engineers | 8 h | 120,00€ | | | | | |
| 44 | | Team training | 60,38 jrs | Ven 14/02/20 | Mer 20/05/20 | | | 463 h | 4 422,12€ | | | | | |
| 45 | | Production line | 5 jrs | Ven 14/02/20 | Ven 21/02/20 | | Technician[7];HR | 263 h | 2 283,72€ | | | | | |
| 46 | | Network Installation | 5 jrs | Ven 20/03/20 | Sam 28/03/20 | 45 | Technician[3];HR | 160 h | 1 519,20€ | | | | | |
| 47 | | Employee training | 5 jrs | Mer 13/05/20 | Mer 20/05/20 | 45;46 | HR | 40 h | 619,20€ | | | | | |

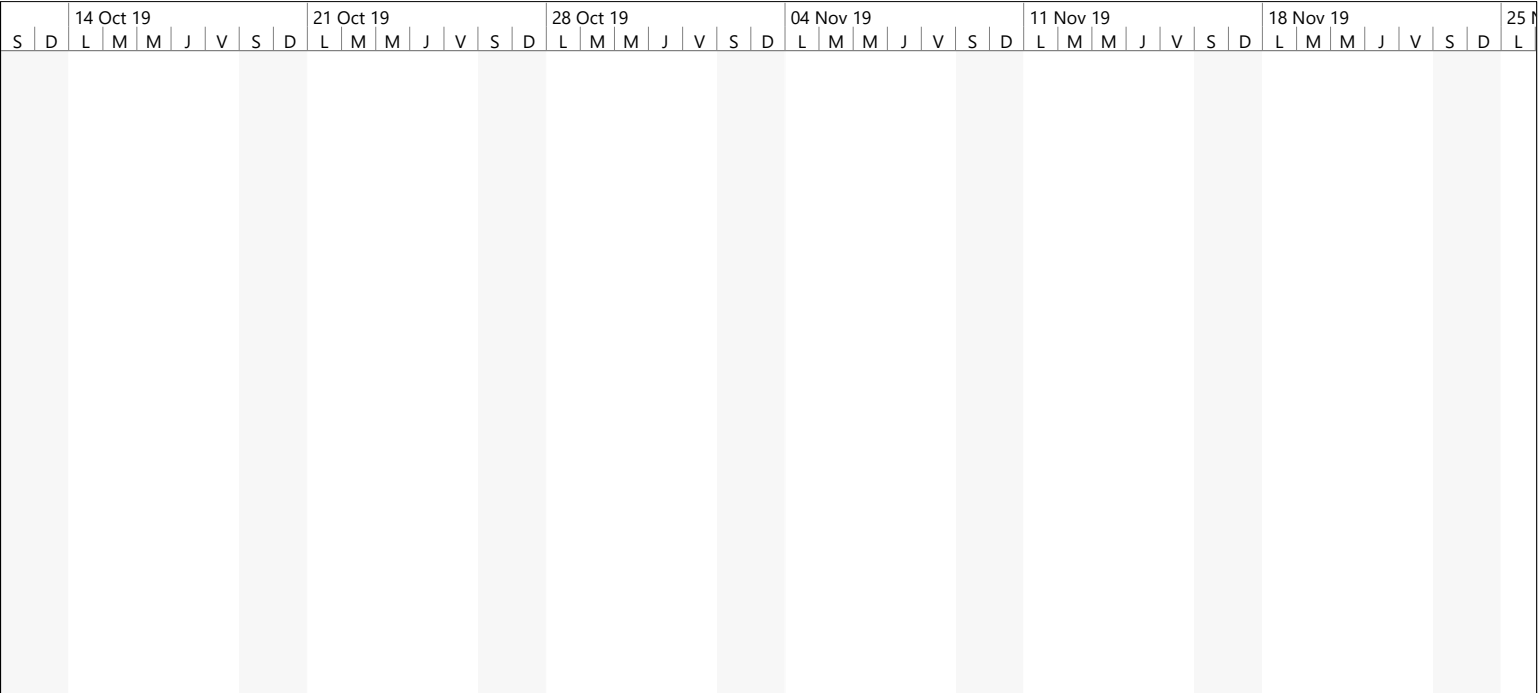
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| Projet : Management_plan Date : Jeu 10/10/19 | Tâche | | Récapitulatif inactif | | Tâches externes | |
| | Fractionnement | | Tâche manuelle | | Jalons externes | |
| | Jalon | | Durée uniquement | | Échéance | |
| | Récapitulative | | Report récapitulatif manuel | | Avancement | |
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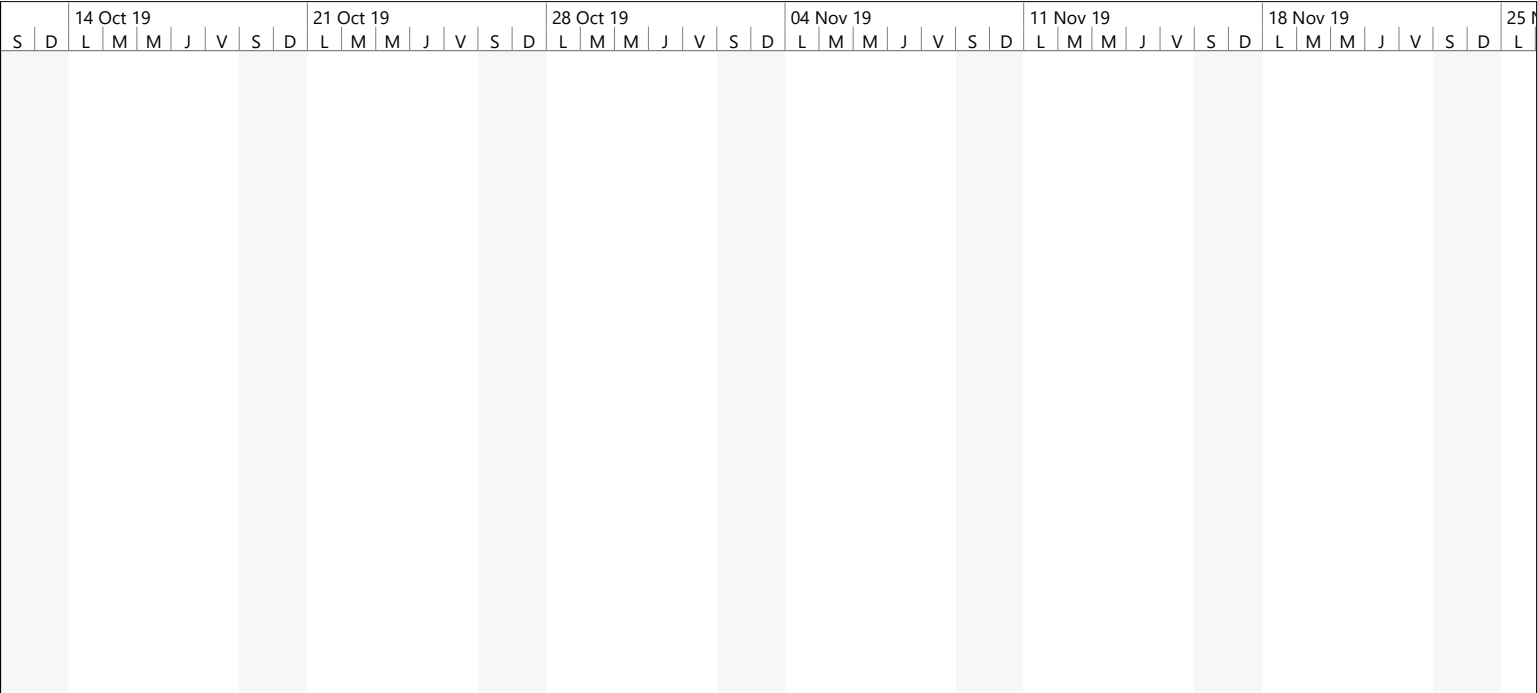
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| | Fractionnement | | Tâche manuelle | | Jalons externes | |
| | Jalon | | Durée uniquement | | Échéance | |
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| Projet : Management_plan Date : Jeu 10/10/19 | Tâche |  | Récapitulatif inactif |  | Tâches externes |  |
| | Fractionnement |  | Tâche manuelle |  | Jalons externes |  |
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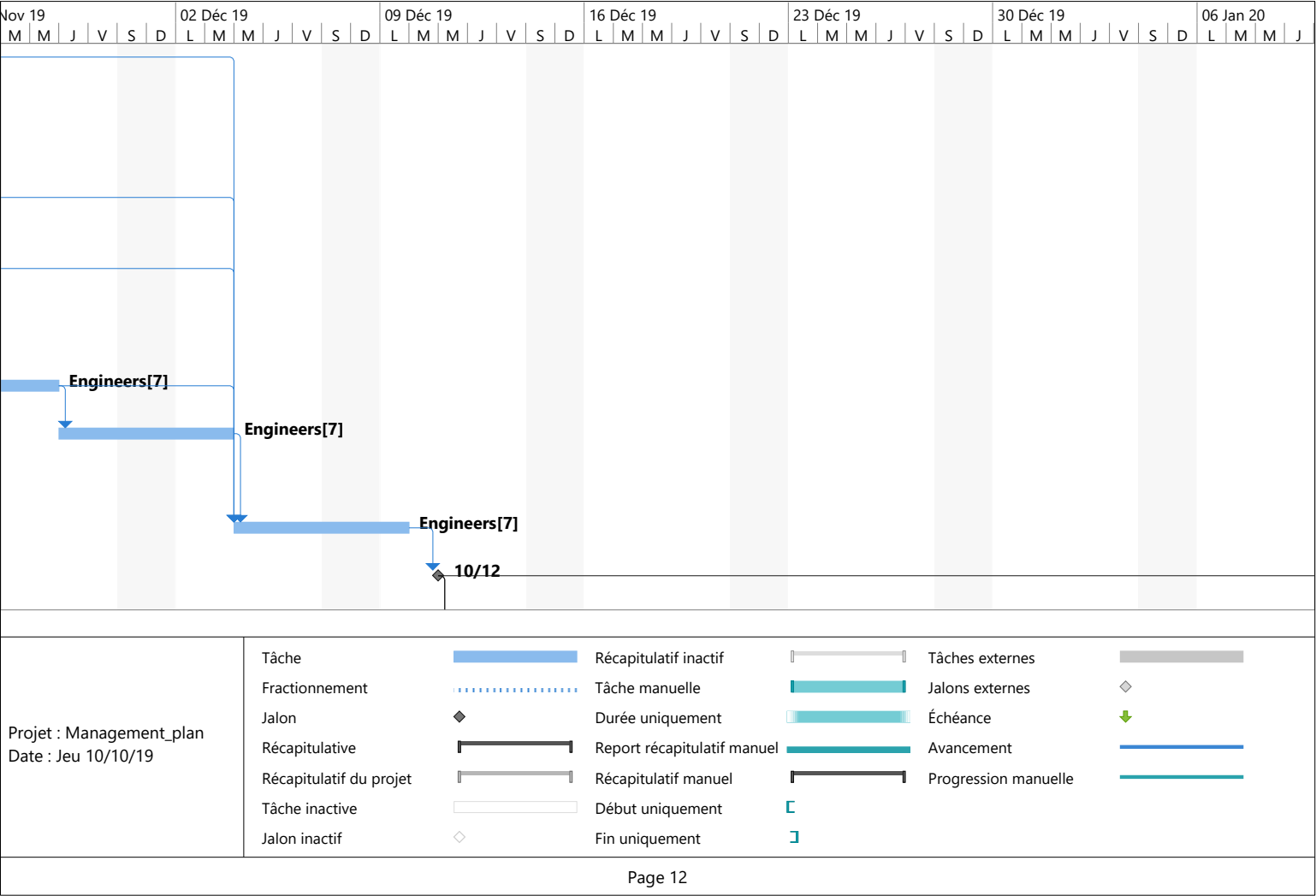
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| S | D | L | M | M | J | V | S | D | L | M | M | J | V | S | D | L | M | M | J | V | S | D | L | M | M | J | V | S | D | L | M | M | J | V | S | D | L | M | M | J | V | S | D | L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Projet : Management_plan Date : Jeu 10/10/19 | | | | | | | | <table><tr><td>Tâche</td><td><div></div></td><td>Récapitulatif inactif</td><td><div></div></td><td>Tâches externes</td><td><div></div></td></tr><tr><td>Fractionnement</td><td><div></div></td><td>Tâche manuelle</td><td><div></div></td><td>Jalons externes</td><td><div></div></td></tr><tr><td>Jalon</td><td><div></div></td><td>Durée uniquement</td><td><div></div></td><td>Échéance</td><td><div></div></td></tr><tr><td>Récapitulative</td><td><div></div></td><td>Report récapitulatif manuel</td><td><div></div></td><td>Avancement</td><td><div></div></td></tr><tr><td>Récapitulatif du projet</td><td><div></div></td><td>Récapitulatif manuel</td><td><div></div></td><td>Progression manuelle</td><td><div></div></td></tr><tr><td>Tâche inactive</td><td><div></div></td><td>Début uniquement</td><td><div></div></td><td></td><td></td></tr><tr><td>Jalon inactif</td><td><div></div></td><td>Fin uniquement</td><td><div></div></td><td></td><td></td></tr></table> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Tâche | <div></div> | Récapitulatif inactif | <div></div> | Tâches externes | <div></div> | Fractionnement | <div></div> | Tâche manuelle | <div></div> | Jalons externes | <div></div> | Jalon | <div></div> | Durée uniquement | <div></div> | Échéance | <div></div> | Récapitulative | <div></div> | Report récapitulatif manuel | <div></div> | Avancement | <div></div> | Récapitulatif du projet | <div></div> | Récapitulatif manuel | <div></div> | Progression manuelle | <div></div> | Tâche inactive | <div></div> | Début uniquement | <div></div> | | | Jalon inactif | <div></div> | Fin uniquement | <div></div> | | |
| | | | | | | | | Tâche | <div></div> | Récapitulatif inactif | <div></div> | Tâches externes | <div></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | Fractionnement | <div></div> | Tâche manuelle | <div></div> | Jalons externes | <div></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | Jalon | <div></div> | Durée uniquement | <div></div> | Échéance | <div></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | Récapitulative | <div></div> | Report récapitulatif manuel | <div></div> | Avancement | <div></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | Récapitulatif du projet | <div></div> | Récapitulatif manuel | <div></div> | Progression manuelle | <div></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | Tâche inactive | <div></div> | Début uniquement | <div></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Jalon inactif | <div></div> | Fin uniquement | <div></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Page 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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Projet : Management_plan
Date : Jeu 10/10/19

| Task | Symbol | Task | Symbol | Task | Symbol |
|-------------------------|-------------------|-----------------------------|-------------------|----------------------|---------------|
| Tâche | [Blue bar] | Récapitulatif inactif | [Grey bar] | Tâches externes | [Grey bar] |
| Fractionnement | [Dotted bar] | Tâche manuelle | [Teal bar] | Jalons externes | [Diamond] |
| Jalon | [Diamond] | Durée uniquement | [Teal bar] | Échéance | [Green arrow] |
| Récapitulative | [Thick black bar] | Report récapitulatif manuel | [Teal bar] | Avancement | [Blue bar] |
| Récapitulatif du projet | [Thin grey bar] | Récapitulatif manuel | [Thick black bar] | Progression manuelle | [Teal bar] |
| Tâche inactive | [White bar] | Début uniquement | [Teal L bracket] | | |
| Jalon inactif | [Diamond] | Fin uniquement | [Teal R bracket] | | |



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Projet : Management_plan
Date : Jeu 10/10/19

Tâche

Fractionnement

Jalon

Récapitulative

Récapitulatif du projet

Tâche inactive

Jalon inactif

Récapitulatif inactif

Tâche manuelle

Durée uniquement

Report récapitulatif manuel

Récapitulatif manuel

Début uniquement

Fin uniquement

Tâches externes

Jalons externes

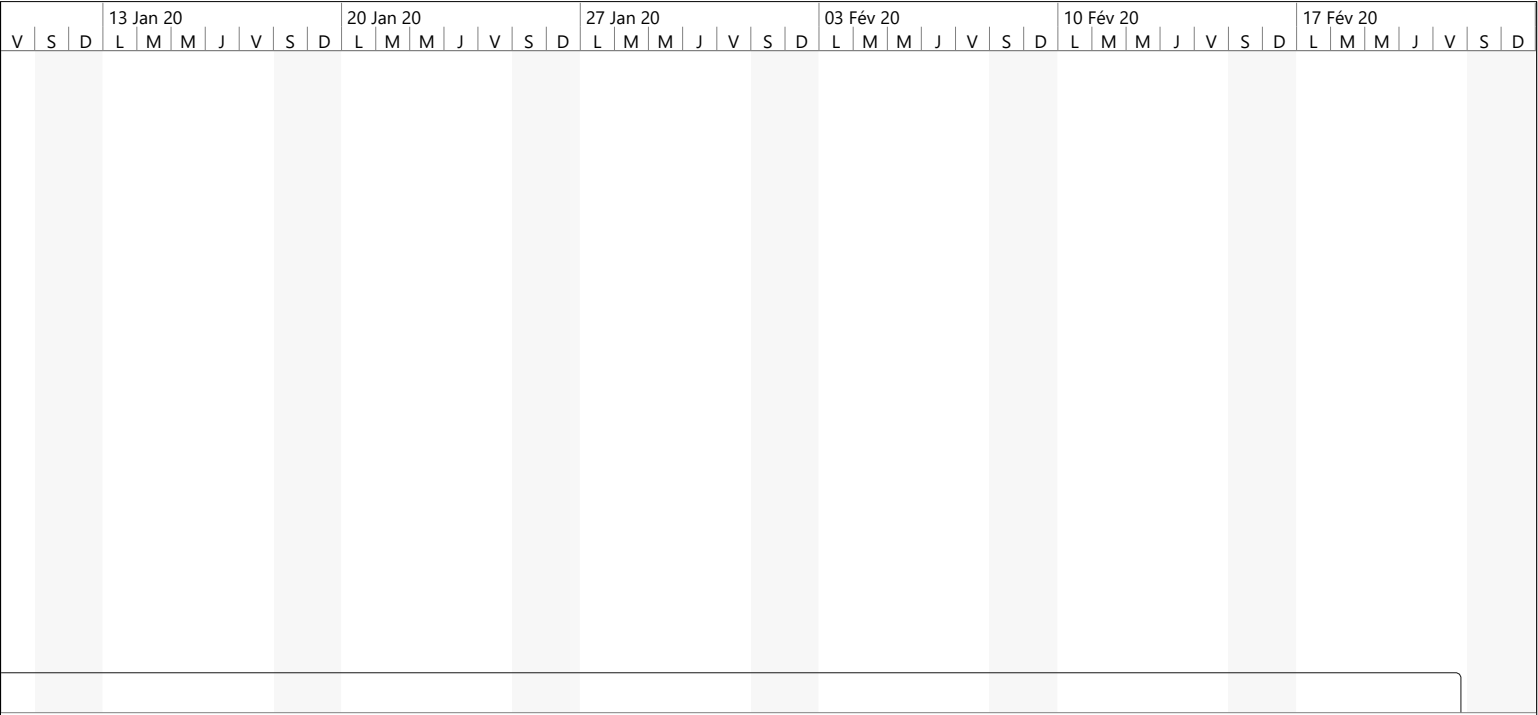
Échéance

Avancement

Progression manuelle

Page 14

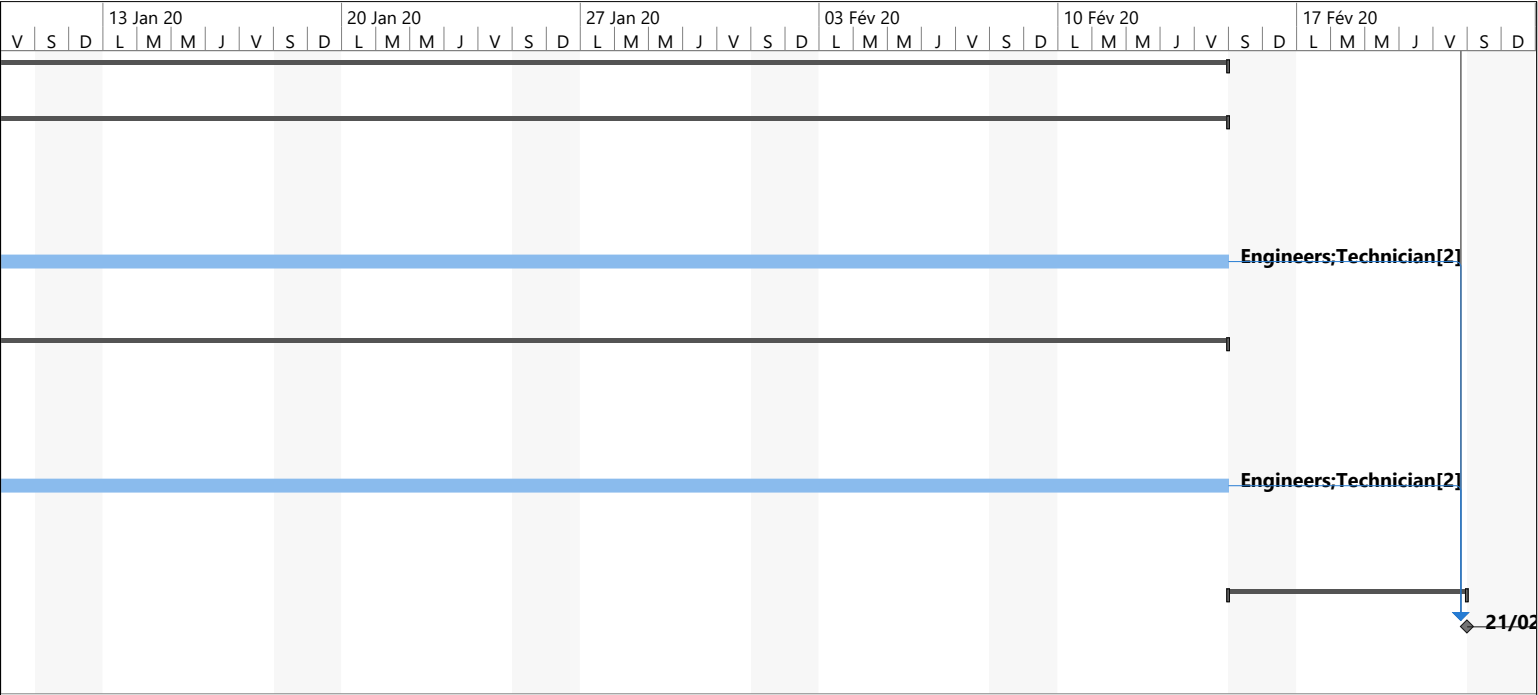
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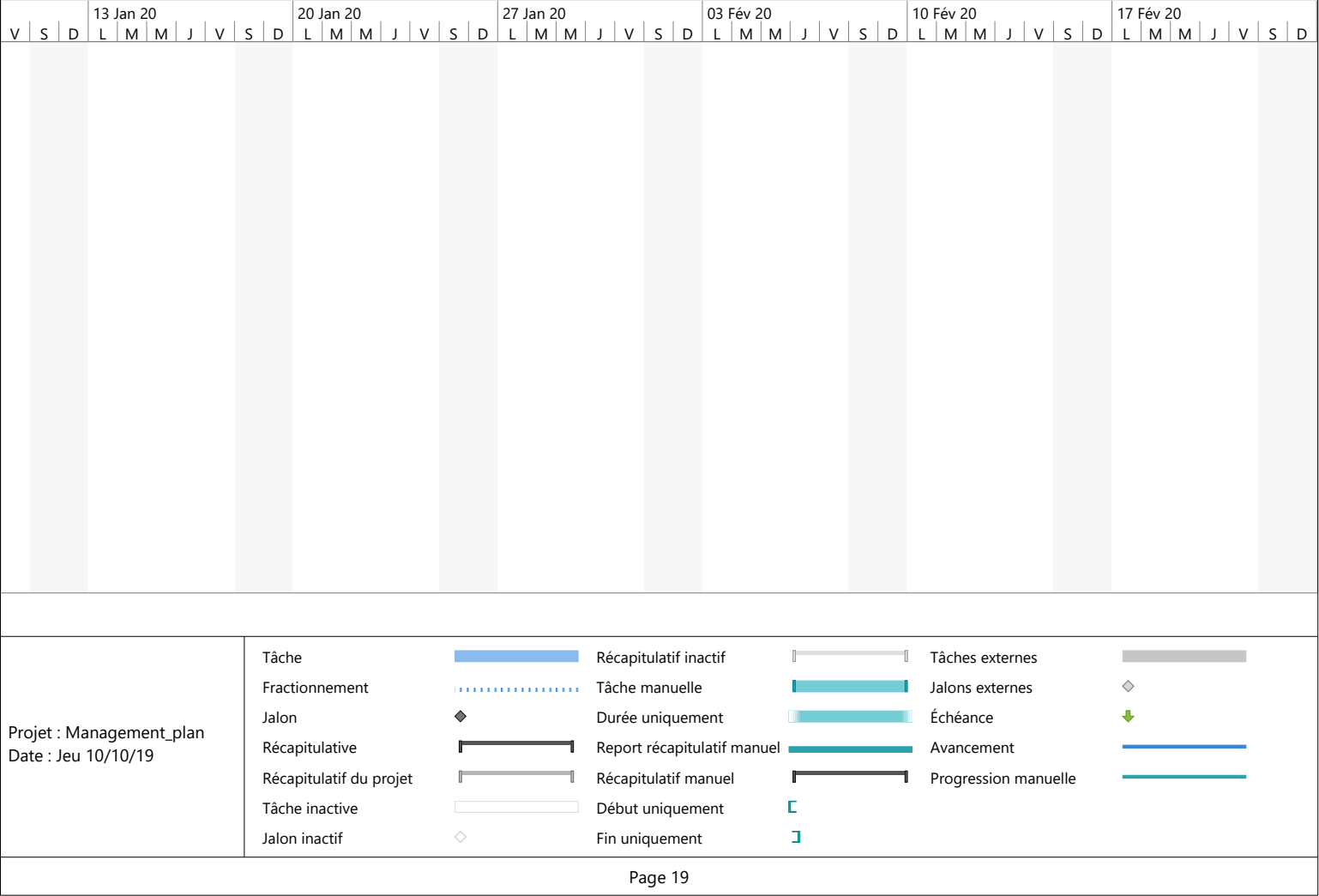
Projet : Management_plan

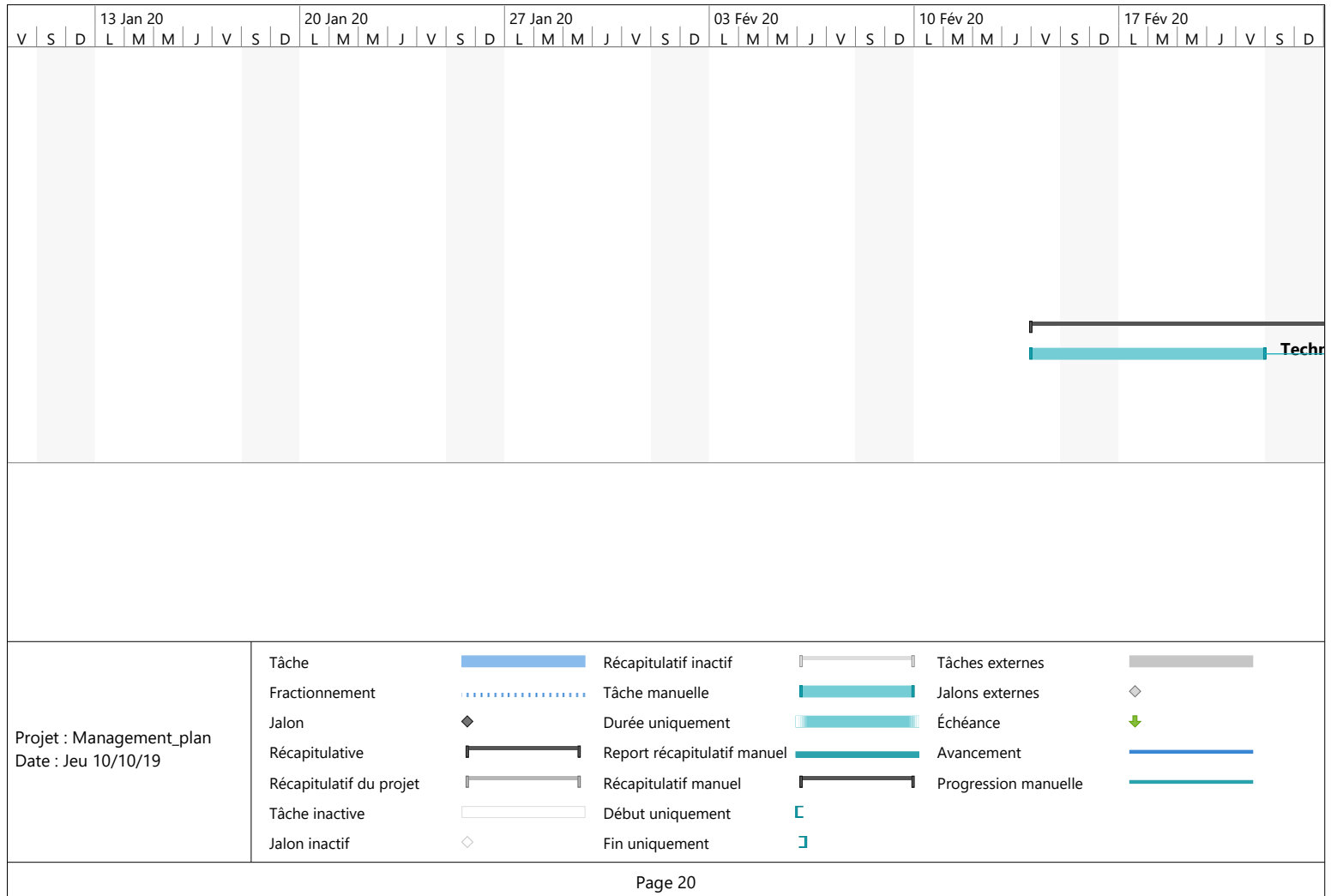
Date : Jeu 10/10/19

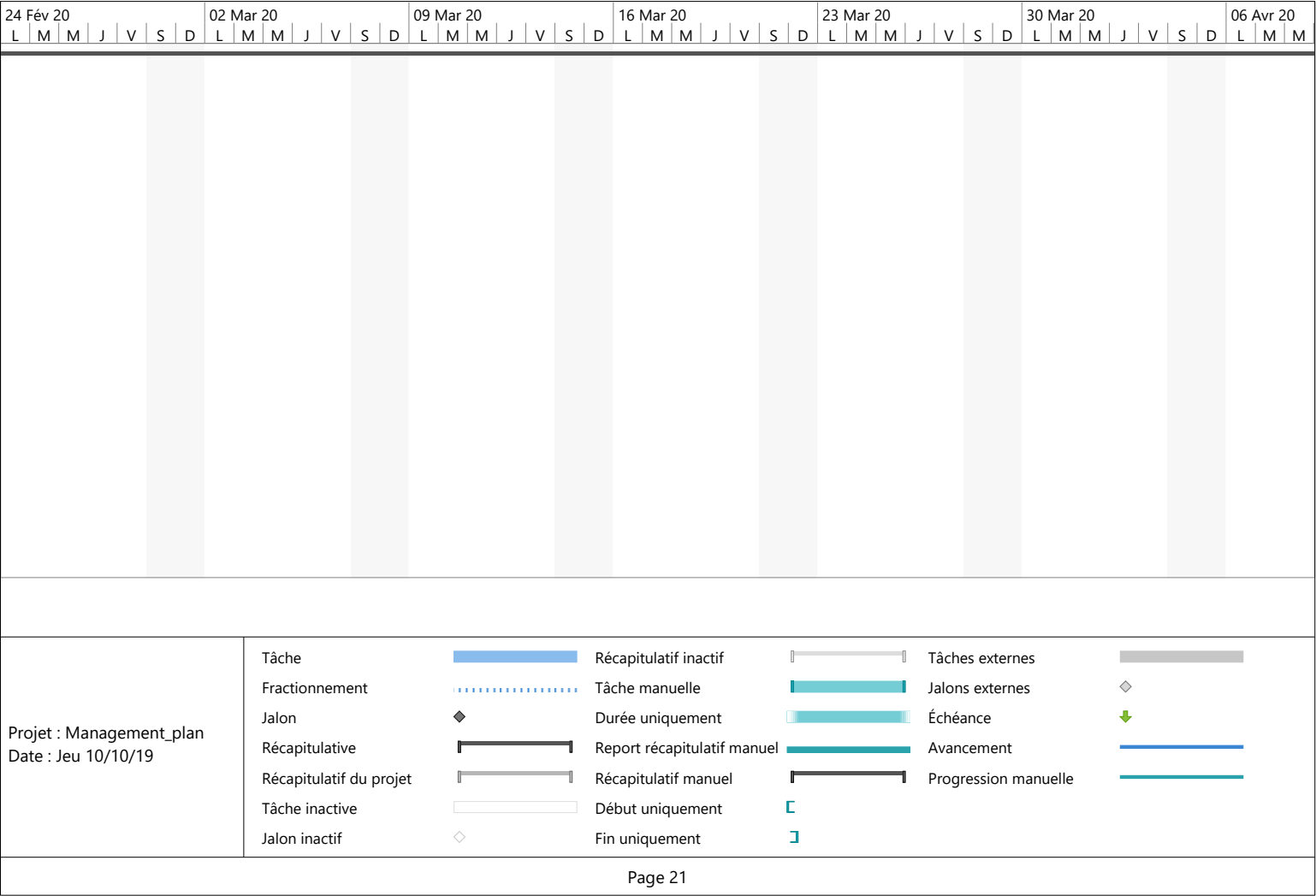
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| Tâche | <div></div> | Récapitulatif inactif | <div></div> | Tâches externes | <div></div> |
| Fractionnement | <div></div> | Tâche manuelle | <div></div> | Jalons externes | <div></div> |
| Jalon | <div></div> | Durée uniquement | <div></div> | Échéance | <div></div> |
| Récapitulative | <div></div> | Report récapitulatif manuel | <div></div> | Avancement | <div></div> |
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| Tâche inactive | <div></div> | Début uniquement | <div></div> | | |
| Jalon inactif | <div></div> | Fin uniquement | <div></div> | | |



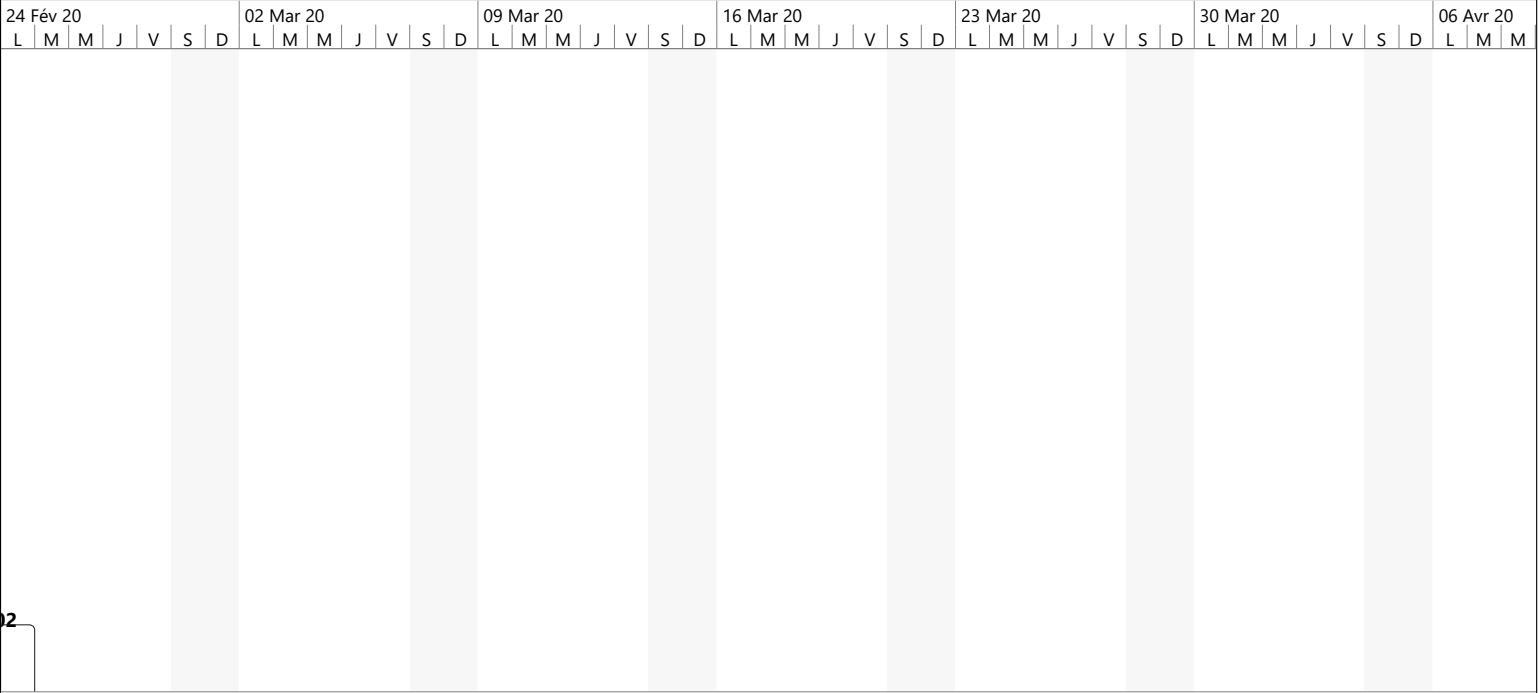
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| Projet : Management_plan Date : Jeu 10/10/19 | Tâche | | Récapitulatif inactif | | Tâches externes | |
| | Fractionnement | | Tâche manuelle | | Jalons externes | |
| | Jalon | | Durée uniquement | | Échéance | |
| | Récapitulative | | Report récapitulatif manuel | | Avancement | |
| | Récapitulatif du projet | | Récapitulatif manuel | | Progression manuelle | |
| | Tâche inactive | | Début uniquement | | | |
| | Jalon inactif | | Fin uniquement | | | |





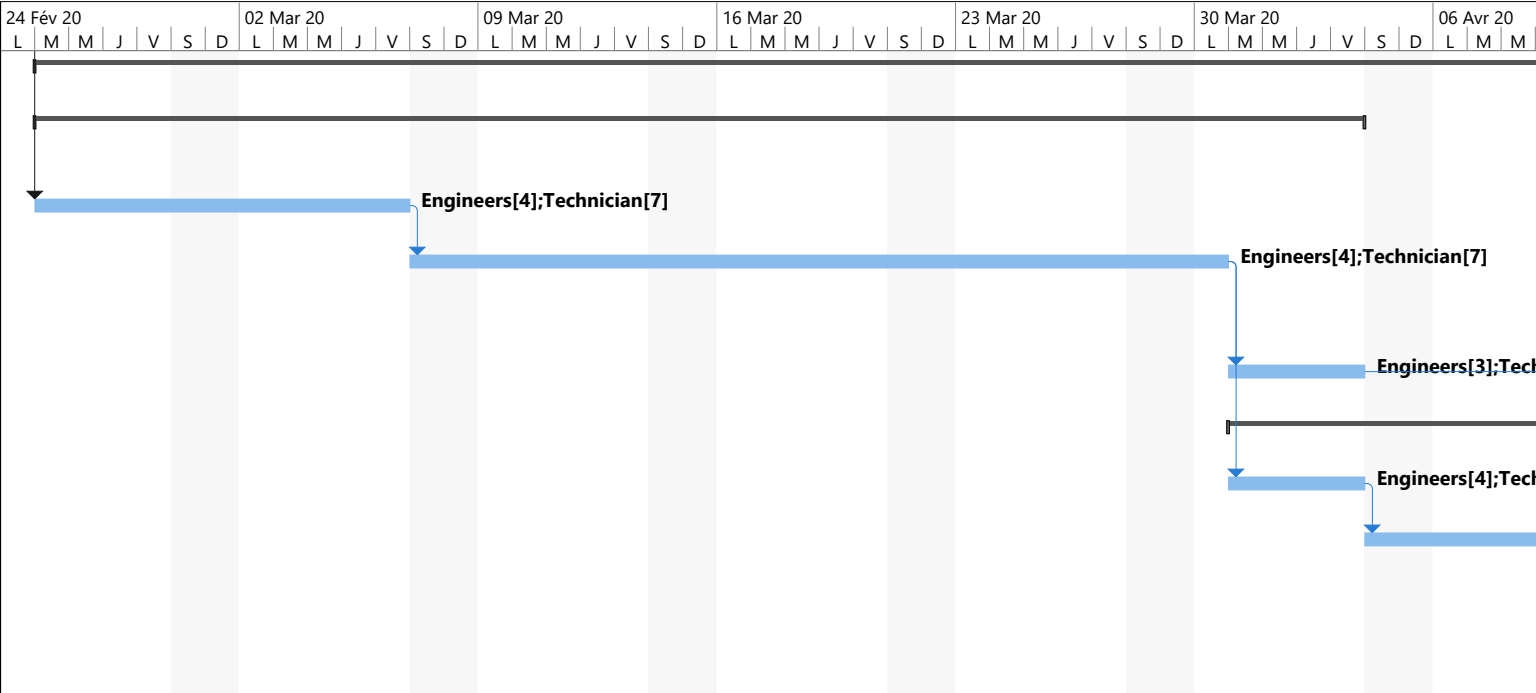


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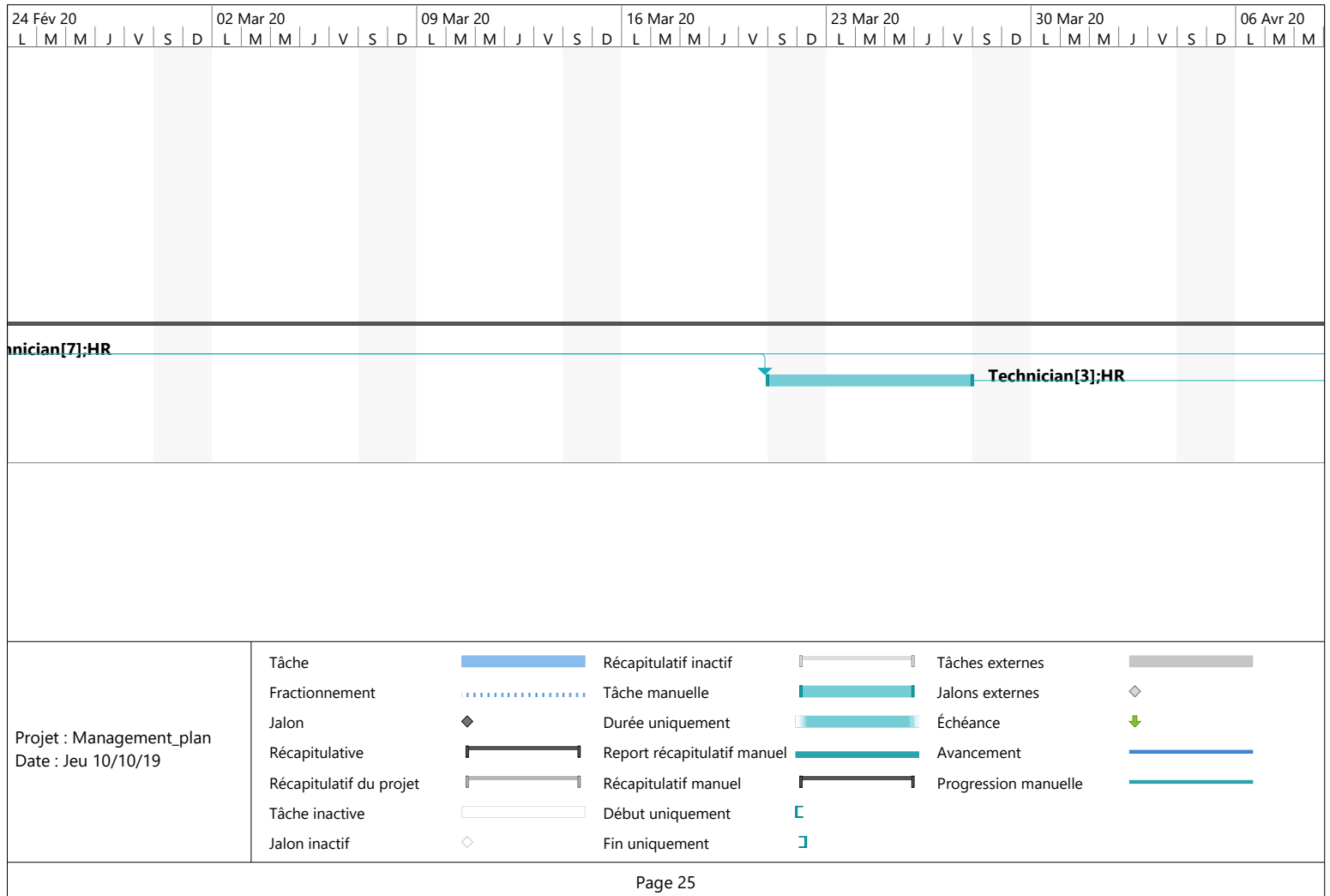


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| Projet : Management_plan Date : Jeu 10/10/19 | Tâche | | Récapitulatif inactif | | Tâches externes | |
| | Fractionnement | | Tâche manuelle | | Jalons externes | |
| | Jalon | | Durée uniquement | | Échéance | |
| | Récapitulative | | Report récapitulatif manuel | | Avancement | |
| | Récapitulatif du projet | | Récapitulatif manuel | | Progression manuelle | |
| | Tâche inactive | | Début uniquement | | | |
| | Jalon inactif | | Fin uniquement | | | |



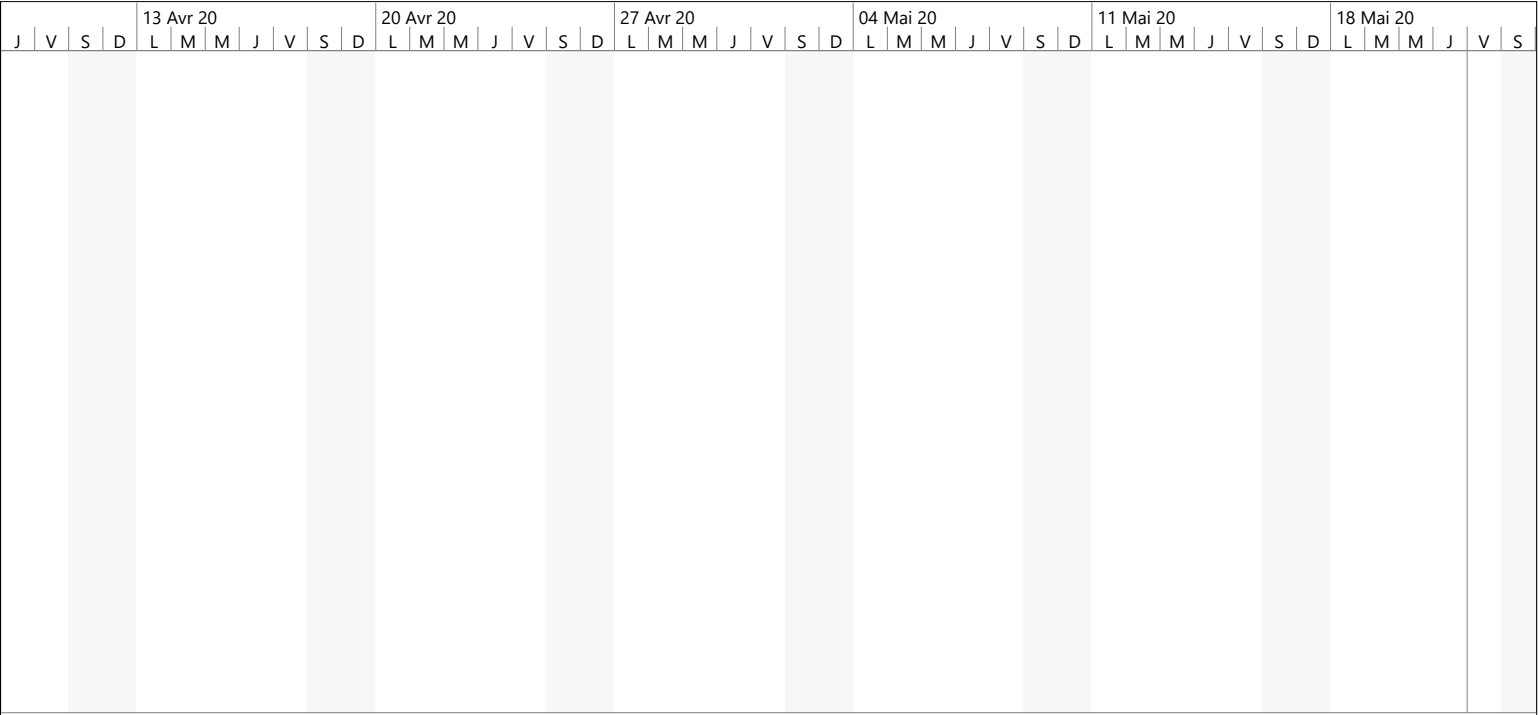
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| Projet : Management_plan Date : Jeu 10/10/19 | Tâche | | Récapitulatif inactif | | Tâches externes | |
| | Fractionnement | | Tâche manuelle | | Jalons externes | |
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Projet : Management_plan
Date : Jeu 10/10/19

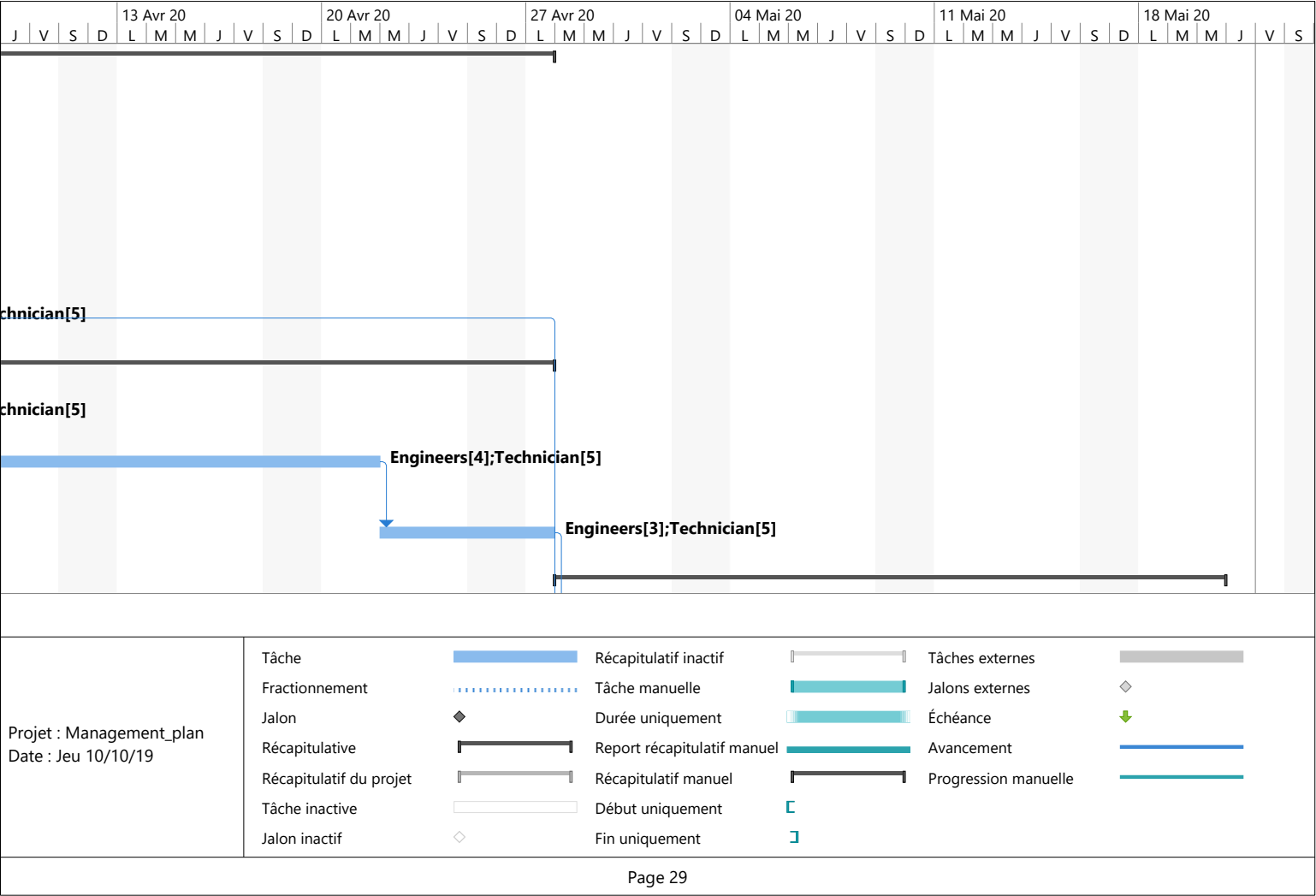
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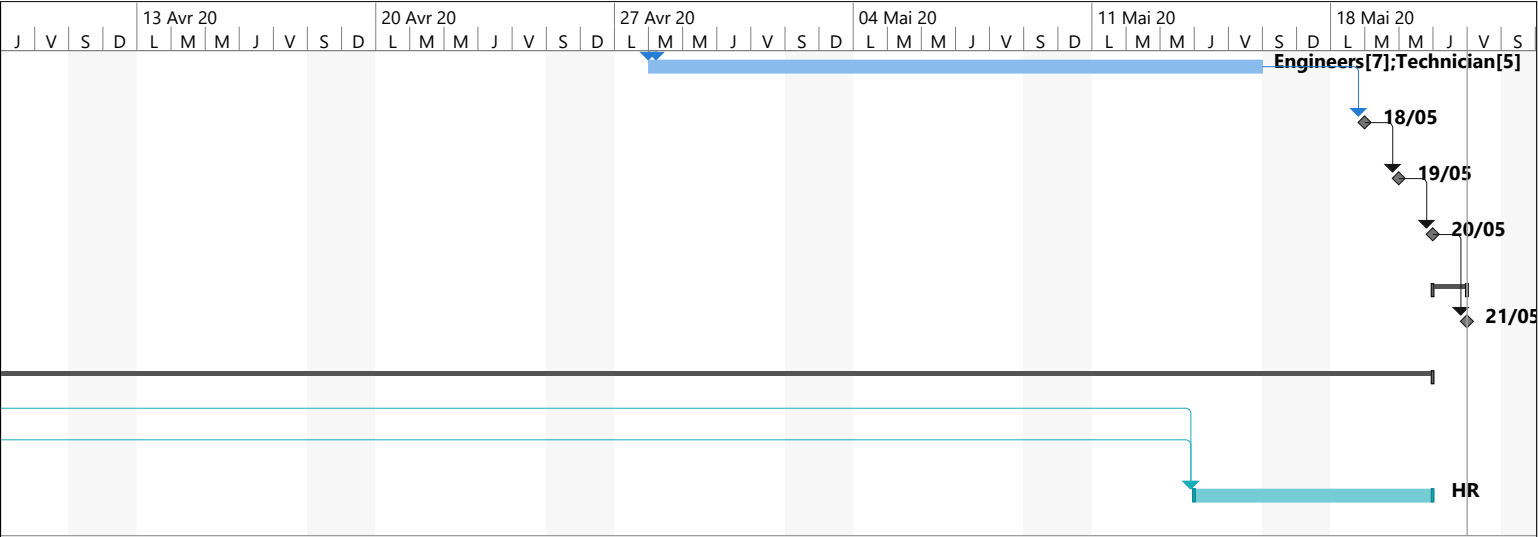
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| Projet : Management_plan Date : Jeu 10/10/19 | Tâche | | Récapitulatif inactif | | Tâches externes | |
| | Fractionnement | | Tâche manuelle | | Jalons externes | |
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| | Récapitulative | | Report récapitulatif manuel | | Avancement | |
| | Récapitulatif du projet | | Récapitulatif manuel | | Progression manuelle | |
| | Tâche inactive | | Début uniquement | | | |
| | Jalon inactif | | Fin uniquement | | | |