

TUNISIA POLYTECHNIC SCHOOL



Worker's internship report
(15th July to 15th August)

SYSTÈMES ELECTRO-TECHNIQUES POUR L'AUTO



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I will finish these acknowledgements by greeting all SETA's employees for their support and the friendly atmosphere I was in during my internship.

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Introduction

Since the beginning of Industrial Revolution, people adopted a practice called Taylorism which consisted in dividing great and complex tasks into single and simple tasks in order to increase productivity. So workers were given small tasks of the whole production. Nowadays, Taylorism is applied at the company level. Big companies delegate small parts of their production to smaller companies. That's how Dräxlmaier, a German group supplying automotive wire harnesses to automotive constructors, created an affiliate in Tunisia: METS (Manufacture Electro-Techniques de Sousse) for the assembly of some parts of the vehicle's electrical wire system. METS also deals with subcontractors to achieve his goals.

SETA (Systèmes Electro-Techniques pour l'Auto), one of METS's subcontractors located in Sfax, was the place of my worker's internship during this summer from 15th of July to 15th of August 2010. This report is precisely about that internship.

The purpose of the worker's internship is the discovering of the world of work for a worker's point of view. So we should rub shoulders with workers as much as possible. In this context, SETA a very young company (created only in 2009), with a lot of young workers (more than 1200 employees and most of them are young), is the ideal company.

I will present my report in accordance with the following plan. Firstly I will present SETA through its men and its work, then I will discuss the progress of my internship and finally I will give an overview about social life of workers in SETA and then conclude.

Presentation of the enterprise

1. General introduction of SETA

SETA - Systèmes Electro-techniques pour l'Auto – is a young company founded in August 2009 installed in Sfax, more precisely on Road MAHDIA km 19. SETA has got a capital of 500,000 TD and employs more than 1200 workers. The number of workers is likely to increase drastically in the following years due to the rapid development of the company. SETA now comprises by Logistics department, Production department, Quality department, Human Resources Department, Information & Technology Department, and also an Accounting Department. As said before, SETA is a subcontractor of METS which is an affiliate of Dräxlmaier, a German supplier of automotive constructors. So its only customer and supplier is METS. That is why there is no commercial department.

Logistic is about controlling the materials' flow in the company, ensuring the availability of raw materials and the delivery of product in time. In the automotive construction field, products are evaluated in terms of time. For example, a finished wire harnesses can represent 15 minutes. So they sell minutes rather than harnesses, and in this context, having a solid logistical policy is very critical.

The production department deals with the assembly of automotive wiring harnesses, controls the rate of the production and make the planning of production (decide which references of harnesses will be assembled) in order to respond to the customer's demand. It is also responsible for the maintenance of working equipment, and the assignment of workers to different sectors.

After the harness has been assembled, it must be checked to ensure it works. This job is very critical since we are talking about vehicles, then about people's lives; this is the mission of the Quality department. Checking quality also permits to reduce the costs due to the return of defective products. Checking quality of wire harnesses is not the only work of this department. It also is involved in improving the workers' environment.

Once we have exposed SETA and its main departments globally, we will give an overview of its human resources.

2. The Human Resources of SETA

There are more than 1240 employees in SETA including 71 executives and 869 workers. Almost all of them are young and very dynamic. There are many job positions in the enterprise listed hierarchically in the organization chart (see appendix II).

3. The Production in SETA

a. Different products

SETA outputs two kinds of products: semi-finished and finished. Semi-finished is intended to be finished by another affiliate of Dräxlmaier whereas finished is directly delivered to the final customer (directly integrated in the vehicle without further modification). The assembly factory is divided in sectors according to the product they are in charge of. For finished products, we have:

- Electrical wire harnesses for car's doors called TV and TH
- Electrical wire harnesses for car's trunk called Heck (in German)
- Ondal
- Electrical wire harnesses for car's seats

And for the semi-finished, we have got:

- Basis which is the center of car's electrical system
- Electrical wire harnesses for airbag
- Options in the vehicle (EAP-FB, B8 modules)

See appendix I for visual description of the products.

b. Material flow in the company

The production in SETA relies on a strong materials flow which has to be always updated when there are setbacks. In order to enhance the traceability of materials, they are given a status depending on the production stage where they are. These are the possible statuses:

Status 100: The product has left METS but is not yet arrived in SETA;

Status 110: The material has just been delivered at SETA's import area;

Status 120: The material after been checked and registered is stored;

Status 130: The material is on production lines;

Status 140: The product is at the export area;

Status 150: The product is no more at SETA;

Status 160: The product has been delivered to the customer.

The raw materials which are essentially cables (crimped cables) and accessories (connectors, tapes of tesa, etc) are delivered from METS (Sousse)

generally around midday. Before unloading, they have status 100. After discharge, they get status 110 after being registered manually.

Then the materials are registered in the management information system and get status 120. After that they are stored chaotically. It means that they are put wherever there is a place and their position is written in the system. As there are two types of raw materials, the store is divided into two parts: one for cables and one for accessories. Some accessories are delivered to the production in bulk while others are delivered with their corresponding cables.

When materials are delivered to the production by feeders, they are registered in the system to have status 130.

After being assembled, the wire harnesses are checked at the testing appliance and the 100% control before being stored in the export area where they have status 140. When they are charged in the truck, their status in the system is 150.

Wire harnesses with status 160 have already been delivered to SETA's client. See appendix III for a visual description.

c. The assembly process

The assembly of harnesses is made of two different types of process: the assembly on fixed locations and the assembly on production lines.

The fixed locations process involves only one operator who works on one building board (baubrett) to assemble the whole wire harnesses alone.

The production lines process involves many operators (more than 8) which all work on the same product, everyone does a small task.

The assembly of wire harnesses necessitates raw materials (cables and accessories), building boards and assembly tools. Each building board corresponds to a reference of an electrical wire harnesses.

The assembly of wire harnesses begins with the feeder who brings cables and accessories from the stockroom. Cables are sorted according to the reference of the harnesses of each building board. The cables related to a reference are suspended above its corresponding building board and the accessories are put in jits next to that building board. The operator begins her work by placing the cables according to the reference's layout drawn on the building board. After that, she mounts accessories (connectors, sensors, etc). And finally she bonds the cables between them according to the layout of the reference. When this work is done, the wire harnesses is tested electrically on testing stations and visually on 100% control stations.

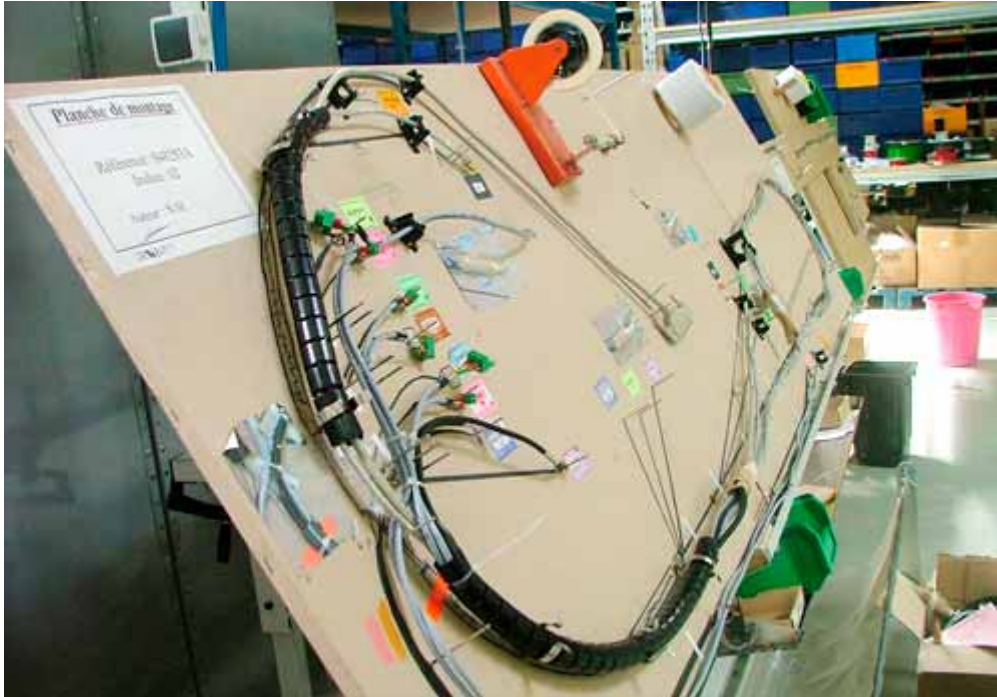


Figure 1. Building board (baubrett)

Internship progress

1. General schedule of the internship

On the first day of our internship, we discussed with our training supervisor the general schedule of the internship. In order to fulfill the purposes of the labor internship, we suggested visiting all departments. That is why the internship was scheduled as following:

- Logistical Department specifically the import area as import store agent.
- Production department.
- Quality Department.

Finally I effectively started with import area, and after I passed to the production area. In fact quality department and production department work together at same time, so I was working under both departments. I started there by working on how to improve the workplace organization especially with the Japanese 5S's methodology. And meanwhile, we were given the task of production time tracking

since there was a need to control the amount of minutes produced. On the last days, I went to the IT Department just to have an idea about what kind of work they do.

2. The Import Service

The import area belongs to the Logistics department. It is there where raw materials are received, registered and stored in order to feed the production. So the main tasks in this department are to help unload the raw materials from the truck at delivery, score physically the boxes and jits received, store them and after, on production feeders' demand, bring them out for the production.

Cables and accessories are stored in boxes or jits. There are two types of accessories, accessories brought out in bulk to the production and accessories brought out at the same time with their corresponding cables.

I worked in this service on almost all the tasks:

- Physical score of raw materials received;
- Registering of raw materials in SETA's system;
- Delivering cables and eventually corresponding accessories on feeders' demand.

In order to fulfill these tasks I used the following tools:

- Pallet truck to lift boxes or jits laid on pallets;
- Computer for updating the system.



Figure 2. pallet truck

I also reflected upon all this work in order to spot failures and propose solutions to them. We wrote at the end of our stay in this service a report about what we learned and we gave our view points. In this report figures a representation of material flow in the import area and suggestions for the stockroom (see appendices IV and V).

3. The work on the methodology of 5 S's

As said in the general introduction to SETA, the quality department is in charge of ensuring SETA's product quality but also of improving the worker's environment. One methodology used to achieve this last point is the 5S's. 5S is a

Japanese methodology for working place organization and each S is a Japanese word: Seiri (sorting), Seiton (Straightening or setting in order), Seiso (sweeping or shining), Seiketsu (Standardizing), Shitsuke (Sustaining). So it is about putting order in the workplace to maximize efficiency. There is an audit checklist used to control whether operators respect the '5S' or not and our task was to analyze this checklist, verify its consistency and make improvements on it.

Let us take a look at this methodology. The 5Ss are arranged according to the order they must be executed. So to apply this methodology, we firstly have to sort the things present on the workplace. Personal items are then eliminated as well as unnecessary ones.

The second step is to set in order all the items we have not eliminated in the first step and put them according to their frequency of use.

The third step is about cleaning the working area (sweeping dust, putting waste in garbage and empty trash).

After those three steps are accomplished, all the rules used up to now have to be standardized in order to ensure the continuity of the methodology.

Finally we must sustain our measure, always criticize positively our approach and improve or adapt it.

In order to fulfill our task we adopted the 5M method to structure our analysis. This method separates different aspects of a problem in 5 groups: "matières" (materials), "materiel" (equipment), "main d'oeuvre" (labor), "milieu" (environment) and "méthodes" (methods).

After having reviewed all these points, we identified the points that should be included in the 5S audit checklist. We compared our results with the existing checklist and propose our improved version.

For the new checklist see appendix VI

4. The hourly tracking of the production

Meanwhile, we were assigned a work from the Logistic department. We had to establish an hourly tracking of the production. The purpose of this task was to spot in all the manufactory the weak points where delay is most important and the reasons of this problem. Every hour we had to take the quantity produced by every operator and every production line, calculate their efficiency and deduce every sector's efficiency, then compare it to the expectations on a board.

Every automotive electrical wire harnesses represents an amount of produced minutes called time range (temps de gamme). Having the number of produced harnesses gives the minutes produced and this number compared to the real time of work gives the efficiency in percentage.

For example the product with reference AJ1R710514 has got a time range of 5.855 min/pdt. Between 08:00 am and 09:00 am an operator has produced 9 wire harnesses of this reference, so she has produced 52.965 minutes within an hour. This represents 87.825% of efficiency.

To facilitate the work we used an excel spreadsheet to automate the calculation. Here are the different fields of the spreadsheet:

Title	Meaning	Example
Product (by its reference)	Identification of the product concerned	AJ1R732 5/11
Time range (Minutes/Product)	Minutes represented by one copy of the product	1.9
Workplace	Workplace where the product is assembled	31
Matricule	ID of the operator in charge of the product	4858
Amount (QTY)	Number of products assembled in the hour (6h-7h for example)	20
Minutes Produced	Equivalent in minutes of the amount produced = QTY*Min/Pdt	38
Efficiency	Efficiency of the operator = Min Produced / 60mn (or 30mn for breaks)	63%

After having made all the calculations, we had to analyze the workplaces where the efficiency were the lowest and find out the causes. Generally it was due to neglect from the operator, sometimes it was the lack of some cable or accessory, or a bad positioning of work tools, etc.

Of course, as this work was not organized before us we encountered some problems:

- We were not numerous enough to be able to do it every hour as wanted;
- Many operators were not used to complete their scorecard so we had to ask for it repetitively;
- The excel spreadsheet had to be improved for efficiency purposes.

At the end of the internship we wrote a report about this work for those who will have it in charge. We also gave suggestions about creating an application to facilitate the task and avoid data redundancy.

5. The IT department

During the last days of my internship, I visited the IT department composed by IT technicians. Their work is to establish and maintain SETA's computer network and develop small applications for other departments' management tasks. SETA's network comprises a WIMAX for internet connection, routers, servers, wire lines, wifi

routers and clients. Many computers access to the network by wifi, it is more efficient because many computers are used in production lines, and also the Quality and Production departments are installed in the middle of production lines; network cables would be cumbersome. SETA's network is also linked to METS's one.

Social life in SETA

1. Working conditions

a. Physical working conditions

SETA's manufactory runs 24/24 by a continuous shift work. The first shift lasts from 06:00 am to 02:00 pm, the second from 02:00 pm to 10:00 pm and the last from 10:00 pm to 06:00 am. Besides this schedule there is the administration schedule from 08:00 am to 05:00 pm, I observed this schedule during my internship. Every worker is allowed to take a 30 minutes break, usually to take a free meal at the company's restaurant. The work lasts from Monday to Friday normally but when there is delay; workers are asked to come every Saturday and sometimes even Sunday. There is also a twirl of the shift from one week to another. Attendance is taken very seriously. The score is made through fingerprint readers placed at the entrance of the manufactory.

As in every industry, working conditions are a little tough. Workers have to stand for hours and in summer, the weather is very hot. And they are under constant pressure because there is a minimum efficiency required from each of them. Also, the operators make repetitive actions which can become quickly very boring. That is why there are often new assignments.

b. Uniforms

Each job position corresponds to a uniform. Logistics' agents wear green aprons, quality agents white ones, etc. Uniform is obligatory, this measure's main purpose is to identify every worker and easily check if he/she is at his/her place.

c. Motivation means

Workers are mainly motivated by pressure. Unfortunately, their superiors often shout at them to stimulate their productivity. They are also motivated by bonuses. If I'd say something about this, I should suggest using other means of motivation like giving responsibility, explaining to workers the importance of their work. Penalties are also applied in case of indiscipline leading, when serious, to layoffs.

d. Safety policy

SETA is establishing security in order to respect general security standards. Some criteria related to workers' security are added on the 5S audit. For example the pathways must be cleared, the chariots used by feeders must not be overloaded, they must use ladders to suspend cables over the building boards, etc.

2. Human relationships

a. Horizontal relationships

A friendly atmosphere prevails between workers; they are used to say jokes. There are also many team tasks like unloading raw materials, retrieving lost materials in the stockroom, assembly of wire harnesses on production lines, etc. These help workers to develop strong collaborative relationships.

Although, as production lines industry requires it, there is sometimes stress, so there may be tense atmosphere.

Workers in SETA are very young, so it was not so difficult for me to integrate despite the language gap.

b. Vertical relationships

Unfortunately, vertical relationships in SETA are based on pressure. The managers often shout at workers to make them work harder. But things are getting improved. They also use results to make workers become aware of their efficiency and then push them to work harder. This is only because everybody is under pressure and they try to make their subordinates aware of the situation.

Apart from this, workers and their superiors have good relationship.

Conclusion

In this report, I presented SETA; an automotive wire harnesses assembly Company where I spent my laborer's internship, through its way of working and its men and women. I explained the main tasks I performed in this enterprise such as working as import store agent, reflecting on 5S methodology and making the hourly tracking of production. I finished by giving an overview of the social life in SETA which is approximately the same as other industries.

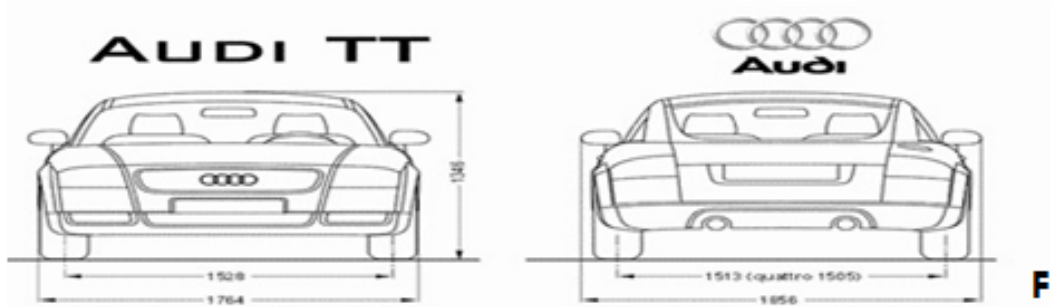
Finally, I am very satisfied of this internship as I think I have met the goals I set in advance. The main problems that could have been encountered were due to the fact that it is a very young enterprise which is not yet stabilized. The great thing I obtained from this internship was to see new graduates make their first steps in the world of work and see how things are quickly moving in a young enterprise.

Actually, I was glad to see that it was not very difficult for me to integrate the workers world. However, I could not get used to standing all the time and also to do repetitive actions like the hourly tracking of production. I felt more comfortable with reflections on 5S methodology and I think this will be the kind of work I will do as an engineer.

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I. Enterprise products in the automobile



ONDAL:

Window wiper

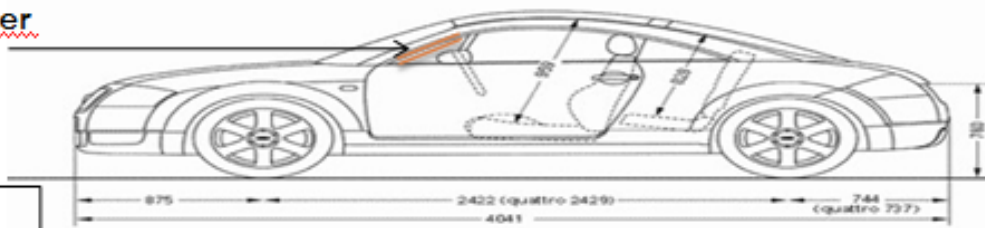
FIXED LOCATION,

B8:

GPRS

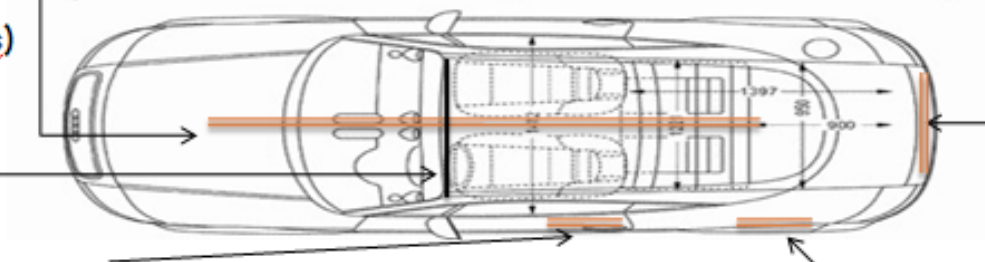
Air-conditioner

RADIO..



BASIS

(fundamental wire harnesses)



HECK

(trunk wire harnesses)

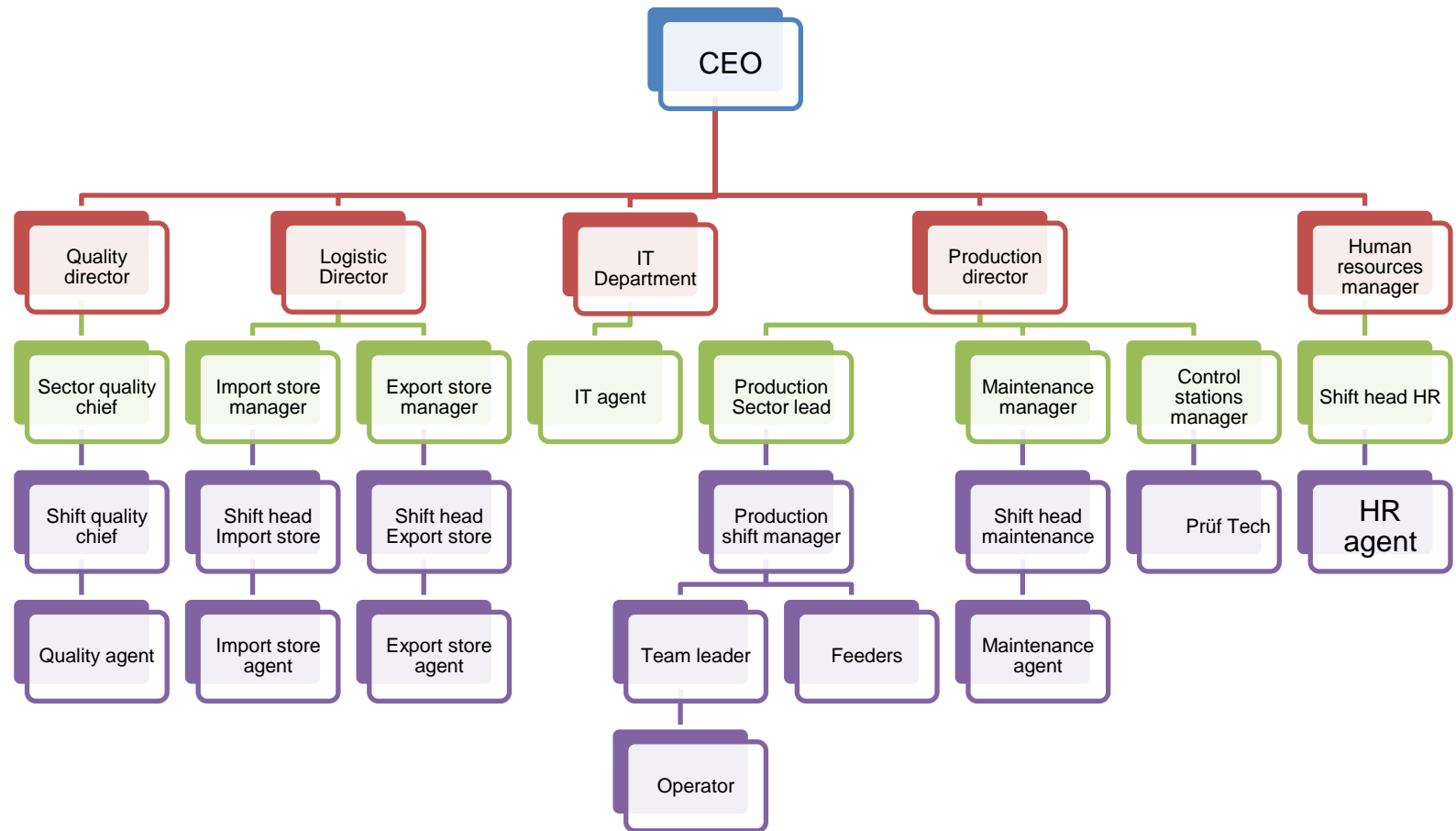
AIRBAG:

Accident protection

TV (rear door wire harnesses)

TH (front door wire harnesses)

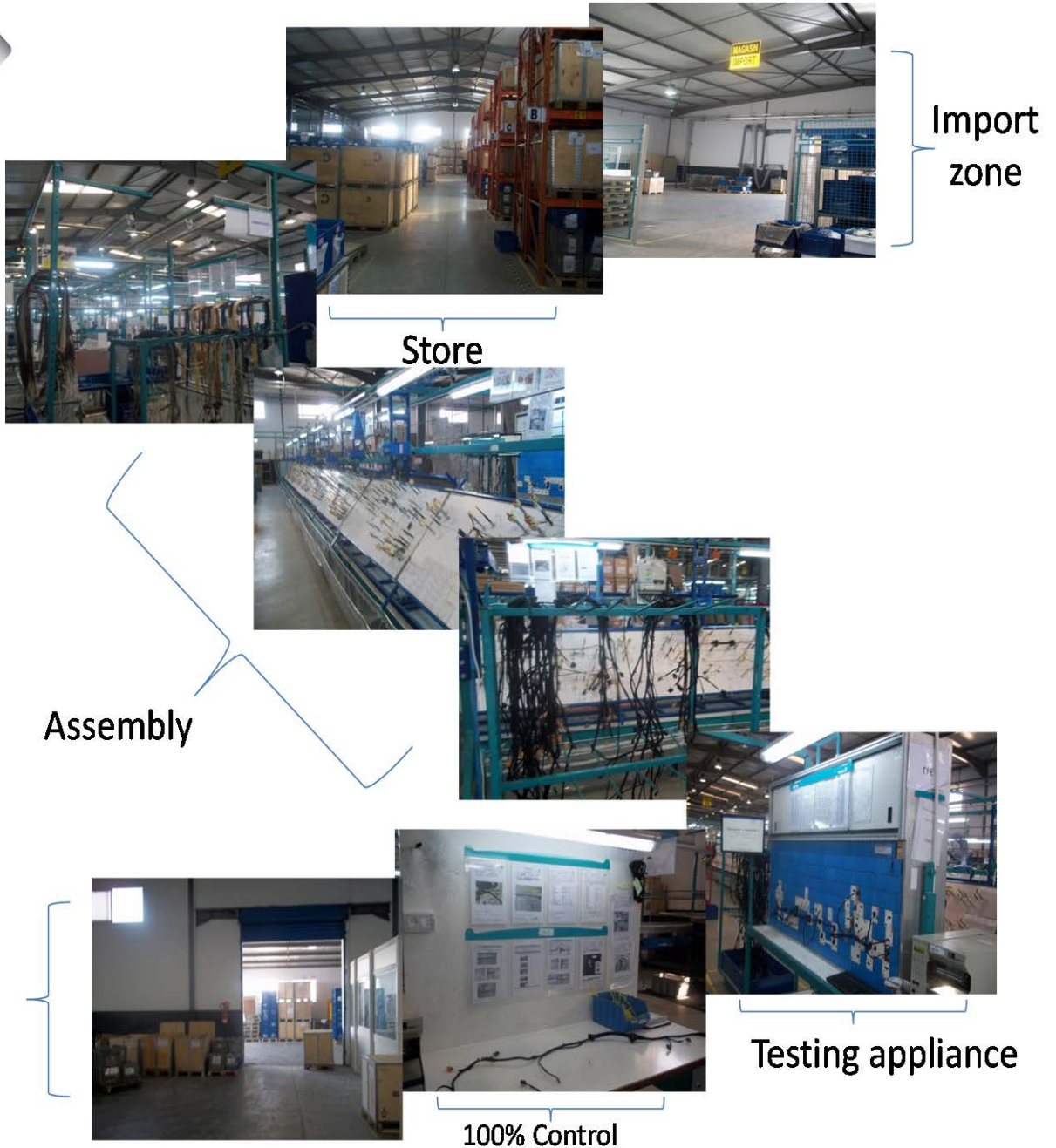
II. SETA's organization Chart



III. The materials flow in SETA

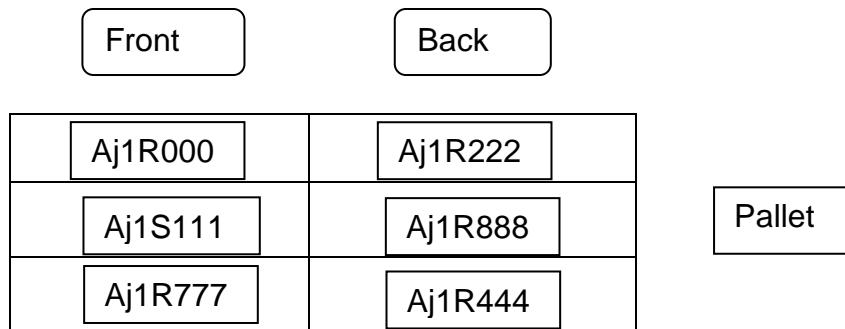


Materials Flow in SETA



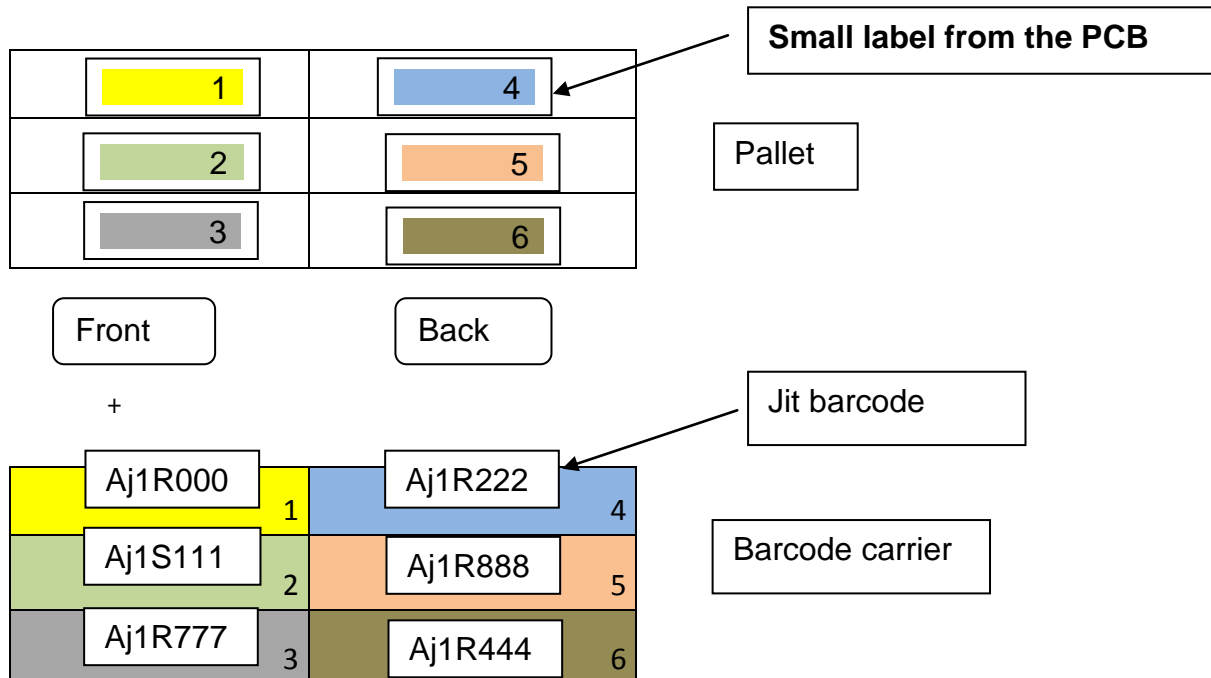
V. Suggestions for the positioning of cables jits in the stockroom

Pallet's storage system in use now



Pallet's storage system according to the idea

We'll call PCB the barcode carrier.



Then when we are looking for a product, we'll just have to check in the PCB instead of bringing out the entire pallet using pallet trucks.

VI. New 5S audit checklist (on 2 pages)

Eliminer

- a. Est-ce qu'il y a des affaires personnelles sur le lieu de travail ?
- b. Est-ce qu'il y a de vieux documents et de vieilles notes sur le lieu de travail ?

Ranger

- a. Est-ce que le matériel de travail est identifié (Machine, outil,...) ?
- b. Est-ce que les accessoires existants au niveau de la production sont correctement identifiés, rangés et lisibles ?
- c. Est-ce que les jits des produits finis sont identifiés par un barre-code ?
- d. Est-ce que les aufnahme sur les planches de montage sont existants, serrés et correctement orientés ?
- e. Est-ce que les Prüfaufnahme sur les stations de contrôles électriques sont identifiés, et correctement fixés ?
- f. Le matériel de travail est-il en bon état ? (pistolets, jits...) Est-ce qu'il y a des parties d'appareils ou d'étagères qui sont visiblement détachés ou desserrés ?
- g. Le matériel détérioré est-il signalé ?
- h. Est-ce que les passages et les voies de transport sont libres ?
- i. Est-ce que les outils de montage sont conformes et se trouvent dans leurs places prévues ?
- j. Est-ce que le déchet est bien séparé ?
- k. Est-ce que les rubans des rouleaux tesa sont totalement consommés ?
- l. Chaque ouvrière dispose-t-elle du matériel nécessaire pour effectuer sa tâche ? Y a-t-il des déplacements intempestifs pour récupérer du matériel (ciseaux, stylos,...) ?
- m. Chaque matériel est-il placé dans un lieu optimal selon son usage ?
- n. Retrouve-t-on effectivement chaque outil à sa place après usage ?

Nettoyer

- a. Y a-t-il de la poussière sur le lieu de travail ?
- b. Les outils, les machines, les étagères, le sol, les planches de montage sont-ils propres ?
- c. Y a-t-il une générale apparence de propreté du lieu de travail ?
- d. Le matériel adéquat pour le nettoyage est-il évident ?
- e. Y a-t-il assez de poubelles ? Sont - elles régulièrement vidées ?

Standardiser

- a. Est-ce que le marquage des places et des dépôts est correctement effectué et respecté ? (poubelles, jits, produits finis, jits accessoires, jits poubelle au niveau de l'ouvrière)

***Note :** les ouvrières au niveau des places fixes pourraient également avoir un lieu standard pour leur bac à déchet. Chaque place dispose de deux bacs mais la plupart des filles n'en utilise qu'un. Si éventuellement, le deuxième est inutile autant l'enlever. Et s'il a toute son utilité, ce qui est normalement le cas, c'est qu'il faudrait standardiser leurs marquages et définir clairement leur contenu.*

- b. Y a-t-il une description des lieux de travail ?
- c. Est-ce que les dessins sont lisibles et ne sont pas déchirés ?
- d. Est-ce que le contrôle et la réparation des planches de montage est réalisé à intervalles réguliers ? la réparation est elle documentée ?
- e. Est-ce que les prüfaufnahme sont conformes (non endommagés, pas de pins manquants) ? sont ils organisés selon le lay-out ?
- f. Est-ce que les bouchons et les couvercles sont tous montés sur la station de contrôle électrique ?
- g. Y a-t-il assez de lumière, de clarté ?
- h. Est-ce que la documentation et l'affichage sont actualisés et se trouvent dans les places appropriées ? Y a-t-il des posters et des rappels de la procédure du 5S sur les lieux de travail ?
- i. Les « must do » et « should not do » les plus récurrents sont-ils affichés et évidents ?

Suivre

- a. Les ouvrières ont-elles reçu une bonne formation sur le 5S ?
- b. Les ouvrières comprennent-elles clairement les remarques affichées ? Ces dernières sont-elles explicites ?
- c. Y a -t-il de réguliers programmes de suivi et de formation continue aussi bien sur la technicité que sur la culture d'entreprise ? (comportement, respect des règles, explication du 5S, importance du travail de chacun,)
- d. Les ouvrières ont-elles rempli leurs fiches de suivi ? Au niveau des chaînes, la production est-elle bien en évidence sur les tableaux d'affichage ?
- e. Y a -t-il des affiches témoignant des améliorations réalisées ?
- f. Les résultats des audits réalisés sont-ils publiés et évidents ?
- g. Est-ce que la tenue de travail est correctement portée ?