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Dubai Precast
Concrete

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INTERNSHIP REPORT

ON

[PRODUCTION AND DESIGN]

Vote of Thanks

I extend my sincere thanks to Mr. Ove Pederson (Production Manager), Ms Rovelyn Cawaling(Assistant Manager - Production Planning), Mr.Joey() for their invaluable support and guidance given to me.

Also I would like to thank Mr. Subin A (Planning Detailer), Mr.Nagaraju() , Mr.Biju(Fabrication Supervisors) and Mr.Sajan (Design Co-ordinator) for giving me insights into the groundwork of their departments.

Lastly I would also like to thank all the other staff who settled my queries as I explored the company.

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Introduction

As an intern at Dubai Precast Concrete I had been given the task of analyzing and studying the processes that take place in the Design, Production planning and the Factory, in an effort to suggest and hopefully implement t any useful changes that might help the company. The journey has been extremely fruitful for me, and expectantly for the company too, giving me an insight into how things transform as they move from a paper to reality.

The importance of any department in a company cannot be understated for each of them contributes in their own different ways to the company and so a useful change in any one of them could greatly help the company as a whole. In my report I have mentioned the workings of the different sectors as well as, have given some of my views on their minor drawbacks. As I moved around the place and got to know people it wasn't hard to see that the staff is extremely sincere and dedicated to their work. However in spite of their busy schedule their always had some time to spare and help me out in case I had any difficulties. This helping nature is very rare in a stressful work environment but its presence in the office brings out the quality of the staff.

The report comprises of my work at the design, production planning and factory. I have also included pictures of both the positive and negative sides of the factory to make it easier to visualize what I want to convey. At the end I have attached a copy of my report of the planning department, which was submitted to Mr.Ove, as well as the reply which was given by Ms.Rovelyn. I hope the report meets the expectations of the company and provides and provides and insight into the different aspects of the departments through my perspective.

Chapter 1: The Design Department

For a construction Company the design department is basically where everything begins. The clients come in with their thoughts of a building and the design department is where thoughts are brought into paper. Design and construction become integrated with the schedule, constructability reviews and estimating. It has been proven repeatedly that when design and construction are integrated and properly managed, there will be overall cost savings and time saved.

In most construction projects here there are three levels of design:

- Schematic—basically a sketch that shows the arrangement of rooms or elements within a room. The space planning and overall look is also decided.
- Design Development—a more detailed floor plan, showing for example, the location of where every window and door is in a room and shown by elevation drawings.
- Construction Documents—the most detailed plans, showing the exact thickness of every door and window, including the materials, etc...and all the information needed to build it.

Getting to the level of specificity required by construction documents takes an investment of both time and money. There are thousands of decisions to make; it can be overwhelming. Hence it is said "For every dirham you spend on design, you will save multiple dirhams in the field because the crew will be so much more efficient."

That's because if the design isn't complete and you proceed with a schematic level of drawings, for example, instead of construction documents—there undoubtedly will be questions and missing information as the construction process proceeds. This often results in change orders and increased costs. More time is usually needed to properly finish the project.

Out here, several estimates are prepared throughout the design process as budget checks. Bids are also solicitude from qualified subcontractors and accurate materials pricing is obtained also that is based on the final construction documents. This greater level of detail allows to further refine the cost estimate. When clients understand the impact of design choices on

the budget, it allows them to modify the design if needed. This means there will be no unpleasant surprises during or at the end of the project.

The structural team prepares first analysis the requirements of the client and then prepares a rough layout of the design. On a later stage more detailing is given as to how much strength can the structure hold. If the design is found to be feasible particulars about the design such as amount of reinforcement, strand diameter etc is planned and given out.

The rest of the design team then gets together to figure out whether the given structural details can be properly accommodated within the design or not. Further they also have to keep in mind the maximum load that can be lifted by the crane and the points from where they can be properly lifted. Later an MEP drawing is prepared by another company whose suggestions are also incorporated within the design. After this a detailed shop drawing is prepared which is to be distributed among the rest of the company to give clear insight into the design.

As the rest of the company is solely dependent on the design department it is extremely important for it to be fast and accurate. In my short stay with the design team it wasn't hard to see the hard work the guys put in. Everyone is aware of their tasks and gets to work on them as quickly as possible. However the rendition program of AutoCAD doesn't provide a faster insight into the design structure. After the design is prepared there isn't much further verifying done on the structural strength of the panels or slabs.

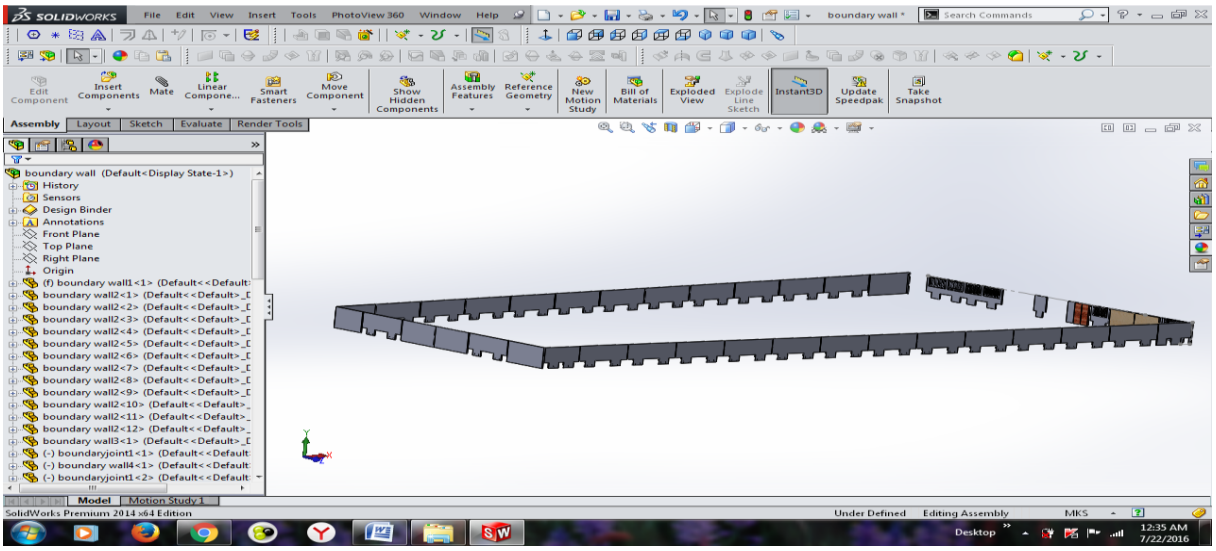

Fig1.1 A 3D rendition of KhanSaheb's boundary wall project

There are many programs such as SolidWorks which can easily render 3D elements and perform various stress strain analysis on them. The pictures you see(Fig 1.1 and 1.2) are my rendition of a project of Khan Sahebs Boundary wall in which not only have I constructed the entire boundary wall but have also performed stress strain analysis on it to show its deviation , breaking point and other critical parameters.

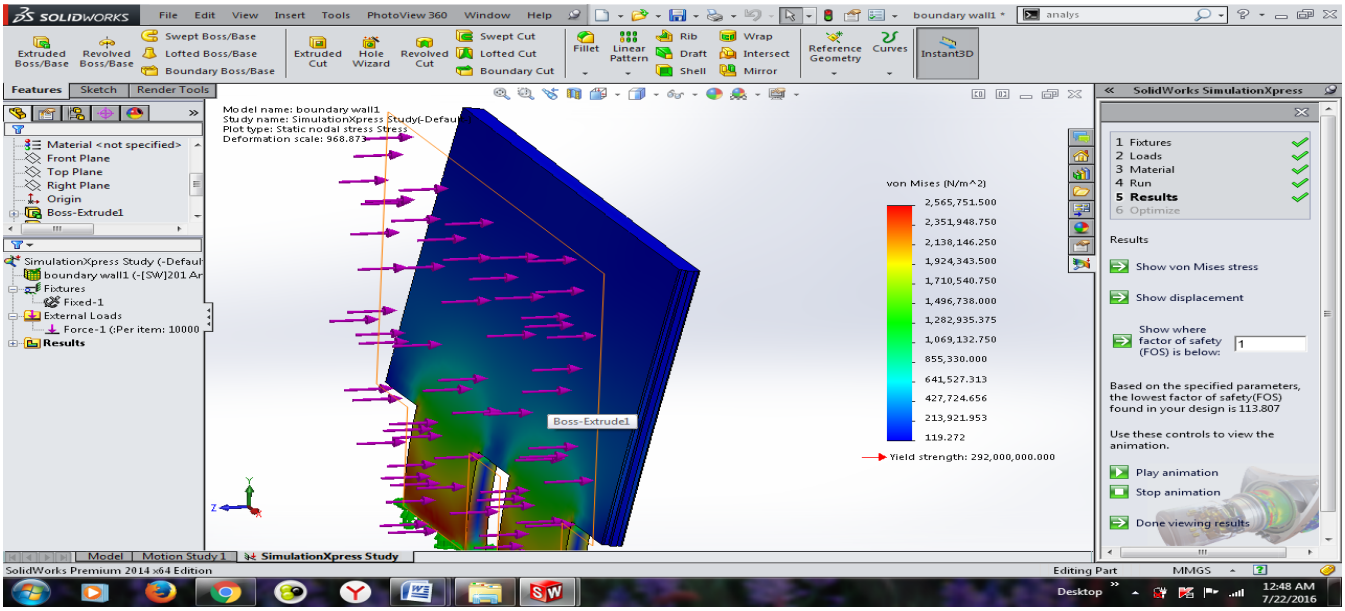

Fig 1.2 A Stress Strain analysis of one of KhanSaheb's boundary walls

An added advantage of SolidWorks is that you can add AutoCAD files into a SolidWork drawing. Indeed there would be problems training the staff to such software but the output would be equally or even more rewarding.

Chapter 2: The Production Planning Department

After being into the design department the next stop is the planning department. Here is where the final designs are given, and after proper analysis, estimates are made as to when would the designs be casted and de-moulded. The entire department is responsible for the proper utilization of the limited tables, man-force and space available to the company. The planning is done so that the sum of mould fabrication + storage +transportation is minimal. Production planning helps to maximize profits and make sure the needs of the customer are being met. Other advantages of production planning include eliminating wasted time by improving process flow, reducing inventory costs, optimizing equipment usage, using employees' time to the fullest advantage and improving the delivery time of products and services. In brief the work and advantages of the production planning group can be summarized as follows:-

- **Better Service to Customers**: Production planning and control, through proper scheduling and expediting of work, helps in providing better services to customers is terms of better quality of goods at reasonable prices as per promised delivery dates. Delivery in time and proper quality, both help in winning the confidence of customers, improving relations with customers and promoting profitable repeat orders.
- **Fewer Rush Orders** : In an organization, where there is effective system of production planning and control, production, operations move smoothly as per original planning and matching with the promised delivery dates. Consequently, there will be fewer rush orders in the plant and less overtime than, in the same industry, without adequate production planning and control.
- **Better Control of Inventory:** A sound system of production planning and control helps in maintaining inventory at proper levels and, thereby, minimizing investment in inventory. It requires lower inventory of work-in-progress and less finished stock to give efficient service to customers. It also helps in exercising better control over raw-material inventory, which contributes to more effective purchasing.

- **Reduced Idle Time**: Production planning and control helps in reducing idle time i.e. loss of time by workers waiting for materials and other facilities; because ensures that material and other facilities are available to the workers in time as per the production schedule. Consequently, less man-hours are lost, which has a positive impact on the cost of production.
- **Lower capital requirements**: Under a sound system of production planning and control, everything relating to production is planned well in advance of operations. Where, when and what is required in the form of input is known before the actual production process starts. Inputs are made available as per schedule which ensures even flow of production without any bottlenecks.

Currently the program assisting this department is the PPS (Production Planning System). The system, without doubt, helps the department immensely by greatly reducing the coordination work. Also it helps bridge the gap between the planning and other departments mainly consisting of the design and production supervision. However the system can be greatly improved by investing a little more on the programs, to formulate them to be able to perform more analysis. The analysis may include automatically updating planning details as per inputs given by the user. Further scanned documents can be directly fed into the program which would automatically assign the designs to different tables.

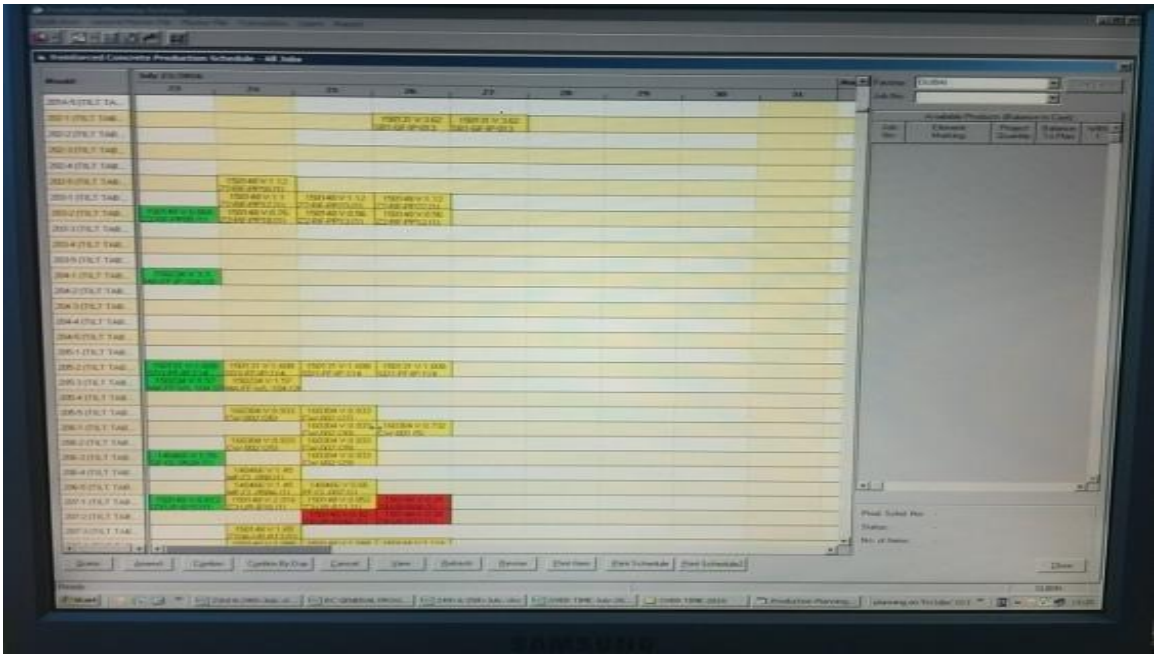

Fig 2.1 The PPS system for RC planning

Three criteria are important for the right choice: The crucial point is the philosophy of the program, i. e. the answer to the question “what is the essence?” An additional aspect is the demand on the user when dealing with the product affecting the costs significantly. The software provider as such is a third remarkable viewpoint in terms of continuity, innovative strength and security of investment. The following methods are common three-dimensional operating principles: The parameterization seems to be the impressive fact of the parameter method offering great advantages for cataloged building components. With the respective effort, it is possible to store the components, such as embedded parts or support solutions, in libraries enabling the user to create his model quickly.

However, there is a disadvantage when it comes to layout editing. The automatism provides anything but a ready-to-build plan, but only the geometry that has to be prepared to a layout with much effort. In case of modifications of the model, the user has to start right from the beginning. Current practice is a construction-accompanying planning. This means that reactions have to be as flexible as possible and free from errors. In addition to this, an „easy-to-modify “program is required.

As an alternative, the user can create his three-dimensional model using the hybrid method, which also allows an automatic generation of plans. The functionality of the program enables, moreover, to derive ready-to-build plans. The automatically derived plan has to be reworked for complex precast components; in this case, however, the entire range of 2D functionality is available and the geometry corresponds with the 3D model.

Chapter 3: The Factory

After receiving the designs and planning details, the factory is responsible for producing those elements in the stipulated time without compromising in quality. Handling of workers and coordinating with the planning department is done by the supervisors. The main components of production in the factory are as follows:-

- **Steel Bending**: This is where the steel for reinforcements and mould fabrication is cut and bent.
- **Mould Fabrication**: Over here moulds are made as per the given designs. Brainstorming has to be done as to how the mould has to be prepared to minimize steel consumption in a 3-D orientation.

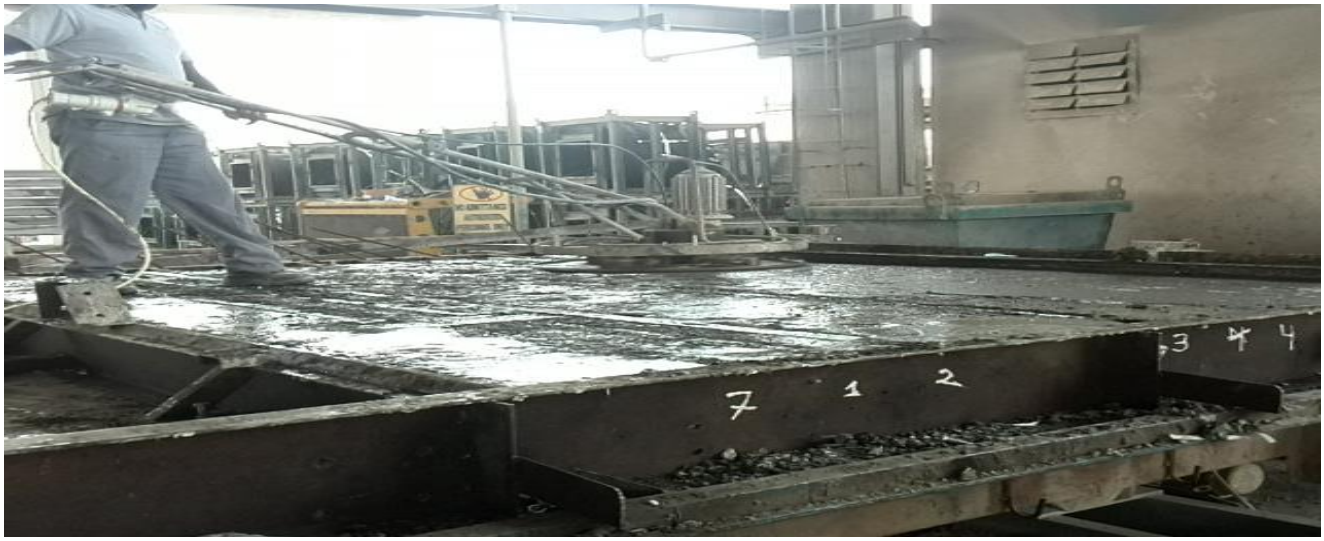

Fig 3.1 Buffing process in factory

- **Casting**: Here concrete mixture is poured into the moulds, vibrated and smoothened. It is then allowed to set for a particular number of hours while vibrating it. Buffing and sand blasting is done later when required.
- **De-moulding**: After casting, the mould is then lifted by a crane and tilting the table.

The mould is then inspected, sent for finishing and corrections (if required) and finally stored or transported. In the company the factory consists of Hollow Core production and RC(reinforced Concrete) Production. The planning of these two is also done independently.

The Hollow Core production requires less man power as majority of the process is atomized. Strands are aligned and tightened by bed cleaning and pre-stressing machines. Concrete is automatically sent by shuttles into the extruding machine, which pours and compresses the concrete. Later slab cutters are used to cut the hollow core according to requirements, the excess gets stored as stock. The RC production is almost similar as to the different components specified at the start of this chapter.

The factory, indeed, consists of hardworking people. Time constraints and quality are tried to be complied with. Given the small space to work in the factory has indeed adapted to work efficiently in the conditions. However in spite of all these there are few concerns which I have addressed below:

- Cleanliness: The factory is kept quite unclean, and though at first sight this doesn't have a direct impact on production it does greatly affect the production in many indirect ways.

Fig 3.2 Garbage piling up within factory

- Apart from the health hazards, the accumulation of garbage takes a psychological toll on the workers, reducing their efficiency, as can be read about in the following article: http://www.environmentalhealthnews.org/ehs/newscience/e-waste-chemicals-change-workers-dna.
- Old Equipments: The machines in the factory are quite old and don't seem to have been maintained properly. Keeping up with the upcoming technology and using them to increase efficiency should be the main motto of the company now. If not optimizing all the

machines, at least some of the ones mentioned below can be tried out:

- Interchanging the manual concrete pouring machine with an automatic one. This is because the presently the pourer is not only old and leaks out lot of concrete but also as concrete is manually poured, the poured concrete is evenly distributed and lot of concrete goes to waste.
- Magnets over Nut Bolt joint: The traditional nut bolt system damages the mould and also requires more time. However using magnets to hold the mould is easier, flexible and faster.

Fig 3.3 Illustrating magnet locking in contrast to the nut bolt system used presently

- Improper maintenance of tables: The surface of the table has been badly damaged resulting in deteriorating surface finishing in the final element. Proper techniques to maintain table has to be taught to the

workers and defaulters penalized.

Fig 3.4 One of the factory tables

Some other suggestions which I would like to put forward are:

- Plugging Hollow core slabs with plastic caps before transferring them to the stock yard to make sure concrete doesn't enter into the hollow portions.
- Covering the hollow core slabs with some material, preferably tarpaulin to prevent water loss.
- Superplasticizers is a new generation of chemicals that can greatly decrease water to cement ratio. The main advantage of this chemical is during winter time, when curing time is expected to increase, the use of this chemical substantially reduces the same time.

  Visit www.buildingresearch.com/newfeatures.php for more details.

Conclusion

The sincerity of all the people within the company, staff and workers, is really commendable. Given the current circumstances the departments have efficiently exploited and made maximum use of the resources available to them. Also the upgrading of program, in planning department, to PPS has immensely contributed to the increase in efficiency of the entire process of production and erection. Space management in the factory is good enough, though not optimal, for the production to take place quite swiftly. However, implementing some of the suggestions mentioned by me above (especially the last ones), may hopefully help in the company's growth too.

I wish this company a prosperous journey ahead, and would love to see it reach new levels in the construction field.

Attachments

This is a copy of the report I had submitted to Mr. Ove on the second week of my internship, regarding the planning department.

Report On Planning Dept

It isn't hard to see that the work in the planning department is extremely organized and well laid out. All the members are extremely hard working and helping. Each member is well aware of his/her tasks and completes it well in time. The PPS is an add-on that helps bridge the gap between the design as well as different units within planning.

During my training days I had the opportunity to learn to operate within the PPS as well as understand how the planning is done using excel, with the help of Mr.Subin and Mr.Nagaraju . A deeper insight into planning was given to me by Ms. Rovelyn, who also mentored me as I planned a small project.

Small Issues

1. **Redundant work**:
   Lot of similar work is done manually solely because of the large number of people involving in it. In other words due to many intermediates between the factory and planning office similar data has to be analyzed again and again.
   Eg. The information of timing is given by the foreman to the supervisor who then makes a report and gives it to the office where it is again processed by 2-3 people before a report is produced.
   Another problem stemming from this issue is the error in data as the data reaches to the office. As data is entered manually in every step, the chances of error are inevitable. Recently a small problem had risen due to this in which the inspector hadn't mentioned in his report about a panel that had been already cast in the morning, leading to the planning office shifting the planned casting date/timings of other elements to get this "already casted panel" to be casted. Though the situation was averted, it gives us insight into the errors creeping into data as it moves upward.

2. **Dependence of Planning on Erection**:
   Though interdependence is not something to get rid of completely, I believe that casting according to erection leads to wastage of moulds that may have to be used again in the same project. Casting first and then taking the required material from the storage as when required would lead to a significant cost reduction. However this may not be happening due to storage issues (I haven't been to the factory yet so I don't have much idea on that) which I am yet see.

Suggestions:

I believe a simple program to do the simple tasks of verifying and analyzing data, and installation of a computer for every two bays could help in first hand data reaching the systems, thereby reducing planning time and chances of error.

Cost of workstation (each) = 5000dhs cost of programming + installation= 1000dhs
Total = 11000AED. approx.

Reply from Ms Rovelyn

Dear Ashutosh,

Thank you for the report.

Considering the short time that you have been with us, it was a good observation on your part.

I couldn't agree more for the first issue (redundant work).

If the elements are updated as produced in production via PIS instead of paperwork, it will help with

the accuracy of the daily reports and planning.

We will check with IT and consider it for implementation in the factory.

For the second issue (cast as per mould not erection seq), I can't agree that much.

It will still be much cost efficient for this factory to have fewer inventories because:

1. Additional Storage Cost/Double Handling will be greater than that of the fabrication cost

2. It is best that produced elements are getting out of the factory immediately since some

Contractors tend to revise/cancel elements which might result to excess inventory

Anyway, I hope you would be able to observe that as well when you get to see Stockyard and the production process.

Thanks & Regards,

Rovelyn Cawaling

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