Proposed New Layout To Help Stock Control of A Upholstery Industry

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Abstract *— Companies from various segments looking for a better results tool should pay attention to the details of great importance for the management of an organization, one of them being the management and control of inventory.*

According to Borges (2010), good resource management helps to reduce the monetary values involved in order to reduce the lowest possible, but within security levels and volumes to meet demand.

The main objective of this article is to analyze the ways of layout change, tools, methods that help to improve its performance and specific purpose, to know and understand the stock of an upholstery industry in order to meet the demand of the company, without waste and. supplies without adding value to the investments made by the organization.

Keywords — *layout, stocks, processes*

I. INTRODUCTION

Companies from various segments that seek better results should pay attention to details of great importance to the management of an organization, one of them being the management and control of inventory.

According to Ballou (2015), the storage of goods foreseeing its future use requires investment with regard to space, maintenance and inventory movement [...]. Ideally, perfect synchronization between supply and demand would be necessary to make inventory maintenance unnecessary. Knowing what you need to have in stock, deciding when to stock up, how much stock is needed, and how to control stock is one of the most important and important roles of the material manager within an organization.

According to Borges (2010), good inventory management helps to reduce the monetary values involved in order to keep them as low as possible, but within the security levels and volumes to meet demand. Therefore, within an organization, it is of great importance to make an inventory analysis. With this analysis it is possible to understand the stock, the material demands, the inventory management tools, and thus meet the needs to work without generating waste and at the same time not missing necessary materials. The main objective of this article is to analyze ways to change layout, tools, methodologies that help improve its performance and the specific objective is to know and understand the stock of an upholstery industry in order to meet the demand of the company, without waste in supply and with adding value to the investments made by the organization.

II. LITERATURE REVIEW

STOCK CONTROL

Every organization has a warehouse to store its materials used in its daily activities, from a service company to an industry, there will always be stocks.

Rodrigues (2014) states that stocks should:
- Ensure the availability of inputs for production, or merchandise for sale / consumption;
- Act as a buffer during the replenishment period;
- Reduce transportation costs by purchasing larger lots;
- Have finished products for delivery to customers.

LAYOUT

Rodrigues (2014) says that layout can be described as the arrangement of processing stages for different spaces and the interaction between these spaces. According to Vieira et al. (2014), the good performance of a layout may depend on the objectives for which it will be employed. Among the examples cited by the author, we highlight:
- Use of Space: Consists of the proper use of physical space and commonly refers to the reduction of space used;
- Flow Extension: It refers to the channeling of the productive flow in the physical arrangement in order to satisfy the objectives of the operation.

SLP METHOD

According to Raposo (2014) the best known method for layout planning in production management is SLP. This is a layout design methodology that was developed for manufacturing operations, which defines and integrates the productive elements, relating them to the location and arrangement of departments, cells or machines in a plant, without a direct concern with the peculiarities of service operations.

III. METHODOLOGY

A methodology adopted to support the application of a simple method adopted by Muther in 1961, by applying the following steps based on the data obtained:

-Step One: Drawing up the flow chart of inventory items through observation, using AutoCAD software;

-Step Two: Survey the factory floor plan and arrange the elements that make up the current layout (including inventory of raw materials and finished products) using a laser printer (100 meters range) and AutoCAD software;

-Third Stage: Elaboration of the Activity Relationship Diagram at scale, through exports of interactions between the productive sectors and the inflow and outflow of products in stock;

-Fourth Stage: Preparation of the Space Relationship Diagram, using the measurements raised in the first stage to determine a physical arrangement plan according to the spaces required for each stage;

-Fifth Step: layout proposal in the processes and inventory present in production (returns of finished products, upholstery structures, countertops etc.).

THE COMPANY SUBJECT TO STUDY

The company under study belongs to the furniture sector, more specifically to the upholstery business. It began work in 2017 and is installed in Zona da Mata Mineira, city of Rodeiro. Its sales are concentrated in the states of Sao Paulo, Minas Gerais and Espírito Santo.

TOOLS

The tools used for the study will be:

• AutoCAD: is CAD-type software - computer aided design or computer aided design - created and marketed by Autodesk, Inc. since 1982. AutoCAD will draw a company map, activity flow, current layout, and proposed new layout. .

• Laser measuring tape with 100m range.

• SLP Method

IV. RESULTS

PRODUCTION PROCESS

The Production Process is basically divided into 10 steps that are distributed throughout the shop floor. The process has as its main raw materials eucalyptus wood, tauari wood for bases, coatings and foams of different densities. Follow the steps:

• Plotter is the industry responsible for printing the tissue cut map. The prints are made on 1.5m wide white paper for later pasting on the fabric to be cut.

• The Warehouse is the sector where the pads, printed maps, fabrics, lines, etc. are stored.

• Serraria is the sector responsible for cutting the eucalyptus wood, given that each upholstery has different sizes and shapes.

• Lamination is the part responsible for cutting the foam blocks to the correct size for each upholstery.

• Assembly is the sector that joins wood components already cut by the sawmill through pneumatic staplers. Through this step the structure of the sofas is obtained.

• Bonding is the sector responsible for gluing the foams to the wood structures provided by the Assembly. In addition, when necessary, it fixes the straps and springs.

• Cutting is the part of the company responsible for cutting fabrics into the shapes required by each upholstery model. It uses fabrics and the material printed by Plotter.

• Sewing is responsible for joining the parts coming from the cutting sector.

• Upholstery is the part of the company responsible for joining the pieces of fabric already sewn into the structures and also for covering the cushions, which in turn are outsourced.

• Packaging is the final sector, which aims to pack the quality approved upholstery with plastic, cardboard and mesh. After packing, the upholstery is ready for shipment.

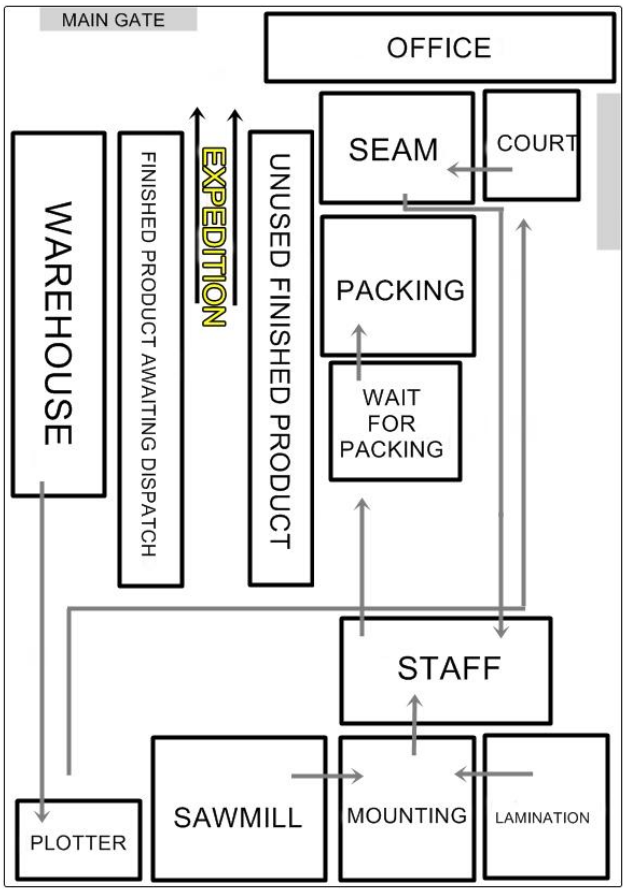
THE STOCK

The company's inventory is basically composed of raw material and finished product inventory. There are also products that return from customers due to breakdown or return that are stored within the company, but with no specific place for storage. Given this, it is remarkable that there are doubts or even difficulties when making inventory notes.

CURRENT LAYOUT

The company does not have the floor plan of its locations, therefore, to determine the current layout, it was necessary to survey the floor plan of the structure in which the production process is housed as shown in figure 01.

Figure 01 - Source: Author. 2019



In the current layout, with the aid of the laser measuring tape, there was a occupied area of 4,170.98m² and a necessary displacement of 321.32m.

According to the current layout, shown in Figure 01, in addition to the production sectors, the space for production is full of non-production items.

Table 01 - Items not allocated correct

NUMBER	NAME	DESCRIPTION
I	Fabrics	Unused fabrics for over 5 years. They are no longer quality for use in products and are stored in the warehouse space.
II	Sewing machines	Sewing machine housings, parts of which have already been used, which are stored in the warehouse space.
III	Shelves	Shelves that store defective utensils and / or are used in products that are out of line. Among them are upholstery feet, decorative buttons, and metal structures that were used in older models.
IV	Countertops	Unused benches that are arranged in the middle of the shop floor.
V	Upholstery Housings	Structures that were built with the wrong measures, or with cracked wood, which prevented its sequence in the productive flow.
VI	Unused Finished Products	These are products that are packaged and stored in the productive sector due to the fact that buyers give up. According to the company, they have been in place for over 3 years and are all unusable.

These items, described in Table 01, are the result of the over dimensioning of the current layout. It is noteworthy that these items do not generate flow problems, but contribute to an unnecessary distance between the productive sectors.

The current layout has ordering, but distances between operations are exaggerated and the environment is polluted with items that are unrelated to normal production flow. These characteristics make it difficult to check the finished product inventory, to check the products for loading, delays and increased travel fatigue etc.

ACTIVITIES RELATIONSHIP DIAGRAM

In this step a diagram is generated to evaluate the proximity between the activities of the productive sector.

SECTOR		PLOTTER	WAREHOUSE	SAWMILL	LAMINATION	ASSEMBLY	COLLAGE	COURT	SEAM	STAFF	EXPEDITION
SECTOR		1	2	3	4	5	6	7	8	9	10
PLOTTER	1		E	U	U	U	U	U	U	U	U
WAREHOUSE	2			O	O	O	O	E	O	O	O
SAWMILL	3				U	E	U	X	X	X	X
LAMINATION	4					U	E	U	U	U	U
ASSEMBLY	5						E	U	U	U	U
COLLAGE	6							U	U	E	U
COURT	7								E	U	U
SEAM	8									E	U
STAFF	9										E
EXPEDITION	10										

Figure 02 - Source: Author 2019

AEIOUX ratings are used to demonstrate the affinity or relationship that one sector has with the other sector. “A” being the sectors that are fully related, “E” the sectors with a little less affinity until reaching the “U”, which are the sectors that have little affinity. The especially important sectors "E" were due to the natural sequence process. “X” ratings are used for sectors that have no affinity and should not be related to the Sawmill and the sectors that deal directly with the fabric. Sawmill dust can dirty the fabric.

ACTIVITIES ARRANGEMENT DIAGRAM

Presented by Figure 03, the Activity Arrangement Diagram materializes a graphical representation of the relationship between the productive sectors.

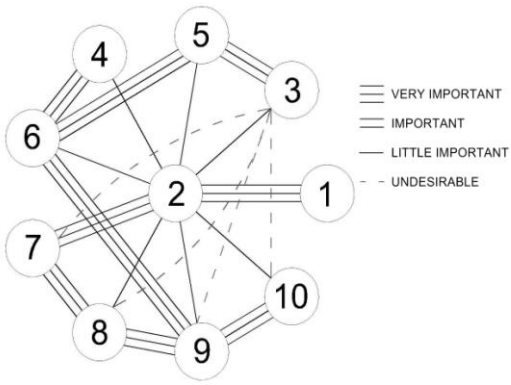


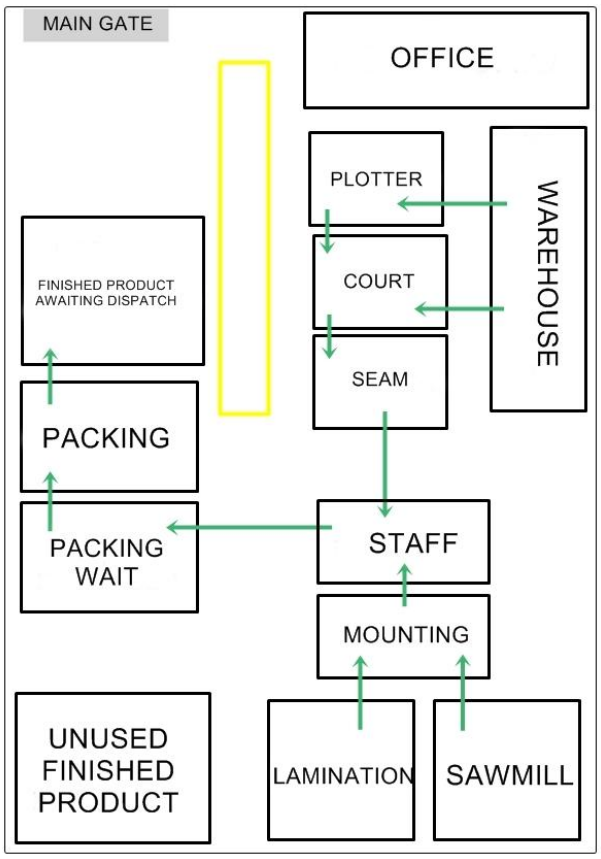
Figure 03 - Activity Arrangement Diagram. Source: Author

PROPOSED NEW LAYOUT

At this stage, based on the information obtained, a new layout proposal is prepared. It follows below in Figure 04.

Figure 04 - New proposed layout. Source: Author. 2019

Note that items unrelated to the production flow were removed from the manufacturing environment. There was then greater clarity in terms



of inventory taking, inventories, etc. Because the environment has been better utilized, you can see items in inventory more clearly.

In addition, the new layout proposes the construction of masonry walls around the area occupied by the Sawmill, reducing the contamination of the remaining operations with saw dust. With these modifications, the required displacement has been reduced as well as the total area occupied by the shop floor.

Table 02 presents a comparison between the measurements obtained with the proposed layout and the current situation, making evident the reduction of both the necessary displacement and the occupied area.

Table 02 - Comparison between the current layout situation and the layout proposal.

Travel required	Occupied area	
Current Layout	321,32 m	4.170,98 m²
Proposed Layout	193,2 m	3.395,75 m²
Reduction	39,87%	18,59%

V. CONCLUSION

It can be concluded that the implementation of the new layout is beneficial for the company, generating benefits in both the flow and the displacements made in the company. Among the improvements, we can also highlight the reduction of space used, a factor that inhibits the accumulation of items unrelated to the production of the factory floor. During the work, there was some difficulty in obtaining data from employees on the shop floor. Raising awareness among staff about the benefits that certain improvements can offer to working conditions can be worked out by the board, aimed at fostering a culture of collaboration and continuous improvement among staff.

VI. BIBLIOGRAPHIC REFERENCES

[1] BALLOU, Ronald H. Business Logistics: transportation, materials management and physical distribution. Sao Paulo: Atlas, 2015.

[2] BORGES C. T .; FIELDS S. M .; BORGES C. E. Implementation of a stock control system at a university press / publisher. Electronic Journal Production & Engineering, v. 3, no. 1, p. 236-247, Jul./Dec. 2010

[3] CORRÊA, Henrique L .; CORRÊA, Carlos A. Production and operations management: a strategic approach. 3. ed. Sao Paulo: Atlas, 2012.

[4] GIL, Antonio Carlos. Methods and techniques of social research. 6. ed. Sao Paulo: Atlas, 2008.

[5] LETTI, G. C; GOMES L. C. ABC Curve: Improving finished product inventory management for small food distributors. Update, Porto Alegre, v. 1, no. 2, p. 66-86, jul. /ten. 2014 ..

[6] LIMA, Rafael Caldeira. NEW LAYOUT DESIGN Case study in a clothing industry. 2016

[7] MARTINS, Petrômio G .; LAUGENI, Fernando P. Production Administration. 4. ed. Sao Paulo: Saraiva, 2015.

[8] MUTHER, R. and WHEELER, J. D. Systematic and simplified layout planning. Sao Paulo: IMAM, 2000.

[9] PAOLESCHI.B. Warehouse and Inventory Management-From Receipt, Storage and Dispatch to Stock Distribution.1 ed, Editora Érica Ltda, 2012

[10] RAPOSO, Jacinta de Fatima Pereira et al. Analysis and proposal of process layout improvement in a table game manufacturing company. In: ENEGEP, 34, 2014, Curitiba. Electronic proceedings of the Brazilian Society of Production Engineering. Curitiba: ENEGEP, 2014.

[11] RODRIGUES, Thiago de Almeida et al. Systematic layout planning and simulation for proposing improvements in organizational performance: Application in a furniture industry. In: ENEGEP, 34, 2014, Curitiba. Electronic proceedings of the Brazilian Society of Production Engineering. Curitiba: ENEGEP, 2014.

[12] VIEIRA, Natália Pereira França et al. SLP METHOD APPLICATION FOR IMPROVEMENT OF PHYSICAL ARRANGEMENT: CASE STUDY IN A FOOD COMPANY. Latin American Journal of Innovation and Production Engineering, Curitiba, v. 3, no. 2, Dec / 2014. Semester