PAPER REF: 155

RE-DIMENSIONING OF A WAREHOUSE LAYOUT A PRACTICAL CASE

Marlene Madureira[(1)], Jose Carlos Sá[1,2(*)], Manuel Pereira Lopes[1], Luís Pinto Ferreira[1], Teresa Pereira[3]

[1]Department of Mechanical Engineering, School of Engineering, Polytechnic of Porto, Porto, Portugal
[2]School of Business Sciences, Polytechnic Institute of Viana do Castelo, Valença, Portugal
[3]Design School, Polytechnique Institute Cavado Ave, Barcelos, Portugal
[(*)]*Email:* cvs@isep.ipp.pt

ABSTRACT

This study aims to design a new warehouse layout as a solution to the warehouse's main problem: lack of space to store all the materials in stock. Besides the existing warehouse building, which currently presents an unsuitable layout for the storage of large volumes, there is a second area right next to the first to increase the storage area. The two buildings were re-dimensioned to accommodate a great quantity of stock, enabling one to transform the warehouse building into an industrial warehouse with appropriate storage methods. The final layout increased the storage area by 64%, from a total of 1.471,41 m^2 to 2.414,22 m^2 overall.

Keywords: warehouse, layout, storage area.

INTRODUCTION

The warehouse focused upon in this paper supplies both the company's production lines as well as its clients. Nowadays, the space provided by the warehouse cannot accommodate the quantity of stock units which exist in the company. This has led to the occupation of secondary areas, which should not be congested. In addition to this situation, the materials handled by the warehouse are of different sizes and dimensions, a factor that makes space optimization even more difficult.

Since there was virtually no information pertaining to the storage of the materials in question, the study of materials was based on sampling through successive counts of the existent stock. This was only possible because production planning for the forthcoming years does not foresee a substantial increase in necessities. However, the company does have a short planning horizon as it depends on official tenders, which have rather limited timespans.

A new collection of data was carried out to register the current layout and the "AS IS" state, which resulted in a new warehouse map. A detailed study of project restraints was undertaken, thus supplying the primary information required to begin the layout design proposals. Six layout proposals were provided for each building.

RESULTS AND CONCLUSIONS

The selected layouts are shown in Fig. 1. One was able to increase the use of height space, which was one of the main issues in the current layout. Conventional racking and cantilever racking were also considered in warehouse A, while warehouse B (new building) is dedicated

to the storage of picking material. Materials are thus segregated: small volumes are stored in warehouse B, and material of larger proportions and pallet sizes is stored in building A.

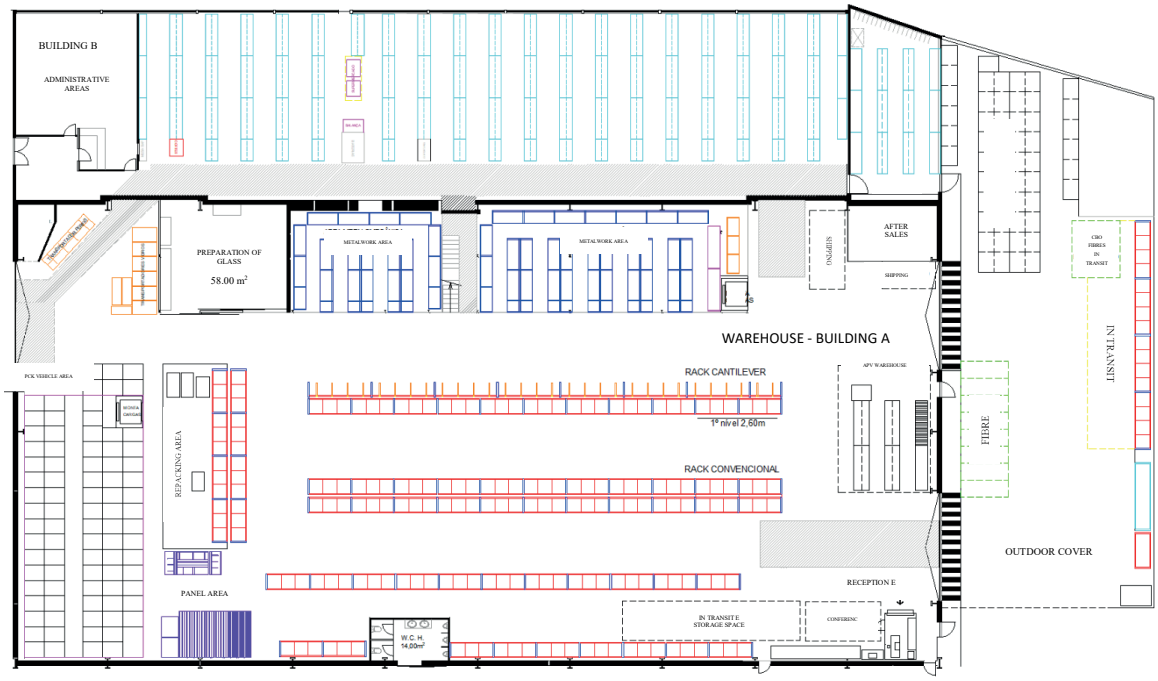

Fig. 1 Final layout

The new layout presents an increase of 218% in height storage, which was one of the main project goals. The proposal added 942,81 m^2 to the storage area, with an additional 64% in usable area, when compared to the present situation. However, some units had to be designated for storage in the covered zone at the entrance of the warehouse due to their excessive size. This would have limited the number of storage structures in the warehouse and restricted space units to other types of components.

Table 1 Comparison between the present layout and the new layout proposal

Comparison: Current state / New layout				
(m^2)	***Present layout***	***New layout***	***Difference***	***Earnings / Losses***
Storage area (floor)	928,26	685,97	-242,29	-26%
Occupied area (floor)	1323,66	1173,43	-150,23	-11%
Storage area (in height)	543,15	1728,25	1185,10	218%
Total storage area (floor + height)	1471,41	2414,22	942,81	64%
Circulation area	1457,74	1765,22	307,48	21%

ACKNOWLEDGMENTS

The author gratefully acknowledges the information provided by the company, which enabled the execution of this study.

REFERENCES

Karakis I., Tanyas M., Baskak M., 2018. “Hierarchical Warehouse Design Approach for Distribution Centres”. International Journal of Business and Management Invention.

Phumchusri N., Kitpipit P., 2017. “Warehouse Layout Design for an Automotive Raw Material Supplier”, Engineering Journal.