

A Case Study of Alternative Pallet Solutions at Tetra Pak

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Pallets are the most common tertiary packaging solution and the demand for pallets has been growing constantly. At the same time, traditional pallet solutions often lead to high transport costs and emissions, as well as other issues like pest migration and low handling safety. Could alternative pallet solutions be the answer? This article explores this question through a case study of Tetra Pak Additional Materials' supply chain.

Background

The most widely used pallet material is wood, which accounts for 86 % of the pallet production worldwide. However, companies are experiencing problems with wood as a pallet material. Disadvantages include forest depletion, degrading of the wood, pest migration, and an unreliable performance of the pallet. Companies also experience problems with pallet sizes; for example, the 1200 x 800 mm Euro Pallet, which is the most common pallet size in the world, has a surprisingly low fill rate in standardized containers. This leads to high transport costs and emissions.

To analyze whether alternative pallet solutions could be the answer to these problems, a case study was conducted at Tetra Pak Addition Materials (AddMat), which is a department at Tetra Pak that develops and manufactures additional materials for beverage cartons. AddMat's supply chain is complex with large volumes being shipped all over the world. The purpose of the case study was to analyze what pallet sizes and materials were best suited for AddMat's different product areas and to calculate the resulting savings, in terms of cost and CO₂e emissions, from using the alternative pallet solutions.

Pallet Materials

There are a number of different pallet materials, but this study considered the three most common ones: wood, plastic, and paper. Wooden and plastic pallets are reusable, while

paper pallets are mainly used once or a few times. Each material has different pros and cons; wooden pallets are relatively cheap and have a large and reliable supply, but they are heavy, have an inconsistent performance and a low food safety. Plastic pallets have a high reusability, durability and food safety, but they are costly and made from a non-renewable material. Lastly, paper pallets are cheap, lightweight, and easy to customize, but they have a low durability and are susceptible to moisture.

Which of these three pallet materials fits AddMat's supply chain the best? After research and calculations on costs and emissions, paper pallets were deemed the best choice for AddMat. The main benefits compared to wood was the lower price which could reduce pallet purchasing costs with up to 70 %, the lower pallet weight which leads to lower emissions in the transport phase, and the higher food safety. Plastic pallets might also seem like a good option at first glance, but since AddMat has a global and highly complex supply chain, it would not be possible to have a closed system with returns of plastic pallets. The only viable option would be to lease plastic pallets from CHEP, the world's largest pallet pooling company. However, this would likely lead to increased costs, which is the main reason plastic pallets are not recommended for AddMat.

Pallet sizes

In this study new optimized pallet sizes were invented, the most promising of which had the measurement 1200 x 770 mm and was named OP₁ (Optimized Pallet 1). Simulations in a program called StackBuilder enabled calculations of a truck and container fill rate measurement called deck-area coverage. Deck-area coverage is the proportion of the floor covered by a pallet. This showed that OP₁ performed much better than the Euro Pallet, especially in 40-foot containers where the fill rate was 15,5 % higher for OP₁ compared to the Euro Pallet. This significant difference in deck-area coverage is visualized in figure 1. Replacing all Euro Pallets with OP₁ was calculated to lead to reductions of cost by 7,9 % and reductions of CO₂e emissions by 7,2 % for the transport of those pallets. Due to the large volumes shipped by AddMat, this means a lot of money saved, as well as a significantly lower climate impact. OP₁ is also a good replacement for the Euro Pallet due to the similarity in size, which makes OP₁ compatible with the same racks and material handling equipment as the Euro Pallet.

Recommendations and contributions

The case study resulted in these recommendations to AddMat:

- 1) Use paper pallets instead of wooden pallets, mainly due to the lower purchasing cost, the lower emissions in the transport phase, and the higher food safety.
- 2) Replace the Euro Pallet with OP₁, which will increase fill rates, which in turn leads to reduced costs and climate impact.

Further information on how these changes affect all parts of supply chain can be found in the report. This study applied available research to a unique case context, which enabled new conclusions to be drawn. One contribution of the study was the methodologies conceived in the study for inventing optimized pallet sizes and for assessing the performance of pallet sizes. These methodologies are described in the report. This study is also useful for companies who are considering evaluating or changing their pallet solution. Lastly OP₁ could be a good substitute to the Euro Pallet for companies loading Euro Pallets in containers.

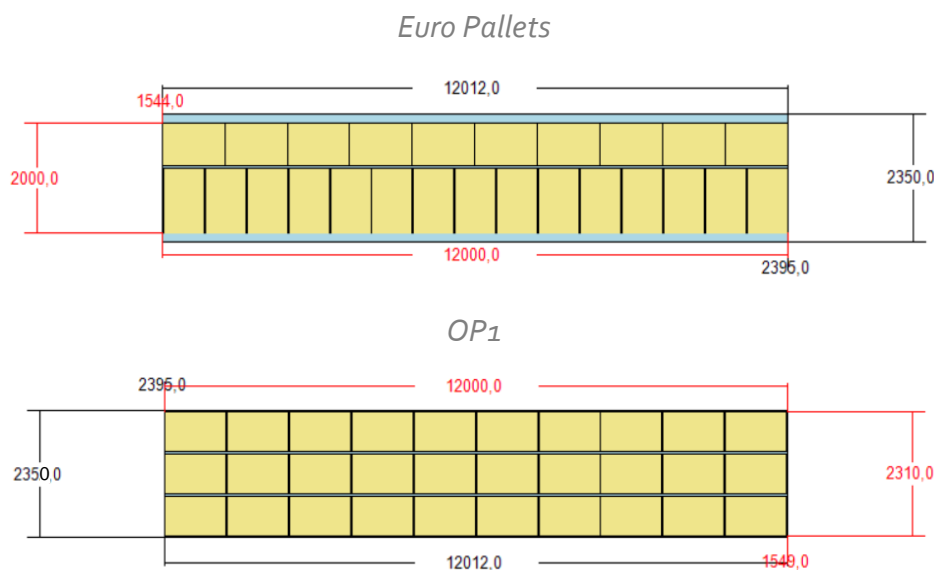


Figure 1. Visualization of the deck-area coverage of Euro Pallets and OP₁ in standard 40-foot containers. Simulation obtained from the software StackBuilder.