

PAPER SACKS MEET HIGH DEMANDS

Catherine Kerninon, EUROSAC, France, and Elin Floresjö, CEPI Eurokraft, Sweden, provide an overview on the latest developments in the paper sack and sack kraft paper industry and present the results of recent market research conducted by the Swedish Research & Development Institute Innventia.

The demands on modern industrial packaging solutions are constantly increasing. This development also affects the cement industry. Next to product protection, several factors need to be considered when choosing the ideal packaging – these range from characteristics concerning the packaging material to performance in filling, distribution and storage, as well as aspects concerning handling by the end user.

In order to assess and specify the current and future demands of its customers, the paper sack and sack kraft paper industry constantly invests in research activities. Based on the research findings, paper sack design and performance undergoes continuous refinement. Due to these optimisations the paper sack remains an innovative packaging solution that combines state-of-the-art-performance with strong environmental credentials.



Factor 1: High speed filling.

Recent study assesses the decision making process of fillers and retailers

In 2014, EUROSAC, the European Federation of Multiwall Paper Sack Manufacturers, and CEPI Eurokraft, the European Association for Producers of Sack Kraft Paper, commissioned the Swedish Research & Development Institute *Innventia* to identify the key influencing and motivating factors which have an impact on the choice of sack material and systems by European fillers and retailers of cement, mortar and other building materials. In particular, they were looking at why the target group would select either paper sacks or alternative packaging solutions such as plastic (polyethylene – PE) sacks.

Choice of sack system is of high strategic importance

One of the key results of the study is that participants considered the choice of sack system to be of high strategic importance, connected with high capital spend. The most significant criteria for the fillers' choice of a sack system are: filling speed, low pack cost, strength, moisture protection, dust-free packaging and damage rates. Moreover, the study reveals that paper cement sacks offer considerable cost and efficiency benefits for fillers – they have a lower packing cost and a higher filling speed when using paper sacks. Although sustainability is not perceived as a parameter of highest importance, paper sacks are seen as advantageous from an environmental perspective by the respondents, since they are produced from an inherently natural, renewable and biodegradable material.

Discussion – how paper sacks fulfill the requirements of fillers and retailers

The European sack kraft paper and paper sack industry sees the results of the research as a validation of their continuing efforts to further develop and optimise their products. The article will now explain how modern paper sacks meet the high performance standards of the cement industry, specifically focusing on the most important decision-making factors identified by the study, namely: filling speed, pack cost, strength, moisture protection, dust-free packaging and damage rates. Furthermore, the text below will look at the underlying reasons and give examples as well as insights on other investigations and developments.

Factor 1: High-speed filling

Thanks to the natural characteristics of sack kraft paper as filter material, paper sacks can be filled at very high speeds. The porosity of sack kraft paper enables rapid and problem-free venting during the filling process without requiring complex and cost-intensive air extraction systems. Over the last 20 years, the porosity of the sack kraft paper has been raised by almost 30% – at the same time offering 45% higher strength. Using current technology, this allows filling speeds for cement of up to 6000 paper sacks per hour compared with filling speeds of 2000 PE Form Fill Seal (FFS) sacks per hour.

Factor 2: Low packing costs

The high filling speed is a considerable advantage in terms of efficiency. It results in smoother and quicker processes as well as lower packing costs, as more cement sacks are produced per time unit. Due to a combination of lower capital and lower operational costs, as well as higher production efficiencies, paper sacks are the most cost-effective solution when compared to alternative packaging solutions.

Factor 3: Strength

Sack kraft paper is made from 100% virgin fibres. It gives paper sacks a unique strength, allowing optimisation of the packaging weight while still maintaining stability under a broad variety of conditions. In the last 20 years, the strength of sack kraft paper has been improved by 45% resulting in a reduction of the paper consumption by 25% per sack. A modern paper cement sack can protect up to 300 times its weight.

Factor 4: Dust-free

As a result of the development of high-porosity sack kraft paper, fillers have an alternative to the previously used perforated paper sacks. These sacks have been a major source of dust in the supply chain. Together with the enhancement of the valve technology, the paper sack industry is able to provide dust-tight sack packaging. To support paper sack converters in their filling practices, EUROSAC and CEPI Eurokraft have established a number of technical methods on how to obtain dust free sacks for cement and other building materials. These are

summarised in an industry guideline that will be published in 2016.

Factor 5: Moisture protection

In terms of moisture protection, paper sacks offer reliable solutions suiting the industry's needs. In many supply chains a wrapped pallet with standard sacks constructed with two-ply-layer sack kraft paper is an adequate and cost effective solution. In other supply chains where sacks will be exposed to humid conditions, a two-ply-layer paper construction with an intermediate PE-film will prevent moisture ingress. Depending on the individual requirements the paper sacks have to fulfill, the paper sack industry provides many different types of high-quality specialty paper sacks with different layer and glue concepts. In especially adverse weather conditions, an extremely thin bioplastic, plastic or other adequate barrier film can be part of the surface layer in the paper sack construction to ensure a particularly effective protection. All of the moisture proof sacks run on existing paper sack filling machines with only little or no reduction in speed and are thus much faster than any FFS system.

Factor 6: Low damage rates

Other important factors that influence the fillers decision of packaging system are pack damage and product wastage. In 2015, *Innventia* conducted further research on behalf of EUROSAC and CEPI Eurokraft, which gathered insights into spoilage rates and product wastage at do-it-yourself and whole/retail supply chains. The research institute, which tracked sacks from the point of fill to the point of sale, found that the level of damage to paper sacks does not exceed one to two percent. "Considering the evidence we have gathered, it is entirely realistic that less than one bag per hundred is affected in this part of the supply chain," says Kennert Johansson, Senior Project Manager and member of the *Innventia* research team.

Similar damage rates for paper and plastic sacks

The spoilage rates observed for FFS sacks are similar to those of paper sacks. This finding underlines the perception of the fillers and retailers who experienced similar damage rates of paper and FFS cement sacks. At the same time, this *Innventia* study refutes recent claims that FFS sacks are damaged less than paper sacks.

Best practice for avoiding damage

Innventia's research revealed that among the major causes of damage for either plastic sacks or paper sacks are incorrect palletisation and forklift operations like snagging or tine penetration. The level of spoilage observed varied widely from store to store, suggesting that differing handling practices have a significant impact on the damage rates and can thus be prevented by education and implementation of best practices. CEPI Eurokraft and EUROSAC are therefore working on industry guidelines that will reduce damage and loss in the supply chain of paper sacks even further.



SAFEdy showerproof pack.

Moisture protection

The paper sacks industry's latest innovations in terms of moisture protection were presented by the European federation of multiwall paper sack manufacturers at the EUROSAC Grand Prix Award ceremony in June 2015. They are on the basis of a valve bag and specially designed for building materials.

Example 1: SAFEdy Showerproof

SAFEdy showerproof is the award-winning paper sack by the German manufacturer dy-pack. The sack uses a combination of paper with nano-perforation (facilitating the de-aeration), a PE-coated outer layer, and an intelligent glue concept to make it watertight. Containing only 10% plastic, the sack is an environmentally friendly alternative. "The switch to the dy-pack SAFEdy showerproof package from our previous FFS pack has allowed us to increase production rates substantially utilising existing filling capacity and precluded the need for further investment in filling machinery," says Graham Matthews, Production Manager at Kilwaughter Chemical Company Limited. "The pack performs well in our target markets and the improved carbon footprint is a positive selling point with our customers."

Example 2: HYBRID^{PRO}

The water-resistant paper-based bag HYBRID^{PRO} by the International Paper & Packaging producer Mondi offers long-term protection from direct rain, while being completely compatible with regular paper sack filling equipment. The traditional sack construction is turned inside out so that a high-density PE layer acts as a protective outer ply, while sack kraft paper is used for the inner ply. Thanks to the de-aeration properties of the HYBRID^{PRO}, de-aeration value of 35 m³/h can be reached. Even if stored exclusively outside, the bag offers a longer shelf life to its content: According to building materials producer Knauf, who collaborated in developing the HYBRID^{PRO}, the shelf life for gypsum is doubled.

Environment

Although environmental aspects are not of highest importance in the decision-making process, fillers perceive paper sacks as being preferable from an environmental perspective because they are produced from renewable, biodegradable resources and the paper sack industry thus contributes to a sustainable development. According to German building materials manufacturer Schönox the same preference can be reported for the retail. The company asked its international customers if they favored paper sacks or FFS sacks. Their packaging of choice was paper sacks. The argumentation included practical reasons like a better stability, easier resealing and handling as well as the better environmental impact.

In fact, the European paper sack and sack kraft paper industry very successfully puts efforts into constantly reducing its greenhouse gas emissions, improving energy efficiency and increasing the share of renewable energies – even far beyond the annual improvement speed needed to reach the goals of the European Union's climate action plan for 2020. The carbon footprint intensity of producing one t of average European kraft paper was reduced by 17% between 2007 and 2012. In general, the European paper industry also constantly optimises its energy needs: According to the latest Sustainability Report from the Confederation of European Paper Industries paper mills' energy consumption has fallen by 4.7% from 2011 to 2013. About 95.2% of electricity is produced on-site in

paper mills using the energy-efficient combined heat and power method. At least 56% of onsite energy needs are met by bioenergy that makes the sector less carbon intensive than others. The paper industry is the largest industrial producer of bioenergy, generating 20% of the biomass-based energy in Europe. Moreover, 92% of water used in the paper-making process is returned to the environment, even cleaner than before.

Generally speaking the environmental aspects will be of even higher importance in the future. The 195 countries participating at the United Nations conference on climate change, COP21, in Paris in December 2015 have come to a worldwide agreement to strive for a temperature increase below 1.5°C by the end of the century compared to pre-industrial times. This agreement further focuses on minimising the use of all kinds of fossil materials that are the raw materials for PE sacks.

Conclusion

This comprehensive study among fillers and retailers of cement and other building materials has revealed that modern paper sacks provide innovative and reliable solutions that satisfy the industry's high expectations and requirements. According to the participants, paper sacks meet the most important criteria that determine the choice of sack system. Fillers especially profit from lower packing costs and high filling speeds when using paper sacks. 🌍