



BILLERUD

From Dust to Dollars



2023-10-11

Mikael Peterson



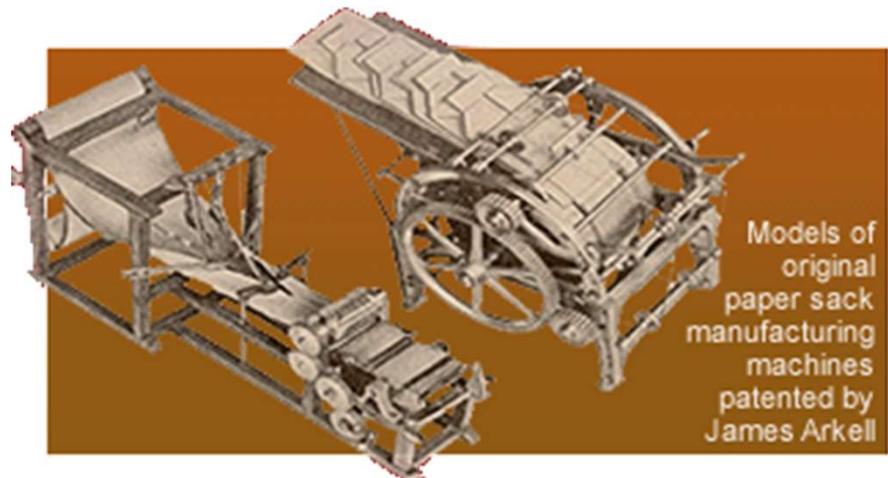
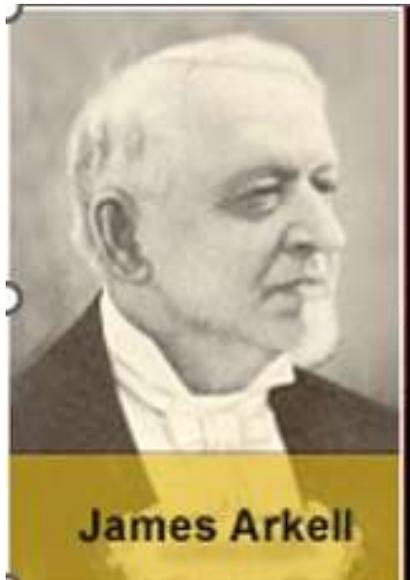
What is the perfect cement packaging?

- Packaging that is **Sustainable**
 - Made from responsible and sustainable resources
- Packaging that is **Safe**
 - For workers as well as consumers
- Packaging that enhances **Efficiency**
- Packaging that **Protects**
 - The filling goods
 - The environment
- Packaging where **Afterlife** is considered
 - Recyclable and Compostable



The journey for the perfect packaging starts....

The birth of the paper sack machine, 1860's



Margaret E Knight

Flat-bottomed paper bag, 1868 (1871)

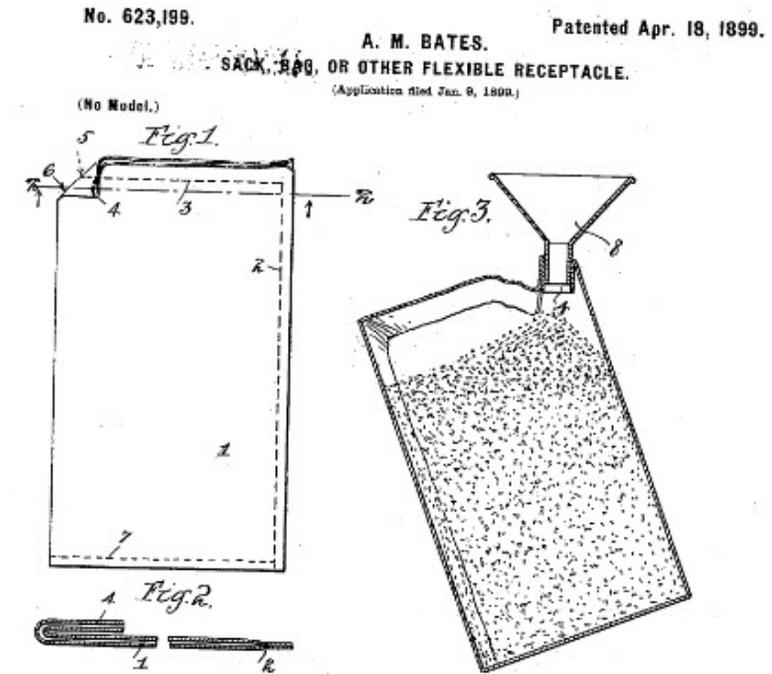


Adelmer Bates

- Self closing valve for paper bags, 1902
- Machine for filling valve bags with measured amount of materials by weight, 1911

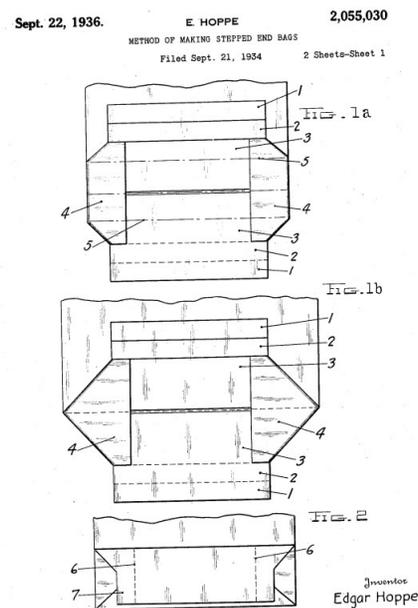
“Cement, grain and flour dusts had long plagued workers with respiratory illnesses, often causing premature death. The invention and acceptance of the Bates multiwall valve bag was a safety breakthrough that has received less recognition than it deserves”

Amigo, E., Neuffer, M. and Maunder, E.R. (1980), *Beyond the Adirondacks: The Story of St. Regis Paper Company*,



Edgar Hoppe

Stepped end methodology, 1934



Samuel Cluett

Sanforizing process, 1930



1950's - New paper production technique
 "Free drying" – web shrinking in CD
 Pioneers: Fiskeby Skärblacks and Korsnäs
 1960's – Finally the Clupak unit were installed

Paper Packaging is Sustainable and Strong

- Paper is made from renewable resources
 - *Billerud source only from responsibly managed forests.*
- Paper is a safe material to use
 - *For workers, consumers, environment*
- Paper sacks enables high speed filling in modern rotopackers
- Paper sacks protects the material
 - *Very low breakage*
 - *Additional barrier possible*
- Paper packaging is easy to dispose of
 - *Billerud papers are recyclable, biodegradable and compostable*



So after 150 years the sack is close to perfect?

- *Valve for high and accurate filling*
- *Enables multiwall for higher strength*
- *Paper gets stronger and stronger, using Clupak and other technologies*
- *Made of a renewable and sustainable material – Paper!*





Dust is Cement Waste!



Dust is Cement Waste!



Cement loss after the drop test of WPP sacks in India.



100 grams of cement



Dust - Material losses

Measured cement losses in plant (per sack)

| | Lowest | Highest | Average |
|---------------------------------------|--------|---------|---------|
| Losses | 400g | 1,200g | 800g |
| Recovered (80%) <i>(Estimated)</i> | 320g | 960g | 640g |
| Lost cement in plant | 80g | 240g | 160g |



Dust – Material losses

Cement loss during transport to consumer (per sack)

| | KPK | WPP | QuickFill |
|---|-------|-------|-----------|
| Cement loss per handling | 30 g | 50 g | 2 g |
| Number of handlings (average) | 7 | 7 | 7 |
| Lost cement per 50 kg sack during transport | 210 g | 350 g | 14 g |



Losses of more than 0,5kg per sack is not unusual – just from dust !



Value of “dust”

| | |
|-----------------------------------|----------------------|
| Cement production | 1 000 000 tpa |
| Total cement lost per sack | 0,37 kg |
| Total cement lost per year | 7 400 tons |

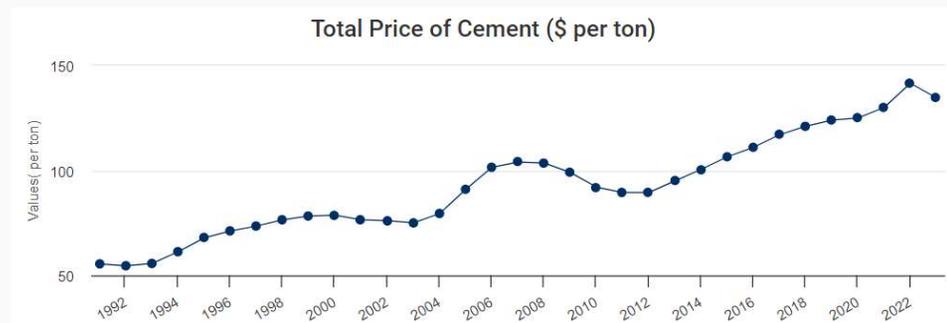
7400 tons ~ 185 40-ton trucks “lost”



Value of "dust"

Price of Cement

Published: August 31, 2023



Source: IBISWorld, 2023

The manufacture of cement produces about 0.9 pounds of CO2 for every pound of cement.

Source: Portland cement association



Value of “dust”

| | |
|-----------------------------------|----------------------------------|
| Cement production | 1 000 000 tpa |
| Total cement lost per sack | 0,37 kg |
| Total cement lost per year | 7 400 tons |
| Assumed cement price | 135 USD/ton |
| Assumed carbon footprint | 900 kg CO₂/ton |

Lost turnover **~ 1 000 000 USD**
Wasted carbon footprint **~ 6 660 ton CO₂**

Dust issues

There are many more issues following in the dusty trail

- Filling machine factors
 - Maintenance costs
 - Wear and tear
- Branding
- Health and safety



HM HASRAT MERANTI SDN BHD
 HASRAT MERANTI (TAPAH) SDN BHD
 HASRAT MERANTI (CHEMOR) SDN BHD

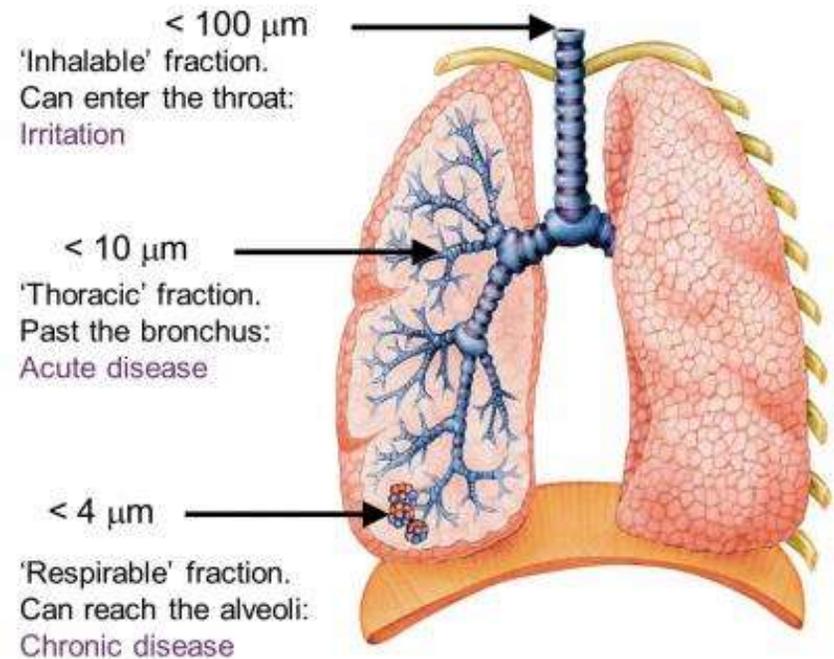


6) BENEFITS AND ADVANTAGES

| | |
|---|--|
| 5) Health, safety and Environmental (HSE) | Dusty High particle dust Workers wear protective masks Cleaning (4 times/shift) Downtime: 120 mins Loss packing: 1,050 bags |
| 6) Machine Maintenance | Sensors blocked by dust Cleaning (4 times/shift) Downtime: 40 mins Loss packing: 350 bags |

Excessive exposure to cement dust is bad for health

- Nose and throat irritation
- Occupational asthma
- Silicosis or scarring of lungs - loss of lung function, severe shortness of breath
- High concentration can lead to death
- Regular Portland cement has 10wt% <math>< 2\mu\text{m}</math>



DUST EXPOSURE MEASURING

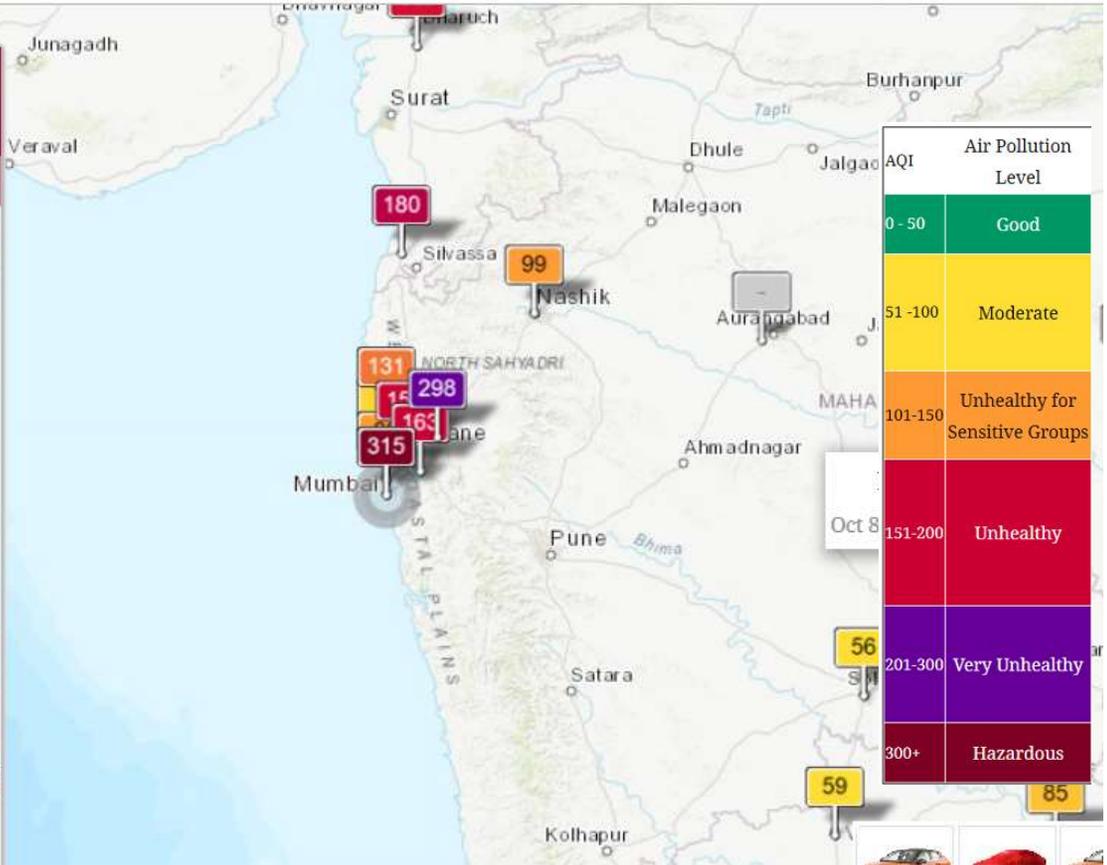
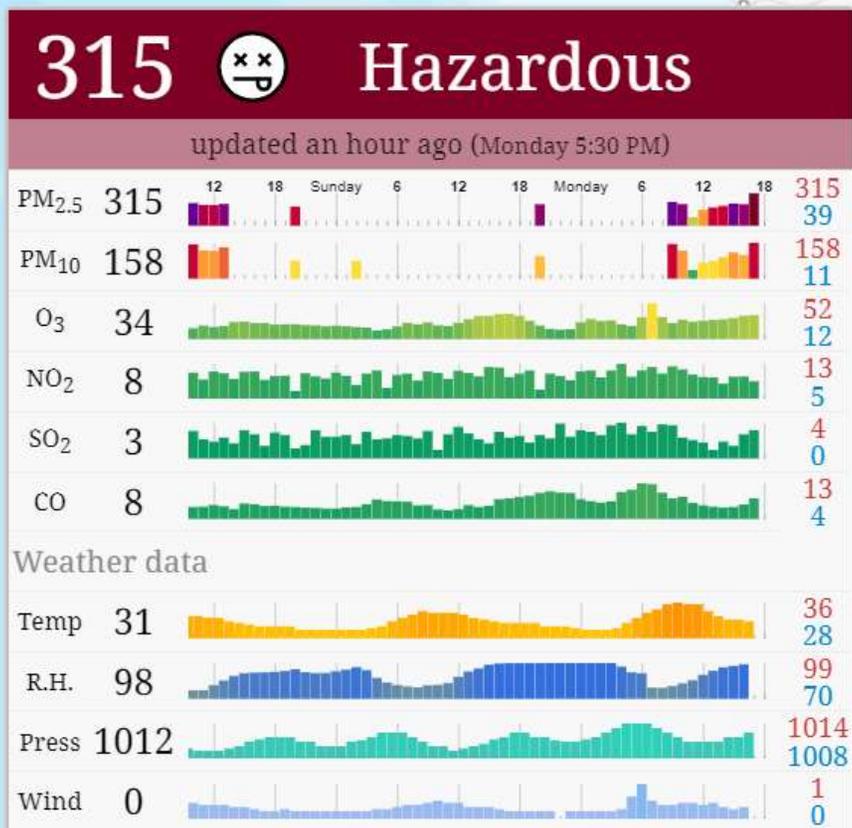
HANDHELD MODEL 831 AEROSOL MASS MONITOR

- PM_1 $PM_{2,5}$ PM_4 and PM_{10} PM=Particle Matter
- PM_{10} = Particles that are smaller than 10 micrometers
- PM_{10} is inhalable
- Most regulators around the world uses PM_{10}
- $PM_{2,5}$ is considered small particles and are normally more hazardous, toxic compounds
- Measures concentration in micro gram/ m^3
- Easy to use



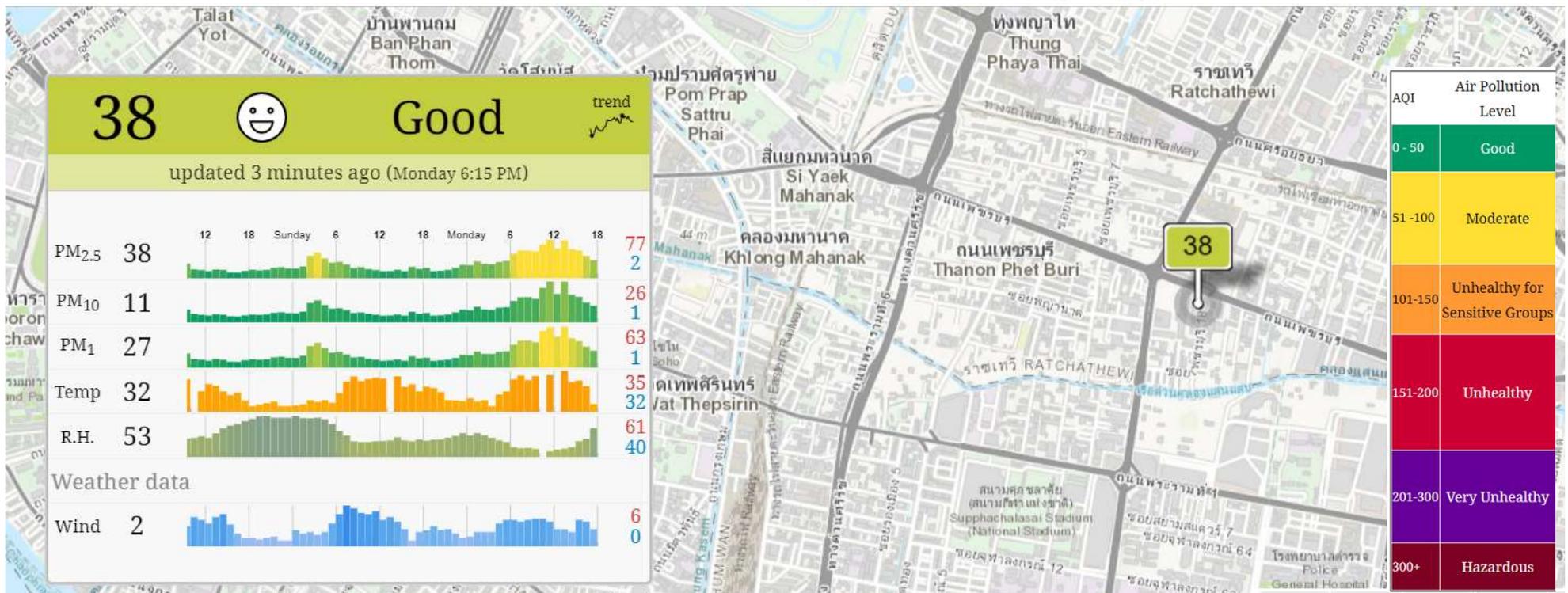
Navy Nagar-Colaba, Mumbai, India Air Pollution

Real-time Air Quality Index (AQI)

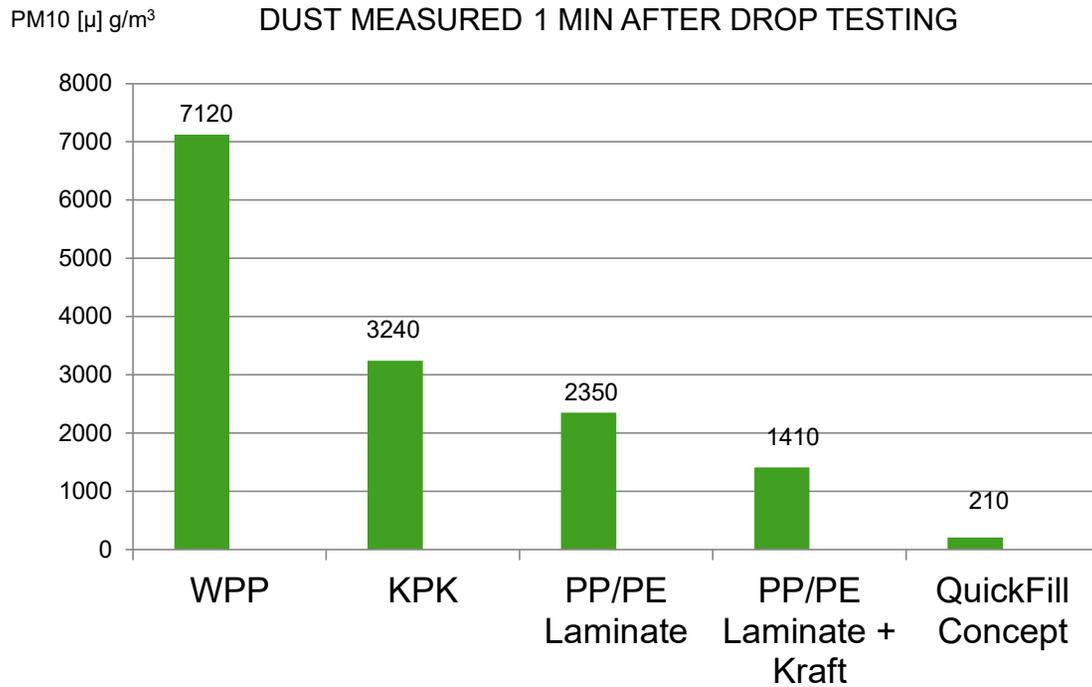


BANGKOK

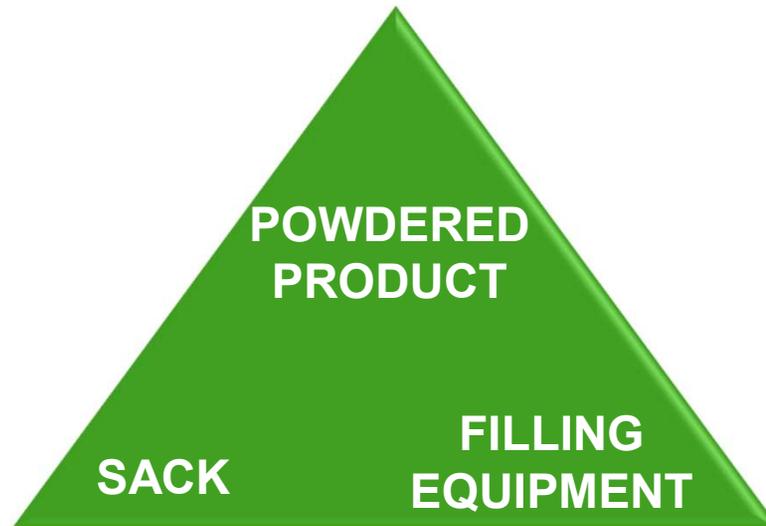
Sansiri - The Line Ratchathewi, Thanon Phetchaburi Subdistrict, Thailand Air Pollution
Real-time Air Quality Index (AQI)



Packaging has high impact on dusting



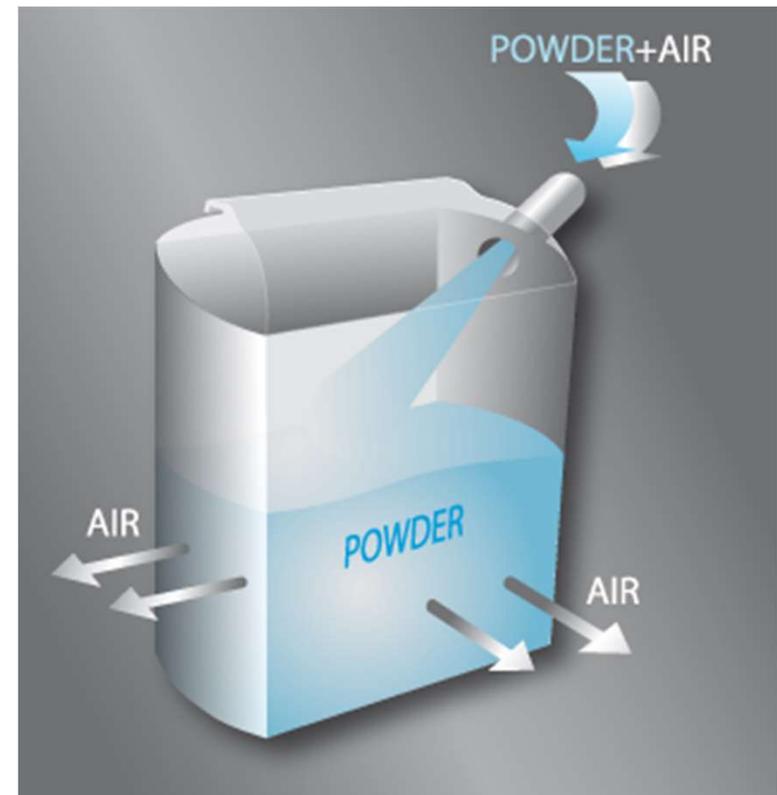
Dust and The Bagging Triangle



The Solution - High deaeration sacks

- High porosity sack paper
 - No need for perforations
 - Strength preserved – perforations mean approx. 10-15% loss of strength

- Less dust
 - During filling for better health
 - Less product waste
 - Retained friction for better handling



BILLERUD QUICKFILL®

- Very strong
 - Enables 2 ply, low grammage
- High performance
 - High porosity
 - Very fast and accurate filling
- Dust free
 - No material losses
 - Better for health and environment
- Environmental friendly
 - Sustainably sourced from certified forests
 - Recyclable



Drive for Sustainability

- More additives in the cement....
.....means higher Blaine
- Challenges for packaging.....
.....more difficult filling
.....more demands on shelf life
-requires new packaging solutions!

MOVING TOWARD A MORE
ECO-FRIENDLY
CEMENT



New Packaging Solutions

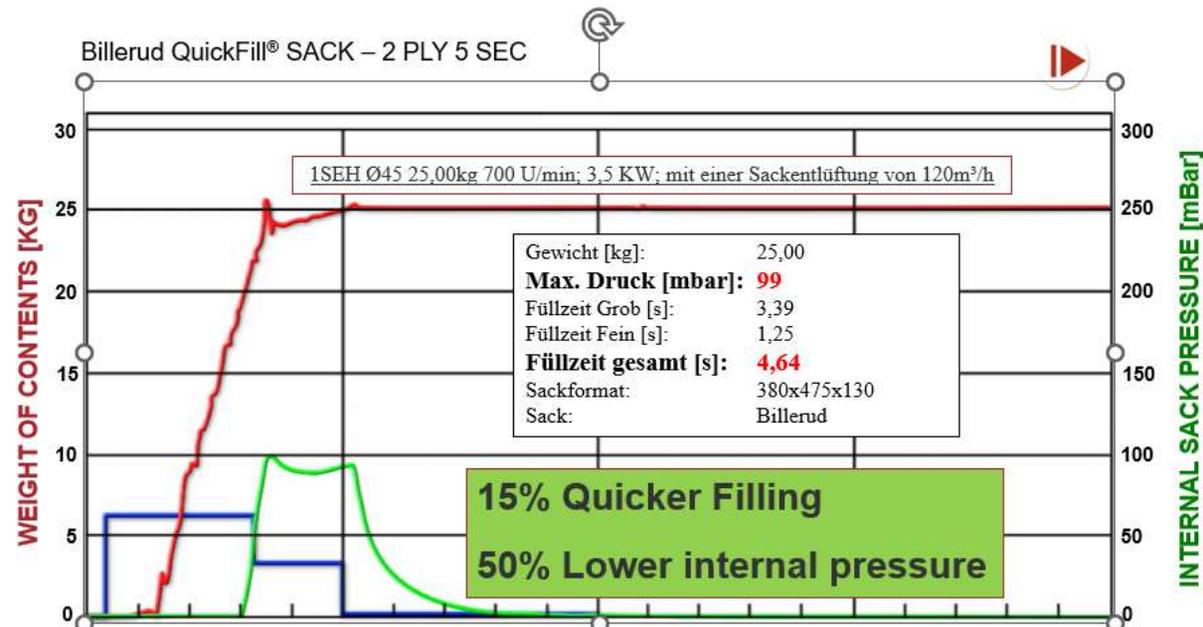
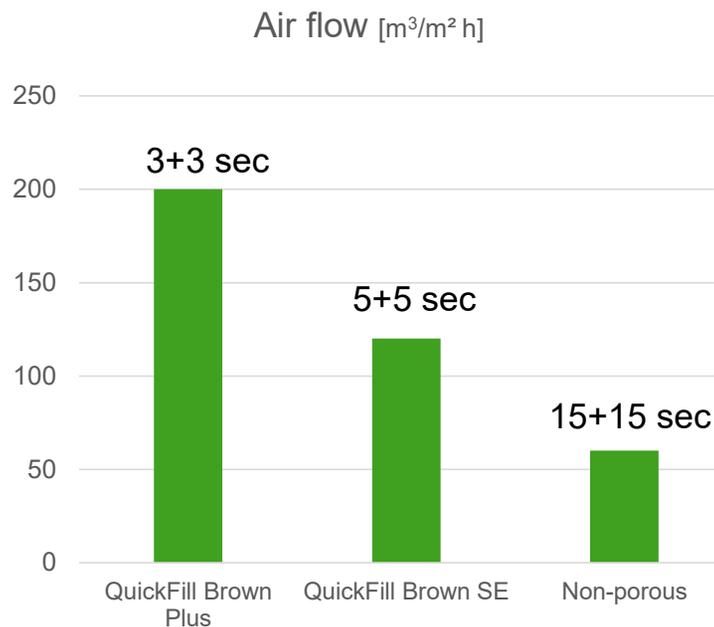


BILLERUD QUICKFILL[®] PLUS



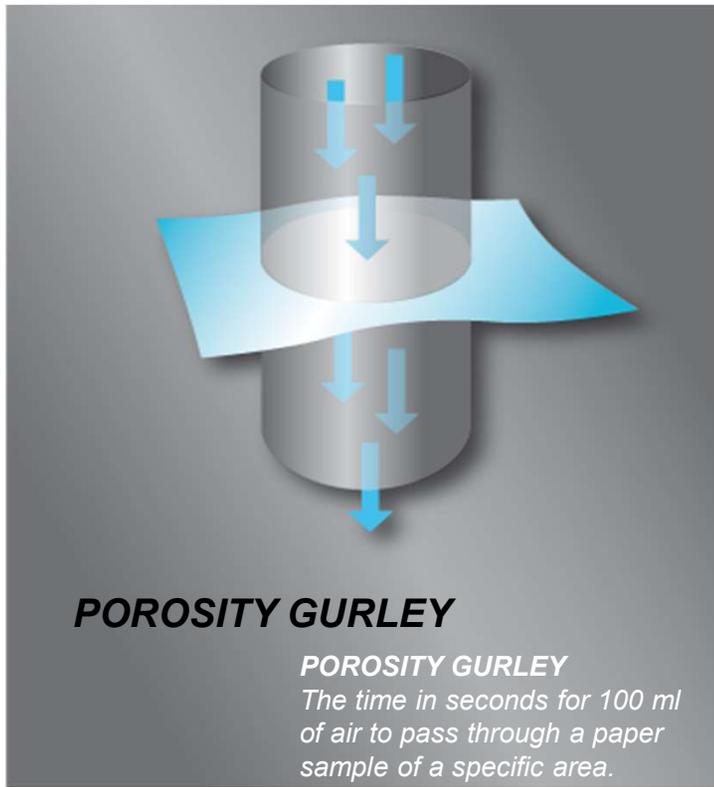
BILLERUD BARRIER SACK

High Porosity enables better filling efficiency



Measuring Dearation

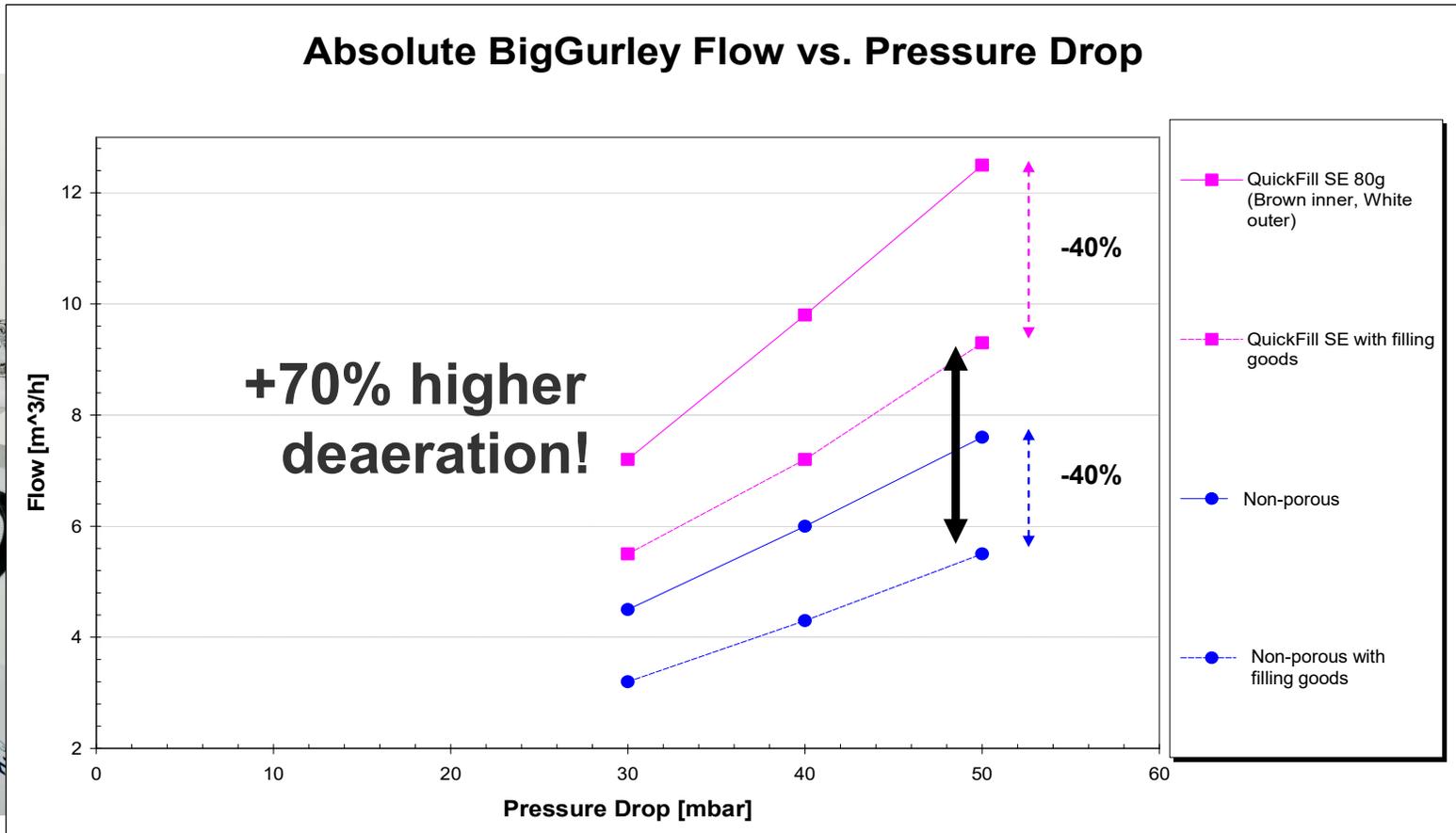
Porosity for the paper – Deaeration for the sack



WILL THE POWDER BLOCK THE PAPER AND EFFECT THE SACK DEAERATION?



Deaeration of sacks for Powdered sugar



From Dust to Dollars

Lots of advantages of using High Porous sacks

- Strong paper – potential to reduce paper grammage
- Reduced size due to extremely high porosity
- Higher filling productivity with challenging products
 - enabling increased sales or cost savings
- No dustings issues
 - Better working environment
 - Less machine wear and need for maintenance
- Less product waste
- Enhanced branding potential

