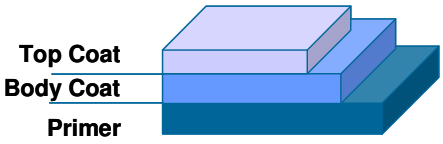
Life-Cycle Costing
BASF PUR Flooring Systems Mastertop 1324, 1325, 1326

BMG Efficiency and Risk Engineering

PUR (Polyurethane)

BASF Mastertop Flooring Systems 1324, 1325, and 1326 are PUR based and are used for applications in hospitals and schools for rooms or corridors. PUR comprises resins, hardener components as well as fillers. PUR flooring systems are applied seamlessly.

Composition and Layers



BASF PUR flooring systems are basically made of 3 layers and consist of about 60% of PUR components (thereof 10% based on renewable raw materials), 30% of fillers such as silica sand and 10% of other materials. The total weight is of about 2.6 kg/m^2.

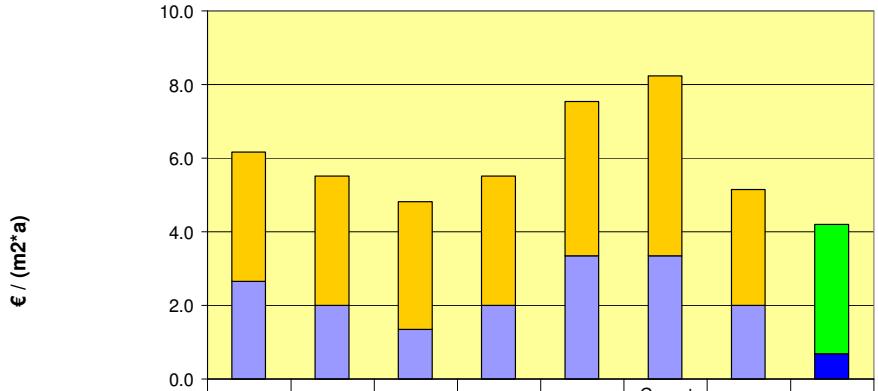
Life-time of PUR Systems and Renewal

An important advantage of PUR based flooring systems is the possibility to renew the top coat - called retopping - without a complete removal of the flooring system. The top coat is partially removed (grinded) and renewed typically every 10 years. The life-time of *primer* and *body coat* is about 40 – 50 years. Other flooring systems have to be removed and replaced completely after their life-time. Compared to other systems, the life-time of PUR flooring systems is long as has been documented by the durability of indoor and outdoor sport flooring applications (for life-time of flooring systems see graph below).

Comparison of Life-Cycle Costs with other Flooring Systems

The data for the comparison of other flooring systems has its origin in Swiss manufacturers and literature studies. Although the scope of these studies is slightly differing, the results show that total life-cycle costs of BASF PUR Flooring Systems are advantageous:

- The costs for application (including product price and application costs, given in €/(m^2 and year of lifetime)) are lower than for the compared systems. The advantageous costs of Mastertop 1324 result basically from its long lifetime.
- The cost for maintenance given in €/(m^2 and year of lifetime) are comparable to PVC, rubber and linoleum floors but lower than for wood and textile floors. However, the costs are slightly higher than for tiles.

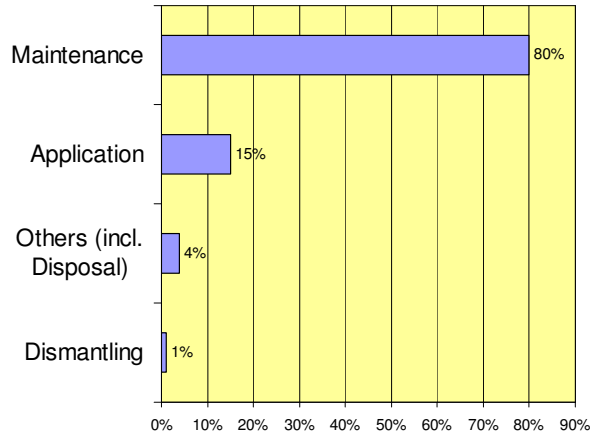


	Polyole-fine	PVC	Linoleum	Rubber	Wood	Carpet (Needel-ded Felt)	Ceramic Tile	Mastertop 1324
Lifetime expected (years)	20	25	25	25	40	15	40	50
Maintenance (Cleaning) € / (m2*a)	3.5	3.5	3.5	3.5	4.2	4.9	3.2	3.5
Application € / (m2*a)	2.7	2.0	1.3	2.0	3.3	3.3	2.0	0.7

Graph: Comparison of life-cycle costs of different flooring systems with PUR based floorings systems of BASF. The life-cycle costs are calculated per 1m^2 and the respective life-time of the flooring system. The application costs of the Mastertop system includes retopping.

Life-Cycle Costing of the BASF PUR Flooring Systems Mastertop 1324, 1325, and 1326

For all three PUR flooring systems of BASF the relevance of each life-cycle step is about as follows:



Two life-cycle steps define about 95% of the total life-cycle costs:

- Maintenance (cleaning including retopping)
- Application of flooring systems

Conclusions

To reduce the total life-cycle costs it is important to reduce the costs for maintenance. These costs can be reduced by

- providing a surface that is easy to clean (e.g. seamless flooring systems),
- using an optimized cleaning procedure for PUR,
- training the maintenance staff in order to apply a correct cleaning procedure.

Additional Economically Advantageous Properties of PUR Flooring Systems are

- seamless application allows an efficient cleaning,
- cost efficient repair of damage,
- retopping guarantees a floor which looks like new throughout the extended lifetime.

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Frame of the BASF Study

What Is Life-Cycle Costing?

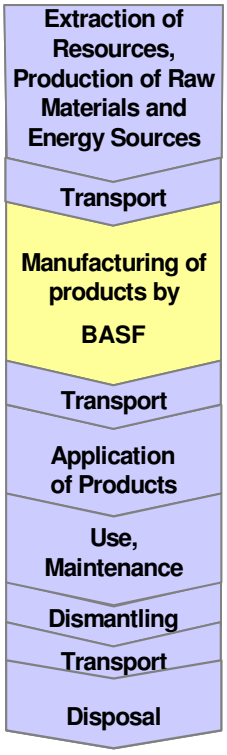
Life-cycle costs are the total costs of a product over the entire life-cycle from the extraction of resources to the disposal of the product.

Goal

The goal of the life-cycle study was to identify the cost relevant life-cycle steps of PUR flooring systems in order to identify improvements potentials and to compare PUR with other flooring systems.

Life-Cycle Steps

The study comprises of the following life-cycle steps:



Manufacturing
Production of raw chemicals and final products.

Transports
Comprises transports by lorry, train or ship.

Use, Maintenance
Comprises cleaning (wet cleaning twice per week, coating once per year), retopping (every 10 years) for PUR based systems.

Dismantling
Complete removal of PUR Systems (including milling).

Disposal
All used flooring system are treated in a municipal incineration plant.

All life cycle steps include packaging materials.

Functional Unit

A functional unit is an entity that is used to compare the life-cycle costs of different products. In this study the costs per m^2 for the total life-time of the flooring systems has been used.

Data Sources

- Cost data for product application retopping and dismantling was provided by BASF
- Costs for cleaning were obtained by a facility management company
- Data on waste disposal were obtained from local suppliers

Comparison with other Studies

For the comparison with other flooring systems, literature data has been used. All compared flooring systems include the raw material production, the application (usage of adhesives was estimated, since no data was available), maintenance (including wet cleaning twice per week and coating once a year) and disposal. Information on dismantling and transports was not available and not considered.

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