

Polyurethanes – Benefits of Polyurethanes



INTRODUCTION

This summary factsheet introduces the four Sustainable Development factsheets which have been published by ISOPA in the last two years. These factsheets cover the following topics:

- o Socio-Economic Information on the European Polyurethanes Industry
- o Saving Energy in Buildings through Thermal Insulation with Polyurethane
- o The Role of polyurethanes in the Cold Food Chain
- o The Benefits of Polyurethanes in Transportation

These factsheets illustrate the great versatility of polyurethanes based on MDI, TDI and associated polyols. They also show the benefits to the environment and to society of the products and the resulting benefits to the European economy.



POLYURETHANE CHEMISTRY

Polyurethanes are made by reacting diisocyanates (MDI and/or TDI) with a range of polyols. The chemical formulations contain, depending on the end product, catalysts, surfactants, often blowing agents and - if necessary - fire retardants. By these means a range of product types can be made –rigid and flexible foams, rigid and flexible integral skin foams, elastomers, adhesives, coatings and sealants. The properties can be controlled by variation of the amount of blowing agent giving a range of densities and the molecular weight of components such as

the polyols which helps to control the flexibility/ rigidity of the end material.

These polyurethane chemicals are used in a range of continuous or discontinuous processes and often combined with other materials to manufacture, for example, insulated building panels, mattresses and upholstered furniture, car seats, domestic refrigerators and freezers, truck bodies, footwear and coatings.



CO₂ AND ENERGY SAVING WITH POLYURETHANES

One of the main attributes and applications of polyurethanes is in rigid insulating foams for range of building applications, domestics and commercial refrigerators and freezers and in truck and container bodies. In the EU more than 40% of fossil fuel-based energy, and hence of CO₂ emissions, is associated with the heating and cooling of buildings. The wider application of existing technology based on polyurethane rigid foam across the EU would reduce overall CO₂ emissions by 10% and enable the EU to meet its Kyoto commitments by 2010.



In the cold food chain polyurethane rigid foam is widely used to keep food fresh at every step in the transport and storage stages and to save energy in the process of doing so. The best known examples are domestic refrigerators and freezers where the EU's energy efficiency programmes have resulted in efficiency gains of 37% in the ten years to 2002.

Energy use and the resulting emissions are growing fastest in the transportation sector. Car manufacturers are using the versatility of polyurethanes to reduce weight and simultaneously improve comfort and safety in car seats, headrests and composite body parts.

OTHER SOCIETAL CONTRIBUTIONS

Polyurethane products also contribute to meeting the need for comfort by being the basis for mattresses and upholstered furniture. Other polyurethane products are the basis for sound insulation mats in vehicles. These examples relate to flexible foams.

Many polyurethanes in transport applications double as safety devices. Examples are steering wheels, fascias and other components in the passenger compartments of cars.

Polyurethanes also contribute to resource as well as to energy conservation. They are inherently durable and abrasion resistant and contribute to the long lives of the end products containing them. Tests and practice has shown the rigid insulating foams retain their high insulation performance for 50 years or more. Many methods for the recovery and recycling of polyurethanes are practised with, ultimately, energy recovery being the method of choice in many sectors.

The key socio-economic parameters for the industry value chain based on MDI, TDI and associated polyols are:

- o Involves more than 23,560 companies
- o Employs more than 817, 610 workers
- o Generates a market value of over €125 billion.

In addition, the associated but indirect activities involve more than 71,000 companies employing about 2,040,000 people. The majority of companies in the polyurethane industry are small and medium -sized enterprises (SMEs).

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