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Potential use of nonwoven textiles in automotive industry

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ABSTRACT

Nonwovens are used in automotive industry for a variety of purposes due to their advantages: lightweight, sound efficiency, flexibility, versatility and easily tailored properties, mouldability (easiness to conforms to irregular shapes), recyclability, low process and materials costs as well as an attractive cost/performance ratio.

Key Words : Non woven, Use, Noise, Control, Automotive industry

INTRODUCTION

Textiles are used in cars for a wide variety of purposes: to enhance comfort, thermal insulation, design, vehicle safety and more often for required acoustic properties. Despite of the fact that textiles represent only 3% of the raw materials used in motor vehicle (compared with 60% steel, 20% plastics, 15% aluminium, etc.), considering the amount of existing vehicles worldwide one can see that automotive industry represents a high potential market for the textile industry. The worldwide growth of automotive textiles shows that is likely to increase for nonwovens, as well as for woven structures, composite and others group of products.

Noise in the car :

Car noise is essentially caused by the unit sound, the exhaust system noise, air-suction noise, rolling and wind noises. All the sources mentioned emit noise directly. While the major part of the sound energy and is spread outwards, some of it reaches the car interior via the body, the running gear or directly. The airborne-noise transmissions or those transmitted via the car interior appear in diverse ways, which partly influence each other. Both noise-reducing measures at the sound sources as well as specific interference the sound transmission mechanisms are important considerations in the achievement of low car noise levels.

Why nonwoven?:

Nonwoven fabric formation is based on fibre-to-fibre relationship rather than yarn to yarn. Most of the research efforts for understanding the sound absorption characteristics of fibrous materials have been devoted to glassfibre mats. Nonwoven fabrics offer an environmentally-friendly alternative to glassfibre mats due to their lower weights, and production methods with lower impact levels on the

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environment. Nonwoven fabrics are "sheet or web structures bonded together by entangling fibre or filaments" (INDA, 2008).

According to INDA (Association of the Nonwovens Fabrics Industry) the most common technologies used to process nonwovens for automotive applications are the following (sq m): spunbonded (66%), needle punching (27%), hydroentangled/resin (6%), others (1%).

According to the same source, the dissemination of nonwovens on product group shows that insulations represent 17% (sq m) from the total applications. Others applications are: carpet related products (43%), trunk (13%), hoodliner (10%), seat (6%), headliner (6%), rear shelf (3%), door (1%), others (1%).

Role of non-woven as noise absorber? :

Noise is an unwanted sound in high-speed transportation. Noise is an increasing public health problem according to the World Health Organization's "Guidelines for Community Noise". Noise can have the following adverse health effects: hearing loss, sleep disturbances, feel tiredness, cardiovascular and psycho physiologic problemsetc.Therefore, it is very important to control or reduce noise from traffic, and in factories, offices, and houses. Noise also significantly decreases productivity in various environments.

Undesirable and potentially hazardous noises are a side effect of a wide range of modern engineering and other purposes. With the continuing development of new technologies, particularly the trend towards faster, more powerful machinery, environmental impact of noise is a matter of increasing concern, and considerable efforts are being made to finding effective means of noise abatement. The problem of noise generated within the closed space can be particularly acute, but several practical solutions do exist. The use of textiles for noise reduction is based on two major advantages of these materials, namely low production costs and small specific gravity.

A noise system can be broken down into three elements.

– Noise Source – The element, which disturbs the air.

– Noise Path – The medium through which the acoustical energy propagates from one point to another.

– Noise Receiver – The person who could potentially complain about the quantity or level of noise as perceived at same point.

– In general four basic principles are employed to reduce noise: isolation, absorption, vibration isolation and vibration damping. The study here is focused only on the absorption phenomenon of sound, where sound energy is converted into thermal energy.

Textiles with porous sound absorber are Bulky, high-loft textiles, which essentially behave as a rigid, porous sound absorber. Bulk porous absorbers, such as fibreglass or mineral wool batts or blankets, and needle punched, resin or thermally bonded fibrous textiles, are well-known and all qualify as rigid porous absorbers.

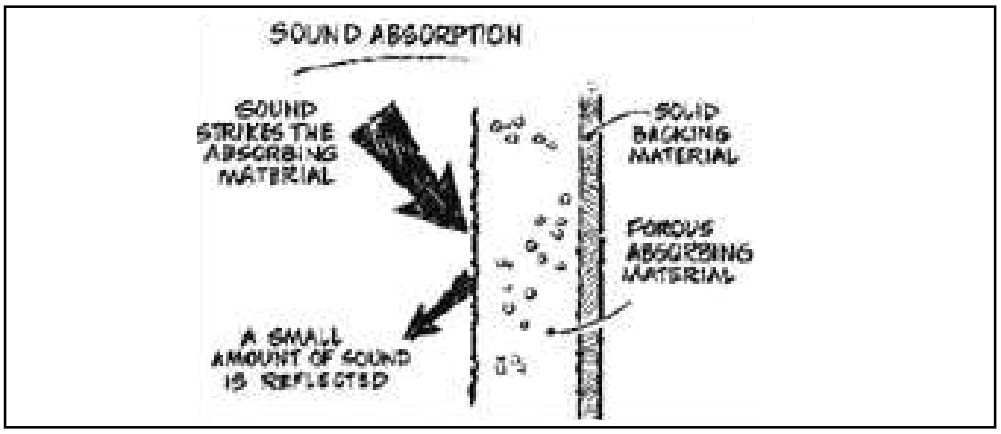
How does sound absorps in fibrous materials ?:

Some materials allow sound to easily enter it. These materials are called porous. Acoustic porous materials can have porosity greater than 90%. Common sound absorption materials are open cell foam and fibre. Sound absorption is an energy conversion process. The kinetic energy of the sound (air) is converted to heat energy when the sound strikes the cells or fibres. Hence, the sound disappears after striking the material due to its conversion into heat.

Some of the properties apart from high sound absorptivity that a sound absorbing material should posses are:

– Appearance.

– Decorative effect.



- Light reflectivity.
- Maintainability.
- Durability.
- Flame resistance.

All types of nonwoven manufacturing types are used but spunbond (66%) and needled (27%) materials are the dominant types. Fibres are mostly polyester (PET) and polypropylene due to cost and good UV resistance. Nylon is mostly in tufted carpets, headliner, and seating in the form or woven, knit, or tufted face fabrics – more likely as not, supported by nonwovens. Solution dyed fibres are finding greater use in order to meet increasing demands for high UV resistance.

Conclusion:

One of the oldest uses of nonwovens in automotives is in noise damping – keeping things quiet. Impregnated jute or shoddy mat materials have been used almost from the beginning. Today's car is much quieter – users demand it, even in the lower end cars. So nonwovens, much more sophisticated than the old padding, have been developed. One of interest is the hoodliner. Formerly often made of a glass mat covered with plastic film, new hoodliners are made of a mixture of microdenier and conventional fibres and moulded to shape to match the engine and compartment to which it is mated. It is estimated that 40% of the cabin noise, for instance, comes from the interaction of tires on the road. Special nonwoven wheel well inserts have been developed and employed as standard equipment to reduce that noise. Anywhere fabrics are used affect the noise level – usually absorbing it.

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