

FIBER AND FIBER CONSUMPTION IN NONWOVENS

1. Introduction

Fibers are the basic element of Nonwovens. Manufacturers of Nonwovens products can make use of almost any kind of fibers. These include traditional textile fibers, as well as recently developed hi-tech fibers. The selection of raw fibers, to considerable degree, determines the properties of the final nonwoven products. The selection of fibers also depend on customer requirement, cost, process ability, changes of properties because of web formation and consolidation. The fibers can be in the form of filament, staple fiber or even yarn. The following table shows the significant fibers used in the Nonwovens industry all over the world.

Table 1 - Fibers used in Nonwoven industry

TRADITIONAL TEXTILE FIBERS	HI-TECH FIBERS
PET	Aramid (Nomex/Kevlar)
Polyolefin (PP/PE)	Conductive Nylon
Nylon	side-by-side, sheath-core, segmented pie and sea-island
Cotton	Melamine (heat & flame resistant)
Rayon	Superabsorbent
Wool	Hollow fibers
Lyocell	Spandex fibers (polyether)
Modacrylic	Fusible co-PET fiber
	PA-6 support/matrix fiber
	Antibacterial fiber
	Stainless steel
	Rubber thread
	PTFE
	Nanofibers

Although there are several natural fibers available for nonwovens, wood pulp - which is far shorter in length than the conventional textile fibers - is the only natural fiber used in

very large amounts because of its high water absorbency, bulk and low cost. Cotton has excellent inherent properties for nonwovens fabrication. Viscose rayon has been widely used in the nonwovens industry in the area of disposables and sanitary products. Rayon fibers can be easily made into webs and readily bonded into nonwovens fabrics. All these cellulose fibers such as cotton, rayon and acetate are absorbent, act as carriers for microbial agents, and give strength combined with biodegradability [1]. Among the synthetic fiber polypropylene (PP) is widely used. PP is inexpensive and has very good rheological characteristics to form fine fibers. PP fibers are hydrophobic, voluminous, and thermoplastic in nature. Polyethylene terephthalate (PET) is used where strength and mechanical properties are of prime importance. Nylon fibers are used for their excellent recovery (resiliency) properties. Bicomponent fibers with different polymers in the core and sheath are widely used in thermally bonded nonwovens [2]. Recent developments in bi-component fiber structure include segmented pie, islands in sea structures. Fiber requirements for nonwovens depend on the product being produced and the fabrication process being used. Since each process leads to a different range of fabric properties, all available fibers cannot be used equally well in all nonwoven processes.

With nonwovens products successfully moving into more technical end-uses, the fiber requirements have also become more exacting with regard to the fiber properties. The cooperation between fiber supplier and fabric producers is now seen as important criteria for additional advancements to come about in the nonwovens field.

Although a large number of fibers are available, commercially important nonwoven fabrics have been limited to relatively few types, the dominant fibers include **polyolefins, polyester, and rayon**. These three fiber types made up a substantial part of the overall nonwovens markets for fibers. The increasing importance of olefin-based fibers is well illustrated by data from major nonwovens-producing regions that show increasing shipments of PP and PE at the expense of some natural fibers, rayon and polyester [3]. Much of this shift in fiber consumption can be attributed to the growing use of olefin-based nonwovens in absorbent products around the world.

Rayon was a major fiber used in the nonwovens industry until 1985 [4]. Over the past decade, production of rayon has decreased considerably in the US and Western Europe because of the increasing cost of the fiber. Since cost of PP and PET dropped compared to that of rayon, and yet they provide superior strength there was big drop in 1989, after which the shipment of rayon staple kept declining slowly. Nonwovens made of rayon are mainly found in medical/surgical/sanitary products and wipes. The cleanliness and absorptive properties made rayon popular in these fields. Similarly, cotton is the preferred fiber in tampon and incontinence products. Its consumption is stable at 40-45 million pounds. Nylon, which is more expensive than most other fibers, is used in a lesser extent. The other "special fibers" listed in table 1 has only a limited market share, probably no more than 15 percent of the whole Nonwovens market.