

SPECIAL FOCUS: *The DRA All-Fiber Model:*
A Unique Tool to Help Chemical Companies' Long Term Planning

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CMAI and David Rigby Associates (DRA), a textile consultancy based out of Manchester UK, have formed a strategic alliance to provide clients with the only "Fuels to Fashion" expertise and analysis of the global synthetic fiber supply chain.

Part of DRA's expertise is captured in a recently developed computer model of the global textile market which makes forecasts of fiber consumption by fiber and product type, by application area, by country, across all apparel, household and technical textile markets. In addition to forecasting consumption for every major natural and man-made fiber, the model provides extensive detail on yarn type (filament vs. staple, tenacity level, type of texturizing, etc), textile product type (e.g. wovens, weft knits, warp knits, melt-spun nonwoven, needle-punched nonwoven, braids, fiberfill, etc) and type of any coating applied (e.g. PU, PVC, rubber, etc).

The DRA model is based on estimates of final or "citizen" demand for around 250 individual textile products. Forecasts are made on the back of projections for economic or industry "drivers" or indicators of end-use consumption for each application area, for each region. These drivers include car production (for many automotive textiles); tire production (for tire cord), building activity (for construction textiles), etc, while GDP is used as the main driver of demand for most consumer textiles such as home furnishings and apparel. All input parameters are consistent with CMAI forecasts.

To complete the demand forecast, DRA uses its experience and industry knowledge to assess changes in the ratio between drivers and total fiber demand over time for each product on a country-by-country basis. The model also forecasts the impact of changes in fiber availability, their relative prices and other aspects of inter-fiber competition on fiber shares over time.

The fiber price outlooks are provided by CMAI and thus are consistent with the oil and gas outlook of CMAI's energy partner Purvin & Gertz and include the accumulated expertise of CMAI's upstream fiber and fiber intermediates consultants. In this way, the DRA model will enable chemical companies and other

organizations involved in providing material, machinery or other inputs into the textile chain, to assess how demand for their products or services is likely to change up to 20 years ahead.

GLOBAL FIBER CONSUMPTION BY END-USE IN 2000

Final Fiber Consumption now over 62 million tones

According to figures published by Fiber Organon, over 63 million tons of fiber were produced in 2000, using "actual" man-made fiber production figures and estimates of average production levels of natural fibers (to compensate for fluctuations in harvests). Polyester accounts for 30 percent of the total with polyamide a further 6.5 percent (see Exhibit 1).

Exhibit 1: Global Fiber Production, 2000

Fiber	(000t)
Cotton	19,754
Flax/linen/ramie	593
Jute and other vegetable fibers	4,015
Silk	86
Wool	1,250
TOTAL NATURAL	25,698
Polyester	18,908
Polyamide	4,099
Acrylic	2,666
Polypropylene (incl. tape)	5,984
Elastane, aramids, etc	312
Cellulosics	2,819
Glass	2,580
TOTAL MAN-MADE	37,368
Total	63,066

Source: DRA from Fiber Organon, own estimates

In the absence of any information on changes in fiber stock levels, we have taken this production figure as an approximation for mill consumption. From this figure we estimate that some 830,000 tons of fiber in total are lost to the system as a result of wastage during processing, leaving some **62,236 kilo-tons** as our estimate for final or citizen consumption in 2000.

Six Major End-Use Markets

Our analysis of final consumption splits the total market into six broad areas:

- Apparel (excluding specialist protective clothing, but including apparel components such as interlinings and thread)
- Interior Textiles (including home furnishings, household textiles and furniture components such as fiberfill, curtain linings and mattress tickings, for both domestic and contract applications)
- Carpets (tufted, woven and nonwoven, including backing, for domestic and contract applications)
- Medical/Hygiene (including coverstock for diapers, etc, cotton wool, wipes, bandages and medical clothing)
- Automotive/transport (including interior trim, upholstery and carpets, air bags, seat belts, mechanical rubber goods such as tire cord and hoses, fiber-reinforced composites and truck covers)
- Other Technical (including textiles for agricultural, construction, industrial, packaging and sporting applications, protective clothing, geotextiles, and "Technical Consumer Goods" such as bags and umbrellas). This segment includes many low value products such as twine, pulp and sacking, utilising large quantities of natural fibers.

Chart 1 indicates that apparel is by far the largest end-use, accounting for almost exactly half of all fibers consumed, with interior textiles accounting for a further 19 percent, carpets 6 percent and technical textiles in total most of the remaining 25 percent.

Chart 2 shows how each of these end-use segments is split between polyamide, polyester and other fibers. From this it is clear that polyester has a significant share of each segment, while only in carpets does polyamide feature strongly.

CHART 1: Total Fiber Consumption by End-Use, 2000

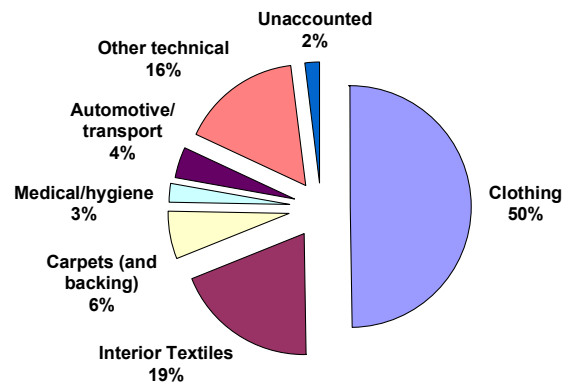
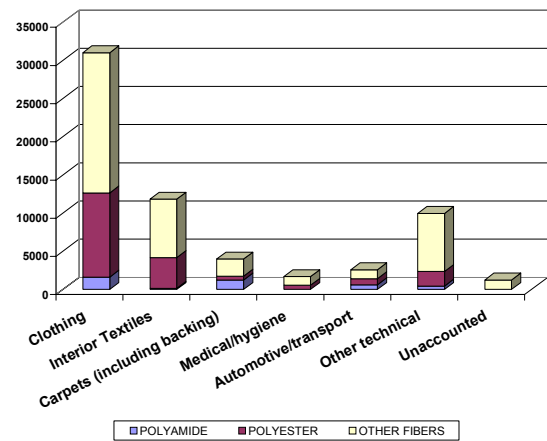


CHART 2: Fiber Consumption by Major End-Use, 2000 (000t)

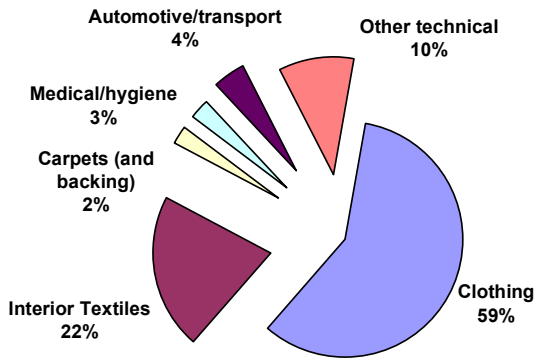


Polyester — A Versatile and Increasingly Cost-competitive Fiber

Polyester offers an excellent price-performance balance combined with a range of properties which have led it to gain considerable ground in a wide range of both technical and consumer applications. In all applications, polyester benefits from a low fiber price and increasingly lower processing cost, especially in the area of dyeing as cationic fibers and disperse dyestuffs become more widely available. As a result, major traditional polyamide end-uses such as black umbrellas (which have a high dye content) have been converted to polyester. In addition, lower costs and improved performance have encouraged the greater use of polyester in coating substrates for apparel fabrics where the fiber has historically suffered from dye migration and "bleeding".

Right across the spectrum, but particularly in apparel and household textiles, polyester also benefits from being highly blendable with other mainstream fibers such as cotton,

**CHART 3:
Polyester Consumption by End Use 2000**



viscose and wool, where polyester adds strength and easy care characteristics. Huge end-markets in both lighter weight fabrics such as sheeting and shirting and heavier applications such as worsted fabrics, account for large volumes of polyester in blended form - with cotton in lighterweights and wool or viscose in heavier fabrics. Polyester fabrics, especially in filament form, also act as excellent print base cloths for use in dresses, blouses and skirts. Textured filament polyester is widely used in basic garments such as skirts and schoolwear. Only in traditional carpet applications does polyester fail to take a major share, as a result of its poor pile recovery. However, its good lightfastness gives it a share in automotive carpets and its low moisture absorption promotes its widespread use in bath mats. In interior textiles polyester is available in flame retardant form for use in contract, and, increasingly, domestic end-uses, and dominates major segments such as net curtains and blinds.

Polyester's price-performance ratio has led it to gain considerable ground in many industrial applications, mostly at the expense of viscose and polyamide in higher tenacity/modulus applications such as tires, belts and hoses and at the expense of natural materials and polymer foams in end-uses such as fiberfill. Polyester rules supreme in major product areas such as seat belts and PVC-coated tarpaulins, while it has become widely used in nonwovens for building, geotextile, filter and medical (including coverstock) applications. The size and importance of the polyester industry in the Far East has led to its particularly rapid introduction there into a range of technical applications. The momentum of polyester in the West, meanwhile, continues to be maintained by on-going developments and investments in new capacity for high modulus low stretch (HMLS) varieties as well as expanding opportunities to recycle polyester bottles and other waste into end-uses ranging from fiberfill to geotextiles.

Polyamide — Increasingly Restricted to Specialist Applications

Polyamide has been the main fiber to suffer as a result of polyester's expansion. In technical markets, polyamide continues to be used in applications which require greater extensibility and energy absorbing capacity ranging from ropes, fishing nets and spinnaker sails to heavier conveyor belting, tires for use on poorer road surfaces, and air bags. However, its higher price and the lack of a "universal" product (Western markets prefer nylon 6,6 while Eastern Europe and Asia have more capacity for nylon 6) have hindered its development and made it a target for substitution by a number of alternative polymer systems offering comparable combinations of properties.

In apparel end-uses, polyamide suffers from both a high price and relatively poor blendability, not helped by a limited supply of staple fiber for blending. The exception is in the area of elastomeric, especially knitted, where the extensibility and softness of polyamide makes it ideal for use in stretch garments. Except in traditional strongholds such as panty hose, control sports fabric, and corsetry, however, even these stretch garment fabrics are increasingly switching to polyester.

A similar trend is being seen in taffeta (lightweight fabrics for linings, foul weather clothing, tracksuits, etc). This has been a traditional stronghold for polyamide, but lower processing costs for polyester have greatly eaten into polyamide's share. Only in the field of carpets does polyamide retain a dominant position, particularly in the US and in the tufted segment, as a result of its durability and springiness. Even here, however, pressure is being felt from polypropylene. Undoubtedly the use of polyamide will continue to grow overall but its share is expected to continue to decline in the face of competition from other synthetic fibers.

**CHART 4:
Polyamide Consumption by End Use, 2000**

