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# BBA FIBERWEB

**T**he nonwovens and aviation services sectors are the two core markets of BBA Group, and following divestments of other operations in the late 1990s, the company has invested heavily in acquisitions and modernization of these two remaining businesses.

BBA's nonwovens operations, recently named BBA Fiberweb, were built up during the early- and mid-1990s with a series of major acquisitions that quickly transformed the company into one of the top global nonwovens producers, and the company has continued to acquire strategically important businesses.

The company's recent focus has been on capacity modernization and rationalization, cost cutting to maintain operating margins, and leveraging manufacturing technology to develop high-margin finished products in its core filtration and hygiene market sectors.

## OVERVIEW

Following the sale of its electrical materials business in 1998 and of the Friction Materials division in the second half of 2000, BBA Group reorganized itself into two business units: Materials Technology and Aviation Services. The Materials Technology operations comprise the nonwovens and related businesses (including a small brake linings business) that were built up during the 1990s through a series of acquisitions. In many cases, the former names of acquired companies, including Reemay (acquired in the early 1990s), Terram (early 1990s), Fiberweb (1995), Corovin (1996), and Veratec (1998), are still used, particularly as brand names. BBA also has a large number of joint venture operations around the world producing nonwovens and composites.

Acquisition of the Corovin business in 1996 made BBA the largest spunbonded producer in Europe, a position that it has enhanced by installing additional spun-melt capacity in Sweden, France, Italy, and Germany from 1998 to 2003. The German operation produces polypropylene and polyethylene fabrics for hygiene,

medical, and home furnishings markets. It also has a small meltblown operation producing filtration and other industrial products, and Corovin had established several German joint venture operations, which BBA continues to operate.

These include Linotec Development GmbH, a joint venture with machinery manufacturer Reifenhauser that manufactures lightweight spunbonded fabric in the former East Germany for hygiene and medical markets, and Finotech Verbunstoffe GmbH, which is a joint venture with film supplier Clopay Plastic Products Inc. for the manufacture of nonwoven and film composites for diaper backsheet applications.

Since acquiring Corovin, BBA has upgraded several of the production lines with additional spinning beams, added a new SMS line in 2003, and added two additional production lines at the Finotech venture, which now annually produces about 35,000 tonnes of nonwoven film composites from three lines.

Corovin also established a number of international joint ventures, which BBA maintains, including the Thai spunbonded producer CNC International Co., which recently expanded with the installation of its second multibeam spunmelt line. In addition, BBA is part owner of Saudi Arabian SMS producer Saudi German Nonwovens Co. (SGN). The company sold its interest last year in South African spunbonded producer Cordustex Manufacturing Ltd., an operation with an annual capacity of about 2,000 tonnes.

During 2000, BBA increased its share of the Linotec venture and the joint ventures in Thailand and South Africa. In early 2001, BBA also established a new technology joint venture with Dow Chemical Co. in Germany called Advanced Design Concepts GmbH. The venture aims to develop new nonwoven production technologies for a range of hygiene and industrial markets and has many parallels with BBA's collaboration with Clopay and Reifenhauser in the Finotech and Linotec joint ventures, respectively. In April 2004, Advanced Design Concepts announced the commercialization of an elastic bicomponent spunbonded fabric

that is stronger than elastic meltblown materials and competitively priced with materials laminated with film or netting.

The 1998 acquisition of Veratec from International Paper for £161 million significantly increased BBA's North American spunbonded and carded nonwovens capacity. The deal also included Veratec's cotton bleaching business, which BBA retained.

Between the major acquisitions, BBA also made a number of smaller yet strategically significant purchases to enhance two of its core business areas: hygiene and filtration. These acquisitions included Italian custom absorbent core composite producer Korma SpA, which was acquired in 1997. BBA has since added capacity in Italy and installed a similar composite line at its Simpsonville facility in North America.

In late 1997, BBA bought Brazilian heavy-weight polyester spunbonded and needlepunched fabric producer Bidim Ltda. from Rhodia-Ster SA. In 1998, BBA bought a 15% share of startup advanced gas filtration media producer AQF Technologies LLC from Hoechst, which retained 85% control of the company. BBA acquired the majority of outstanding shares in AQF in 2000 and moved further to aggressively expand its filtration operations. Also in 2000, it acquired Snow Filtration Co. LLC, one of the largest converters and distributors of air and liquid filtration products in the U.S., for \$30.7 million. It has since sold Snow's cut-and-sew Industrial Fabrics Division, which made finished filtration products.

In early 2003, BBA acquired a small competitor in the polyester spunbonded market, South Carolina-based Superior Nonwovens, for £21.5 million. In a lawsuit filed in late 2000, BBA claimed Superior had been using its proprietary spunbonded technology without permission. The purchase brought the litigation to a close.

The acquisitions will help BBA meet its stated target to become predominantly a hygiene and filtration components supplier. The company aims for the two sectors to account for about three-quarters of its total nonwoven sales. Following the acquisition of Snow, BBA integrated that company and AQF with its existing Reemay operations to create a new BBA Filtration business unit.

Some of BBA's filtration operations were also included in another new business unit created in early 2003. The Absorbent Media Group was established to build on the company's existing expertise in the Korma absorbent core and airlaid businesses together with certain filtration expertise, and it will target air and water filtration, waste liquid management, and odor control.

### BBA Fiberweb major production technologies

Technology	Raw material	Bonding process	Fabric weight
Spunbonded	Polypropylene	Thermal, thermal calender	8-300 gsm
	Polyethylene	Thermal calender	23-150 gsm
	Polyester	Thermal (point and area)	13-200 gsm
		Thermal	100-400 gsm
	Bicomponent	Thermal calender	15-150 gsm
		Thermal calender	10-160 gsm
SMS/SMMXS	Polypropylene	Mechanical, thermal	20-400 gsm
		Thermal calender	n.a.
Meltblown	PP/PET	Through-air	17-40 gsm
		Thermal	40-80 gsm
Carded	Rayon/PP	Thermal calender	30-110 gsm
		Thermal calender	25-60 gsm
	Nylon, PET, PP	Resin	n.a.
		Chemical, thermal	30-110 gsm
Hydroentangled	Rayon, PET, pulp, rayon bicomponent		
Airlaid	Pulp, binder fiber, SAP, SAF	Latex, thermal	n.a.
Composites	fabrics, films, elastic, powders	thermal calender, ultrasonic, latex	n.a.
Caustic entanglement	Cotton	Mercerisation process	100-300 gsm

As well as growing rapidly through acquisition, BBA has also reported steady organic growth and has upgraded many of its older production lines in addition to phasing out some older capacity altogether.

BBA closed the Lewisburg facility in Pennsylvania, a former Veratec drylaid and wetlaid production site, in 2002. The assets of the wetlaid business were sold to Ahlstrom for an undisclosed amount.

Since then, BBA has continued to incrementally add capacity. In the first half of 2003, the company started up a new SMS line at Peine, Germany, and an SMMS line at its CNC International joint venture operation in Thailand. In late 2003, it also started up a \$35 million, multicolor spunlacing line at the Bethune, South Carolina, facility, replacing a smaller proprietary spunlacing line that had been installed by Veratec in the mid-1990s. In October 2003, Snow Filtration consolidated to a larger facility and became BBA Fiberweb Filtration.

## FINANCIAL RESULTS

Revenues in 2003 were £528 million compared to £495 million in 2002 (at constant currency). Underlying operating profits of £66 million were impacted adversely by £6 million from a significant increase in raw material prices, and BBA's operating margins at 12.4% were slightly lower than in 2002 (13.6%) for the same reason. During the year, the company renamed its Nonwovens business BBA Fiberweb to capitalize on one of its strongest brands. BBA now manages the businesses under three sectors: Healthcare, Industrial Products, and Consumer Care.

In Fiberweb Industrial, the overall market volume growth in 2003 was 4%, with underlying sales growth being 5%, within which construction sales grew by 20% following the introduction of a new Typar house-wrap product. In Consumer Care, sales grew by 6%. This side of the business was significantly expanded during the year: first, by the commissioning of a new baby wipes line in Bethune, South Carolina, which after ramping up in the fourth quarter of 2003 is now running near planned levels; second, with the September acquisition of Tecnofibra, Milan, Italy, for €33 million (£23 million). Tecnofibra is a leading provider of wipes and consumer care materials in Europe. In Fiberweb's healthcare market, volumes were up 5%.

### BBA Group sales and earnings

(£million)

	2001	2002	2003
<b>Total net sales</b>	<b>1,289.4</b>	<b>1,331.3</b>	<b>1,324.6</b>
Materials Technology	515.6	505.2	527.5
Aviation, total	773.8	826.1	797.1
<b>Profit before goodwill</b>	<b>153.4</b>	<b>158.5</b>	<b>146.8</b>
Materials Technology	67.6	68.6	65.5
Aviation	85.8	89.9	81.3
<b>Capital Expenditure</b>	<b>98.3</b>	<b>85.9</b>	<b>75.0</b>
Materials Technology	n.a.	n.a.	n.a.
Aviation	n.a.	n.a.	n.a.

Source: BBA Group

During the year, BBA commissioned new lines in Germany and at its joint venture in Thailand. Capacity utilization improved at the airlaid plant in China. The Finotech joint venture in Germany started new on-line printing capabilities.

Pricing for the year on average was marginally lower, and this side of the business was impacted by the increase in polypropylene costs in the first half. These costs jumped 25% in the first few months of 2003 and subsequently retreated by 10%, where they remained until the end of the year. Although many of these kinds of increases get passed through to customers through contractual arrangements, the increases usually lag the raw materials increases.

## EUROPEAN OPERATIONS

**Belgium.** BBA's site at Zaventem, Belgium, produces nonwovens with a basis weight in a range of 10–300 gsm and in widths from 8 to 450 cm. The raw materials and processes used are PP, PE, PET, PA, cotton, viscose, spunbond, melt-blown, SMS, carded, wetlaid, drylaid, composites, thermal-bonded, spunlaced, chemicalbonded, and ultrasonicbonded. Major applications include medical, filtration, protective clothing, household, packaging, automotive, graphic arts products, industrial specialties, diskette liners, cosmetics, battery separators, wipes, and absorbents. The division's brands are Securon, Novonette, Powerweb, Wetweb, Webril, Nubtex, Photex, Quack, Red-1, Hyton, Red Runner, Ultramesh, VeraTack, Veraclean, Veragard, Covene, Webflo, Flexilon, and Ultraloft.

**France.** The company's operation in France, Fiberweb France SA, is located at Biesheim in the northeast of the country. It exports the majority of its products to Western Europe. In the past five years, the company expanded its proprietary S-Text coextrusion spunbonded technology, with one line starting up in 1996 and another in late 2000, doubling total annual S-Text capacity to about 20,000 tonnes. The S-Text fabric is primarily used for hygiene applications, but it also has some medical applications. The Biesheim plant also includes additional spunbonded lines plus drylaid capacity. Major applications at the site include hygiene, agriculture, medical, and industrial.

**Germany.** The former Corovin operation in Peine manufactures spunbonded fabric in a range of colors and weights from 10 to 180 gsm, although its focus is lightweight fabrics for use in the hygiene industry. Before being acquired by BBA, it had diversified into similar markets as Fiberweb, including construction, medical, and filtration. This together with the similar spunbonded technology used by Corovin and existing BBA companies made Corovin a good fit for BBA.

Corovin manufactures fabric from PP and polyethylene, with various finishes added off-line. Spunbond lines are modified Lurgi-Docan units, and meltblown equipment is supplied by Accurate Products Co. Several lines at the Peine site use spunbonded-meltblown multibeam technology for the manufacture of hygiene and medical products that

require hydrophobic and hydrophilic regions. Major applications include hygiene, medical, building, protective clothing, home furnishing, automotive, and filtration.

One Lurgi spunbonded-meltblown line was expanded with the addition of multiple meltblown beams in 1999, increasing its annual capacity by about 3,000 tonnes. The beams are believed to have been supplied by Reifenhauer. In early 2003, a new Reifenhauer SMS line was started up, annually adding an estimated 6,000 tonnes of capacity. Other lines at the facility include two SMS lines and three spunbonded lines. Total annual capacity at the plant is now over 35,000 tonnes.

In mid-1994, Corovin entered into a joint venture with Charoen Popkhand Group and NEP Realty & Industry Co. Ltd. to establish a spunbonded operation in Thailand called CNC International Co. Ltd. The company manufactures around 3,000 mtpy of spunbonded fabric on one line, and it started up a second line in 2003 producing an estimated 12,000 mtpy of SMMS fabric on a Reifenhauer Reicofil 3 unit.

Corovin also established a joint venture with machinery manufacturer Reifenhauer called Linotec Development GmbH in mid-1997. Linotec is now wholly owned by BBA. The joint venture developed an ultra-lightweight spunbonded production process that could produce uniform fabric with basis weights as low as 8 gsm and widths up to 5.4 m, using a proprietary stretching process. The company also manufactures standard PE/PP spunbonded fabrics on its double-beam lines and can laminate spunbonded fabrics with polyethylene film to create its breathable Linopore brand fabrics. Major applications include hygiene, medical, and industrial.

**Italy.** BBA's production facility at Trezzano Rosa, Fiberweb Neuberger SpA, is the site of an SSMMS line supplied by Reifenhauer. The line was started in early 2000, with an annual capacity of up to 20,000 tonnes of hygiene and medical fabric. The €35-million unit operates alongside two existing spinnelt lines, both of which have undergone modification since the mid-1990s.

A Fiberweb modular spunbond (FMS) line, which is capable of producing spunbonded and spunbonded-meltblown-spunbonded (SMS) composites, was started up in early 1996, and an STP spunbonded line has been modified to produce SMS fabrics. Following the startup of the SSMMS line in 2000, total annual spinnelt capacity at the Neuberger facility is more than 30,000 tonnes. Also in Italy, BBA's absorbent core manufacturer, Korma SpA, rebuilt and expanded its production facilities, where it manufactures custom absorbent core products from nonwovens, tissue, and superabsorbent polymers or fibers.

**Sweden.** The operation, located at Norrköping and now known as BBA Nonwovens Sweden AB, also underwent capacity expansion in 2000, which increased annual spunbonded output by 12,000 tonnes. Two additional spunbonded beams were added to the plant's largest spunbonded line, a 5-m-wide modified Lurgi unit, doubling its capacity to 24,000 tonnes at a cost of about €25 million. The plant has two additional spun-

bonded lines and spunbonded fabric produced there is targeted at hygiene, medical, industrial, and roofing markets.

**United Kingdom.** Terram Ltd. targets geotextiles and construction fabrics markets from its main plant in Pontypool, Wales. It also has sales offices in Germany, France, and Malaysia. Terram's bicomponent spunbonded technology was expanded and upgraded to increase product uniformity in 1997, which increased the plant's overall capacity by 25%, according to BBA. Brand names at this facility include Terram, Filtram, Melfab, Roofstat, and Terra-Firma.

## AMERICAS OPERATIONS

BBA's operations in North and South America include a total of 12 roll goods manufacturing plants in Canada, the U.S., Mexico, and Brazil producing large amounts of drylaid and spinnelt fabric, as well as smaller quantities of needlepunched, spunlaced, and wetlaid material.

**Simpsonville.** The company's Simpsonville, South Carolina, facility was the former U.S. headquarters of Fiberweb's North American operations, and it is now the headquarters of BBA's hygiene operations. It also took over many of the head office functions previously carried out at Veratec's former headquarters at Walpole, Massachusetts.

The Simpsonville facility produces spunbonded, SMS, and carded fabrics for hygiene, medical, and filtration markets. A laminating line was started up at the site in early 1999, and a new high-speed carding line was installed in 2001 that more than doubled the output of carded fabric at the plant.

In 1999, a proprietary Korma absorbent core composite line was installed in a new building on the Simpsonville site at a cost of \$11 million. The line uses the same technology as BBA's Korma facility in Italy to assemble finished cores for diaper and femcare products. There is also production capacity for meltblown fabrics that are used in laminates, and a new composite lamination line was started up in 1999.

Simpsonville is also where BBA's latest generation of spinnelt fabric is manufactured. The company unveiled the so-called Flite 4.0 process technology in early 2001. The fabric produced on the new line is called Sofspan-ETS. It is produced from a patented blend of polyolefins, including low-density polyethylene, and it is said to be easier for converters to process by offering improved thermal, ultrasonic, and pressure-bonding capability. The fabric is reportedly produced on a reengineered SMS line at the plant.

Brands made here include Securon, Celestra, Excell, Softex, and Sofspan.

**Reemay.** In 1999, BBA's Reemay facility in Old Hickory, Tennessee, became the headquarters for the company's newly integrated filtration business, bringing together the Reemay, Fiberweb, and Veratec filtration operations. Production at the Old Hickory site includes polyester and polypropylene spunbonded, needlepunched, and laminated fabric for predominantly durable markets including filtration, housewrap, and geotextiles, as well as specialized markets such

as dryer sheets and Tytar can-separator sheets. It also includes point-bonding, sheeting, and slitting operations, and it is the home of a converting and recycling operation called Tycon.

Reemay is one of BBA's oldest nonwovens businesses. It began in 1986 when its then-owner, InterTech, acquired two nonwovens businesses from DuPont Co. for roughly \$65 million. These businesses were the U.S.-based business of Tytar spunbonded polypropylene and a worldwide business of Reemay spunbonded polyester. The sale included manufacturing facilities for the products at Old Hickory, as well as associated patents, technologies, and inventories. The sale did not include DuPont's manufacturing facility for Tytar in Luxembourg, which used identical technology and the European-based business for that product.

Since being spun off from DuPont, Reemay has grown substantially, and it has become the largest special-purpose spunbonded producer in the U.S. and one of the largest nonwovens suppliers to the filtration market. Its fifth polyester spunbonded line using proprietary technology called Nova was started up in early 1999, almost a year later than originally scheduled due to some re-engineering of some components to enhance the technology. The company says the Nova lines can spin a variety of polymers, and Reemay also is developing several products including three-dimensional, nonroll good material intended to offer significant strength at light weights. Potential applications are construction, filtration, and aerospace.

When BBA acquired the polyester spunbonding assets of Superior Nonwovens in early 2003, production was incorporated into the Reemay business. The 3.2-m-wide Superior line uses pointbonding and areabonding technology.

Laminating operations at Reemay are carried out off-line to create multiple-layer laminates and composites. Other converting capabilities include custom bonding, embossing, slitting, and coating. Reemay itself was also a major supplier of nonwovens to Snow Filtration, a converter of filtration products acquired by BBA in mid-2000. Snow operated a single converting facility in West Chester, Ohio, converting a wide range of fabrics, including spunbonded, drylaid, wetlaid, meltblown, and needlepunched. In early 2004, the Snow Filtration business was moved from Ohio to Old Hickory.

**Washougal.** At the Washougal, Washington, facility BBA has upgraded two of the three modified Lurgi-Docan spunbonding lines since 1997. The first line was modified by the addition of a meltblown beam to the smallest of the plant's lines, expanding annual capacity by 5,000 tonnes.

In 1999, the company said it would replace one of the Lurgi lines with a new multibeam spunbonding line to manufacture an estimated 12,000 tonnes of fabric annually, up from an estimated 9,000 tonnes produced by the old line. The new line has fine-denier capability and started up in late 2000. The third Lurgi unit at Washougal has bicomponent spinning capability and will remain in production. The predominant product manufactured there is the Celestra spunmelt fabric.

**Bethune.** The Bethune facility in South Carolina was a former Veratec site that has become the focus for BBA's new push into spunlace markets. The facility once housed a number of drylaid lines and a proprietary spunlacing line installed by Veratec in the 1980s.

At least two drylaid lines remain at the facility, and BBA replaced the old spunlacing line with a four-card Rieter-Perfojet unit with airforming capability and an annual capacity of up to 15,000 tonnes, although actual output is likely to be around 12,000 tonnes based on product mix. The new line was installed to primarily supply specialty wipes fabric for a multiyear contract with a major converter, believed to be Procter & Gamble Co. Total investment in the project was \$36 million.

**Other Americas facilities.** Several former Veratec facilities have been closed since being acquired by BBA. Veratec had seven nonwovens manufacturing locations in the U.S., Canada, and Mexico and employed about 2,000 people. Since acquiring the business in 1998, BBA has spent about \$25 million to restructure the company, including the closure of Veratec's former headquarters operations in Walpole, Massachusetts; the closure of the Athens, Georgia, carded nonwovens plant; and the 2002 closure of the Lewisburg facility in Pennsylvania.

The Green Bay, Wisconsin, facility was originally built to produce resinbonded fabric softener substrate for its principal customer, Procter & Gamble. After P&G switched to spunbonded polyester softener substrate, Veratec consolidated much of its resinbonded production from the Athens and Lewisburg plants to the Green Bay operation. The plant still produces small amounts of resinbonded fabric softener media, but its future is also in the balance.

The Toronto, Canada, facility houses a 3.2-m-wide Reifenhauser spunbonding line that was installed in the early 1990s and an SMS line that was installed in the mid-1990s. Both produce hygiene fabric. Two thermalbonding production lines in Toronto that produced coverstock were shut. In early 1996, Veratec started up an SMS line in Iturbide, Mexico, to serve the growing Latin American diaper market and was reportedly planning to add an additional line at the facility, but BBA did not do so.

BBA also produces polyester-based nonwovens at a site near Sao Paulo, Brazil. Using spunbonded, resinbonded, stitchbonded, and needlepunched processes, the site manufactures products for geotextiles, shoes, roofing, and filtration end uses.

## ASIAN OPERATIONS

BBA's involvement in Asia includes a joint venture in Thailand (CNC International Co. Ltd.), where a 3,000-mtpy spunbonding line and a 12,000-mtpy SMMS line operate. The SMMS line was started up in 2003 and will supply mainly hygiene and medical markets.

BBA Nonwovens in Japan manufactures product for baby and feminine care, adult incontinence, medical, agricul-

tural, geosynthetics, construction, filtration, personal care, protective clothing, textile, and industrial specialties.

In early 2001, BBA started up its first wholly owned production facility in Asia, a greenfield airlaid plant in China to supply absorbent core fabric to Procter & Gamble Co. for use in domestic femcare products, as well as wet wipes and other end uses.

The \$68 million plant was constructed in Tianjin just outside Beijing and has an annual capacity of about 16,000 tonnes. It is a 2.7-m-wide line incorporating forming heads supplied by M&J Fibretech. The line is capable of both latex bonding and thermalbonding. The plant also has festooning, slitting, and packaging capability.

### **OTHER OPERATIONS**

Saudi German Nonwovens Products Co., a joint venture company in Saudi Arabia, operates an 8,000-mtpy SMS line

supplying hygiene, medical, and industrial markets.

### **BUSINESS OUTLOOK**

The company expects that a number of new R&D projects will come to fruition in 2004—including from the partnership with the Dow Chemical Co. to produce elastic bicomponent spunbonded fabric. Also in 2004, BBA anticipates some benefit from improving economies, particularly in North America, but it will also see full-year benefits from new contracts and acquisitions completed during the course of 2003. The company plans further growth outside of North America.

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<b>BBA Fiberweb nonwovens production (Nonwovens Markets estimates)</b>						
<b>Manufacturing Location</b>	<b>Equipment/technology</b>	<b>Fibers/resins</b>	<b>Fabric properties</b>	<b>Capacity</b>	<b>Brands</b>	<b>Markets</b>
BBA Nonwovens Italy SpA Via Bologna y 20060 Trezzano Rosa Italy Tel.: (+39) 02 909 991 Fax: (+39) 02 909 99400	1 proprietary spunbond line, thermalbond	PP resin	4.5 m-wide; 12-70 gsm	5,500 tonnes	Base	Hygiene, agriculture, industrial.
	1 modified Impianti SMS line, thermalbond	PP resin	3.0 m-wide; 12-70 gsm	7,000 tonnes		
	1 Reifenhauser SSMMS line, Reicofil 3 system	PP resin	4.2 m wide; 15-100 gsm	19,000 tonnes		
BBA Fiberweb Tecnofibra 22070 Carbonate Via Dante, 75 Como Italy Tel.: (+39) 0331-83601 Fax: (+39) 0331-836090	2 hydroentangling lines	Fiber and microfiber	n.a.	20,000 tonnes for wet wipes	n.a.	Hygiene, medical, other. Sportswear insulation, furniture/ bedding waddings.
	1 card needlepunching line with crosslapper Resin and thermalbonded Resin					
BBA Nonwovens France SA F-68600 Biesheim France Tel.: (+33) 389 72 4700 Fax: (+33) 389 72 8982	1 Lurgi Docan spunbond line, thermalbond	PP resin	2.5 m-wide; 17-90 gsm	3,200 tonnes	Agryl, Sodoca, Dipryl	Hygiene, agriculture, industrial, medical.
	1 Lurgi Docan spunbond line, thermalbond	PP resin	3.0 m-wide; 15-70 gsm	5,000 tonnes		
	1 dryform/thermalbond line	PP staple	2.5 m-wide; 15-65 gsm	1,800 tonnes		
	2 dryform/thermalbond lines	PP staple	3.0 m-wide; 15-65 gsm	5,450 tonnes		
	2 proprietary S-TEX spunbond/ thermalbond lines	PP other	3.0 m-wide; 150 gsm	7,000 tonnes	S-TEX	
BBA Nonwovens Germany GmbH Woltorferstraß 124 D-31201 Peine Germany Tel.: (+49) 5171 408 0 Fax: (+49) 5171 408 999  New lines commissioned in 2003	1 SMS line, Lurgi/ Reifenhauser technology	PP resin	2.5 m-wide; 10-150 gsm	5,000 tonnes	Corovin, Corosoft, Corogard, Carolind, Coroquilt, Covertan, Coroval	Hygiene coverstock, protective clothing, medical, automotive, agriculture, filtration, home furnishings, industrial, building.
	1 double beam spunbond line, Lurgi technology		4.2 m-wide; 10-150 gsm	10,000 tonnes		
	1 SMMS line, modified Lurgi technology		3.6 m-wide; 10-150 gsm	11,000 tonnes		
	2 SMS lines, Lurgi/Reifenhauser technology (second added 2003)		3.6 m-wide; 10-150 gsm	15,000 tonnes		
BBA Nonwovens Sweden AB Box 913 601 19 Norrköping Sweden Tel.: (+46) 11 24 4400 Fax: (+46) 11 640 75	1 modified Lurgi Docan five beam spunbond line, with needlepunch	PP resin	5.2 m-wide; 12-150 gsm	24,000 tonnes	Holmestra	Hygiene, medical, industrial, roofing.
	1 Lurgi Docan thermobond line		3.0 m-wide, 12-70 gsm	6,800 tonnes		
	1 Reicofil spunbond line, thermalbond		1.5 m-wide; 15-70 gsm	300 tonnes		
Terram Ltd. Mamhilad Park Pontypool Ghent NP4 0YR UK Tel.: (+44) 1495 757722 Fax: (+44) 1495 763383	1 spunbond line, proprietary technology	PP/PE bico.	5.0 m wide; 65-1000 gsm	9,000 tonnes	Melfab, Roofstat, Terram, Filtram	Geotextiles.

### BBA Fiberweb nonwovens production (Nonwovens Markets estimates)

Manufacturing Location	Equipment/technology	Fibers/resins	Fabric properties	Capacity	Brands	Markets
BBA Nonwovens Reemay Inc. 70 Old Hickory Boulevard Old Hickory, TN 37138 USA Tel.: (+1) 615 847 7000 Fax: (+1) 615 847 7068	3 proprietary spunbond lines	PET, co-PET resin	3.8 m wide; finer-denier fabric (down to 2.2 den.)	35,000 tonnes	Reemay	Home furnishing, apparel, agriculture, coating, filtration, fabric softener.
	2 proprietary spunbond lines	PP resin	5 m wide; coarser-denier fabric	26,000 tonnes	Typar, Tekton, 1 Biobarrier	Carpet- backing, geotextile, agriculture, home furnishing, packaging, housewrap, housewrap, furniture. landscape fabric, can separator pads.
	1 needlepunch line	Spunbond  substrate, PET, rayon, PP staple	4.2 m wide;  40-220 gsm	3,500 tonnes	Typelle	Home furnishing, industrial, coating, furniture, bedding.
BBA Nonwovens Washougal Inc. 3720 Grant Street Washougal, WA 98671 USA Tel.: (+1) 360 835 8787 Fax: (+1) 360 835 2546	1 Lurgi Docan spunbond-meltblown line,	PP resin	1.5 m wide; 14-85 gsm	2,500 tonnes	Celestra	Hygiene, medical, coating, home furnishings, agricultural.
	1 spunbond line, three beams thermalbond	PP/PE resin	3.5 m wide; 14-85 gsm	12,000 tonnes		
BBA Nonwovens Simpsonville Inc. 840 Southeast Main Street Simpsonville, SC 29681 USA Tel.: (+1) 864 967 5600 Fax: (+1) 864 967 5695	2 dryform/thermalbond lines MOTHBALLED	PP, PET, rayon staple	3.5 m wide; 17-130 gsm	6,400 tonnes	Securon, Celestra, Excell, Sofspan	Hygiene, filtration, adhesive, hygienic, wipes, coverstock
	1 high-speed carding line, thermalbond	PP, PET, rayon staple	4.0 m wide; 15-100 gsm	8,000 tonnes		
	1 proprietary spunbond line	PP resin	4.2m wide; 14-70 gsm	7,000 tonnes		
	1 proprietary SMS line	PP resin	3.2 m wide	6,000 tonnes		
	1 meltblown line	PP resin, others	1.0 m wide; 8-300 gsm	450 tonnes		
	1 meltblown line		1.5 m wide; 8-300 gsm	900 tonnes		
	1 spunlace line, pilot only	PET, rayon, cotton, pulp	n.a.	pilot		
Bidim Industria e Comercio Ltda. Rua Iguatemi 192-17 andar Cjs 173/174 italm Bibl 01451-010 Sao Paulo Brazil Tel.: (+55) 11 5573 7998 Fax: (+55) 11 5573 6819	1 spunbond line, proprietary (Rhone-Poulenc)	PET	5.0 m wide; 50-300 gsm	6,000 tonnes	Bidim, Tridim, Biflex, Geogrim	Geotextiles.

BBA Fiberweb nonwovens production (Nonwovens Markets estimates)						
Manufacturing Location	Equipment/technology	Fibers/resins	Fabric properties	Capacity	Brands	Markets
BBA Nonwovens Bethune 500 Chestnut St. Bethune, SC 29009 USA Tel.: (+1) 843 334 6212 Fax: (+1) 843 334 6462	2 dryform lines, specialty cotton  1 Rieter Perfojet spunlace line, four cards plus airlaid capability	Cotton  Rayon, PET, woodpulp, blends	n.a.  3.5 m wide; 20-150 gsm	2,000 tonnes  12,000 tonnes	Webril  Nubtex, Flexilon, Versalon, Everspun	Wipers, medical/ health care Wipes, medical/ health care, home furnishings, apparel
BBA Nonwovens Green Bay 3120 Commodity Lane Green Bay, WI 54304 USA Tel.: (+1) 920 336 0222 Fax: (+1) 920 336 3418	1 dryform line, card and print & resin bond	Rayon, PET, latex	3.8 m wide; 18-65 gsm	4,700 tonnes	Dryfil	Dryer sheets
BBA Nonwovens Reemay Inc. (Formerly Superior Nonwovens) 100 Iso Parkway Gray Court SC 29645 USA Tel.: (+1) 864 876 5040	1 Spunbond line, proprietary technology	PET resin	3.2 m wide; 30-200 gsm	5,000 tonnes	n.a.	Dryer sheets, filtration
BBA Nonwovens Canada 6 Curity Avenue Toronto, Ont. M4B 1X2 Canada Tel.: (+1) 416 285 3100 Fax: (+1) 416 288 1651	1 Reicofil spunbond line  1 Reicofil SMS line	PP resin  PP resin	3.2 m wide; 17-70 gsm  4.2 m wide; 13-30 gsm	4,000 tonnes  7,000 tonnes	Veraspun  Veraspun	Hygienic coverstock, medical/ health care, coating, industrial.  Coverstock.
BBA Nonwovens Mexico Veratec de Mexico SA de CV Km 60.2 Carretera 57 Queretaro SLP San Jose Iturbide GTO 37980 Mexico Tel.: (+52) 42 110 900 Fax: (+52) 42 110 999	1 Reicofil SMS line	PP resin	4.2 m wide; 12-110 gsm	7,000 tonnes	Veraspun	Hygiene, medical, industrial
BBA (China) Airlaid Co. Ltd. 49 The Seventh Ave. TEDA 49 The Seventh Ave. TEDA Tianjin 300457 China Tel.: (+86) 22 2532 9333 Fax: (+86) 22 2532 9338	1 M&J airlaid line, thermal-, latex-, multi-bonding	Pulp, PET, rayon,  SAP	2.7 m wide	16,000 tonnes	n.a.	Absorbent cores, wipes, filtration, medical
CNC International Co. Ltd. 11/16 Moo 2 T.Nikompatana King Ampur Nikompatana Rayong, 21180 Thailand Tel.: (+66) 38 897 1234 Fax: (+66) 38 636 637  New lines commissioned in 2003	1 Reifenhauser SMS line  1 Reifenhauser SMMS line (Reicofil 3)	PP resin  PP resin	3.2 m wide; 10-150 gsm	7,000 tonnes  12,000 tonnes	n.a.	Hygiene, medical, agriculture

### BBA Fiberweb nonwovens production (Nonwovens Markets estimates)

Manufacturing Location	Equipment/technology	Fibers/resins	Fabric properties	Capacity	Brands	Markets
Saudi German Nonwovens Co. P.O. Box 3319 Al-Khobar 31952 Saudi Arabia Tel.: (+966) 3 812 2111 Fax: (+966) 3 812 1333	1 Reifenhauser SMS line	PP resin	3.2m wide; 10-150 gsm	7,000 tonnes	n.a.	Hygiene, medical, industrial
BBA Nonwovens Japan Matsunaga Building 2-1-17 Hamamatsu-Cho Minato-Ku 105-0013 Tokyo Japan Phone (+81) 3 3578 9230 Fax: (+81) 3 3578 9239	n.a.	n.a.	n.a.	n.a.	n.a.	Personal care, Medical, Agricultural, Geosynthetics, Construction, Filtration, Textile, Industrial