



Manufacturing and Facilities

FPD-U.S. is comprised of two manufacturing locations: Winchester, Virginia, and Salisbury, North Carolina.

The Winchester plant is a facility that was started in 1947 and over the years has grown to approximately 10 acres under roof. A full line of quality friction material products are produced (blocks, pressed strip, rolled strip, disc pads and industrial products) operating three shifts per day.

Manufacturing processes are a combination of "tried and true" heat and pressure methods in the area of blocks and strips with "state-of-the-art" unit molding methods in use for disc brake.

As previously mentioned, generally the molded, thermosetting resin process is used, consisting of batch weighing, mixing, preforming, pressing, curing and finishing (grinding, drilling, marking, etc). Recently, "state-of-the-art" technologies utilizing "unit molding" techniques combined with integrated finishing and gaging has been installed to reduce costs.

Quality Control

Emphasis on statistical process control, non-destructive testing, automatic or integrated inspection and adherence to rigid technical and customer specifications has earned Abex the reputation of "THE" quality producer in the friction material

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field.

Quality program emphasis has concentrated on statistical process control in which the production machine operators have been trained to use process control charts to predict quality problems before actual defects are made. Managements insistence on development of process capability has reinforced the importance of statistical process control to our suppliers and our customers.

Raw Materials

As a result of the conversion to asbestos-free products some new and less familiar materials are being used. However, none can be considered extreme or exotic.

The majority of our larger quantity material requirements are petroleum dependent and, therefore, tend to fluctuate with oil prices and availability.

Recently FPD Winchester has put together the most significant project in the history of Winchester - the Phoenix Project.

Phoenix is aimed at readying our Winchester facility for change. Specifically for the change brought about by the rapidly growing global nature of our business and of our competition. We must be a world class producer of friction materials and build upon our

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quality and technical leadership.

Phoenix is our vehicle to do this.

The mission of Phoenix is to transform Winchester into the low-cost friction material producer worldwide.

The employment of state-of-the-art technologies combined in unique ways are the primary means to achieve this mission. There are, however, three major factors that will be considered throughout the project:

1. Alternatives to asbestos.
2. Continued high product quality.
3. Changing customer needs.

Many of the specific features of the Phoenix project address several of these major factors as well as primary mission.

Milestones of the project include:

- 1987 - Introduction of automatic unit molding and automatic finishing for disc brake pads.
- 1988 - Integrated strip finishing lines.
- 1989 - Complete automated block processing.

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1990 - Automated rolled process for passenger car strips

1991 - Elimination of preforming for passenger car and heavy duty strip processing.

The Salisbury plant is a modern "state-of-the-art" facility (1974-75) producing only high volume heavy duty truck blocks. Operations are focused on quality running three shifts per day.

We feel Salisbury is the low cost producer of heavy duty blocks worldwide.

The slab manufacturing process is used, consisting of batch weighing, mixing, preforming, pressing (heat and pressure forming of slabs), cutting into pieces, baking, finishing (grinding to size, drilling holes, marking, grooving, etc.), and packing - bulk and/or sets.

The manufacturing process is highly automated and is continually updated to "state-of-the-art" where appropriate and justifiable. Computers and micro processor controllers are utilized in several areas for control and data acquisition.

Quality Control emphasis is on non-destructive testing (ultrasonic) and is conducted "on-line." Additional automatic inspection is planned (including video scanning). Operator statistical process control is in wide use and the equipment and

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operators are capable of meeting very stringent customer specifications and requirements for consistent quality, tolerances and performance on many different and changing products. Our quality producer reputation remains unchanged.

Though largely self-supporting, staff at Salisbury is minimal, with support services arranged through Winchester as required to supplement Salisbury capabilities (financial services, engineering support, product development and introductions, testing, quality assurance, environmental assessment, etc.). Data processing is on-line with Winchester and production requirements are generated from Winchester. Raw material needs are combined (and common) with those of Winchester being sourced from Winchester, as are major capital purchases.

Both U.S. locations maintain and support active and effective employee involvement programs including Quality Circles, the "Get Involved" program and at Salisbury a modified Scanlon Gainsharing Program. Employee output per manhour is good and all employees are dedicated to the introduction and development of processes for complete new families of asbestos-free products.

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Products

Friction materials produced by Abex - U.S. generally follow a molding process utilizing thermosetting resins and will be 100% asbestos-free starting in 1988. At this time we expect to be the only "full line" asbestos-free supplier.

Abex FPD was first to introduce non-asbestos materials to the Original Equipment market and also first to introduce a quality rivetted drum lining to the Aftermarket.

Market reaction to asbestos-free products is generally favorable, recognizing a great deal of time and effort by Abex and our customers has been required to adapt and qualify the new asbestos formulations replacing asbestos formulations that have been in use for many years.

These activities of application and qualification will continue and expand in the future as asbestos-free products are demanded by other segments of the market.

From a technological viewpoint, product change has been significant and accelerating in the past few years with considerable change expected for the near future. Several factors have been combined to change product technology. They include the following:

0 Change to asbestos-free which was dictated by

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environmental/governmental requirements. This change demands use and development of substitute materials while maintaining competitive cost positions.

FPD-U.S., with its strong technical background and support, was a leader in the development of alternative fibers and fabrication methods that allowed our early entry into the asbestos-free products while maintaining our position as the low cost producer of high quality products for both Original Equipment and Aftermarket segments.

- O Vehicle downsizing and production of front wheel drive vehicles.

Requires materials/formulations that can absorb higher energies while performing noise-free with adequate wear life.

- O Import vehicles have increased penetration of the U.S. Original Equipment market with corresponding impact on the Aftermarket.

Requires tooling and equipment as well as application and development engineering to substitute proper formulation.

Products manufactured and marketed include:

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- 0 Disc brake products include a full line of semi-metallic and asbestos-free non-metallic materials that meet Original Equipment (Ford, Chrysler, Volkswagen) and Aftermarket specifications. Noteworthy applications include:

Ford Escort
Ford Aerostar
Ford Ranger
Ford Taurus Police Vehicle
Tempo/Topaz
Turbo Thunderbirds
Chrysler Stretch Van
Volkswagen

- 0 Non-asbestos strip linings (manufactured using both wet and dry process) again have gained both Original Equipment (Ford and Chrysler) and Aftermarket acceptance for passenger cars and light trucks. Noteworthy applications include:

Ford Ranger
Ford F-150
Chrysler Rear Drum-in-Hat Parking Brake

- 0 Blocks. The asbestos-free formulations pioneered by Abex for the commercial vehicle market again have widespread acceptance in both Original Equipment, Fleet and Aftermarket customers as the premium material and processing details are considered proprietary. It is important to realize that

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Abex's early commitment to asbestos-free products has allowed sufficient time to resolve manufacturing issues normally associated with changes in product mix. The heavy duty product line includes block, pressed strip and disc brake parts. Noteworthy applications include:

GMC Bus Brakes

Greyhound Bus Brakes

Rockwell Disc and Drum Brakes

for Trucks and Trailers

Eaton Brakes

Fruehauf Trailer Brakes

Dana Brakes

Lucas Girling Brakes

It is our intention to exploit the technological advantages we have over our competition which include formulations, processing and our manufacturing plants' commitments to quality through statistical process control.

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