

BANDAG
MANUFACTURING BROCHURE



MIXING



THE MIXING DEPARTMENT RUNS THREE DISTINCT OPERATIONS

Preparing a batch of raw rubber for mixing



The Mixer

The Mixer is an enclosed, automated mixing machine. It is designed to break down rubber and chemicals into working batches of approximately 220kg each.

At the end of the conveyor, the raw rubber is fed into the mixer



The Drop Mill

This is an open roll mill designed to mix the working batch and break it down into a sheet of rubber, roughly 600mm wide and 8mm thick. An imprint wheel marks each sheet with information showing the date, the "recipe code" and which shift produced the material. At this stage a sample is taken from every batch and tested for quality control purposes.

The drop mill - birthplace of another BANDAG retread



The Festoon

Each sheet of rubber is fed into the festoon, a conveyor system that cools the rubber. From there they are layered onto a skid for later processing. At this stage each batch is weighed and laboratory tests are carried out.

The Festoon





EXTRUDING



THE EXTRUDING DEPARTMENT HANDLES FIVE OPERATIONS

The Cracker Mill

The cracker mill is designed to warm up several batches of sheeted rubber together and then send the material to the blend mill by conveyor.

The Blend Mill

The blend mill is an open roll mill that blends the compound, further warming it up in the process so that a uniform, blended stock is prepared for the extruder. Once again, a conveyor transports the material to the next process.

The Extruder

The Extruder is machine with a large motor-driven screw that continually forces the rubber through an adjustable die, forming a rectangular extrusion. Immediately after it leaves the extruder, the extrudate passes over a section of conveyor where its weight per metre is checked. If its weight falls outside of the prescribed tolerances, that length of extruded material is rejected and sent back to be reprocessed.

Cooling Conveyor

A conveyor lined with a water spray system cools the extrudate, which has been forced through the extruder at a high temperature (approximately 170°C).

The Extruder Wind-up

The wind-up process starts with a dip tank of solution, which coats the surface of the extruded material, preventing it from sticking together. The rubber then passes through a guillotine where it is cut to determined lengths. The lengths are then wound into rolls that are weighed and kept on racks for further processing.



Feeding the blend mill



The extruder with the weighing section of the conveyor to the right



The cooling conveyor in the background



Winding up the freshly extruded rubber



PRESSING



THE PRESSING DEPARTMENT COMPRISES HYDRAULIC PRESSES, MOULDS, COOLING RACKS AND MECHANICAL TRIMMERS

The presses - where new tread is formed through the process of vulcanization



The Presses

There are two hydraulic presses. They are fitted with platens and moulds which form and cure extrusion rolls into tread stock of various designs, using the factors of time, temperature and pressure.

The Cooling Racks

The cured tread stock is drawn from the presses onto cooling racks where they are air-cooled. Resultant fumes are also removed with extractor fans.

The trimmer



The Trimmers

The trimmers are machines that remove excess rubber from the moulded tread. After being trimmed, the tread is inspected for quality compliance. It is then wound into rolls for further cooling and storage before being released to the next production process stage. Tread that is found to have defects is sent to the splicing area. The flawed section is cut out and the tread is spliced. No length of tread may be spliced in more than two places.

The splicing area





FINISHING



THE FINISHING DEPARTMENT IS MADE UP OF FOUR IN-LINE PROCESSES

The Buffing Machines

The buffer hosts four in-line wire brush drums. The brushes roughen the surface of the back of the tread, preparing it for cementing during the retreading stage.



Inspection

The finishing Inspector inspects the buffed tread for quality compliance before it continues on the conveyor to the cementing applicator.

The Spiral Cementer

The spiral cementer evenly coats the back of the tread with a rubber cement solution to facilitate the actual retreading process.

Finishing Wind-up

This machinery applies a layer of polythene to the back of the finished tread and then winds the tread into a roll for so that it can be weighed and wrapped. Once weighed, a roll (item) label is generated. The roll is then wrapped in "stretch wrap" and placed on a conveyor to the palletising area. Here rolls of the same tread type are stacked on a pallet and scanned into the operating system. The tread is now ready for delivery to the dealer.

Global Tread Label What's in the label.

PRODUCT NAME: BZY

PRODUCT SIZE: 230

UNIQUE PRODUCT NUMBER: 1001247

MANUFACTURING PLANT DETAILS: BUNGE (INCORPORATED IN SRI LANKA) LTD

ITEM NUMBER: J2302TEST

ITEM WEIGHT IN POUNDS: 41.60

ITEM WEIGHT IN KILOGRAMS: 91.6

DATE OF MANUFACTURE: 29 OCT 2002

TIME OF MANUFACTURE: 11:27

FINISHING LINE WHERE TREAD WAS INSPECTED: CAM 2 230 mm

MANUFACTURING PLANT IDENTIFIER: J=ALRODE PLANT

Additional label text: 41.60 Kg, 29 Oct 2002, 11:27, 230, 1001247, J2302TEST, J2302TEST, 1001247, 91.6 Lbs, 41.60 kg, CAM 2 230 mm, DATE 29 OCT 2002, TIME 11:27, PLT LINE 2, PROF IN 2001



M I C R O - S I P E



Many of our tread designs feature MilEdges®.

MilEdges® are the result of the Micro-Sipe® process where thin lateral sipes are cut across the tread surface.

A Truck using Micro-Sipe® tread can significantly increase traction and cooling. This enhances the cost per kilometre performance.

All passenger treads are Micro-Siped®. Truck treads can be either plain or Micro-Siped® and stock of both types can be made to order.

MilEdges® and Micro-Sipe® are Bandag patents.





THE CALENDAR



The Calendar Department consists of the warm-up mill, the blend mill, the calendar, the wind-up cooling area and the boxing and palletising area. The calendar department produces cushion (HD 30), an adhesion material that is placed between the casing and the tread during the retreading process.

Warm up Mill

This is where the compound is blended and warmed up. It is then sent on a conveyor to the blend mill.

Blend Mill

The blend mill "feeds" the Calendar machine. The compound is kept on this mill until the Calendar requires it. The compound is kept warm and is constantly blending during this time.

Calendar

The Calendar machine sheets the compound and cuts it into the various widths required for the different size treads available.





TECHNICAL DEPARTMENT



QUALITY CONTROL

Bandag's quality control department is concerned with the external quality of their products. Appearance, moulding quality, edge trimming, buffing quality, packaging and labelling-these are all issues of concern to this department. Samples of goods are selected at random according to prescribed sampling sizes.

The goods are inspected to ensure that they are free of a variety of possible defects. Inspection records are kept and analysed daily. Each month the results are collated and reported on, both internally and to Bandag headquarters, USA, so that comparisons with other Bandag plants can be made.

LABORATORY

Bandag's laboratory is ultimately responsible for monitoring, controlling and maintaining the high standard of the rubber compounds mixed and processed at the plant. Once a batch of rubber compound is mixed it is isolated at a holding area. A sample is then taken to the laboratory and tested to ensure that it conforms to the required specifications. Batches that comply are released for further processing.

During the production process, some compounds such as cushions and repair gum are sampled and tested at the laboratory to ensure they comply with the prescribed specifications.

The laboratory also duplicates the bonding process being performed by our dealers with casing and treads, by sampling buffed treads off the finishing line. They are built into adhesion samples, and pulled apart to check the strength of the bond.



WAREHOUSING



Bandag's warehouse holds stock of all its tread designs, including related products such as repair gums and envelopes. This means stock from the warehouse can be delivered to Bandag's dealers at short notice. In some instances a minimum stock level of certain tread designs is kept due to low demand.

Where this is the case, orders for these tread types need to be manufactured. On the other hand, the warehouse is well stocked with standard and more popular tread designs. Orders for local delivery can be affected within 24 hours, while month-end orders and orders for destinations further afield may take a longer.

The warehouse is open on all working days of the year to meet the high demand for stock by Bandag's dealers.

