A Mexican manufacturer of automobile tires produces a variety of tire products in a range sizes, design, and tread configurations. The manufacturing process is complex and involves numerous components to create this advanced engineered product. Rubber fiber, textile, and steel cord are just some of the components that go into the tire’s inner liner, body plies, bead assembly, belts, sidewalls, and tread. The process also requires using the latest technology, equipment, and precision instruments.
The manufacturer needed to accurately measure the length of the tire’s inner liner and perform the specified cut lengths before this material progressed into the first stage of the tire building process.

The inner liner is the inner-most layer of the tire. Its main functions are to retain the compressed air inside the tire and maintain tire pressure. The proper length and thickness, as well the no-defect surface finish, are critical to retaining air pressure. The proper length of the inner liner sheet is pre-cut, so the material is ready for the tire building process.

The tires are built on a flat drum in a two-stage process. In the first stage, the inner liner is wrapped around a drum and the first body ply is wrapped on top, followed by the second body ply. It is critical that the inner liner is cut to the exact length specifications in order to properly register and integrate with the ply layers and other components in the second stage of the process, which include the bead assembly, belts, sidewalls, and tread.

**Problems with Contact Measurement Method.** The tire maker used a contact method for measuring the length of the inner liner and making the specified cut lengths during production. But, this technology created numerous measurement errors due to slippage, debris build-up, and day-to-day wear issues. The contact measurement system also marred the liner, affecting the integrity and quality of the product. These problems resulted in significant production downtime and material loss, affecting the company’s profitability. The company needed an accurate, non-contact length measurement system to ensure it produced the inner liner to the highest product quality specifications.

The process engineers at the company selected the Beta LaserMike LaserSpeed LS8000-310 non-contact encoder for its cut-to-length inner liner operation. The encoder uses advanced, laser-based, non-contact technology to precisely measure the length and speed of the material in the cutting process. The LS8000-310 projects a unique pattern on the surface of the liner. As the product moves, light is scattered back to the LS8000-310 unit. This information is translated into product speed and pulses are produced to determine the liner length. The encoder sends a pulse output to a control system to trigger the precise post-length cuts. This solution enables the company to measure liner lengths and control the cutting operation at fast-processing speeds with accuracies up to ±0.05%.

**Critical Process Factors.** The key process determinants used to specify the appropriate length measurement solution included:

- Ensuring the exact length of the inner liner before proceeding with the 1st stage of the tire building process
- Minimizing downtime due to mechanical failures and equipment recalibration

**Installation.** The LS8000-310 is installed downstream at the cutting station. Due to the proximity of mechanical structures on the line and clearance requirements, the encoder is mounted perpendicular to the material at a standoff distance of 1000 mm (39.4 in). The LS8000-310 projects an elliptical shaped measurement area of 100 mm (3.0 in). This provides the ample depth to accommodate the material thickness of the liner and ensures accurate measurements during production. The LS8000-310 also provides the same outputs as the mechanical contact encoder for easy installation. Minimal modifications were required to the manufacturing line and cut control process.
While it’s still early to determine the productivity results and ROI, the tire manufacturer anticipates the following benefits from implementing the LaserSpeed measurement solution:

- Highly accurate and repeatable length measurements
- Eliminate defects in product integrity with non-contact method
- Minimize product waste, maximize profits
- Reduce downtime due to on-going maintenance
- Reliable operation during production processes

Beta LaserMike’s LaserSpeed non-contact encoders are the most accurate, reliable, and cost-effective measurement solution for controlling product length and realizing production savings.

To learn more, visit: www.laserspeedgauge.com