

Improving cutting accuracy and repeatability on cut-to-length lines by replacing contact wheel encoders with a non-contact laser

Understanding the problem

Many manufacturing processes use contact wheels with encoders to measure the speed and length of the product during production.

However, in many cases this does not provide the desired outcome because the product being measured is either soft, sticky, coated in oil or subject to rapid acceleration or deceleration. This can lead to inaccurate measurement and on some processes the traditional contact wheels require constant maintenance to ensure reliable measurement. This can be due to particle pick up on the wheel changing its effective diameter or wear of the wheel or the supporting mechanism. For operations where a continuous product is cut to shorter lengths the final lengths can very often be longer than they should be resulting in the manufacturer giving away a percentage of their total yearly production.

World's best accuracy
<±0.03%



Measurements conducted on various processes have discovered that very often the typical measurement error with a contact wheel encoder is in the region of 2-5%. However, the error is not constant and will vary depending on the product being measured, the line speed and the surface coating. This inconsistency makes it difficult for the process engineer to account for these errors in the control system. Therefore the actual accuracy will vary depending on the product that is being produced. On some process lines an encoder is connected to the drive roll and this is used as the reference for length control. As the drive rolls primary function is to push or pull the material through there is always an inbuilt slip with this type of measurement method.

LaserSpeed solution

The LaserSpeed is a direct replacement of a contact wheel and encoder system improving the accuracy and repeatability of measurement. As the LaserSpeed is unaffected by the product surface condition, oil coating, whether the surface is wet or dry, the accuracy and consistency of measurement is much better than can be achieved by a contact wheel encoder.

The LaserSpeed will achieve an accuracy of better than ±0.03% and a repeatability of ±0.02% irrespective of the product or conditions. Furthermore being non-contact the gauge is maintenance free resulting in lower running costs. LaserSpeed is used on many cut-to-length applications where a flying shear or saw is used in process to cut a continuous product to shorter lengths.

Applications

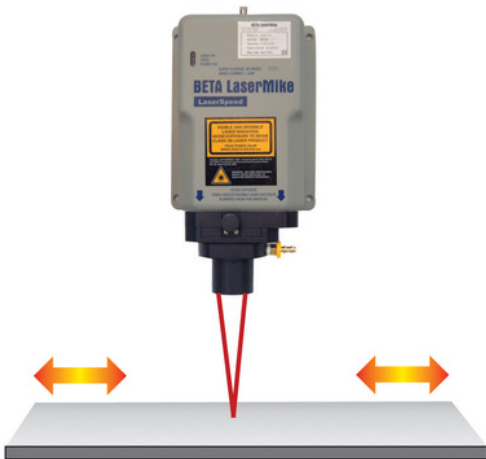
The LaserSpeed Pro can be used on all types of cut-to-length line to replace an existing rotary encoder.

- ◆ Stone or glass wool
- ◆ Carpet
- ◆ Gypsum board
- ◆ Wood based panels
- ◆ Roll forming lines
- ◆ OSB board
- ◆ Insulation materials
- ◆ Flooring materials
- ◆ Steel processing lines
- ◆ Steel or aluminium cut-to-length lines
- ◆ Extruded Products
- ◆ Cable

Connecting a LaserSpeed

The LaserSpeed has a full quadrature output just like a regular rotary encoder.

The pulse rate can be configured by the user to emulate the rate of existing encoder. This means that the existing control system does not need to be changed or reprogrammed. Once connected an existing line will benefit immediately from the improved accuracy of using the LaserSpeed. In some cases a 2-5% improvement in cutting accuracy has been achieved.




Benefits of LaserSpeed

LaserSpeed gauges have no moving parts and are permanently calibrated resulting in significant time and money saving.

- ◆ High accuracy and repeatability
- ◆ No moving parts to wear out
- ◆ Consistency of measurement
- ◆ No marking of material
- ◆ Measures on oily surface
- ◆ Quick and easy installation on existing lines

Specification

*Depending on model

Accuracy: $\pm 0.03\%$ of reading	Quadrature pulse output 1 - 250kHz max	Modbus TCP
Repeatability: $\pm 0.02\%$	Quadrature pulse output 2 - 5 MHz max	EtherNet/IP
Speed range: 0 ... 12000m/min*	Serial RS232 - speed, length QF & Status	Profinet I/O
Protection class: IP67	Serial RS432 - speed, length QF & Status	Profibus DP
Laser class: 3B 	Ethernet UDP/TCP/IP - speed, length QF & Status	SSI