

Precision Measurement Reduces Scrap

Quality Control using Non-contact Measurement of Length and Speed on Rotating Tubes

To provide quality testing of steel tubes, a suite of non-destructive testing techniques are combined to facilitate a fast and complete assessment of the tubes. Where length and velocity measurements on rotating tubes are needed, Laser Surface Velocimeters are used to provide unambiguous position data during the test procedure.

Inspection facilities include processes suitable for non-destructive testing of seamless steel tubes such as electromagnetic inspection (E.M.I.), magnetic powder inspection (MPI), metallurgical tests and ultrasonic testing. Depending on the application and specifications, ultrasonic testing is applied over the whole length and perimeter of the tube for a comprehensive failure analysis. Testing of both longitudinal and transverse defects as well as the inspection of wall thickness and lamination are critical for quality control. In order to localize the defects, the actual testing method is combined with a position measurement technique like velocimetry. Laser Surface Velocimeters use the laser Doppler principle to evaluate the

laser light scattered back from a moving object and to determine the exact motion and position of a tube in the test stand. The combination of methods provides a fast and complete testing of the tube.

Installation at the Ultrasonic Test Stand

A series of Laser Surface Velocimeters are used at the ultrasonic test stand to measure length and velocity of the tubes. The tubes that are passing through the facility are rotating with a speed of 2 m/s. Each inlet and outlet of the stand is equipped with two LSV-065 Sensor Heads, one for measuring the longitudinal motion and one for the lateral (rotational) direction. The title image shows the setup of the

LSV-065 Sensor Heads and precision adjustment plates for measuring the longitudinal (left sensor) and rotational speed (right sensor) of the tube. The paired sensors at the inlet and outlet of the ultrasonic test stand provide clear measurement data for the determination of the tube's position while traveling through the stand. The translational speed is quite low in relation to the rotational speed (Fig. 1). Thus, the respective sensor head must be precisely aligned parallel to the travel direction in order to avoid any superposition with the lateral motion. Otherwise the translational speed would be too low or too high and cause errors in length measurement. The alignment on each sensor is enabled by finely adjusting a mounting plate and by following an adjustment procedure before starting routine operation. With the aid of precision set screws, the angular position can be controlled precisely.

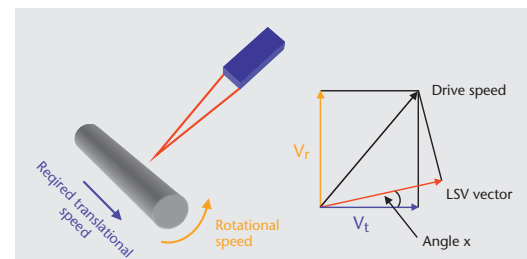


Fig. 1: Superposition of translational and rotational speed.

Non-contact and Precise

Laser Surface Velocimeters combined with suitable accessories provide non-contact precision length and speed measurements even in the case of superimposed motions. For the ultrasonic test stand described here, where the tubes are performing two different motions with very different speeds, the achieved accuracy of the method (<0.1% of measured length) has proven to be more than sufficient for measuring both motions independently.

More Info:

www.velocimeter.us
www.velocimeter.co.uk