

Without having looked in the tube

Easily recognizing paint marks on the welded seams of stainless steel strip tubing

As a general rule, stainless steel strip tubing is formed of steel sheeting. It features a welded longitudinal seam. Now and again, this longitudinal seam is color coded before being cut according to the wishes of the end customer. For example, this is important for the post-processing of the tubes at a later stage. For this reason, it is necessary to guarantee a continuous checking of the coat of paint on the welded seam. It is proposed that a sensor system is to be used for this. However, not every apparently obvious solution necessarily brings the necessary level of reliability and flexibility as a manufacturer of strip tubing found out.

Identification using different colors

Expressed simply, longitudinal seam welded tubes are produced directly from the coil and in so doing, are shaped to form a slit tube. They are then welded along the longitudinal seam and after annealing and calibrating, they are cut using a saw to the respective length that the end customer requires. If requested by a customer, a manufacturer of stainless steel strip tubing will identify the welded seam, wherein the marking takes place in different paints in accordance with customer specifications (Fig. 1). This identification may be necessary for post-processing by the end customer at a later stage, e.g. if the tubes have to be bent for specific applications, wherein the length of the welded longitudinal seam has to be taken into consideration in the bending process (buckling and stretching of the tubing wall).

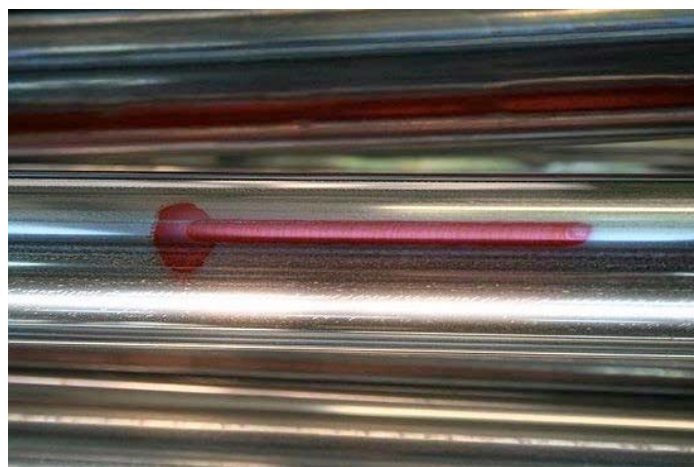


Fig. 1

New paints can be added

The key thing to ensure is that a continuous and especially reliable detection of the color marking takes place along the entire welded seam. For this task, a sensor system should be used before cutting the respective tube. A complicating factor in the recognition is the fact that other new paints can be added to the paints that are already used, i.e. if the end customer wants an identification scheme that differs from the paint markings that are already used.

Complex requirements

A contrast sensor for detecting the markings was initially preferred as a seemingly obvious solution. However in practice, this proved too unreliable. Essentially, this was not any wonder, if one considers the complex requirements of the application. As such, the coating of paint that has to be examined over the entire length of the welded seam is partly irregular. Sometimes a lot of paint has been used to cover the surface and sometimes less paint. In addition, there is the tube's strong inherent reflection. In turn, the sensor had a harder job to recognize whether or not there is enough paint for the secure identification of the weld seam. Furthermore, the fresh reflective coat of paint shortly before the examination station made the task of reliable identification harder still.

Application know how was needed

If a goal is not reached with an obvious solution, then the advice of a specialist is needed. The strip tubing manufacturer then turned to ipf electronic and found the specialists they were looking for. The Lüdenscheid-based provider of sensor solutions does not just have a wide portfolio of products, but it has also earned a good name for itself in many areas of industry as a competent business associate, especially when it comes to applications with complex requirements relating to sensor equipment.

“True-Color” recognition and more”

The engineers from ipf electronic recommended an OF34 series “True-Color sensor” for the special application used by the strip tubing manufacturer. These sensors are especially suited to the recognition of colors in the case of objects with a very non-homogenous or glossy surface. As the actual color brightens and/or “softens” depending on the degree of shine on the surface, these “True-Color sensors” have a diffuse light which ensures a significant reduction of the gloss effect.

As a result of an additional polarization filter, the application also prevents direct reflection, which can emanate along the welded seam, from both the tube itself as well as from the paint that has been applied. Furthermore, the True-Color detector and special evaluation software guarantee an accurate differentiation of even the smallest differences in color. In connection with this, apart from the accurate identification of colors, one particular feature of the sensor system lies in the fact that the reflective properties of a surface can be evaluated with the help of software. Here, the specific tolerance ranges can be set for the intensity of the reflecting light.

Easy, fast and simple

In order to carry out the reliable recognition of the weld seam identifications, the sensor was mounted over a series of rollers which conveyed the tubes for cutting (sensing range of 20mm to the tube surface) (Fig 2).



Fig. 2

Via the evaluation software, it was then possible to specify the light output of the white light LEDs and the permissible tolerances for the color and intensity deviations. As not only the paints that have already been used for the weld seam markings change, but new paints can be added for the task of identification (based on customer requirements), the strip tubing manufacturer decided to teach the sensor by the operating staff during the ongoing production, depending in each case, on the color. If the marking device is filled with the respective paint for identification and the weld seam is marked, the tube merely has to be passed under the sensor. Via a very easy to handle control box (Fig. 3), the operator can then set the sensor for the examination by actuating a teach button. Following this, the sensor examines the identification continuously, wherein the tube is moved under the device with a speed of around eight to ten meters a minute. If the sensor detects that the paint marking on the weld seam is outside the set tolerances, a signal lights up on the control box so that the operator can immediately separate the tube that is affected.

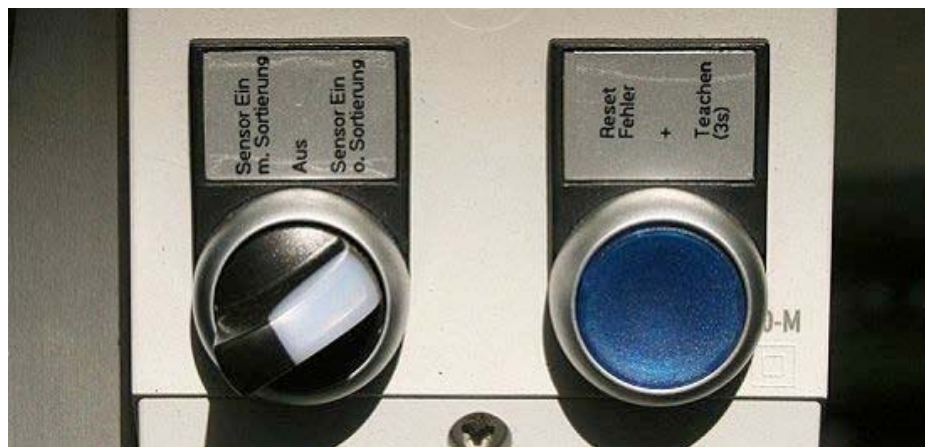


Fig. 3

Easy, fast and simple. This succinctly sums up the sensor solution for detecting weld seam markings for a strip tubing manufacturer. However for this, specialists are required who recognize the requirements for such a solution, specific to the application, and who have the correct sensor system to hand.