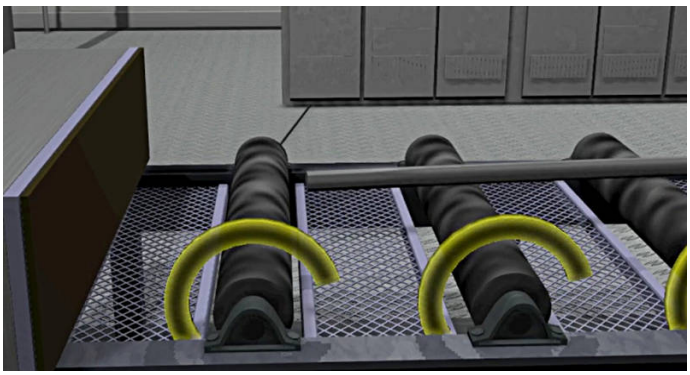
A complex task – with a simple solution

An economic alternative for occasions when there is no place for conventional sensors

For example, the VY85 signal inverter from ipf electronic (Fig.1) has been developed to shape a PNP normally open (no) switch signal of a sensor into any other signal (PNP normally closed (nc) or NPN). This way, it is possible to adapt sensors with any output signal to the input on a control unit. However, the inverter can do much more besides. This is demonstrated by an application in a metal processing works where, because of the local circumstances, it was not possible to install conventional sensors.

Fig. 1

In a hot rolling mill, rod material (with different diameters) is transported from a sand blasting plant to a stop via a roller conveyor. At this point, the metal rods are removed for further processing. As soon as the rod material touches the stop, the roller conveyor is to be stopped via a corresponding signal to a plant control unit. This is done in order to prevent surface damage to the resting rod material by the rotating rollers.



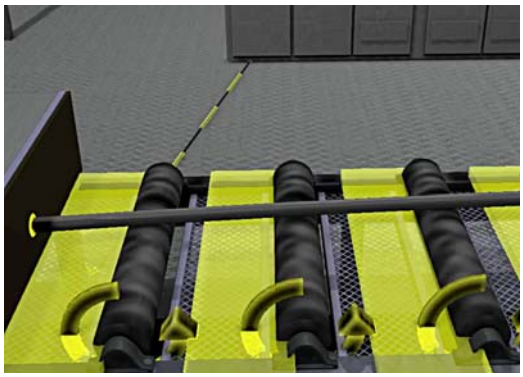


Fig. 2 + 3

The restrictive installation prevents the use of sensors

For various reasons, conventional sensors were not seen as an appropriate solution for this task. Due to the width of the roller conveyor (approx. 1000mm), the rods can almost be at any point on the conveyor. As the material is also supposed to be removed from the roller conveyor from above with a crane, or laterally, these areas also did not allow for any sensors to be installed with an 'unobstructed view' of the rods. Using sensors, detection from below, onto the roller conveyor, was also not possible. This is because of the fact that in such a case, the stop would have to be located exactly between two transportation rollers. Another issue was the fact that in part, very thin metal rods could be misshapen by the sandblasting process, so that they did not touch any precisely definable area on the stop.

The stop as the only possible detection area

In view of the exceptionally restrictive installation options for sensors on this plant, there was essentially only the area of the stop itself that could be considered as a suitable detection area – and here as well (or more accurately, between the stop and the control unit of the plant) the signal inverter is used as a contact relay. The contact relay has an input for 24V signals and an input for 0V signals. As a rule, a 24V power unit is plugged on the side of the plant for providing electricity to the sensors. The 0V connection is connected to the ground potential. All conductive parts of the plant connected with the ground potential rest against the 0V potential. And ultimately, it is this basic principle that the ipf electronic team have exploited in this special application.

On the side of the plant, ground potential is available everywhere

For this, a plastic panel was initially attached to the locating surface of the stop arm that is adjustable with an electric motor. In turn, a metal panel is mounted onto this plastic panel. The plastic panel itself acts as a form of insulation. This way, there is no conductive connection of the metal panel with the rest of the plant. An electrical connection is established via a simple conductor between the insulated metal panel and the contact relay input in the switch cupboard. As the metallic rollers of the conveyor establish a conductive connection to the overall system via their bearing, a 0V connection to the power unit of the plant is available as potential via the electrical grounding. In turn, the rod material that is conveyed via the roller conveyor takes up this potential. As soon as the metal rods hit against the stop, this signal is transferred to the insulated panel and thus, via the conductor to the contact relay input.

Through the wiring (with 0V), it is possible to pick up a 24V switch signal at the output of the contact relay and conduct it to the signal input of the plant's control unit. This way, the roller conveyor is stopped via a control signal as soon as a metal rod makes contact with the stop.

The time function ensures extended pulses

Through a time function integrated into the equipment (turn-off delay), the contact relay offers additional advantages in connection with these types of application (or similar). With this time function, even very short input signals (on the part of the output) can be extended to 10 seconds max. As such, the relay can also be used on control units which are not in the position to process very short signals. In the application described here, the time function serves to stop the roller conveyor directly when the rod material first comes into contact with the stop. Otherwise, the problem would arise that the metal rods may rebound when making contact with the stop and strike again, i.e. several signals would be transferred to the control unit.

Varied applications

Special challenges require special solutions. In this case, the sensor specialists from ipf electronic were able to find a solution for the complex requirements of a customer that was both economic and easy to implement. Here as well, it was only the stop that had to be insulated and a connector installed to the contact relay in the switch cupboard. The rest of the wiring could then be done in the switch cupboard. As is clear from this application, further potential applications for the contact relay are conceivable in all places where in general, material contact has to be recognized but, because if the specific conditions related to the installation, the integration of conventional sensors is not an option. This could also apply to the feed control mechanism of a tool in a punching machine, to mention just one option.

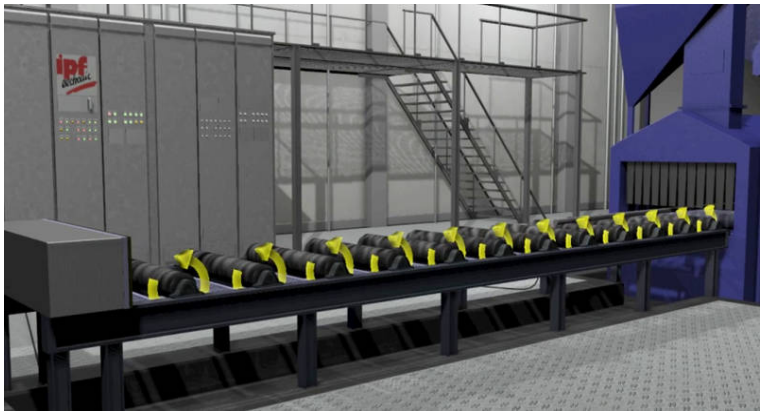


Fig. 4