

Hot rail and section monitoring systems.

Immediate post rolling inspection of rolled section or rail is vital, if effective fault diagnosis is to be made and potentially costly problems identified. To tackle the issue, innovative inspection systems have been installed by JLI vision in Corus steel mills.



The inspection ring (lamp side) during commissioning

JLI vision is a supplier of advanced and dedicated vision systems, with more than 20 years experience in industry. The company has developed, installed and commissioned rail and section measurement and inspection systems for Corus.

Image collection

Installed prior to the cooling beds are six cameras and floodlights, mounted on a circular holding ring through which the red hot rails and sections pass at speeds up to 4m/sec. Operating around the clock and

employing optical filtering to make the sections appear as if cold, the cameras monitor the surface quality and read identification characters marked on the rails and sections. As the rail enters the camera ring, images from all six cameras are recorded electronically. With a pixel size of 0.2mm, the images are recorded at a frame rate of 16 frames/second on each camera. To avoid flickering images caused by the 50Hz mains, all floodlights are driven by special electronics drivers to stabilise the illumination.

Data storage

The system saves pictures of entire rails. For each rail, approximately 2000 images with a total file size of 182MB are recorded. The data is subsequently compressed and stored on a 500GB hard disk, giving approximately two weeks capacity depending on production throughput. If the mill wishes to retain the images, hot swapping to a new hard disk is possible.

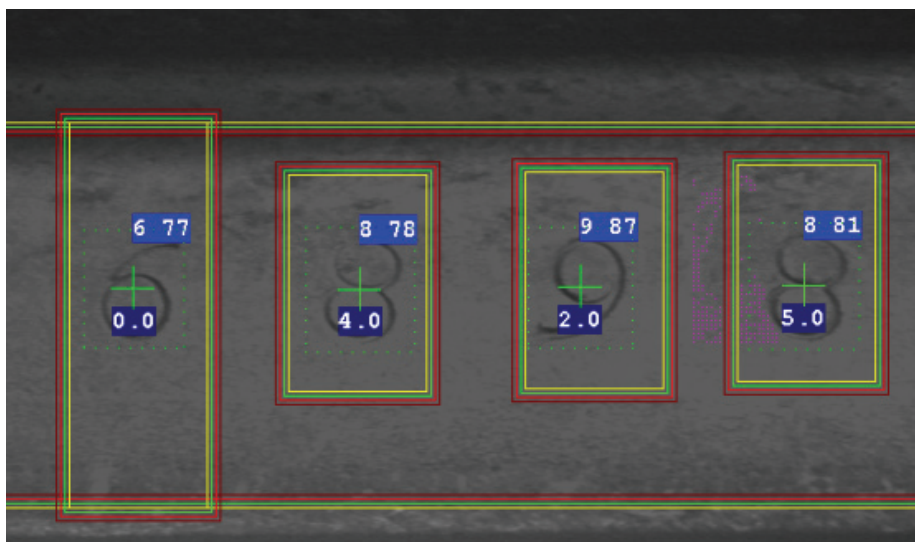
Inspection and analysis

Inspection of the images is performed by operators in an air-conditioned room, at a speed determined by the operator and not by the production flow. All images are screened by the operator and if a defect is identified, it can be marked on the image. Rails marked as defective generate a command to the computer, with rail serial number and the distance from the nose to the defect location. This information allows the rail and section to be further scrutinised on leaving the cooling bed. With inspection carried out directly after rolling and stamping, if a fault is identified, the operators can decide if it is a single flaw or a defect that will be recurring. If the mill is producing defects in series, it is important to stop rolling and correct the fault immediately. The quick reaction time translates into great savings for the mill, with defects identified much earlier whilst avoiding filling the cooling beds with defective products. Documenting image records of all surfaces of the product, is important for quality assurance purposes and is an innovative development not previously available to beam or rail mills.

Future developments

Further developments are planned to automatically screen all images for recurring faults, alerting the operators and identifying faults in the rolls. It is estimated that more than 90% of the rails can be given the all clear, and the operators only have to manually judge 10% of the surface to verify or reject a defect flag. Depending on the management defect requirements, other image processing software is also available for installation. As the system collects images, a comprehensive database is built up, allowing JLI vision to 'train' the software to operate in much the same way as human vision.

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