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Improvement in hot rolled shape defect after cold rolling

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In this paper, abnormality in the profile of the cold rolled strip due to hot rolling is discussed. The defect is observed at one of the biggest cold rolling customer in the western region of the country. The final product is the colour coated sheets which demands a very good strip profile and surface. TATA steel supplies approximately 20000 Tons/ month to the customer where ~65% of material is being used for manufacturing of colour coated sheets. The cold rolled strips are rolled in very thin gauges and any localized defect on the strip surface is not acceptable by the customer. For past few months, customer was raising concern on TATA steel supplied material compared to the competitors. Approximately 852 tons of TATA steel material was put on hold at the customer end on account of shape defect. To understand the issue at customer end, detail observation of the customer processing line is being carried out by cross functional team. Observation revealed a ridge type of defect in the cold rolled material. The defect is generally known as ridge which is attributed to localized build up in the cold rolled steel sheets, it is a localized shape defect that appears in several variations along the length of the strip in coil form and got its name from its appearance. The defect is generally revealed after coiling of ~50% of the length in the coiler and physical observations of the hot rolled coils at plant do not reveal any shape defect. Defect analysis was carried out by comparing the defect borne samples against defect free samples, pre- and post-cold rolling samples were also collected and analyzed. Detail analysis of thickness variation, process parameters, and scheduling norms, roll surface, roll cooling and roll bite lubrication were carried out and optical image analysis were also analyzed to detect the presence of any bimodality in grain sizes and other micro-structural in-homogeneity. Cause and effect diagram was made to find out the hidden parameters which can contribute to this defect, based on the brain storming by various agencies, hot rolling parameters like thickness cross profile, high spots, and temperature profile across the width, finish rolling temperature and roll cooling nozzle condition, rolls thermo-graph were identified. Identified parameters were further analyzed with the help of one of the QC tool (Boxplot) which showed significant correlation with finish rolling temperature and thermal scans across strip width w.r.t the ridge shape defect. Based on the analysis and finding, appropriate measures were taken at plant and after the implementation of the corrective action no such defect was recorded from any of the customers.

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