KAWASAKI STEEL TECHNICAL REPORT
No.24 (April 1991)

Development of Coiling Temperature Control System on Hot Strip Mill

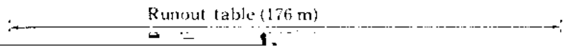
Kazuhiro Yahiro, Jujiro Yamasaki, Masahiro Furukawa, Kazuo Arai, Masahiko Morita, Masamitsu Obashi

Synopsis :
At the Mizushima Works hot strip mill, a newly developed cooling control system has been introduced downstream of the finishing mill as a means of improving product quality uniformity. The system includes a transformation progress model tuned by an on-line transformation detector and a precise temperature model in which consideration is given to the dependence of the heat transfer coefficient on temperature and temperature distribution in the depth direction. The two models make possible the exact prediction of changes in surface and mean temperatures, and of the transformed fraction in the cooling process, resulting in improved coiling temperature accuracy and better product uniformity.

Development of Coiling Temperature Control System on Hot Strip Mill*

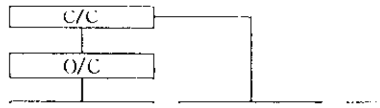
Synopsis:

At the Mizushima Works hot strip mill, a newly developed cooling control system has been introduced downstream of the finishing mill as a means of improving product quality uniformity. The system includes a transformation progress model tuned by an on-line transf...



uniformity.[2] Banks No.1-4 are provided with a water

Table 2 Comparison between new and conventional coiling temperature control systems



tem in dynamic setting calculations as well as in from the involve calculation of the sum of a series or convergent calculation. It was thus possible to express mean tem-

(strip thickness, 1–32 mm; heat transfer coefficient, 75–750 kcal/(m^2·h°C); cooling time, 0.5–20 ...

perature using the following equation[5]:

deviation of 0.2°C was found. This level of precision values of 0.6–0.85 were obtained on the basis of meas- [illegible]

pyrometer,[8] while α_{conv} values were in the natural [illegible]

tions affecting the austenite grains. In order to establish [illegible]

developed by the authors was installed at eight points [illegible]

$$q_F = q_F^* + \sum^{n} (d_i A_Y^3 + e_i A_Y^2 + f_i A_Y) \cdots (16)$$

ΔT_{W_i}: Temperature drop caused by water cooling at bank i

from the documentary data in Fig. 7.[14] The γ — P

at bank i

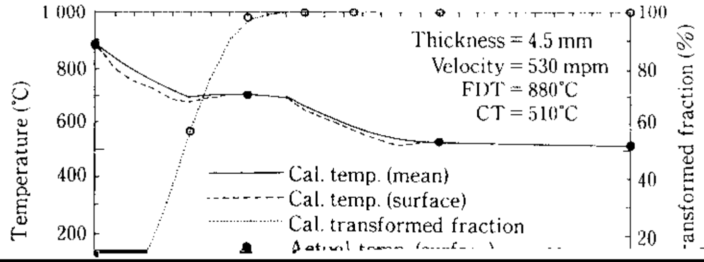


Fig. 9 Example of process ...

parison of calculated and measured temperatures. The ... in Figs. 10 and 11. The comparison of the coiling t...

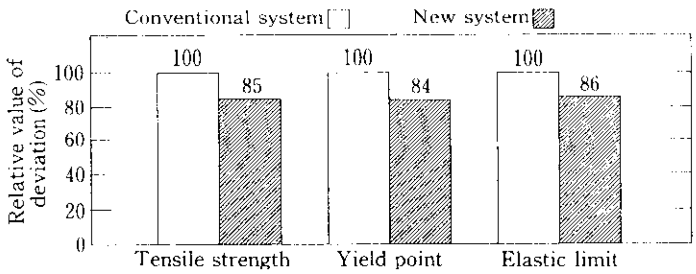


Fig. 12 Improvement of accuracy of mechanical properties (0.15% C–0.75% Mn steel)

properties prior to introduction (i.e., the index 100 represents mechanical property deviations using the [illegible]

time.

(5) A 7.8% improvement in the $\pm 20°C$ coiling tempera- [illegible]