

Automatic Flatness Control System in Tandem Cold Rolling Mill for Ultra-thin Gauge Strip*



Synopsis:

In April 1988, a new flatness control system was installed at a 6-stand tandem cold rolling mill that pro

B : Delivery-side coolant (bending force : 0)

Rolled material

Mild steel

+ Decrease bender (- 35 t / chock)

Table 3 Specifications of shape-sensor

$$\Delta\sigma_i = \frac{F_i - \bar{F}}{\bar{F}} \times T \dots\dots\dots(1)$$

Accuracy (2σ)	(I-unit)	2.6
Period of output	(s)	0.35
Number of channels		
52-mm wide channel		10
26-mm wide channel		30
Total		40

$$I_i = \frac{\Delta\sigma_i}{E} \dots\dots\dots(2)$$

- F_i : Output at i channel
- \bar{F} : Average of F_i
- T : Actual tension (kgf/mm²)
- $\Delta\sigma_i$: Distribution of tension (kgf/mm²)
- E : Young's modulus (kgf/mm²)
- l : Difference of elongation at i channel

B × Zone:

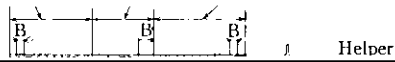


Figure 3 shows the steepness comparison results between off-line and on-line measurements. The on-line

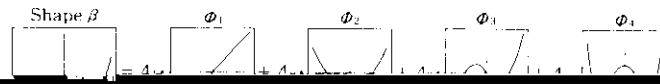
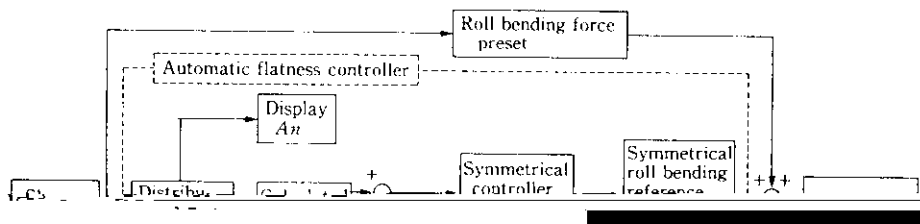
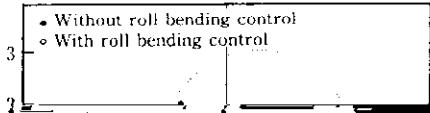
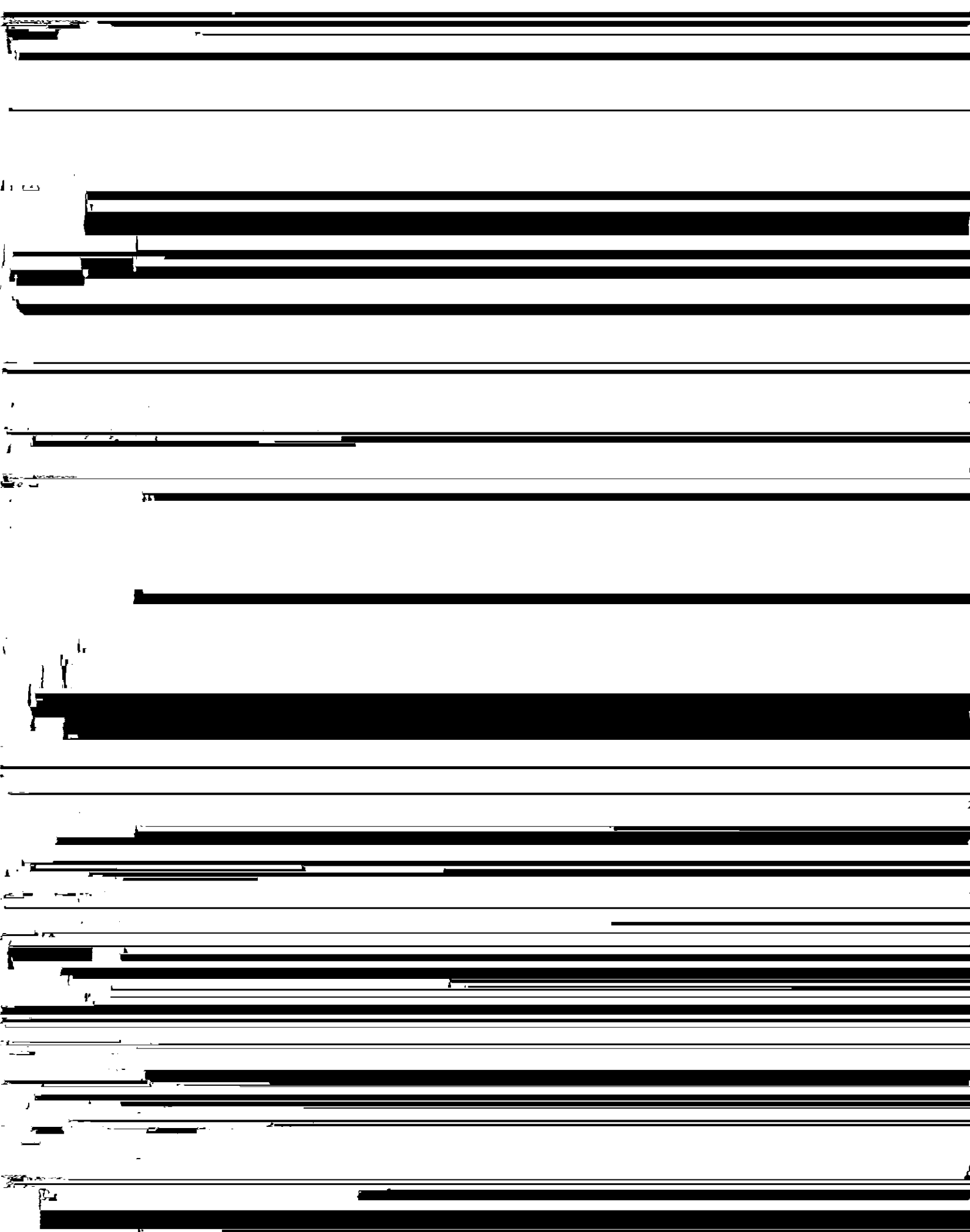


Fig. 5 Recognition of shape pattern





effects on controlling center buckles compared with the entry-side coolants. In addition, Fig. 9 shows that the maximum steepness is decreased to less than 0.8% (i.e.



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