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Edge-Drop Control of Hot and Cold Rolled Strips by a Tapered-Crown Work Roll Shifting Mill

Kunio Kitamura, Ikuo Yarita, Namio Suganum a, Toshinobu Nakanishi, Ko Toyoshima

Synopsis :
In the rolling of hot and cold rolled strip, one of the essential tasks is a minimization of edge drop, which is a sharp reduction in the transverse thickness profile at strip edges. The authors made an experime ntal study of deformation behavior at strip edges, followed by an investigation into the characteristics of edge drop control on a tapered-crown work roll-shifting mill by us ing a laboratory mill and commercial cold and hot strip rolling mills. The results of find ing: (1) The edge drop is caused by three dimensional material flow which occurs at the strip edge, and is largely affected by changes in the work roll profile resulting fr om roll flattening, (2) in the cold rolling tandem mill, edge drops can be markedly corrected by applying a one-side-tapered crown work roll shifting mill us ed at one stand upstream, and (3) in the hot strip mill, the one-side-tapered crown work roll shifting mill is also found effective in improving edge dorps.

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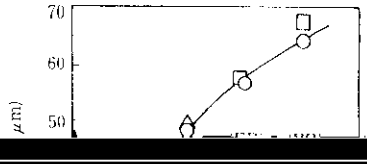
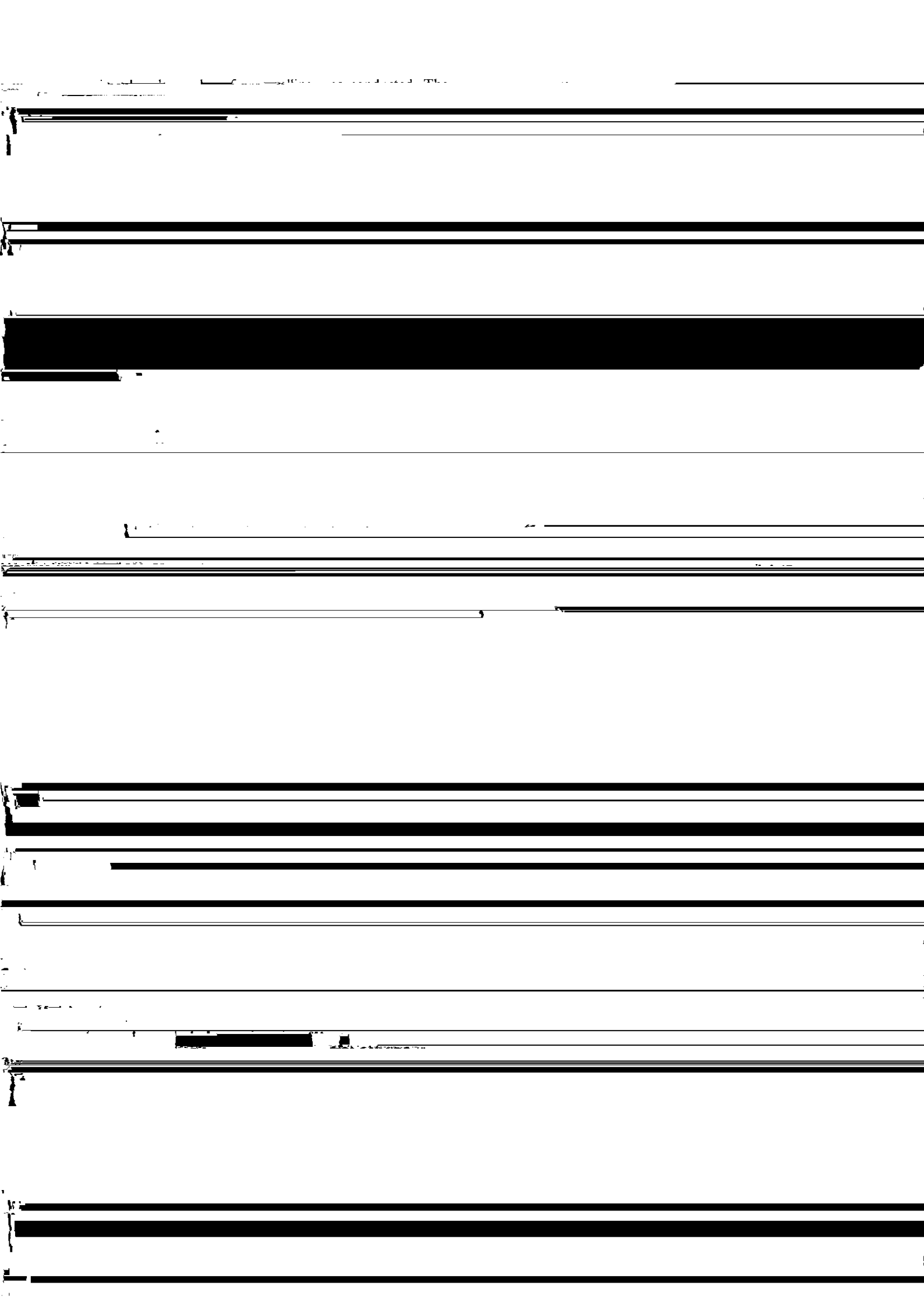
Synopsis:

In the rolling of hot and cold rolled strip, one of the

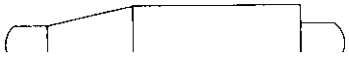
in a hot strip mill[4] and a cold strip mill[5] to control the crown and edge drop.

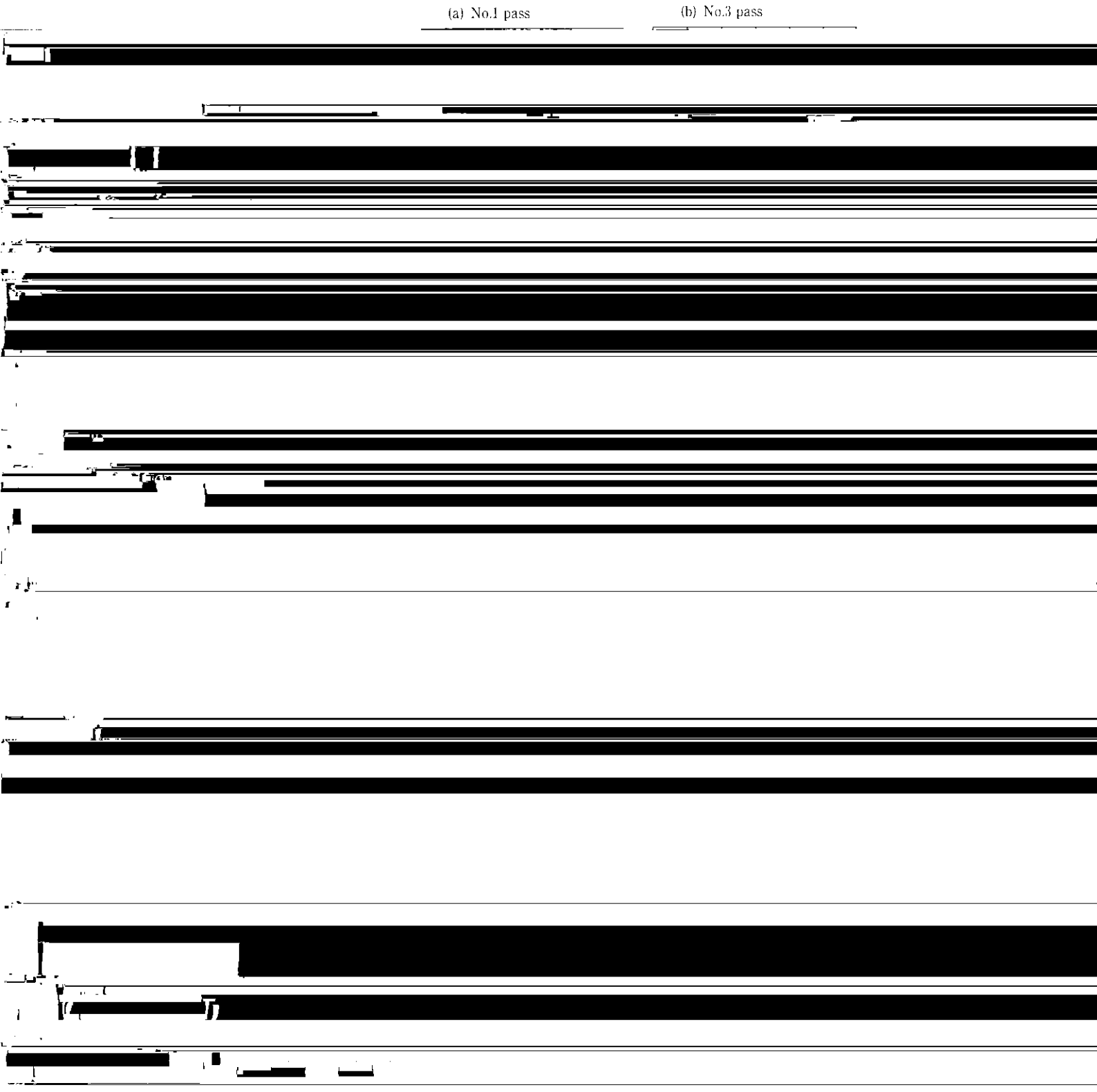
In this report, the deformation behavior at the strip edges was investigated by studying the edge drop during strip rolling, and the edge drop control characteristics by





with increasing edge drop, and the greatest width spread occurs in the range from the edge to a point 50 mm in





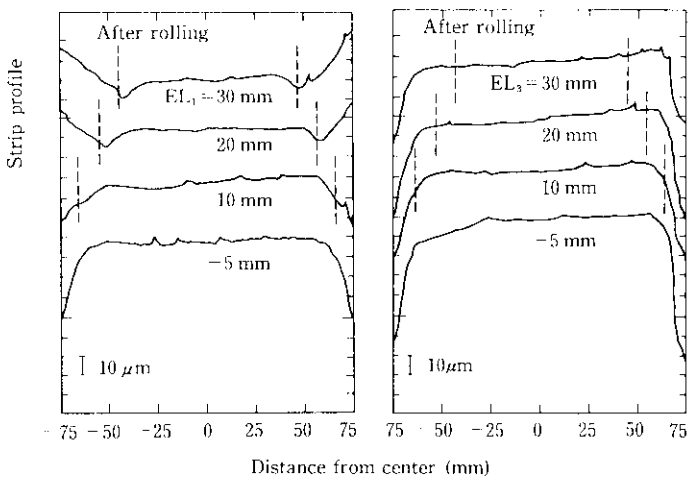
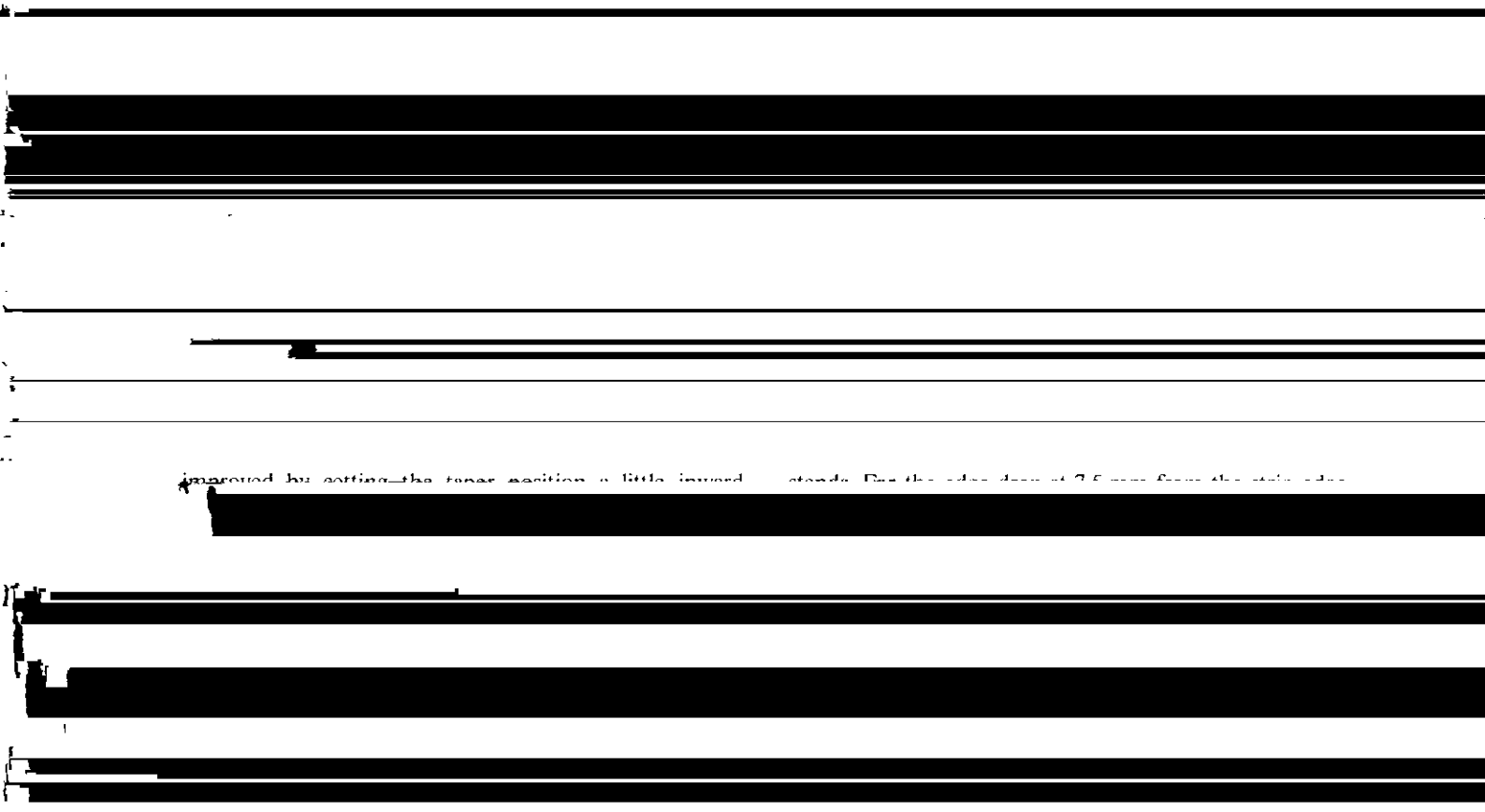
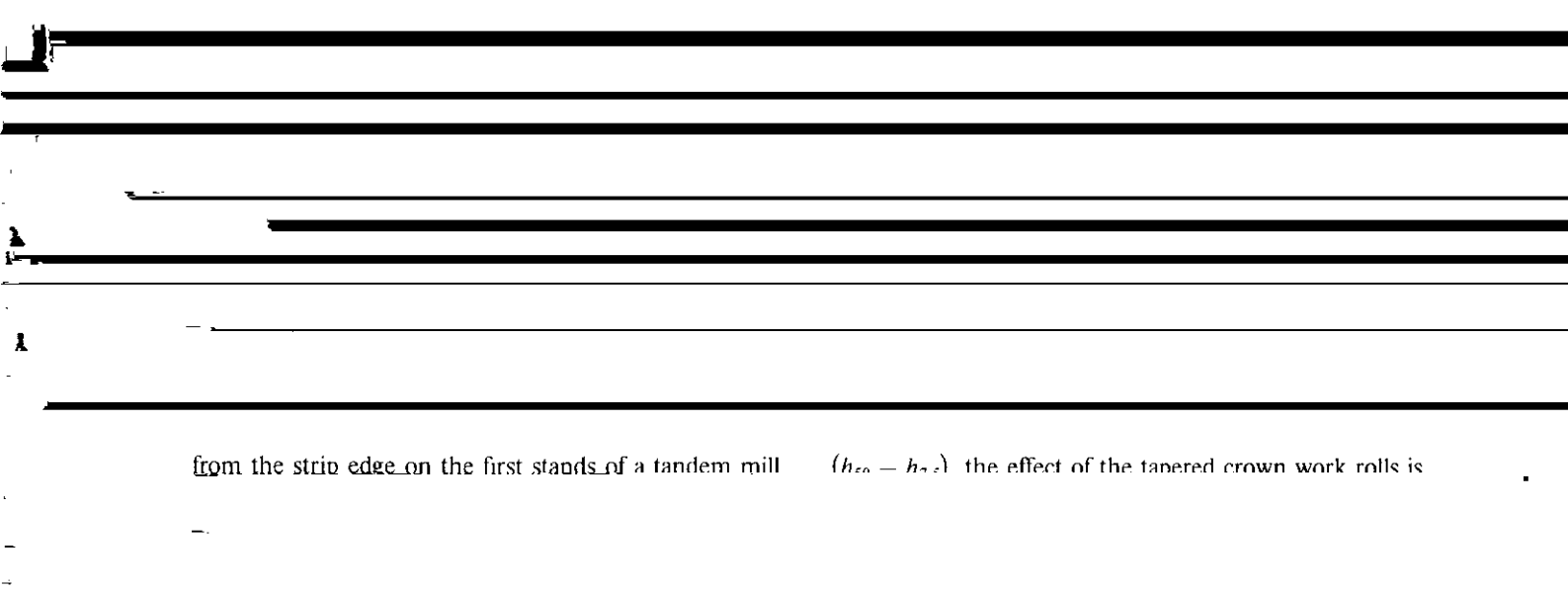


Fig. 7 Effect of taper position (EL) on cold rolled strip profile in small scale laboratory mill

this effect is scarcely apparent after the third pass. For $ER_{2.5}$, however, the effect of EL is great even after the third pass. This shows that the edge drop can be

the strip edge ($h_{50} - h_{17}$), it is apparent that the effect of the tapered crown work rolls displayed itself on the No.1 stand, while it is not apparent on the subsequent





from the strip edge on the first stands of a tandem mill ($h_{50} - h_{17}$), the effect of the tapered crown work rolls is

Table 5 Experimental conditions in hot strip mill

Material		Low C steel
Entry thickness	(mm)	4.5
Exit thickness	(mm)	3.2, 3.8
Width	(mm)	927
WR diameter	(mm)	678
WR barrel length	(mm)	1 422
WR taper		$\tan\theta=0.03/100$
WR taper position		EL=50~250 mm

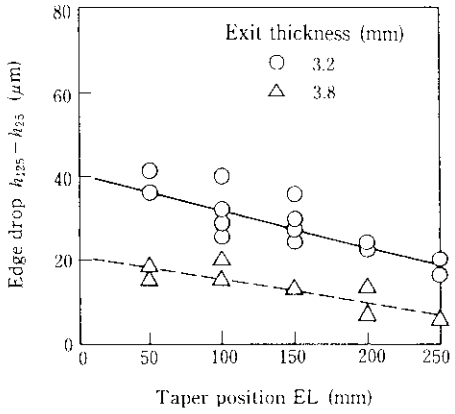


Fig. 12 Effect of taper position (EL) on edge drop of hot rolled strip

without using the roll pass of the No. 6 stand, and was reduced from a thickness of 4.5 mm to 3.8 mm or 3.2 mm. The strip width was 927 mm, and the strip crown C_{h25} (thickness difference between the middle of the width and a point 25 mm inward from the edge) on

shown in Fig. 12. The edge drop decreases linearly with

the entry side of the No. 5 stand was 60—70 μm. Roll-

increasing EL. When a comparison is made with the

metal flow occurs near the strip edges, affecting the