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A New Process for Manufacturing Deep-Drawing Cold-Rolled Steel Sheets from Extra-Low-Carbon Steels

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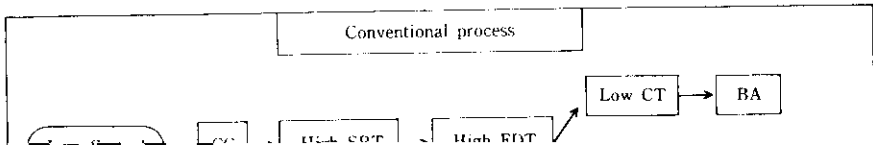
Synopsis :

For developing a new process of manufacturing deep-drawing cold-rolled steel sheets, effects of chemical composition and hot-rolling conditions on mechanical properties of extra-low-carbon steel sheets have been investigated. The results obtained are given below: (1) In low C content less than 0.002%, resistance to aging can be obtained without overaging treatment in continuous annealing. However, improvement of deep-drawability by lowering C content is small because planar anisotropy of mechanical properties is extremely large. (2) A small addition of Ti or Nb effectively decreases the planar anisotropy and gives good deep-drawability. (3) Lowering a slab reheating temperature below 1100 °C in such steels provides good deep-drawability even for hot-rolling with the finishing temperature below Ar₃ and the coiling temperature below 600 °C. This is noticeable in Ti-added extra-low-carbon steels. (4) On the basis of g_{c3}carbon sid-r

A New Process for Manufacturing Deep-Drawing

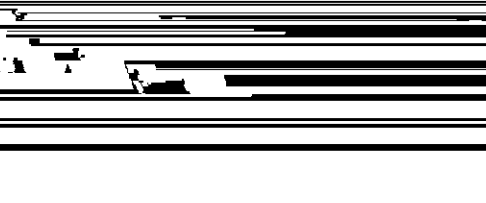
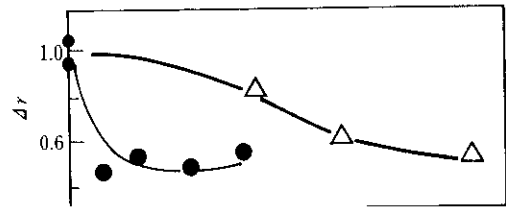
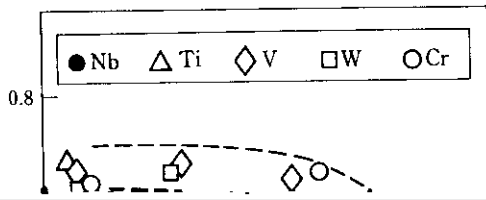
Extra-Low-Carbon Steels^{*1}

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degassing-refining techniques, is remarkable, and it has now become possible to economically produce extra-low-carbon steels with C contents of 0.005% or less.

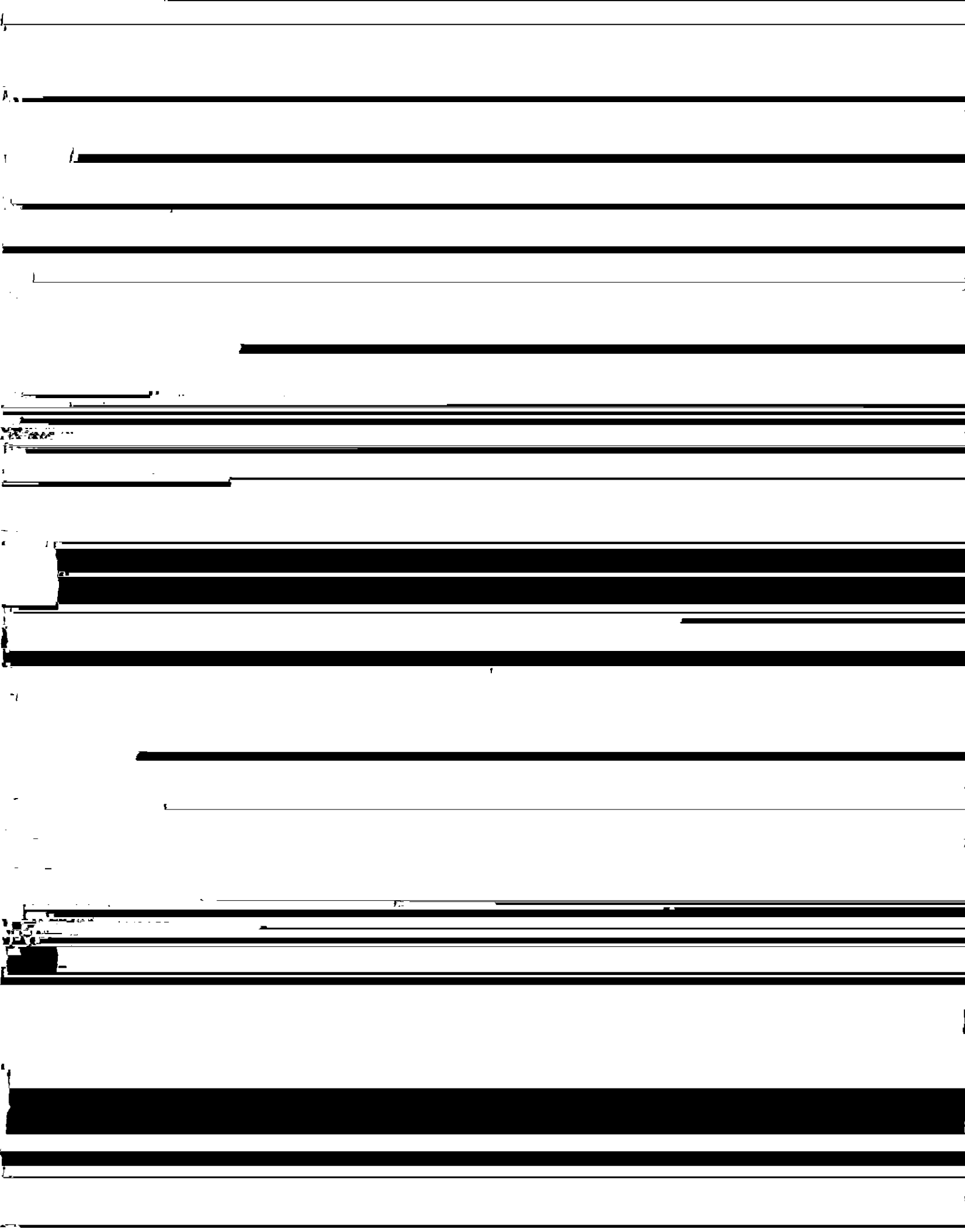




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reduced by addition of Nb or Ti.

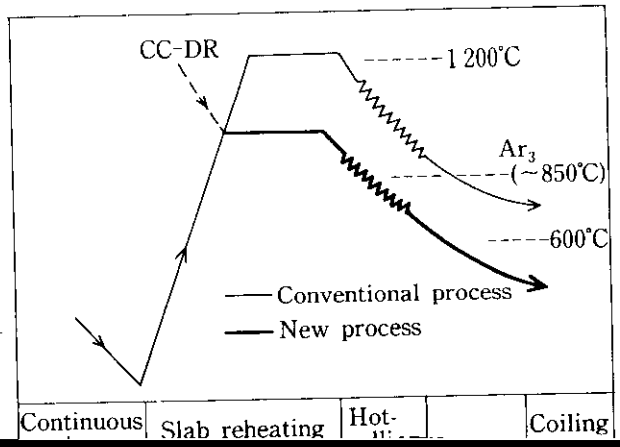
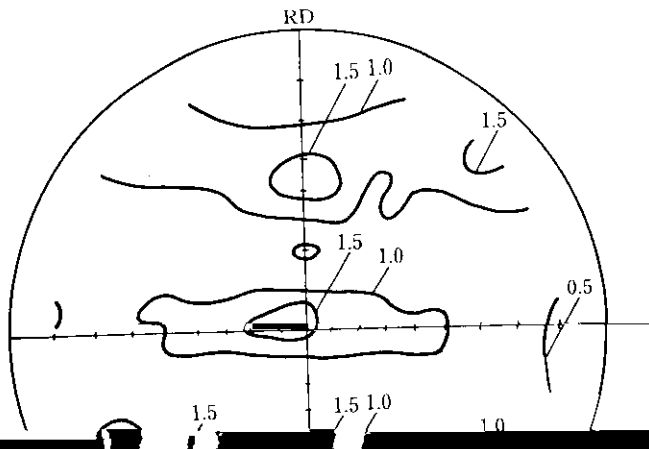
Figure 7 schematically shows a comparison between



0.002%C-- 0.010%Nb	0.002%C-- 0.032%Ti (Ti* = 0.006%)
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reheating is great in Ti-added steels.

The relationship between low-temperature hot rolling ($FDT < Ar_3$) and deep-drawability will now be discussed. To produce cold-rolled steel sheets excellent in deep-drawability (high r -values), the general practice has been to finish hot rolling at temperatures above Ar_3 .



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