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Hot Workability of Austenitic Stainless Steels Containing  
Delta-Ferrite

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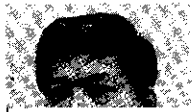
Synopsis :

Hot workability of austenitic stainless steels, which have problems of cracking when they are hot rolled, is studied. Sulfur has a great effect on hot workability and decreases ductility of steels at around 1050 during cooling from the slab reheating temperature. For steel containing little delta-ferrite, the ductility increases again as the temperature decreases. For steels containing delta-ferrite, however, ductility does not increase again. Then, the temperature range of reduced ductility for these steels expands widely towards lower temperatures. The effects of S and delta-ferrite on hot workability are discussed. Hot workability of these steels are improved remarkably by eliminating the effect of S. Problems of cracking during hot working can be solved completely by reducing S content to below about 10 ppm and/or with the addition of Ca or REM.

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**The body can be viewed from the next page.**

## Hot Workability of Austenitic Stainless Steels Containing Delta-Ferrite\*



**Synopsis:**

*Hot workability of austenitic stainless steels, which have problems of cracking when they are hot rolled is studied.*

order, cracks such as those with the  $\delta$ -ferrite which is considered to have the strongest influence

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17.7 PH were observed in rolled strip. This cracking on hot workability; changes in  $\delta$ -ferrite amount are also

during hot rolling presents the most serious problem in studied.  
the production process for steels of these types.

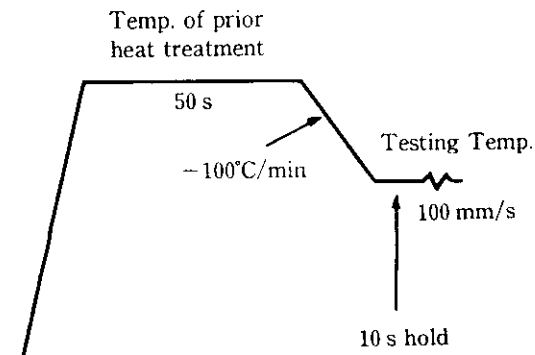
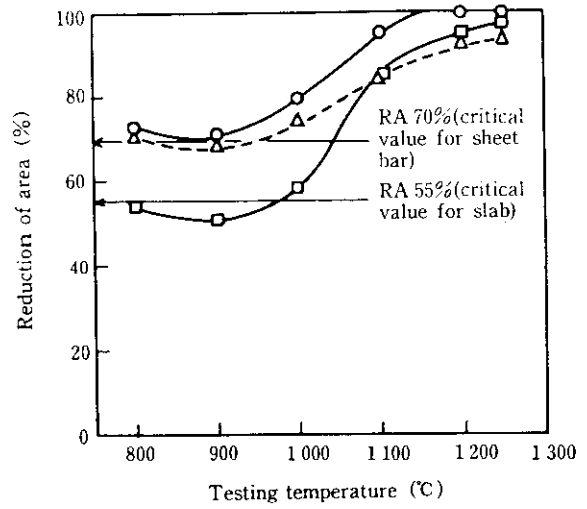


Fig. 1 Heat pattern of Gleeble tensile test



tensile direction was parallel to the casting direction. Rolled specimens were cut so that tensile direction was parallel to the rolling direction. Blocks from as-cast and

	mark	alloy	result
90% rolled	○	20Cr-10Ni	OK

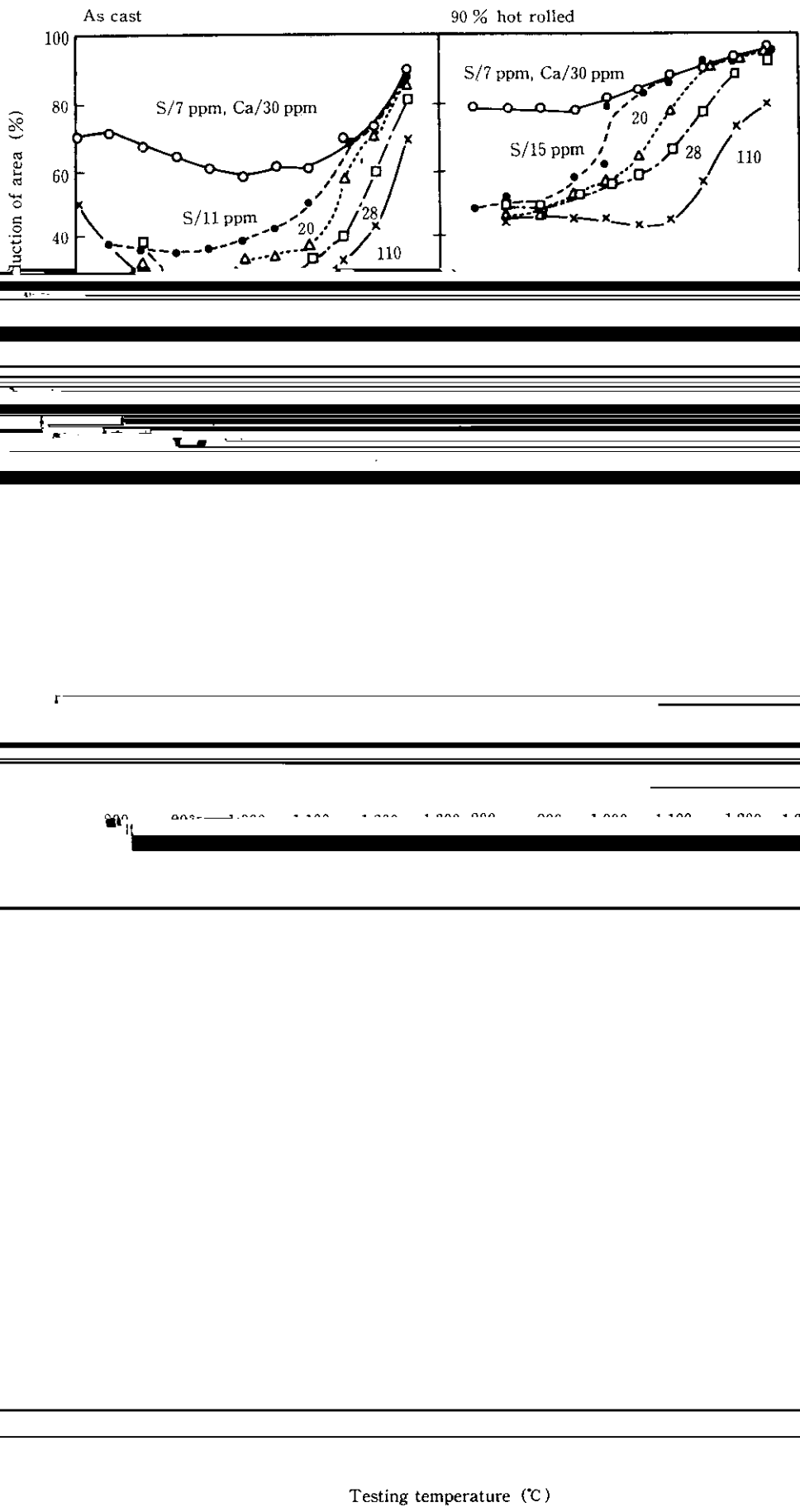
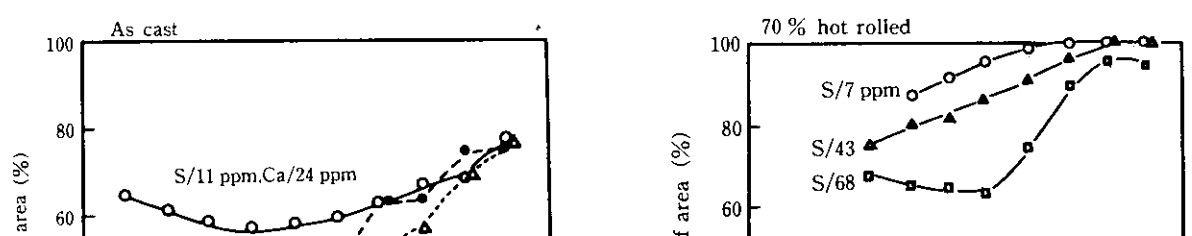
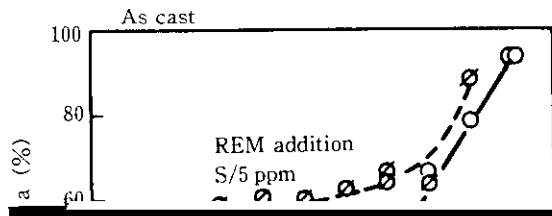
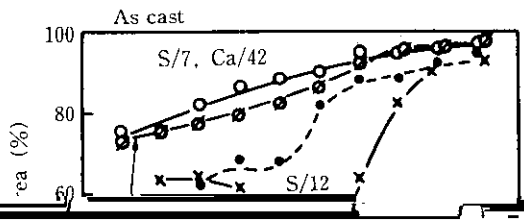


Fig. 3 Effect of S on the hot workability of 17-7 PH stainless steels with as-cast and hot worked structures





90 % hot rolled

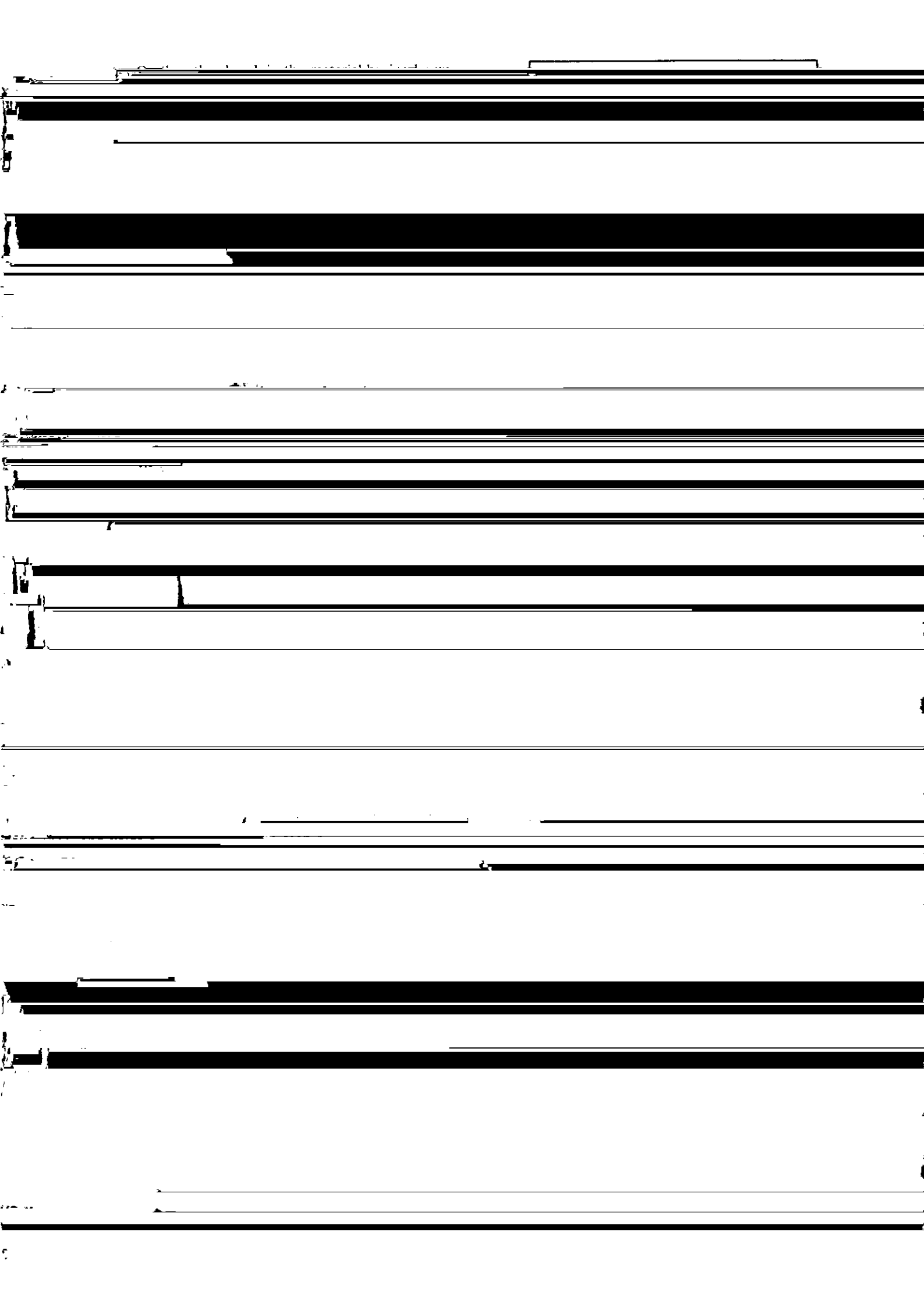
Assuming that the effect of S can be disregarded in

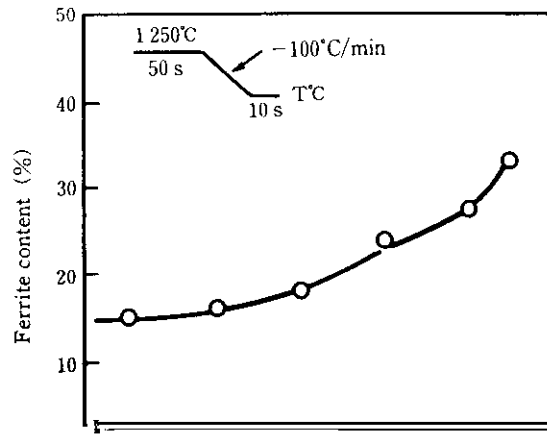
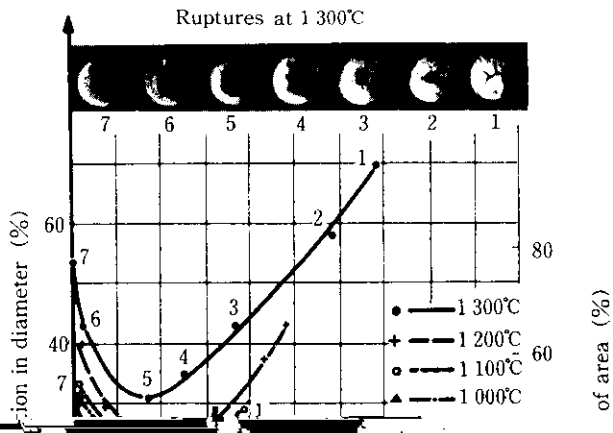
As CC

35% rolled

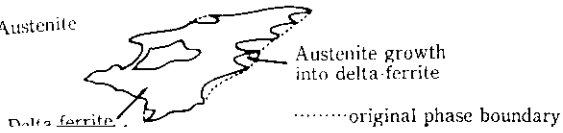
*[Faint, illegible text]*







Austenite



Austenite growth  
into delta-ferrite

-----original phase boundary

or lower, or extremely reduced S must be stabilized by Ca or REM.

- (2) Ductility reduction due to  $\delta$ -ferrite occurs in the temperature range around 1100°C, as is also the

ductility reduction extends to lower temperatures, and this causes edge cracking.

- (4) Finely and homogeneously dispersed  $\delta$ -ferrite pro-

