

Effect of Alloying Elements on Cold Forgeability of 0.53%C Steel*



Synopsis:

The effects of alloying elements on both forgeability and hardenability were investigated in order to apply a 0.53

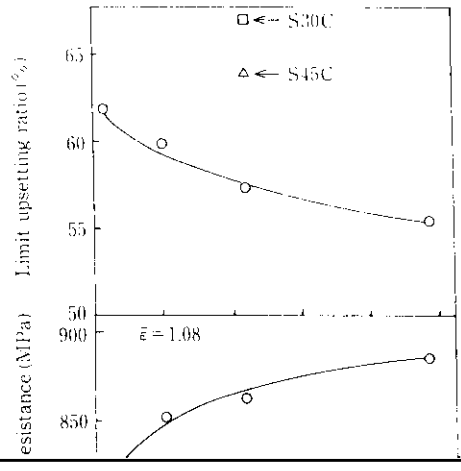
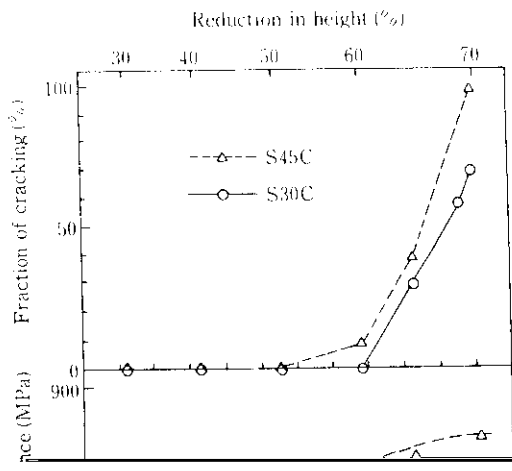
2 Experimental Methods

2.1 Materials

Vacuum melted steels with the chemical compositions

steel	C	Si	Mn	P	S	Cr	Mo	Al	N
A1	0.53	0.02	0.75	0.016	0.010	0.16	—	0.043	0.0057
A2	0.53	0.10	0.76	0.016	0.010	0.16	—	0.044	0.0058

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The limiting upsetting ratio of steel B1 containing 0.3%Mn was highest at 68%. However, as the Mn con-



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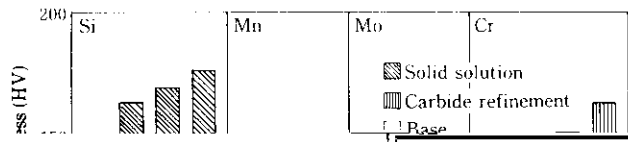
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o Si(A1~A4)

roidizing ratios of the steels containing Mo and Si, which raise the A_c temperature were higher than

would not affect the behavior of cementite dissolution into an austenite phase even with rapid induction heating.

A decrease in the hardening depth by changing the heat treatment prior to induction hardening from normalizing to spheroidizing annealing was more clearly distinguishable in the Cr-bearing steels,

The effects of adding Si, Mn, Cr, and Mo on both the cold forgeability and hardenability of 0.53%C steel were investigated in order to apply this material for cold forging use. The results obtained are as follows:

(1) The deformation resistance of spheroidized 0.53%C

ite. The cementite was not fully dissolved in the austenite phase by rapid induction heating.

(5) It can be concluded that a 0.53% C steel can offer the same cold forgeability and induction hardenability that are available from conventional steel for cold