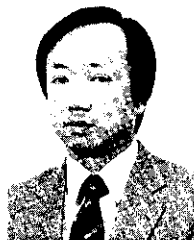


Development of Controlled-Rolled 70 kgf/mm² and 80 kgf/mm² Class High Tensile Strength Steel Plates for Welded Structures*



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Synopsis:

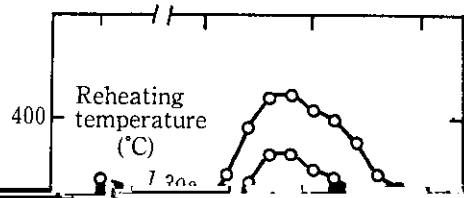
To meet demands for higher strength steel plates for construction machines with excellent cold formability and weldability, as-rolled HT70 steel plates (TS: 686 MPa) having a maximum thickness of 25.4 mm and as-rolled HT80 (TS: 784 MPa) steel plates of 12.7-mm thickness have successfully been developed by using a plate mill. Both precipitation hardening and inhibition of recovery of deformed ferrite are maximized by optimizing ferrite and austenite dual-phase region rolling. Consequently, strength of the plate has been much increased without deteriorating toughness for lower C_{eq} . The cold formability of the developed steels is superior to that of conventional as-hot-rolled HT80. Weldability tests have shown that the steels developed have good impact properties at welded HAZ and do

of the steels with mill scale is slightly higher than 50% of its TS, indicating the same behavior as that of the conven-

Table 1 Chemical compositions of steels

(wt. %)

Steel	C	Si	Mn	P	S	N
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($\alpha + \gamma$) dual-phase region rolling.

Results of electron microscope observation using the two-stage replica method are shown in **Photo 2**. In the Ti-bearing steel finished at 710°C, α grains formed sub-grains, while a cell structure of dislocation which did not develop subgrains was observed in the β phase.

No.	Specimen	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Bend test (180°)
1	100	355	460	22	OK
2	100	355	460	22	OK
3	100	355	460	22	OK
4	100	355	460	22	OK
5	100	355	460	22	OK
6	100	355	460	22	OK
7	100	355	460	22	OK
8	100	355	460	22	OK
9	100	355	460	22	OK
10	100	355	460	22	OK
11	100	355	460	22	OK
12	100	355	460	22	OK
13	100	355	460	22	OK
14	100	355	460	22	OK
15	100	355	460	22	OK
16	100	355	460	22	OK
17	100	355	460	22	OK
18	100	355	460	22	OK
19	100	355	460	22	OK
20	100	355	460	22	OK
21	100	355	460	22	OK
22	100	355	460	22	OK
23	100	355	460	22	OK
24	100	355	460	22	OK
25	100	355	460	22	OK
26	100	355	460	22	OK
27	100	355	460	22	OK
28	100	355	460	22	OK
29	100	355	460	22	OK
30	100	355	460	22	OK
31	100	355	460	22	OK
32	100	355	460	22	OK
33	100	355	460	22	OK
34	100	355	460	22	OK
35	100	355	460	22	OK
36	100	355	460	22	OK
37	100	355	460	22	OK
38	100	355	460	22	OK
39	100	355	460	22	OK
40	100	355	460	22	OK
41	100	355	460	22	OK
42	100	355	460	22	OK
43	100	355	460	22	OK
44	100	355	460	22	OK
45	100	355	460	22	OK
46	100	355	460	22	OK
47	100	355	460	22	OK
48	100	355	460	22	OK
49	100	355	460	22	OK
50	100	355	460	22	OK

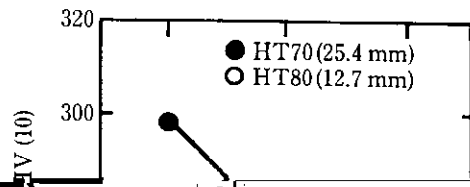
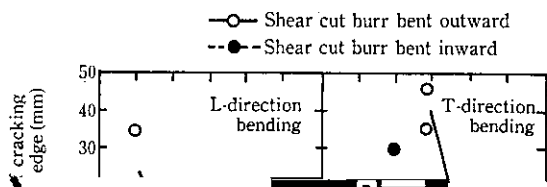
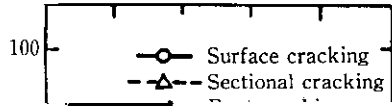


Table 8 Welding conditions for HT70



	SMAW	GMAW
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Welding wire	KSA106 4 mm ϕ	KM60 1.6 mm ϕ
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of the joints was equivalent to that of the base metals.

Results of the Charpy impact test are shown in **Fig. 9** for each notch position. Even at the fusion line (FL), which showed the greatest deterioration, the absorbed

