

KAWASAKI STEEL TECHNICAL REPORT

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Heavy Gauge "RIVER TOUGH" H-Shapes of the New TMCP Type for Building Structures

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Synopsis :

The new TMCP (thermo-mechanical control process) method is a process to enhance ferrite nucleation by using VN precipitates to refine the microstructure, and it is an integrated control method of microstructures applicable to the rolling of the heavy gauge H-shapes, to which the restrictive conditions of rolling, including the cooling process should be ensured. As a result of applying the new TMCP method to 355 MPa class heavy gauge H-shape with dimensions of 612× 500× 50× 80 mm, its microstructure was rema

of the New TMCP Type for Building Structures*

Synopsis:

The new TMCP type for building structures is described.

Rolling stage	Temperature (°C)	Rolling speed (m/min)	Reduction (%)	Grain size (μm)	Interfacial energy (mJ/m ²)
1	1100	100	15	15	0.15
2	1050	150	15	12	0.18
3	1000	200	15	10	0.22
4	950	250	15	8	0.28
5	900	300	15	6	0.35
6	850	350	15	5	0.42
7	800	400	15	4	0.50
8	750	450	15	3	0.60
9	700	500	15	2	0.75
10	650	550	15	1.5	0.90
11	600	600	15	1.2	1.10
12	550	650	15	1.0	1.30
13	500	700	15	0.8	1.50
14	450	750	15	0.6	1.80
15	400	800	15	0.5	2.10
16	350	850	15	0.4	2.40
17	300	900	15	0.3	2.80
18	250	950	15	0.2	3.20
19	200	1000	15	0.15	3.60
20	150	1050	15	0.1	4.00
21	100	1100	15	0.08	4.50
22	50	1150	15	0.06	5.00
23	0	1200	15	0.05	5.50

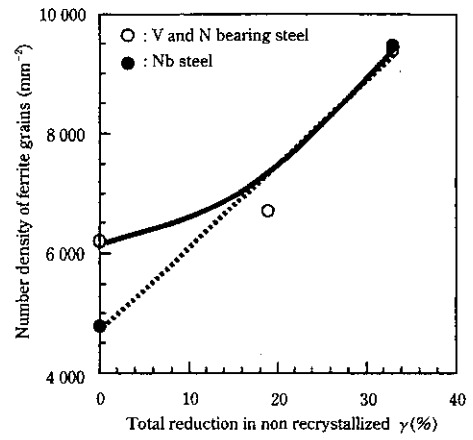
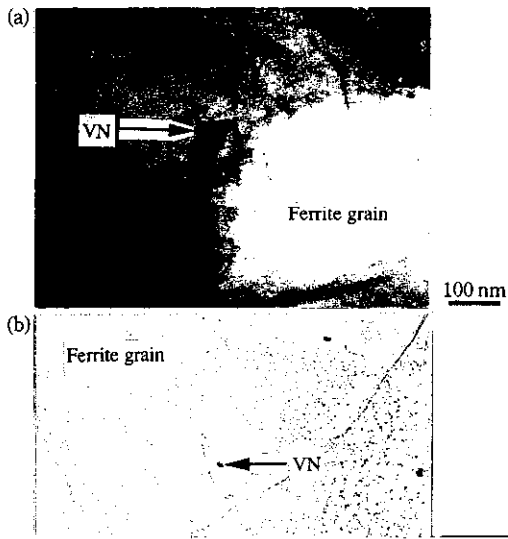
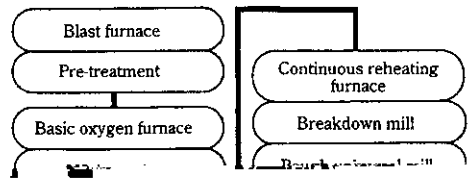
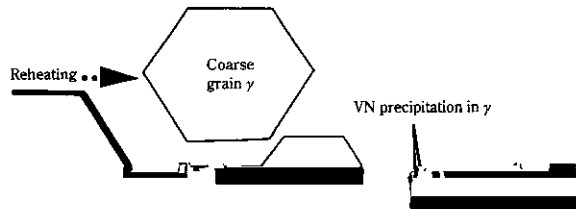


Fig. 2 Relation between the reduction in the non-recrystallization region and the number density of ferrite grains



O: L-direction Δ: C-direction
□: Z-direction +: 45° direction

O: L-direction Δ: C-direction

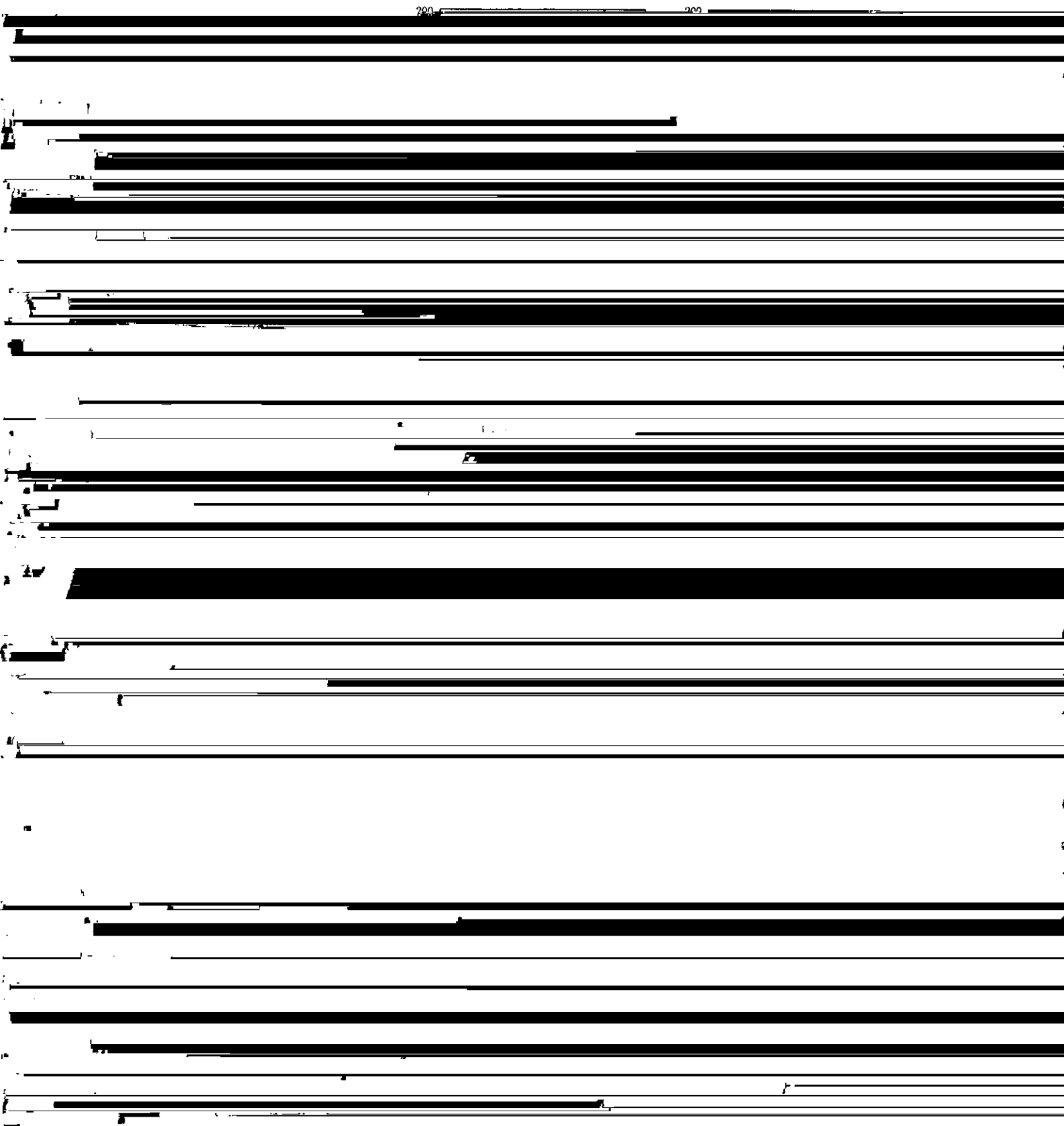
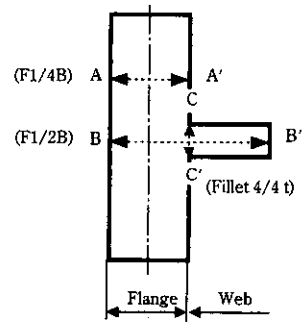
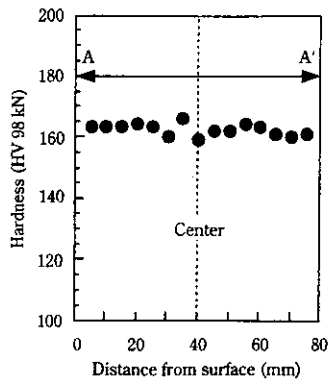


Table 4 Tensile test results of flange and beam welded joints

Sample	T.S. (N/mm ²)	Fracture position
Convex test piece	592	Plate
	592	Plate
No convexity	540	H-shape
	553	H-shape

