

# KAWASAKI STEEL TECHNICAL REPORT

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

Tatsumi Kimura, Takanori Okui, Kiyoshi Uchida

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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 <sup>2</sup> )
1	1150	100	15	15	0.15
2	1100	150	15	12	0.18
3	1050	200	15	10	0.22
4	1000	250	15	8	0.28
5	950	300	15	6	0.35
6	900	350	15	5	0.42
7	850	400	15	4	0.50
8	800	450	15	3	0.60
9	750	500	15	2.5	0.70
10	700	550	15	2	0.80
11	650	600	15	1.5	0.90
12	600	650	15	1.2	1.00
13	550	700	15	1.0	1.10
14	500	750	15	0.8	1.20
15	450	800	15	0.7	1.30
16	400	850	15	0.6	1.40
17	350	900	15	0.5	1.50
18	300	950	15	0.4	1.60
19	250	1000	15	0.35	1.70
20	200	1050	15	0.3	1.80
21	150	1100	15	0.25	1.90
22	100	1150	15	0.2	2.00
23	50	1200	15	0.15	2.10
24	0	1250	15	0.1	2.20

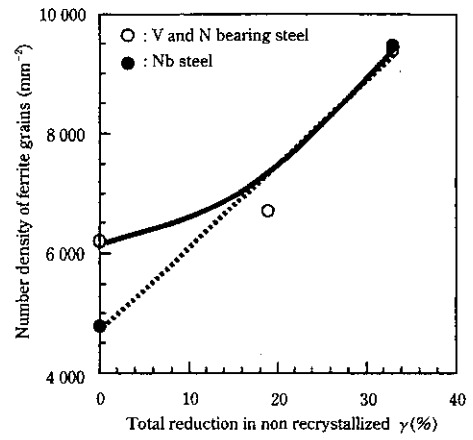
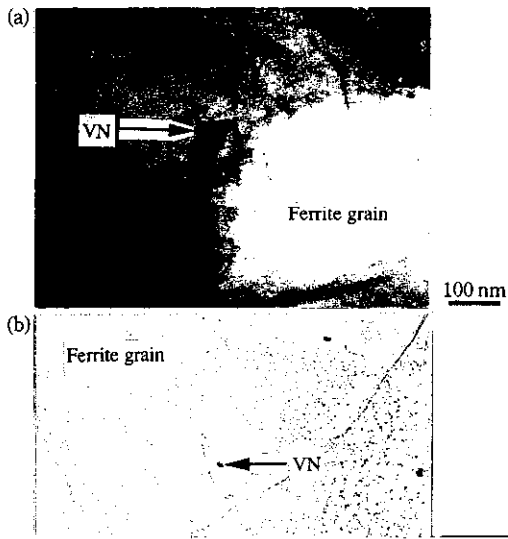
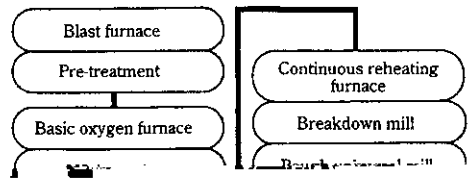
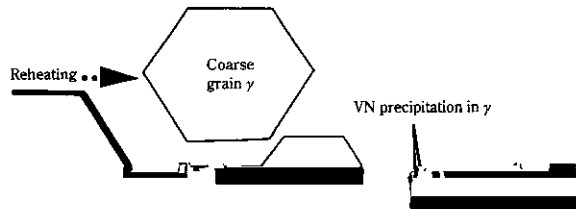


Fig. 2 Relation between the reduction in the non-recrystallization region and the number density of ferrite grains



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

O: L-direction    Δ: C-direction

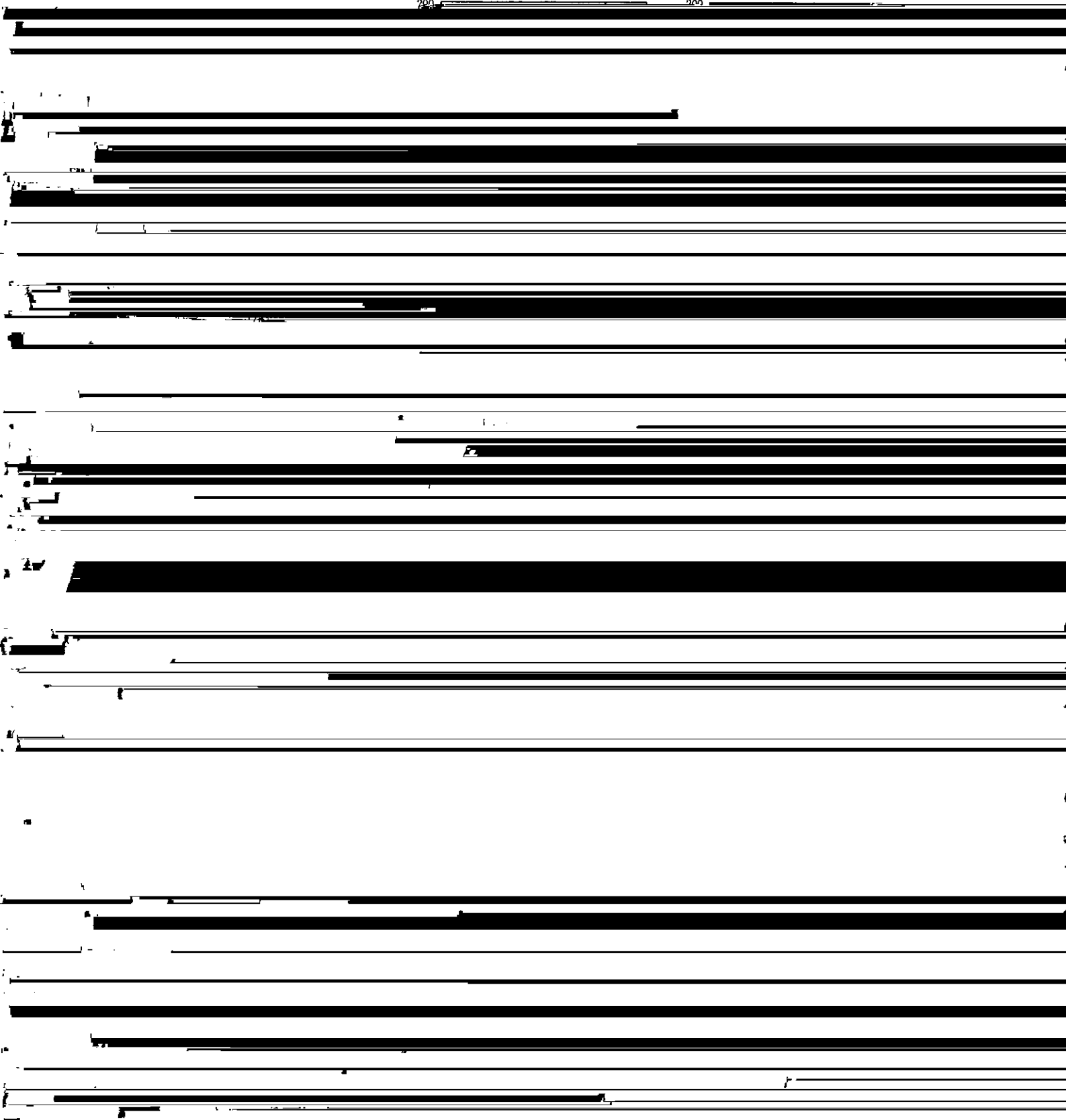
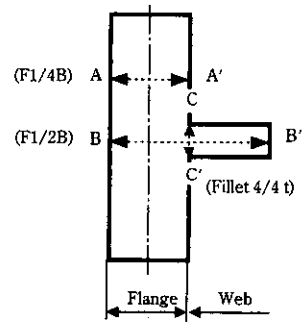
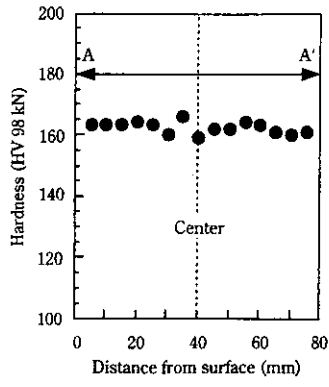


Table 4 Tensile test results of flange and beam welded joints

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

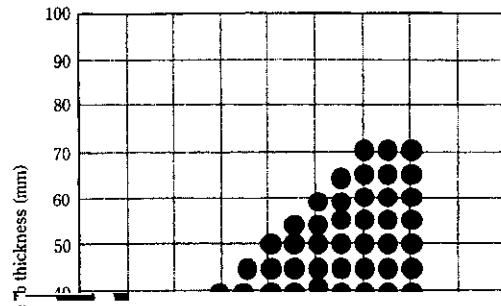




Table 5 Application of the new TMCP type heavy gauge H-shape "RT325, RT355"

No.	Project	Designer	Scale	Details	
				Spec	Max thickness (mm) Delivery

Kobe International

3R-22F

RT-325R (SN490R)