

Elastic-Plastic Behaviour and Design of Box Column Built-up by Partial Penetration Welds

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Synopsis :

Thick-walled built-up RHS tubes are widely used for columns of high-rise buildings. In assembling tubes, full-penetration groove welds have usually been applied to corner seam welds, specifically, in the beam-connected region due to their design method. To establish an economical design method by employing partial penetration groove welds, experimental and finite element analysis were conducted on the plastic behaviour of connection between the beams and the RHS column. In the analysis, a numerical model for the elastic-plastic shear behaviour of corner seam welds derived from small fracture tests was used. Based on the assumed yield mechanism of the connection, theoretical yield strengths are estimated in terms of the strength of welds, and compared with those obtained by the experiment. The result shows that the estimated strengths give good agreement with the experimental values. Therefore, the design method is verified to be practical for the seam welds.

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### 要旨

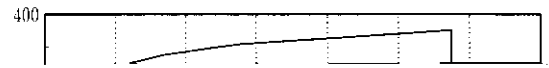
建築構造用溶接組立角鋼管柱の製作コスト低減を目標として、角鋼管柱のかど溶接を全線部分溶込み溶接とした場合の必要溶込み深さについて検討した。柱はり接合部に関する部分架構実験と弾塑性

Table 1 Dimensions of specimens

(mm)

Name of specimen	$N/N_y$	$a/c_t$	Column		Beam				Dia-phragm	Location of initial yield
			$H_c$	$c_t$	$H_b$	$B_b$	$b_{tw}$	$b_{tf}$		
A-1	0.6	0.22	300	36	360	200	16	22	16	Corner weld
A-2	0.6	0.37	300	36	300	200	12	32	16	Panel
B-1	0.3	0.21	300	36	360	200	16	22	20	Corner weld
B-2	0.3	0.37	300	36	300	200	22	36	20	Panel





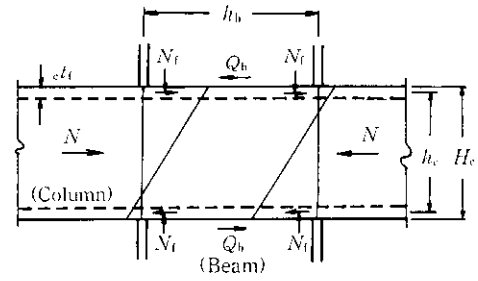
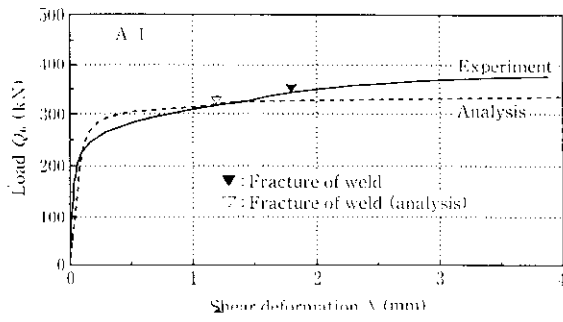


Fig. 9. Yield distribution of beam-column joint

Fig. 8 Comparison of analytical shear deformation with experimental

Table 4 Comparison of estimated yield strength with experimental value

溶接部の歪率とせん断変形の関係を、Fig. 8 に実験値と比較す