

6. Development of Hybrid Beam Consisted of H-Shaped Steel and Reinforced Concrete - Evaluating Ultimate Strength and Deformation Capacity -

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Compared to a simple steel beam, a hybrid beam consisting of a reinforced concrete beam (RC beam) at both ends and a steel H beam (S beam) at the center increases the rigidity of the member and suppresses deformation. However, when an S beam is embedded in an RC beam, the shear force acting on the RC beam via the lever mechanism that transmits stress between different structural members exceeds the shear force of the S beam. This force grows with shorter embedded lengths, limiting embedded lengths to a minimum of 2.5 times the S beam depth and imposing significant design constraints.

We performed structural experiments with the goal of developing a hybrid beam in which the embedded length is about twice the S beam depth. We examined the validity of the method for calculating ultimate strength and the relationship between the shear margin (ratio of shear strength to bending strength of the RC beam) and deformation performance, thereby confirming that configuring reinforcing bars by the method proposed allows shorter embedded lengths.

Key words: large hybrid beam, reinforced concrete structure, steel structure, shear strength, deformation capacity