

Jirapat Jirapaphan 2011: Topology Optimization of Prestressed Concrete Beams.
Master of Engineering (Civil Engineering), Major Field: Civil Engineering, Department
of Civil Engineering. Thesis Advisor: Associate Professor
Benjapon Wethyavivorn, Ph.D. 79 pages.

This research presented the process of Topology Optimization of prestressed concrete beams by Simple Evolutionary Procedure. The models of 4.00 meters span loaded with 920 kg/m distributed along the length and 460 kg at 50 centimeters spacing with prestressing of 11,000 and 12,000 kg eccentrically from the neutral axis 7.5 centimeters for the 25 centimeters depth beam and span loaded with 944 kg/m distributed along the length and 472 kg at 50 centimeters spacing with prestressing of 7,000 and 8,000 kg eccentrically from the neutral axis 10 centimeters for the 30 centimeters depth beam forming eight different cases. The analysis was performed using finite element method to systematically neutralized element with stress lower than the prescribed set value.

The results showed that the prestressed concrete beams together with topology optimization process can reduce the amount of concrete by about 20 to 40 percentage depending upon type of loading, cross-sectional area and level of prestressing force.

Student's signature

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