Siradech Surit 2011: Topology Optimization for Concrete-Steel Composite Beams. Doctor of Engineering (Civil Engineering), Major Field: Civil Engineering, Department of Civil Engineering.   Thesis Advisor: Associate Professor Benjapon Wethyavivorn, Ph.D. 131 pages.

The objective of this research is to develop a method and strategy of finding the optimal topology for concrete-steel composite beams. Case studies were simply supported reinforced concrete beams with span 4.0 meter with depth 40, 50, 80 and 100 centimeter and 2.0 meter span with 100 centimeter depth, loaded by point load of 1500, 2000 and 2500 kilograms at mid-span, forming 12 load and span combinations. Finite element model was the smeared reinforcement model with fixed grid mesh. The optimization processes begin with an unreinforced concrete beam then the optimal topology of both concrete and steel progressive emerged at the same time gradually remove in efficient element. The processes continue until the ending criteria were met. The optimal topology can be found by using two criteria, the minimum weight criteria and minimum cost criteria.

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