## Analyzing of Arch Steel Beams with Pre-Stressed Cables

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**Abstract :** By day-to-day developed techniques, it is possible to pass through larger openings by using smaller beam-column sections. Parallel to this trend, it is aimed to produce not only smaller but also economical and architecturally more attractive beams. This study aims to explain the structural behavior of arch steel beam reinforced by using post-tension cable. Due to the effect of post-stressed cable, the arch beam load carrying capacity increases and an optimized section in a smaller size can be obtained with a better architectural view. It also allows better mechanical and applicational solutions for buildings. For better understanding the behavior of the reinforced beam, steel beam and arch steel beam with post-tensioned cable are all modeled and analyzed by using SAP2000 Finite element computer program and compared with each other. Also, full scale test specimens were prepared to test for figuring out the structural behavior and compare the results with the computer model results. Test results are very promising. The similarity of the results between the test and computer analysis shows us that there are no extra knowledge and effort of engineer is needed to calculate such beams. The predicted (and proved by tests) beam carrying capacity is 35% higher than the unreinforced beam carrying capacity. Even just three full scale tests were completed, it is seen that the ratio (%35) may be increased ahead by adjusting the cable post-tension force of beams in much smaller sizes.

Keywords : arch steel beams, pre-stressed cables, finite element, specimen Test

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