# Abstract

Construction work consumes a huge amount and various types of one dimensional materials in many different sizes and lengths. Normally, these stock materials are sold and are available in only a few standard lengths. To prepare them for the construction, the stock materials are cut into small different lengths and number of pieces and there is a lot of trim loss in the process including labor and stockyard spent for storing open orders. The one-dimensional cutting stock problem and the contiguity problem models were invented in literature to determine the optimal cutting plans with the minimum trim loss and the most contiguous cutting sequences. However, demand assortment, which consists of the demanded lengths and number of pieces of the job, is a crucial factor of the amount of trim loss. This demand can vary considerably from job to job according to the designs and the components of the building structures. It is still unclear how this combination of the demanded lengths and number of pieces affect the loss. This research conducts the experiment and uses the sensitivity analysis technique to extract the correlation between the variation of the demand and the cutting loss. The demanded lengths are divided into six continuous ranges and the proportions of the demanded number of each range are controlled. The combination of demanded length and number of pieces are systematically altered to simulate many different decent jobs. Statistical techniques are also applied to analyze the results. The results show that the proportion of demanded number of pieces between the six ranges has an impact on the trim loss. The long length range ($Li/LS > 0.500$) increases the trim loss whereas the short length range ($(Li/LS) <= 0.200$) decreases it. The intermediate length range ($0.200 < (Li/LS) <= 0.500$) is necessary for the formulation of efficient cutting patterns. The number of different cutting patterns in the plans has an influence on the contiguity of the cutting jobs. The outcome of this research helps in building a wise strategy to arrange cutting jobs with the right assortments, which produce even less trim loss along the project timeline and consequently save the project cost.



**Keywords**: Cutting Stock Problem, One-dimensional Construction Materials, Demand Assortment, Contiguity, Cutting Plan, Trim Loss, Steel Bar