Topology Optimization Through Computer Aided Software

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Topology Optimization is a mathematical method used to reduce the structural weight, material, and layout of a design that many industries implement in their design process. The project goal was to use topology optimization on static structures through automated simulations to produce the most cost effective and structurally stable designs. The automated process will eliminate the cost of material used on a static structure and it will also eliminate extensive planning when picking a given design. This paper focuses on the work done in a 10-week research program by 3 community College students, led by civil engineering faculty at SFSU. The research behind this paper focuses on the use of topology optimization on static structures. With this knowledge we understand the design process it took in topology optimization with computer aided software. The research seeks to eliminate the need to use of the graphical user interface of ANSYS and AutoCAD completely to automate the simulation and structural analysis while optimizing a given geometry or design through the MATLAB environment by running a script file. The research presented is meant help build an automated platform that will eliminate many time consuming and rigorous steps. Our platform was able to analyze a static structure with a faster productivity rate and produce quantitative results that will help us further understand the topology optimization process.