

Determining Factors of Suspended Glass Systems with Pre-Stress Cable Truss

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Abstract : The use of glass as an envelope of a building has been increasing in the twentieth century. For more transparency and dematerialization new glass facade types have emerged in the past two decades which depends on point fixed glazing system (PFGS). The aim of this study is to analyze of the PFGS systems which are used on the glass curtain wall according to their types, degree, architectural and structural effects. This new system is desired because it enhances the transparency of the façade and it minimizes the component of the frames or of the profiles. This PFGS led to new structural elements which use cables, rods, trusses when designing a glass building facades, this structural element called the suspended glass system with pre-stressed cable truss (SGSPCT) which has been used for the first time in 1980 in Serres building. The twenty glass buildings which are designed in different systems have been analyzed during this study. After these analyses five selected SGSPCT building analyzed deeply and one skeletal frame building selected from Lefkosa redesigned according to the analysis results. These selected buildings have been included of various cable-truss system typologies and degree. The methodology of this study is building analysis method and literature survey with the help of books, articles, magazines, drawings, internet sources and applied connection details of the glass buildings. The selected five glass buildings and case building have been detailed analyzed with their architectural drawings, photographs and details. A gridshell structure can be compared with a shell structure; it consists of discrete members connecting nodal points. As these nodal points lie on the surface of an imaginary shell, their shapes function almost identically. Difference between shell and gridshell structures can be found in the fact that, due to their free-form and thus, due to the presence of bending forces, gridshells are required to resist loading through their cross-section. This research is divided into parts. A general study about the glass building and cable-glass and grid shell system will be done in the first chapters. Structural analyses and detailed analyses with schematic drawings with the plans, sections of the selected buildings will be explained in the second part. The third part it consists of the advantages and disadvantages of the use of the SGSPCT and Grid Shell in architecture. The study consists of four chapters including the introduction chapter. The general information of the SGSPCT and glazing system has been mentioned in the first chapter. Structural features, typologies, transparency principle and analytical information on systems have been explained of the selected buildings in the second chapter. The detailed analyses of case building have been done according to their schematic drawings with the plans, sections in the third chapter. After third chapter SGSPCT discussed on to the case building and selected buildings. SGSPCT systems have been compared with their advantages and disadvantages to the other systems. Advantages of cable-truss systems and SGSPCT have been concluded that the use of glass substrates in the last chapter.

Keywords : cable truss, glass, grid shell, transparency

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