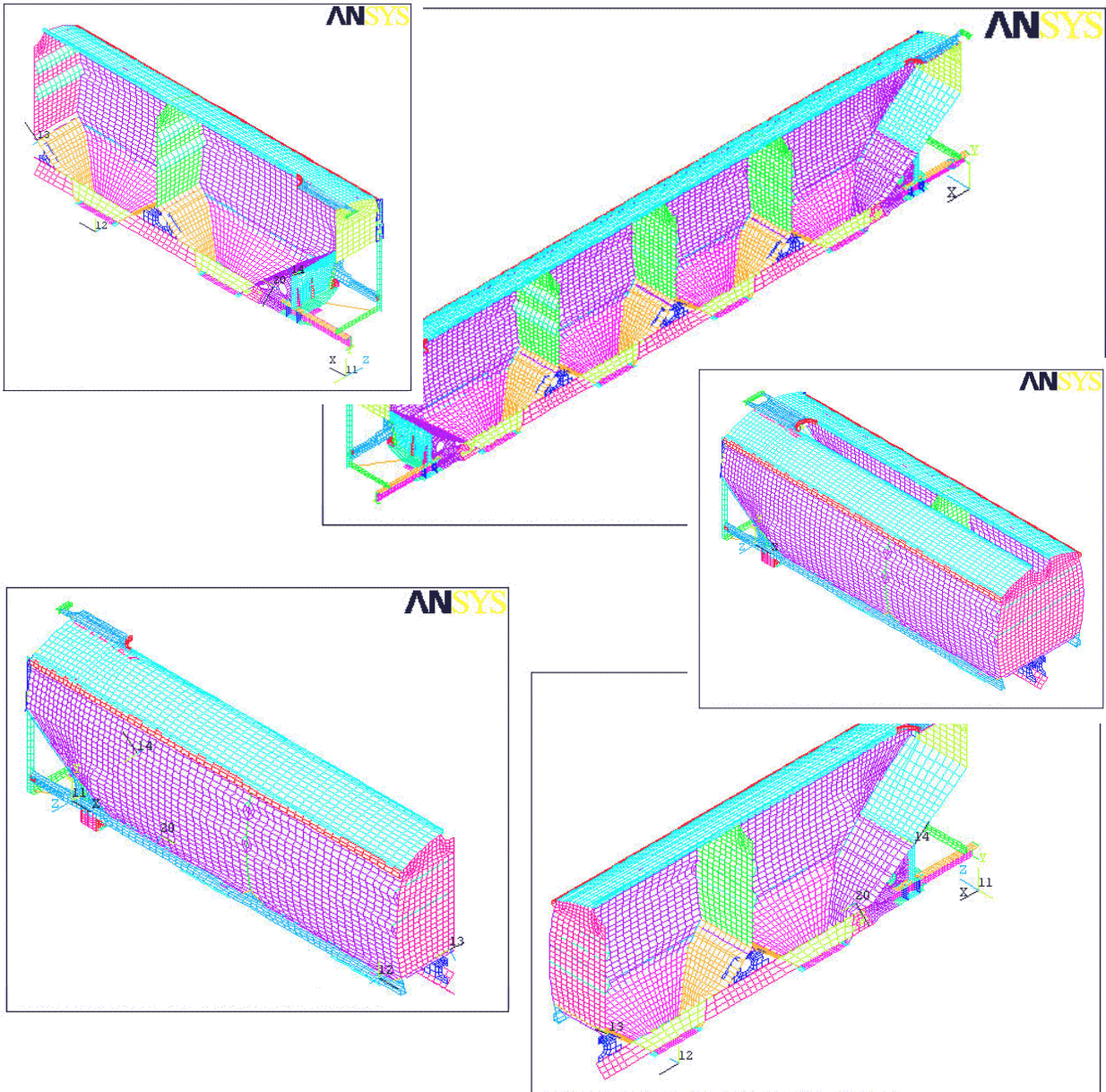


# FINITE ELEMENT ANALYSIS OF A HOPPER CAR

PURPOSE: Structural stress and buckling analysis of a 6351 Cu. ft. Hopper Car

A structural analysis of a Hopper Car was performed per AAR (American Association of Railroads) specifications using Finite Element Analysis. The FE model was prepared using 3-D quad shell elements and beam elements and comprising approx. 37000 elements and 207114 dofs. A total of 12 load cases (Buff, Draft, End Compression Empty and Loaded Car, Single Ended Impact, Coupler Jacking, Side Bearing, Vertical 2.2, Jacking, Twist, 50K Vertical Coupler Load Up and Down) were analyzed. Results of the analysis for each load case were summarized and tabulated. Subsequent to the stress analysis, buckling checks for the roof and top chord and side sill were also conducted and a fatigue analysis was performed.



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