This paper focuses on the modelling of fire in case of various distributions of combustible materials in a large compartment. Large compartments often represent a challenge for structural fire safety, because of lack of prescriptive rules to follow and difficulties of taking into account the effect of non uniform distribution of the combustible materials and fire propagation. These aspects are discussed in this paper with reference to an industrial steel building, taken as case study. Fires triggered by the burning of wooden pallets stored in the premises have been investigated with respect to different stacking configurations of the pallets with the avail of a CFD code. The results in term of temperatures of the hot gasses and of the steel elements composing the structural system are compared with simplified analytical model of localized and post-flashover fires, with the aim of highlighting limitation and potentiality of different modelling approaches.