In this paper stents employed to treat peripheral artery disease are analyzed through a three-dimensional finite-element approach, based on a large-strain and large-displacement formulation. Aiming to evaluate the influence of some stent design parameters on stent mechanics and on the biomechanical interaction between stent and arterial wall, quasi-static and dynamic numerical analyses are carried out by referring to computational models of commercially and noncommercially available versions of both braided self-expandable stents and balloon-expandable stents. Addressing isolated device models, opening mechanisms and flexibility of both opened and closed stent configurations are numerically experienced. Moreover, stent deployment into a stenotic peripheral artery and possible postdilatation angioplasty (the latter for the self-expandable device only) are simulated by considering different idealized vessel geometries and accounting for the presence of a stenotic plaque. Proposed results highlight important differences in the mechanical response of the two types of stents, as well as a significant influence of the vessel shape on the stress distributions arising upon the artery-plaque system. Finally, computational results are used to assess both the stent mechanical performance and the effectiveness of the stenting treatment, allowing also to identify possible critical conditions affecting the risk of stent fracture, tissue damage, and/or pathological tissue response.