In this paper the calculation results of a two-speed synchronous, silentpole, large power motor, are presented. Using the FEM tools, the two dimensional, field circuit model (for electromagnetic calculation) and two- and three-dimensional mechanical models, for the large power motor, type GAe 1510/12p were examined. The simulations, for load, for both rotational speeds, were conducted. The target of application of discussed analysis is the vibration behavior of the machine.