Legacy 7-8 wt% YSZ (Yttria-Stabilized Zirconia) materials have been used over the last thirty years for various turbine applications, namely as TBCs (Thermal Barrier Coatings). The benefits of 7-8 wt% YSZ TBC materials are well-known in the literature, with key features of low thermal conductivity, high temperature phase stability and compatible thermal expansion to superalloy substrates with MCrAlY (M=Ni, Co, Fe) bond coats. The YSZ coatings are produced by either Air Plasma Spray (APS) and/or Electron Beam Physical Vapor Deposition (EB-PVD). Design considerations for selection of the coating method are component size, cost and performance requirements. Each method has its own advantages and disadvantages. Conventional APS is relatively inexpensive but limited to porous or dense YSZ coatings, whereas EB-PVD produces filamentary strain tolerant coatings at much higher cost. To offset the high capital cost of EB-PVD, researchers have looked at developing strain tolerant coatings through microstructure changes produced by alternative processes. Suspension Plasma Spray (SPS) moves towards more sophisticated segmented / columnar structures using dual or multilayer approaches where coatings structures can be adjusted for specific applications and components. The goal of this work is to better understand the similarities and differences of these YSZ microstructures in terms of their characteristics through using equal material selections and test conditions.