We investigate the geometric properties of circular space-times within the framework of 3+1 and subsequent 2+1+1 decomposition of space-time. The problem that is discussed revolves around the identification of minimal 2-dim. submanifolds, within each space-time included, aimed at constructing an adapted coordinate system to the second decomposition, that leaves the resulting submanifold minimal. We employ a shooting method to solve the Neumann boundary value problem for the second-order non-linear ordinary differential equation $L = 0$. Cases of Minkowski limit, some parameter values of the Levi-Civita metric, and a Weyl metric are solved analytically, and the adapted coordinates system is determined. For other cases, numerical plots and 3D plots of the minimal submanifolds for various geometries are presented.