Al₂O₃ nanoparticles were used for fabrication of multilayer nanocomposite film deposition on cationic denim fabrics by electrostatic self-assembly to improve the mechanical properties. Denim fabrics were pre-treated with 2,3-epoxypropyltrimethylammonium chloride (EP3MAC) by a pad-batch method for cationic surface charge. Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy (FTIR-ATR) and Scanning electron microscopy (SEM) were used to verify the presence of deposit nanolayers. CIELab analysis was performed on the fabrics before and after the treatment with Al₂O₃ nanoparticles by the layer-by-layer deposition method. After aging processes, the effect of layer-by-layer deposition method on the some of the physical properties of denim fabrics were also investigated.