The study is focused on the manufacturing of fully dense and porous Ti6Al4V parts by Powder Bed Fusion (PBF) method. In the scope of the study, the reasons of the impact of the powder recoating system and internal stress-induced failures in the manufacturing of tensile specimens were investigated and solution proposals were presented. Results that were determined by implementing the most suitable solution were investigated. In this study, failures that occurred during manufacturing were prevented by analyzing the powder recoating system. As a result of the study, the negative effects, which were caused by the impact of the recoater blade on the parts, were prevented. It was observed that the samples were bent due to the forces that were generated by the recoating system movement during manufacturing. The bending conditions were eliminated when the samples were manufactured in a barrel. Thus, no deformation occurred in the part. The negative effects of internal stresses in samples were removed by using the cooling rate concept and FEA analysis. Finally, assumptions of simulations were verified by manufacturing samples with the same machine parameters.

KEYWORDS: Additive manufacturing, powder bed, fusion, PBF, recoater, Ti6Al4V, residual stress