Injection-molded samples of thermoplastic polyetherurethane (TPU) were treated with low-temperature oxygen plasma for different processing times in order to enhance cellular attachment for a gastric implant. Its effects were investigated by contact angle measurement, surface topography, cytotoxicity and cell colonization tests. No significant changes were found in the surface roughness of plasma treatment with plasma treatment time of less than 5 min. Longer treatment showed significantly higher surface roughness. It seems that there was a link between the changes in contact angle and enhanced cell growth on the treated surface, although only for the range up to plasma treatment times of 3 min. Prolonged treatment times did not cause any major changes in the water contact angle, but strongly improved the number of growing cells on the surface. Plasma treatment for 3-7 min led to a twofold increase in the number of cells compared to untreated samples and did not significantly alter the WST-1 nor worsened the lactate dehydrogenase activity compared to the control. Thus, it appears that O(2) plasma treatment is a suitable surface modification method for a gastric implant made of TPU in order to improve surface cell attachment where 3-7 min is the recommended treatment time.