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Wear Prediction on Total Ankle Replacement Effect of Design Parameters

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This book is dedicated to my parents, who taught me to strive to achieve success because success does not come easily and made the experience of facing challenges as a supply meaningful to benefit in the future. It is also dedicated to my wife who always stands beside me to inspire and support to create the best in any field.

Preface

Loosening of the bearing component of total ankle replacement (TAR) became the main cause to implant failure. The ankle joint is the lowest joint in the human body. It has a complex mechanism with build-up of four bones, namely tibia, fibula, talus, and calcaneous. The ligamentous structure on the ankle joint is the most important part in providing stability while performing any physical activity. The bone ends of the joints in human bodies are covered by cartilage that a flexible connective tissue allows the bones to move effectively and smoothly without pain. The cartilage in the lower limb joints is used to carry body weight and allows for shock absorption. However, deterioration or wearing away of joint cartilage causes arthritis to occur. Arthritis is the main issue that brings an ankle joint to have an operative management. Total ankle replacement (TAR) is consistently referred to treat the disorder. The wear of polyethylene produced wear particles induced osteolysis which is limiting longevity of TAR. The wears of polyethylene leading to osteolysis in the long-term period due to the development of wear particles which cause bone losses surrounding implant lead to instability and subsequently loosen the implant components.