

An Investigation into the Potential use of A Hydrogel / Thermoplastic Elastomer System for Knee Surgery Applications

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Abstract. With over 1.7 million meniscal injuries in the western world treated each year the treatment of irreparable meniscal tears remains a major challenge for the orthopaedic community, thus a \$2bn global market has emerged. The main goal of this research is to develop artificial menisci which mimic the natural fibrocartilaginous tissue. The meniscus is sensitive tissue that can that can easily become injured; such injuries can be mechanical, such as in athletes or degenerative processes seen in older patients with more brittle cartilage. Treatment of tears in that location remains a major challenge in surgery as removal of all or parts of the meniscus may eventually lead to osteoarthritis (Fairbank, 1948). Therefore, the aim of this work will focus on the development of a novel, moist, biocompatible and non-toxic composite material to help repair or replace a torn meniscus. This polymeric device will match the mechanical properties of a natural meniscus using combined technologies derived from hydrogel and thermoplastic elastomer systems. This proposal will also explore the manufacturability and effects of sterilisation of the aforementioned polymeric systems using conventional technologies to mass produce the device(s) in an efficient and cheap manner.