

My PhD research project consists of the design and construction of a human mouth model (OTFMS), the orthodontic torque and force measurement device simulating the arrangement of natural dentition (14 teeth in an archform). For the first time in the history of orthodontic biomechanics research, this model will be capable of simultaneously measuring orthodontic forces as well as moments in three planes of space for every individual tooth in the dental arch (Fx, Fy, Fz, Mx, My, Mz). The multi-axis force transducer system used in this project measures all six components of force and torque. The research project will be conducted in three stages:

Stage I: Using Multi Axis force Transducers for Orthodontic torque measurement

The purpose of this study was to evaluate the third order moments (torque expression) produced by engaging rectangular 0.019”X0.025” SS archwires into the archwire slots of four self ligating brackets (Damon II® /ORMCO, Smart Clip® /3M, Speed® /Strite industries, Inovation® /GAC), using a specially developed device for torque measurements utilizing a multi-axis force/torque transducer. We concluded this stage of research and a paper was submitted for publication.

Stage II: Construction of Orthodontic Torque / Force Measuring System OTFMS

Work is underway and the construction of this device will be completed within a few months.

Stage three: Use the OTFMS to identify Orthodontic force systems

The position of the teeth in the OTFMS is adjustable in three planes of space, this allow us to simulate varying degrees of malocclusions and to study the force systems resulting during orthodontic treatment for such malocclusions.