Objective
The process of gait is a very complex and mystifying process. There are a limitless amount of perturbations that can be introduced to it and a seemingly limitless amount of compensatory patterns that the body can utilize to keep itself ambulating. All of these variables get amplified when the ambulating individual has a missing limb segment, as is the case with the prosthetic ambulator. One such phenomenon that occurs commonly in amputee gait is the perception amputees report as the “dead spot.” Although anecdotally known to many amputees and prosthetists alike, little research has been done to quantify it and its effect on the ambulatory pattern of the amputee. The “dead spot” phenomenon is a period in midstance on the prosthetic side in which the amputee experiences a locking in to a position of excess stability. It is the period in which the prosthetic heel and toe are both in contact with the ground. Although stability is beneficial to anyone's gait, amputees have to use a considerable amount of effort to push through this point to load the toe of the prosthetic foot to get an energetic return during terminal contact. This extra effort required to motor out of prosthetic midstance is energy inefficient and should be documented so that researchers can begin to create ways of eliminating. The aim of this study was two-fold. The first aim was to establish a kinetic and kinematic profile of the “dead spot” phenomenon and the second aim was to compare several feet, including those which claim or report no “dead spot.” The project utilized amputees as subjects so that a true profile could be established and used 3D kinematic systems with integrated forceplates to measure kinetic changes.

Methods
This study utilized one unilateral transtibial (below knee) and one transfemoral (above knee) amputee as subjects. All subjects are independent being classified as K3 ambulators. The subjects were brought into the motion analysis lab at Eastern Michigan University and signed an informed consent form. The subjects then had various anthropometric measurements recorded in accordance with the plug-in gait model. The subjects were then fit with 45 reflective markers in accordance with a modified full body marker set. The subjects then walked on an elevated 8mx1.5m elevated walkway with 2 AMTI OR6-7 forceplates imbedded in it while being recorded by the Vicon Motion Capture system. The forceplates along with the Vicon system allows for whole body kinematics as well as kinetics to be recorded. One subject also had the iPecs system (College Park Industries) inserted into their prosthesis to measure forces and moments occurring within the prosthesis. The subjects took 15-30 trials on each foot. Rates of perceived exertion were recorded after the data capture session on each foot. Both the subjects and the prosthetist fitting the feet were blinded as to which foot was which and only the research director knew their identity. In addition, the feet were worn in a randomized order. Footwear and alignment were kept constant amongst conditions. Temporal-Spatial outcome variables were calculated from the Vicon trajectory data using custom scripts written for Matlab R2013a. All variables were tested for significance in difference using IBM SPSS 22 statistical software. A repeated measures ANOVA with Fischer's Least Significant Difference post hoc was used to determine significance. The level of significance was set at p=0.05.

Results
As a result of the study, a kinetic profile was able to be established in regards to force pattern peaks during prosthetic midstance. In addition, there were significant differences observed in regards to peak forces and moments between feet. Significance was also found in temporal-spatial data in between feet as well. There was also a difference noted in recorded RPE between conditions.

Conclusion
A kinetic profile of the “dead spot” phenomenon was able to be established in our subjects through the efforts explained here. Furthermore, this profile did change between prosthetic feet during midstance.
Biographical Sketch
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