INTRODUCTION
The use of plaster of paris by certified Prosthetists and Orthotists is common practice in their fields. Although this material can be found in nearly every O&P clinic in the country, little is understood about its chemical makeup and behaviour. The chemical makeup of plaster is $2\text{CaSO}_4+\frac{1}{2}\text{H}_2\text{O}$. When plaster is mixed with water it becomes fully hydrated taking its natural form known as gypsum ($2\text{CaSO}_4\cdot2\text{H}_2\text{O}$) (Weiser, 1932).

The Second World War lead to many advancements in the field of orthotics and prosthetics through focus on material research. When veterans returned with missing limbs, the U.S government and clinicians were both motivated to find materials that would better suit young able-bodied amputees (Lusardi, 2007). Finally after much government funded research we progressed to present day materials. The use of polyethylene, polypropylene, and acrylic carbon-fiber sockets came into the field, becoming the standard of the industry today. With all this advancement in polymer science very little attention was given to the behaviour of plaster of paris.

As is known by most practitioners plaster models dry out overtime and are easily hydrated again by exposing the model to water. However, no one has chronologically measured whether or not there is physical size change in plaster models from its initial manifestation to up to two weeks after the pour.

METHOD
A silicone model of a transtibial amputee will be employed as the original casted limb. A silicone limb was chosen over a human subject for casting as it will remain consistent in size and is not variable due to diet or other morbidities. The transtibial model will be scanned with the Vorum spectra scanner. This scan will be used as the base line to compare the changes in the positive model overtime.

The positive plaster model will be scanned immediately after it is poured and then it will be stored at room temperature for the two weeks in the absence of direct water contact. After two weeks the model will be scanned again to quantify any differences in size between the chronological scans. Once the scan is completed the model will be submerged in water for several hours and scanned again to see if the common practice of “soaking the model” changes the shape of the plaster.

RESULTS
By quantifying the change in plaster models overtime we may better understand some of the variables that lead to ill-fitting orthotic or prosthetic devices. The constant hydration and dehydration of models may skew the shape of the original cast unannounced to the practicing clinician making the task at hand much more difficult.

DISCUSSION
Certified Prosthetists and Orthotists are often challenged when fitting an edematous and/or dysvascular limb. The fluctuations in limb size depends on diet, lifestyle, and other morbidities. The fluctuations in limb size are due to the inability to regularly excrete water. Since limb size is variable from day to day, fitting prosthetic or orthotic devices with accurate anatomical contour is difficult as the patient is inconsistent in size.

If the positive models are also changing size it would compound the difficulty to fit patients accurately.

CLINICAL APPLICATIONS
The data gathered through this study can be an effective tool for clinicians to refer to. No one really understands to what extant plaster models fluctuate over time. If a clinician modifies a model but a test socket is not pulled until days later it is possible that an undesired fit maybe due to the change in the model and not the patient.

REFERENCES