MANUFACTURING OF CUSTOM CARBON FIBER ANKLE-FOOT ORTHOSES (AFO)

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Introduction

• Custom unidirectional carbon fiber ankle foot orthoses (AFO) are manufactured for patient's post-stroke

• AFO provide stability maneuverability based on individual patient's needed support

• Stiffness of AFO are tailored to meet the requirements for each patient

Manufacturing

• Plies are generated based on the anatomical measurements and stiffness requirements of the patient

• Plies were cut in different fiber directions in order to increase the strength of the overall part

• The footplate is designed in a manner that provides a natural rocking motion when walking

Assessment

• Manufactured AFO are visually inspected for any defects

• Defects include wrinkles, delaminations, and fiber quality

• The stiffness of the strut, footplate, and cuff are tested to ensure comfort of patient is met

• Strut height, cuff width, and footplate geometry are made in order to ensure a good fit for the patient

Future Work

• Optimize the ply generation cutting process

• Standardize the quality assessment practices

• Streamline the bagging and debulking process during layup

• Improve the manufacturing quality further

• Reduce waste of pre-preg while cutting the plies

• Develop new footplate geometry based on patient requirements

Objectives

• Streamline the ply generation and layup sequence

• Reduce the amount of wrinkling present during and after the layup process

• Manufacture a visually appealing AFO

• Produce an AFO that is durable enough for patient use and correct size

• Optimize the comfort of each AFO design

Acknowledgements

This work is supported by the UD AFO Program and the Biomedical Engineering Team.

Special thanks to Lukas Fuessel, Ted Lake, and Johnny Thiravong