



Company Information

Company Name	<i>Continental Tire the Americas</i>	Date Submitted	<i>05/21/2021</i>
Project Title	<i>Design and Development of an Engineering Test Fixture for Retread Tire Testing (CONT_TEST)</i>	Planned Starting Semester	<i>Fall 2021</i>

Senior Design Project Description

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

Discipline	Number	Discipline	Number
Mechanical	3	Electrical	1
Computer	1	Systems	
Other ()			

Company and Project Overview:

Continental Tire the Americas is part of Continental AG which is an international and Fortune 500 company. As an international premium manufacturer, Continental is on the leading edge of technology.

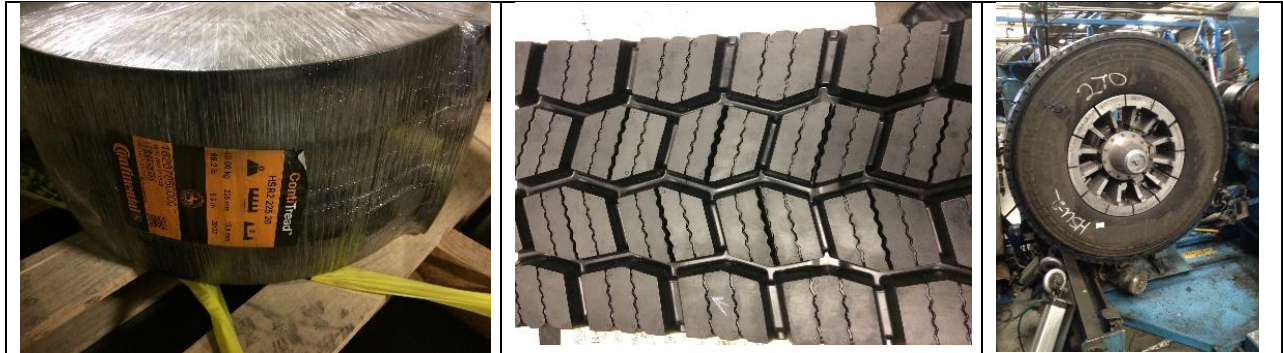
Continental is one of the world's leading manufacturers for commercial vehicle tires. In our plants throughout the world, we produce tires for a variety of applications, characterized by different vehicles, road conditions and customer requirements as well as driver behavior.

Our product portfolio comprises truck and bus tires as well as commercial specialty tires. The business unit is developing from a mere tire manufacturer to a solution provider, also offering services and solutions such as the ContiLifeCycle™, ContiPressureCheck™ and Conti360°, which help our customers to optimize their business. Continental Tire the Americas, LLC (CTA, formerly Continental General Tire) is headquartered in Fort Mill, South Carolina and is a subsidiary of Continental AG. CTA acquired General Tire in 1987.

For this project you will be working with the Truck and Bus Tire Division of Continental Tires. The Truck and Bus Division incorporates multiple New Tire Brands, the ContiLifeCycle (Retread Brands), and Digital Solutions.

The project will be for ContiLifeCycle/Retread Research and Development (R&D). What is Retread? The official definition from Merriam-Webster is to vulcanize a new tread to the prepared surface of a worn tire. In industry it is a re-manufacturing process in which a truck tire that has worn its initial tread is inspected

and repaired and a new tread is applied and cured on the casing. This is a less expensive and more environmentally friendly way to get the desired functionality without having to buy a new tire.



This project will focus on developing a process and test method for pre-cured treads. The R&D department needs to be able to test different parts of our manufacturing processes without needing to build a complete tire. Currently, the R&D lab outsources the process of vulcanizing treads and doing pull testing. The primary focus of the project will be on the curing and pull test processes.

Project Requirements:

Currently to test changes or improvements in our tread production or our retread manufacturing we have to build a full tire and send to a tire testing laboratory for evaluation. We however have no way of quickly repeating a test internally that would allow us to test multiple items at the same time and see the differences to alter our ideas and process.

R&D would like a way to test treads that are cured flat without having it be formed into a tire. In the rubber industry it is common to perform pull testing of rubber components in the tire. The samples, however are very thin and have a piece of Teflon film that keep the two components from adhering to each other. We want to try and replicate this process used in thin components for our much thicker components. We have components as thin as 1-2 mm to as thick as 28 mm. We need a way to cure these different components together and create pull testing like that of our thinner samples.

The first objective of this project would focus on how we curing these thicker components so that they can be pull tested. A specification for this curing apparatus exists. In addition, curing apparatus' are available off the shelf from suppliers. This team will find the best available option for purchase, then perform some minor modifications to it to suit the samples being processed in the lab. The second objective is the main objective which is the design and build of a pull test station. The machine would have a method for holding the samples, gradually pulling the unit under test and recording the in process and final test results for the test characteristics. The data will be logged and displayed on a small display device.

The test method and machine would need to be repeatable and have a system that is easily adaptable to Continental Internal Systems.

Expected Deliverables/Results:

- To quickly complete the online ContiLifeCycle Training Course to have a background to the project.
- To within the two weeks visit the Retread Shop to see the process live and ask questions
- To understand and determine the necessary process to create a flat tread cured samples (Machines, Tread Types, Process/Procedures)
- Review off the shelf sources and buy a curing chamber
- Modify the curing device (adding thermocouples)
- Write a procedure and best practices document for the curing of flat samples
- After feasibility and testing of best practices for curing of flat samples team would need to determine the best test method for trying to “pull apart” these samples.
- Design of a pull test machine with a display of test characteristics
- Write/Develop any coding required to process test results
- Run sample tests and write test method procedures as final deliverable.

Disposition of Deliverables at the End of the Project:

Continental would expect at the end of the project to have available for our use a flat sample curing machine with procedure and a test machine with a developed test method that we can take at the end of the Senior Design Expo.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- Understanding of thermocouples and the computer programs that go into it.
- Interest in Labview and instrumentation
- Hands on building/machining skills as the process will require the engineers to work directly in our Retread Facility and with different rubber samples.
- Ability to travel to Continental’s R&D HQ in Ft. Mill, SC as required.