Minnesota State College Southeast

BIKE 2020: Carbon Fiber & Composites

A. COURSE DESCRIPTION

Credits: 5

Lecture Hours/Week: 3

Lab Hours/Week: 4

OJT Hours/Week: *.*

Prerequisites: None

Corequisites: None

MnTC Goals: None

The objective of this class is to familiarize students with the composite materials layup process and the main types of composite fabrication. Students will learn the advantages and disadvantages of processes such as match molding, bladder blown compression, trapped rubber, RTM, and vacuum forming. Lab work will include building a carbon fiber based component using a wetlay process. Students will learn to identify problem molding areas and techniques used to best address these. (Prerequisite: none) (5 credits: 3 lecture/2 lab credits)

B. COURSE EFFECTIVE DATES: 02/27/2018 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Understand history and role of composites and carbon fiber in fabrication processes
2. Understand commonly used methods for composite fabrication
3. Demonstrate comprehension of physical attributes of carbon fiber and composites
4. Demonstrate the composite wetlay process of fabrication
5. Explain the role of the matrix and reinforcement (fiber or particles)
6. Explain use of resin, hardener, and release agent
7. Demonstrate safety procedures when doing composite layup, including safe disposal of unused materials
8. Gain the knowledge of how to prepare and lay out all materials and tooling to work with composites
9. Gain an understanding of how to keep the area and tools organized and clean when working with composite materials
10. Observe first hand some of the difficulties and limitations of working with a wet layup composite structure
11. Explain the benefits of composites as they pertain to bicycle fabrication

D. LEARNING OUTCOMES (General)

1. Understand the general physical properties of different types of composites
2. Understand the relationship between component properties and fiber orientation
3. Understand how resin choice can impact properties of composites
4. Understand how design properties of components can be controlled by altering the composite properties, fiber orientation, layers, and other variables
5. Knowledge of composite fabrication methods commonly employed in bicycle manufacturing
6. Understand layup and material preparation processes for low volume and high volume production
7. Understand how to identify common composite molding problems based on geometry or other factors and how to minimize defects
8. Build simple composite components using low volume processes
9. Ability to safely handle and work around composite materials and resins, and properly dispose of unused materials
10. Understand the impact of different finishing process on composite components

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted