UNC Charlotte – Lee College of Engineering Senior Design Program

Senior Design Project Description

Company Name	*QuEST Gloabl*	Date Submitted	*6/6/2019*
Project Title	*Low Cycle Fatigue Evaluation Tool* **QG_TOOL**	**Planned Starting Semester**	*Fall 2019*

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	2	Electrical	
Computer	2	Systems	
Other ( )			

Company and Project Overview:

QuEST Global (Quality Engineering & Software Technologies) is a production engineering company in the Aero Engines, Aerospace & Defense, Hi-Tech & Industrial, Medical Devices, Oil & Gas, Power, and Transportation verticals. The company has operations spread across 42 locations in 13 countries including US, Canada, Singapore, UK, Germany, Italy, Spain, France, Sweden, Romania, Japan, and India. Quest Global was founded in 1997 and employs 12,000 people as of April 2019. At QuEST, we have a rich range of multi-national customers from diverse backgrounds and industry verticals that bring many challenging projects to the table. This offers our employees the opportunity to work with some of the leading engineers in industry and chase their dreams of taking on challenging roles that QuEST has to offer.

This project objective is to automate calculations that QuEST does in order to determine Low Cycle Fatigue (LCF) Life.   LCF life is currently calculated using external resources and software. This method is costly and time-consuming to the company. Developing an automation tool would have significant impact in our future analysis scopes. In addition, a computational tool will provide visual method to determining/reporting LCF life.

Project Requirements:

The objective is to develop a computational tool for calculation of low cycle fatigue life. The

program should have capabilities to include an interface to receive ANSYS outputs. With LCF analyses, the user must input stress, temperature, and material information, choose among several analysis options, and the program will compute the number of cycles required to initiate a crack. On the project team, the Mechanical Engineering students will work on the mechanical models and calculations required to calculate the LCF life. The Computer Engineering students will write the programs that implement this mechanical analysis using the ANSYS inputs and provide outputs in a useful format for the engineering analysis.

Expected Deliverables/Results:

- A computational tool that calculates the LCF Life from given ANSYS inputs
- The tool must have the ability to export the expected life for every node in the FEA Model

Disposition of Deliverables at the End of the Project:

The work product is displayed at the last Expo then immediately handed over to the supporter.

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

- ANSYS APDL Coding – to be able to extract the output data.
- MATLAB, Python or any open source computing language
- MEGR 3221 - Machine Analysis & Design I
- General knowledge of FEA concepts – A high level of FEA is not required as the students will only be working with the outputs of the FEA tool, but it would be very helpful to understand the terminology and conceptually what the tool is doing.