

## UNC Charlotte – Lee College of Engineering Senior Design Program

### Senior Design Project Description

<b>Company Name</b>	<i>Hydromer Inc.</i>	<b>Date Submitted</b>	<i>11/15/2019</i>
<b>Project Title</b>	<i>Design of automated spray coating system for viscous coating solutions (HYDRO_SPRAY)</i>	<b>Planned Starting Semester</b>	Spring 2020

#### 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:

<b>Discipline</b>	<b>Number</b>	<b>Discipline</b>	<b>Number</b>
Mechanical	3	Electrical	2
Computer	1	Systems	
Other ( )			

#### Company and Project Overview:

Hydromer® is a leading global surface modification and coatings solutions provider. As a trusted partner to companies worldwide, our solutions add value to our clients' products so that they can stand out in the marketplace. We are an innovation-driven, customer-centered organization with a focus on meeting our clients' needs.

Hydromer collaborates extensively with clients to deliver superior, customized polymer-based solutions. We create or modify coating formulations that adhere to a multitude of substrates and match the unique requirements and geometries of any device. We are a leader in developing coating formulas and processes that meet a market-driven need for greener, more sustainable solutions.

We offer custom industrial and medical device coatings, contract coating services, customized coating equipment, contract manufacturing, and turnkey operations backed by outstanding teams of research and development, customer service, and tech support.

Hydromer's technologies enhance the value of our clients' products by delivering lubricity, thromboresistance, anti-fogging, antimicrobial, and other properties. Our coatings aid in the manufacture of medical devices, aerospace components, cosmetics, and products in a variety of industries. We are an FDA, GMP/ISO 13485, and ISO 9001 production facility.

### **Project Requirements:**

Hydromer is expert in developing coating application processes for medical device as well as industrial coating. We have several types of in-house coating process systems such as dip coating, spray coating and meniscus coating. We also responsible for the production of our own coating solutions from raw material . The coating solution properties such as viscosity, surface tension, and % solid as well as required coating thickness and substrate geometry determine the coating process technique. Spray coating is often used for irregular sample geometry and thinner coating requirements. However, the spray coating is limited by the viscosity of coating solution. Some of our in-house coating solutions are viscous and existing spray equipment are not capable of achieving uniform coating. The objective of the project is to develop a spray coating system for viscous coating solutions with programmable nozzle movement in 3D to achieve controlled uniform coating thicknesses.

### **Expected Deliverables/Results:**

- Develop a process flow diagram (PFD), and Process and Instrument Diagram (P&ID) with all process parameters as per Hydromer requirements
- Design and develop a technical work plan with activities, timeline and deliverables
- Find/develop a suitable spray nozzle(s) which can operate at high pressure and able to spray viscous solutions to achieve thin uniform coatings
- Build the spray coating system with programmable x-y-z movement of nozzle using linear movement controllers that can be controlled from a computer interface as per PFD, and P&ID to achieve requirements
- The equipment should be capable of the in-chamber heating to dry out coating while being applied in different passes
- Hydromer team will provide required technical details & assistance, coating solutions, substrates for the development of the equipment and tests

### **Disposition of Deliverables at the End of the Project:**

Students can showcase the spray coating system that they build in Expo. At the end of the project, system will be transferred to Hydromer's Concord office.

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

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