

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

### Senior Design Project Description

<b>Company Name</b>	<i>Dixon Quick Coupling</i>	<b>Date Submitted</b>	<i>3/27/2019</i>
<b>Project Title</b>	<i>Modular Plates for Connection of Multiple Hydraulic Couplers</i> <b>DIXON_MOD</b>	<b>Planned Starting Semester</b>	<i>Fall 2019</i>

#### 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	5	Electrical	
Computer		Systems	
Other ( )			

#### Company and Project Overview:



Dixon Quick Coupling is a leading manufacturer of hydraulic and pneumatic quick disconnect couplings and related products. Quick disconnect couplings are designed to make a quick, leak-free connection for many different fluid power and fluid transfer applications. Our products are used in a wide variety of industries including transportation, oil and gas, construction, underground utility, agricultural, industrial and more.

Dixon is famous for its variety of couplings that allow fast, hand actuated connections that provide a leak proof seal. An example is shown below:



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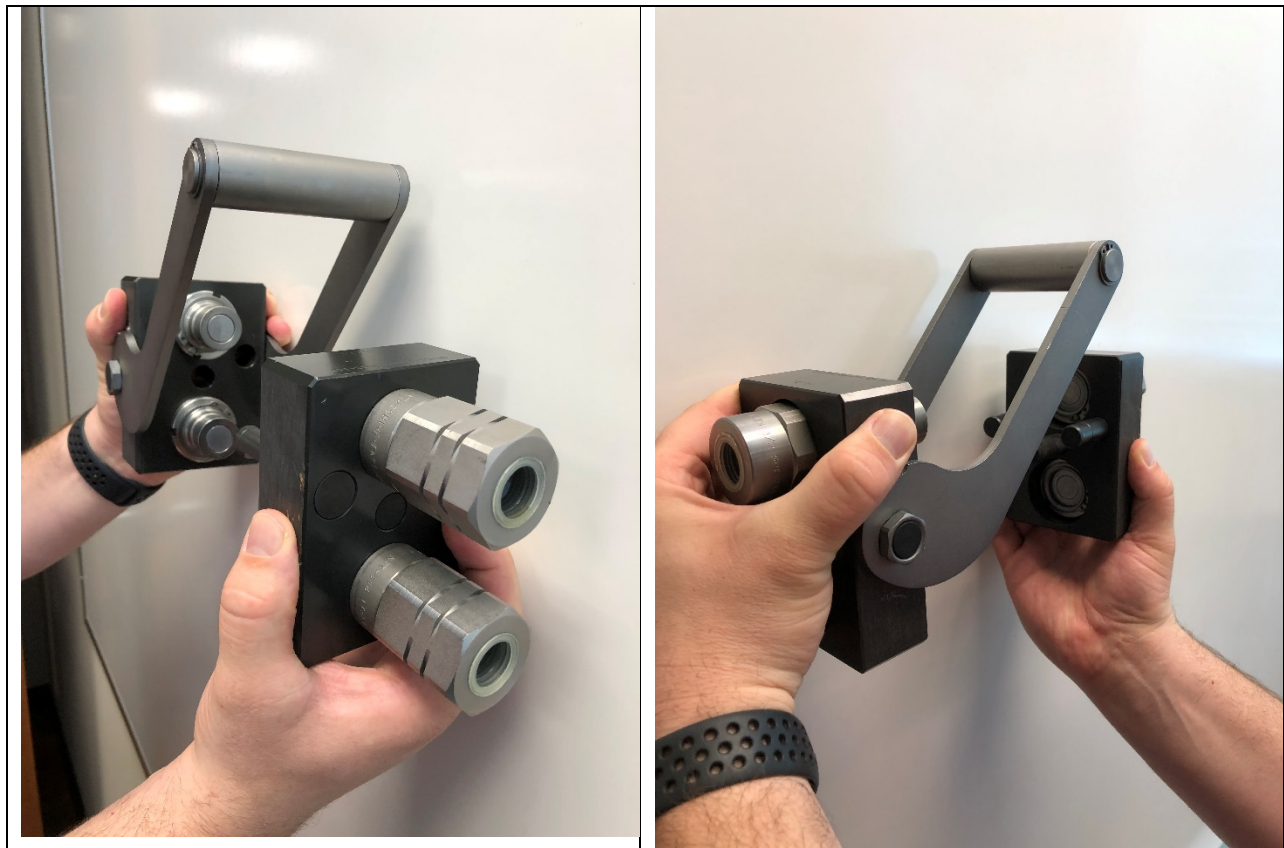
In this example, the locking collar is retracted, which allows full insertion of the part on the right side. Once seated, the collar is released which locks and seals the coupling in place. Dixon has

had another concept they are interested in which is a modular plate mounted coupling. That is the focus of this project.

Many applications require the connection of simultaneous connection of multiple couplings. These applications require varying quantities and sizes of couplings. Rather than connect the couplings one by one, multiple couplings would be mounted onto mating plates and a mechanical device actuated to bring the mating plates together and lock all of the couplings in place.

**Project Requirements:**

The following pictures illustrate this concept. The two plates are brought together by hand and partially inserted. The lever is then pulled to lock the plates together.

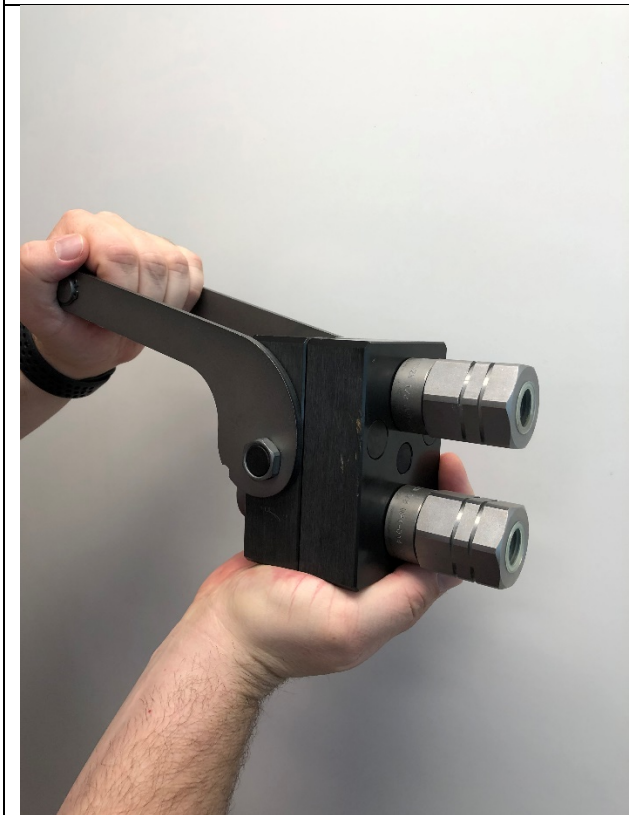




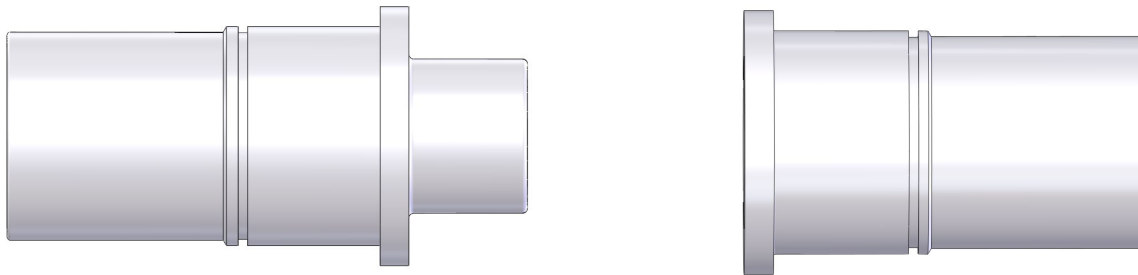


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An example of the usage for this type of product would be for large industrial machines that have multiple hydraulic couplings. Instead of doing the couplings one at a time in a cramped space, the plate coupling would provide a quicker and more compact connection. In the pictures, two of the same size couplings are used. For the project design, a modular system that allows for different size couplings to be added to create easy customization of plates is a novel approach to solve this problem and is the desired pathway. The project team will design, fabricate, and test a modular plate system for simultaneous connection of multiple hydraulic quick couplings. The plates will connect manually using a mechanical mechanism but must be self-aligning and self-locking. Modules must be designed and fabricated for 3/8", 1/2", 3/4", & 1" couplers. The design should allow the number of modules used to vary from one to at least eight. The locking/mating mechanism must lock all couplings simultaneously. Other specifications will cover items such as size, weight, durability, ease of use and security of lock. Here is an image of the coupler design that will be used in for the project.



The design of the couplers is not within the project scope, however recommendations for design changes will be considered.

The students will have full freedom to consider multiple approaches for this project and are encouraged to use their creativity to explore and present multiple pathways to accomplish the specifications. It is envisioned that proof of concept models will be 3D printed and a metal prototype made for the selected design if time permits.

To demonstrate the system at Expo, the project team will be given components of a hydraulic system which they can develop a suitable configuration to demonstrate the use and functionality of the plates.

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

- 3D Cad models for all components and assemblies including modules for 3/8", 1/2", 3/4", and 1" couplers
- 2D drawings of all components
- 3D Printed prototypes
- Functional metal (steel or aluminum) prototypes
- Report of all testing conducted with metal prototypes
- Functional hydraulic system for display



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

All hardware, models, and drawings developed by the UNC Charlotte senior design team is the property of Dixon Quick Coupling. The hardware will be given to Dixon at the conclusion of the design expo unless otherwise noted.

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

- 3D CAD Modeling – Solidworks preferred
- Basic machining and fabrication