UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE *of* ENGINEERING

Senior Design Project Description

Company Name	Corning Optical Communications	**Date Submitted**	3/29/2018
Project Title	Automation of a Fiber Optic Cable Stripping Operation (CORN_STRIP)	**Planned Starting Semester**	Fall 2018

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project. 250 hours are expected per person. Complete the following table if this information is known, otherwise the Senior Design Committee will develop based on the project scope:

Discipline	Number	Discipline	Number
Mechanical	6	Electrical	0
Computer		Systems	
Other ( )			

Company and Project Overview:

Corning is one of the world's leading innovators in materials science, with a 166-year track record of life-changing inventions. Corning applies its unparalleled expertise in glass science, ceramics science, and optical physics. Corning has approximately 45,000 employees worldwide and annual sales of $10.5 billion. Corning invented the world's first low-loss optical fiber in 1970. Since that milestone, they have continued to pioneer optical fiber, cable and connectivity solutions. As global bandwidth demand driven by video usage grows exponentially, networks continue to migrate from copper to optical-based systems that can deliver the required cost-effective bandwidth-carrying capacity.

Corning's Hickory NC location produces a wide variety of fiber optic cable assemblies for use in communications systems around the world. One of the first steps in the cable assembly operation is to strip the cable sheath. Currently, this operation is done manually. The objective for this process is to develop proof of concept designs for automating this process. The goals of the automation are to eliminate operator to operator variation, improve quality and reduce costs.

Project Requirements:

The current process for preparing a fiber optic cable for the installation of a connector consists of three successive jacket and coating removal steps. A typical cable is shown in Figure 1.

Figure 1 – Fiber optic cable

The yellow part is the outer jacket. The light yellow fibers are aramid fibers which protect and strength the cable. The white part is the inner coating which protects the actual fiber optic element.

Step 1 is removal of the outer sheath. Each step is performed with a different hand-held plier-like stripping tool. Prior to each hand operation, the operator must measure and mark the cable location at which to strip the jacket or coating. Figure 1 shows the tools required to perform the manual operation.

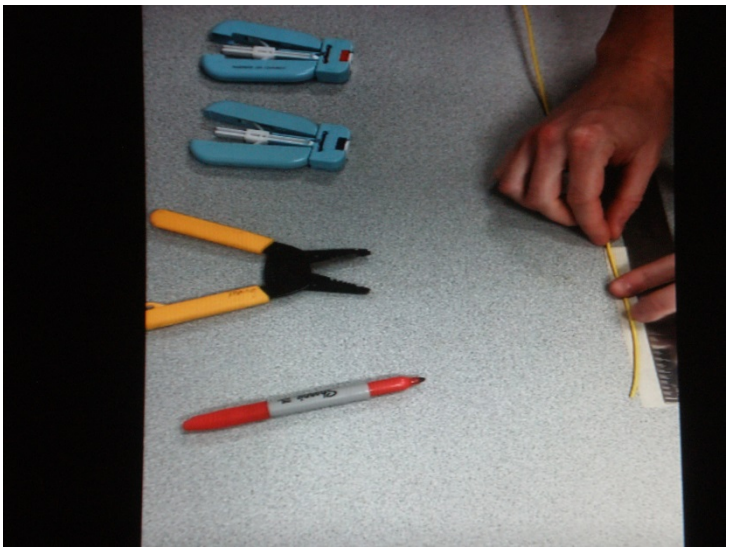

Figure 2: Hand tools required for manual preparation steps. Operator is manually measuring and marking the strip location.

The first objective of this project is to semi-automate or automate the mechanical stripping processes. This may be done by applying electro-mechanical actuation to a series of fixtures that have already been developed to take the place of the hand-held tools. See example of fixture at Figure 2. These developmental fixtures incorporate blade and alignment technology, but require manual squeezing of the blades, as well as manual pull of the cable through the blades.

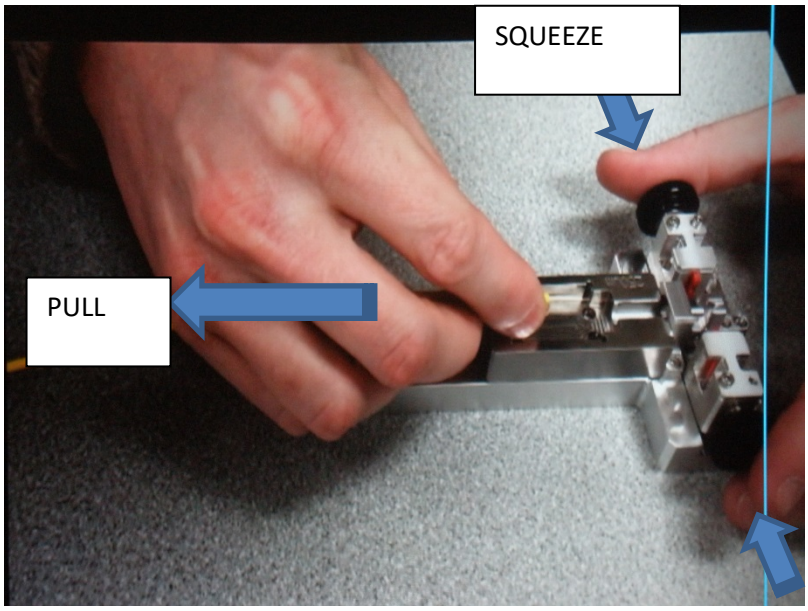

Figure 2: Cable stripping fixture showing manual squeeze and pull

The second objective is to integrate a positioning system into the fixtures to automatically set the axial blade position from a stored reference look-up table, and eliminate the need for the operator to measure and mark the strip location. The stripped length of cable jacket and fiber coating vary from one type of connector to another. Figure 3 shows the specified strip lengths for two popular styles of optical connector.

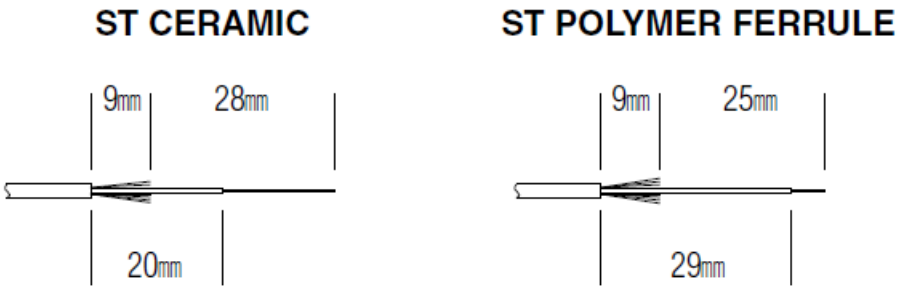

Figure 3: Strip position diagrams for two typical types of connectors

The project includes several opportunities for "stretch" objectives beyond these:

- the integration of the three separate automated strip processes into one continuous process
- a menu-driven system for pre-setting strip length from a stored database
- integration of a method to cut the aramid yarn to length, in addition to jacket and coating removal
- a network-able design that would facilitate synchronized update of the stored reference information among multiple workstations

The project team may, or may not, use the existing blade technology and stripping fixture devices (e.g. Fig. 2) in developing their technical concept.

Expected Deliverables/Results:

- Automated device that accomplishes the first two objectives defined above as a minimum and additional 4 objectives as agreed by team and supporter, using the fixtures provided by Corning or an apparatus developed by the student team.
- Device must maintain the integrity of the non-stripped areas.

Disposition of Deliverables at the End of the Project:

Proof of concept device may be utilized by a follow-on project team. After the Expo demonstration, Corning will either take the device or leave with ISL to pass on to the next team.

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

- Data gathering trips will need to be taken to Corning's Hickory NC site.
- Design reviews will be at Corning's Hickory NC facility