



Company Information

Company Name	<i>CommScope Inc.</i>	Date Submitted	<i>Nov 15, 2022</i>
Project Title	<i>Sustainable Alternatives to Fiber Optic Cable Disposal (COMMS_CONCR2)</i>	Planned Starting Semester	<i>Spring 2023</i>

Senior Design Project Description

Personnel

This project is reserved for Civil Engineering Technology students and will be mentored by Dr. Ali Sears. CommScope will provide technical supporters in the area of Mechanical, EHS, Quality and Manufacturing.

Company and Project Overview:

CommScope is a global provider of infrastructure solutions for communication and entertainment networks. Our solutions for wired and wireless networks enable service providers including cable, telephone and digital broadcast satellite operators and media programmers to deliver media, voice, Internet Protocol (IP) data services and Wi-Fi to their subscribers and allow enterprises to experience constant wireless and wired connectivity across complex and varied networking environments. Our solutions are complemented by a broad array of services including technical support, systems design and integration. We are a leader in digital video and IP television distribution systems, broadband access infrastructure platforms and equipment that delivers data and voice networks to homes. Our global leadership position is built upon innovative technology, broad solution offerings, high-quality and cost-effective customer solutions, and global manufacturing and distribution scale

We have a team of approximately 30,000 people to serve our customers in over 150 countries through a network of world-class manufacturing and distribution facilities strategically located around the globe. Our customers include substantially all the leading global telecommunication operators, data center managers, leading multi-system operators (MSOs) and thousands of enterprise customers, including many Fortune 500 companies.

CommScope <https://www.commscope.com/> is a manufacturer of fiber optic and coaxial cables engineered for satellites, security, closed-circuit TV, video, residential and commercial structures, and cell towers. You will find our solutions in the largest buildings, venues and outdoor spaces; in data centers and buildings of all shapes, sizes and complexity; at wireless cell sites; in cable head-ends and telco central offices; and in airports, trains, and tunnels. Vital networks around the world run on CommScope solutions.

We have manufacturing and distribution facilities all over the world. North Carolina is home to our headquarters in **Hickory** and three manufacturing facilities: **Catawba** (1,000,000 sq ft); **Claremont** (590,000 sq ft).



INDUSTRIAL SOLUTIONS LABORATORY

Our products are sold in many forms and under countless brand names. You likely use some of our products every day!



CAT 6 Cables

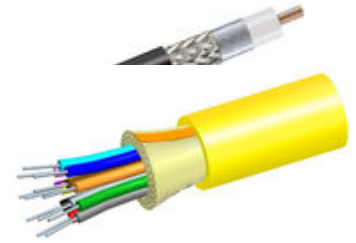
Waveguide Cables



Cable in Conduit



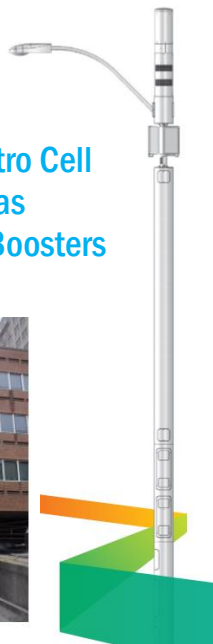
Fiber Optic Cables



Network Solutions



Macro & Metro Cell
Antennas
Hidden WiFi Boosters



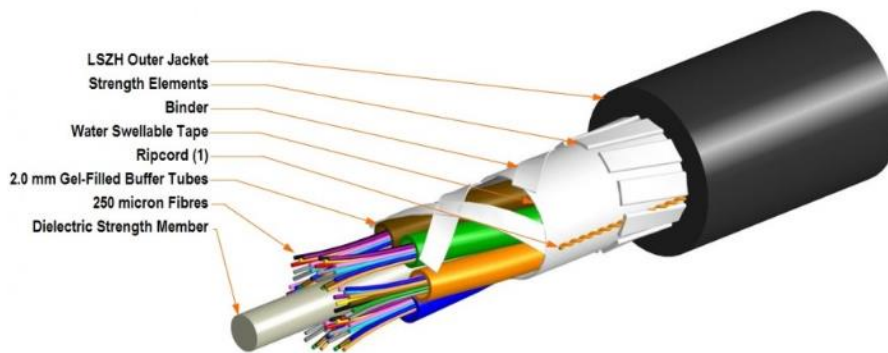
Whether you are streaming your favorite Netflix show, posting some Instagram pics, or giving a presentation over Zoom, you want your connection to be clear, fast, and consistent. Your connection is likely using a fiber optic cable. Fiber optic cables deliver quality at a fast speed, but the cables are currently not recyclable. Fiber optic cable waste is generated in the manufacturing process and by our customers during cabling upgrades and replacements. The greater the need for speed, the greater the impact to our global environmental footprint.

Typical fiber optic cables consist of glass fiber optics, dry or gel-filled PP buffer tubes, water blocking tape, filler rods, nylon binders, aramid yarn, glass reinforced plastic rods, steel tape, ripcords, and polyethylene (PE). The recycling of fiber optic cable is an industry wide problem. The interior composition of the cable gets caught in recycling equipment, the gel gums up the teeth of the equipment, and the individual components have a low recovery value. As such, fiber optic cable is disposed of in the landfill. During the manufacturing process, a significant amount of waste is generated due to the time required to sync the process during startup. On the consumer



side of the business, fiber optic cable is landfilled during building and venue upgrades or cable damages from storms and outages.

In the long term, CommScope recognizes recycling solutions are contingent upon modifying the life cycle product design. However, in the short term, CommScope is seeking sustainable alternatives to divert the volume of fiber optic cables from our landfills.

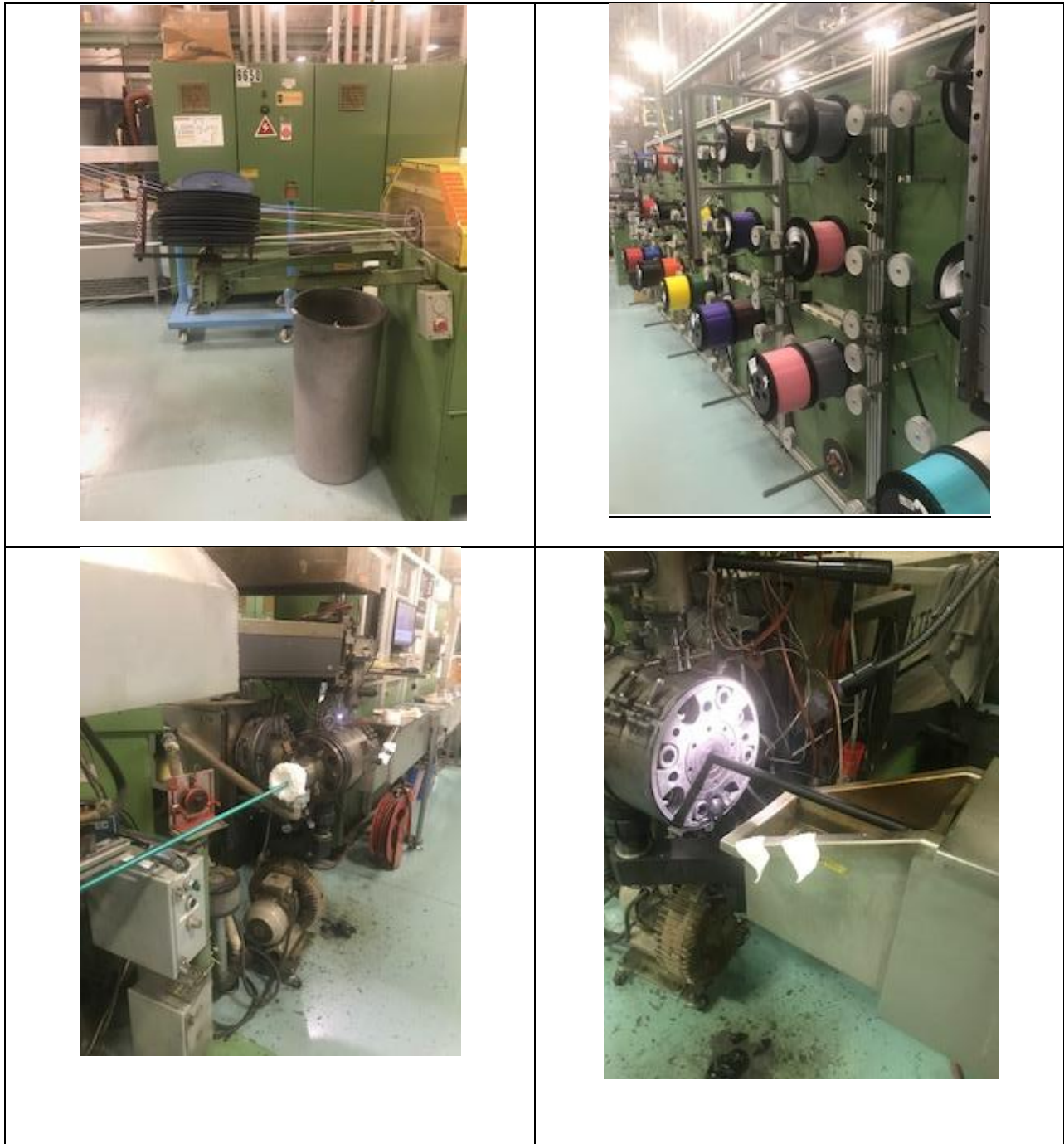


***Typical Fiber
Optic Cables***





INDUSTRIAL SOLUTIONS LABORATORY



The photos above show some of the equipment that pulls wire bundles together with wires, sheaths and jacketing material. Waste generated in starting these processes is desired to be recycled.

Project Scope:

Fiber optic cable is disposed of in large coils (without metal holder) as shown below.



The fiber optic cable waste that is not easily recyclable and currently going to landfills. To reuse/repurpose the cable, CommScope is requesting testing for using fiber optic cable as an additive to concrete to improve flexural/compressive strength, with crack arresting properties when compared to off the shelf fiber reinforcements. CommScope will provide specific shredded fiber optic cables in various ratios depending on the shredding and testing requirements from UNCC. The goal is to reuse fiber optic cable commercially in applications such as road construction, landscape applications, etc. This project is a follow-on to a Fall 2022 Phase 1 project.

Expected Deliverables/Results:

Semester 1

1. Identify immediate options for using shredded fiber optic cable as additives for concrete for increasing flexural strength and durability.
2. Request to meet ASTM C1116 standard for fiber-reinforced concrete.
3. The design shall offer similar properties to standard concrete additives at/or equal to current market costs.
4. Testing to be done to determine optimal thread lengths and various ratios of cables.

Semester 2

5. Promising results from Semester 1 have resulted in the approval of Commscope to proceed with the Phase 2 scope. In this phase, CommScope and UNC Charlotte will move forward for durability testing and developing and document process design prototype samples.
6. Establish the economics of the process when scaled up to determine if the process is commercially feasible and provide cost-benefit analysis.
7. Consideration for long-term environmental impacts for encapsulated fiber cable in cement.



Disposition of Deliverables at the End of the Project:

Provide documentation and pilot test apparatus to supporter after the completion of the Expo.

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

- Ability to travel to Claremont, NC for a site visit to the manufacturing plant.
- Travel to CommScope recycler to visit and see current cable shredding practices
- Interest in the design of sustainable practices.