Team Conduit: Abrasion Resistant Coating for Fiber Optic Cables

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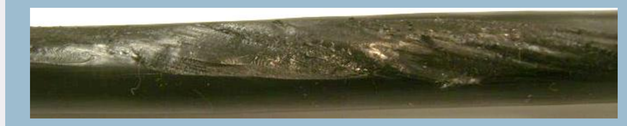
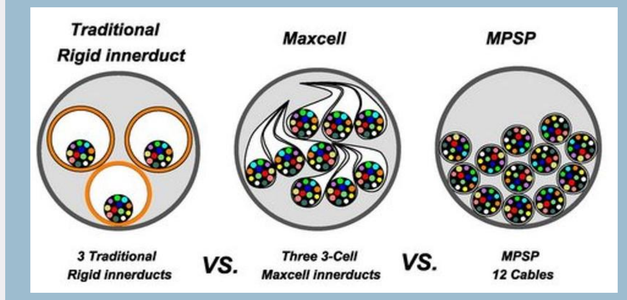
Introduction



Scoring caused by cable instillation.



Depictions of the innerduct, textile sleeve, and theoretical chemical coating cable protectants.

- Without a protective cover, the instillation of fiber optic cables causes scoring, jeopardizing the cable's contents
- Initially, innerducts protected cables, fitting 3 per conduit
- Conduit Space Recovery Systems (CSRS) developed a textile sleeve that allows for three times as many cables per conduit
- The next proposed step is to create and a apply an abrasion resistant coating to further save space

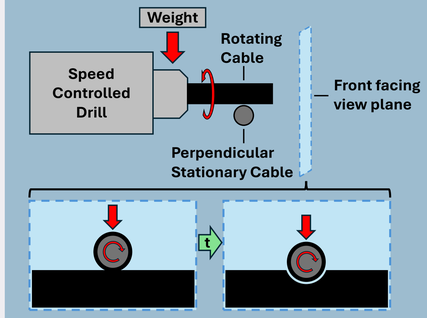
Objectives

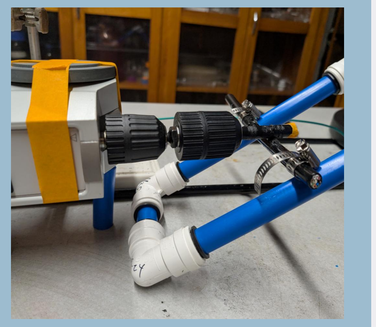
- Develop an apparatus to generate scoring on fiber optic cables
- Select materials to test for abrasion resistance
- Combine results with the other group to complete a final analysis of chosen coatings

Our Group	Both Groups	Other Group
Abrasion Reistance	Clear Thin Cuttable Nontoxic	Quick Drying Tackiness

Rotating Cable Apparatus

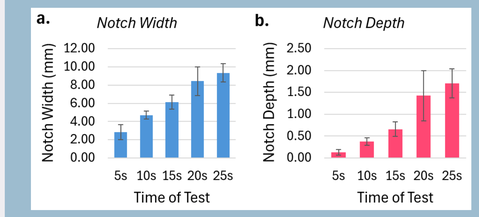
Design





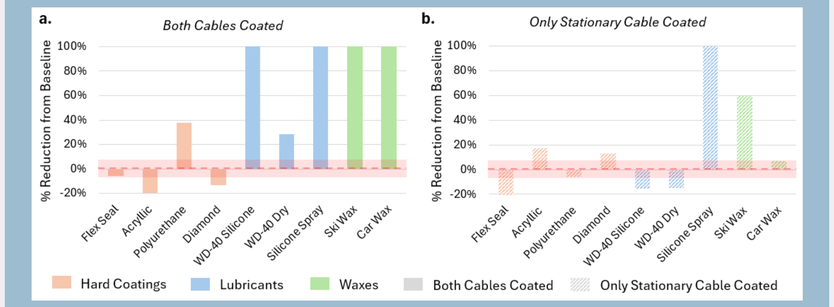
- Drill rotates one section of cable against another
- 200 ft/min installation speed → 1600 RPM cable
- Scoring is measured through width and depth of notches

Results



- Optimal test duration of 15s
- C.I. Notch Depth is 0.78 ± 0.06mm (α=0.05)

Baseline data of uncoated cable abrasion. Both notch widths and depths are reported for different runtimes. An optimal time of 15 seconds was chosen because the contents of the cable were breached in longer tests.

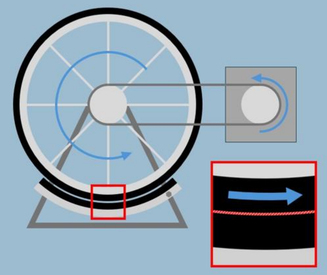


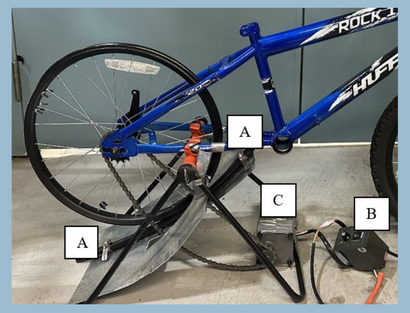
Abrasion notch depth reduction data of experiments where (a) both the rotating cable and stationary cable are coated and where (b) just the stationary cable is coated. Some coatings appear to produce negative resistance, which is likely due to random variation and was considered a zero percent reduction

- Silicone Spray and Ski Wax were the most consistent
- Paraffin waxes are promising to explore further

Bike Wheel Apparatus

Design



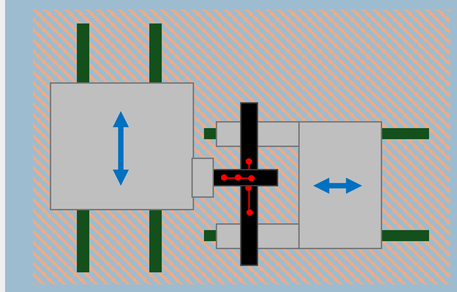


- Cable fixed to wheel spins and contacts stationary cable
- 200 ft/min installation speed → 45 RPM wheel
- Force was added to increase tension between cables

Conclusions/Future Work

- Silicone Spray and Ski Wax performed the best, which is in agreeance with the drying/friction group
- Waxes are the best materials to further investigate
- Both apparatuses have room for improvement

Rotating Cable Apparatus



- Link the two sections
- Allow for linear adjustments between tests
- Improves stability and consistency

Bike Wheel Apparatus

- Fins a solution for motor mount and sprocket
- Design and build capstan apparatus
- Find solution for easily removing cables