Automatic Assembly of VSFF Optic Connectors

Corning Optics

Western Carolina University

PROBLEM STATEMENT

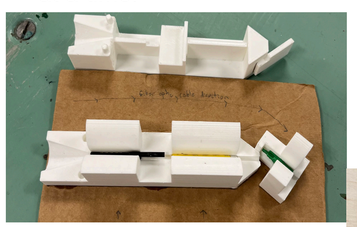
Currently, one person can only assemble around 24 US Conec VSFF connectors a day by hand. This process is incredibly tedious, so Corning Optical Communications LLC has tasked Team 3 with automating certain parts of the assembly process to decrease the amount of time it takes to assemble the VSFF connectors.

REQUIREMENTS

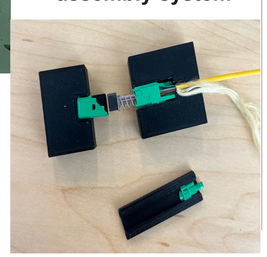
#	Description
1	Automatically load boot, crimp/heat-shrink and housing onto cable in under 30 seconds.
2	Automatically assemble housing, shroud and crimp body in under 90 seconds.
3	Load and assemble components in correct orientation.
4	Components should be loaded in correct order

CONCEPTS

- For the loading system, the team needed a system to place 3 small components onto a fiber optic cable in the correct order. A prototype system of nests with a funnel to guide the cable through the components was designed
- For final assembly, another 3 components needed to be snapped together. A holder and slide were prototyped to snap the pieces on one at a time.



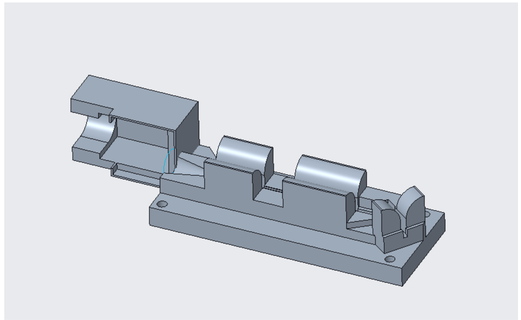
Early concept of component loading system



Initial concept of assembly system

FINAL DESIGN, APPROACH, PLAN

The team designed a final working prototype for the component loading system as you will see below. The design includes nests for each component, and a mount for the extruder that would be feeding the cable through the system. The team also designed an initial prototype for the assembly system. This prototype is designed to snap the shroud into the housing component by use of a gear bar that is pushed by a servo.



Model of component loading system nests

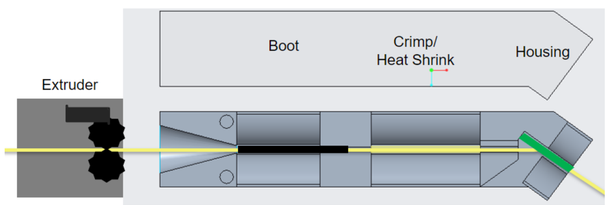
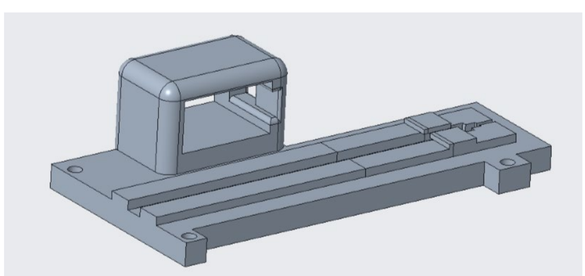


Diagram demonstrating how cable will be fed through the components

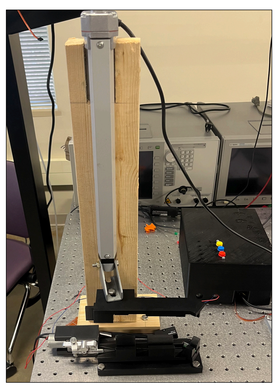


CAD model prototype of assembly system

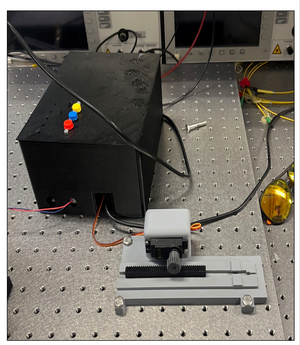
RESULTS

Team 3 was able to create and build a fully functional prototype for the component loading system. The team tested the automatic loading prototype 5 times each to obtain an average loading time of 17.5 seconds which was lower than the required time of 30 seconds. The team also added a few amenities to the loading system including a linear actuator to control the lid, and a sensor that detects if the housing is oriented correctly and alerts the operator.
The team produced an early prototype for the assembly system. This prototype was intended to snap the shroud over the ferrule into the housing, and the team began running tests on it that proved somewhat successful. Some additional improvements could be made, and the team was not able to design an assembly system for snapping the crimp into the housing.

View showing the fiber optic cable being fed through the components, currently through the crimp/heat-shrink



Prototype of component loading system showing linear actuator-controlled lid and electrical control box



Prototype of assembly system for shroud component

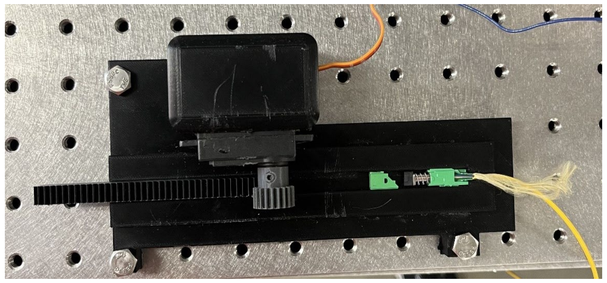


Photo of the assembly system prototype for snapping the shroud over the ferrule into the housing

SUMMARY AND CONCLUSIONS

A functional prototype was made for the component loading system. The component loading system prototype is finished, requiring only a few minor visual improvements. The team was able to create a prototype for snapping the shroud into place but lacked enough time to produce a prototype for snapping the crimp body in place.

FUTURE WORK

The assembly system requires further development, but the current prototype has a solid foundation. The spring tends to get stuck when the assembly system snaps the shroud together with the housing. A way to reliably attach the crimp body to the housing requires further development.

TEAM & ACKNOWLEDGEMENTS

- Jordan Bevis ECET
- Ben Buchanan BS ET
- Brian Dunlow EE
- Bo Schlager ME

Sponsors: pafleenor@corning.com
BlairM2@corning.com
Faculty Mentor: Paul Yanik

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