Corning Process Model

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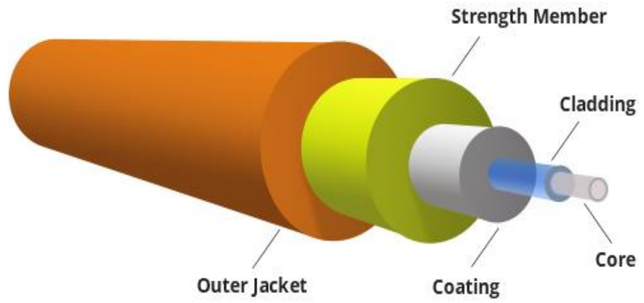
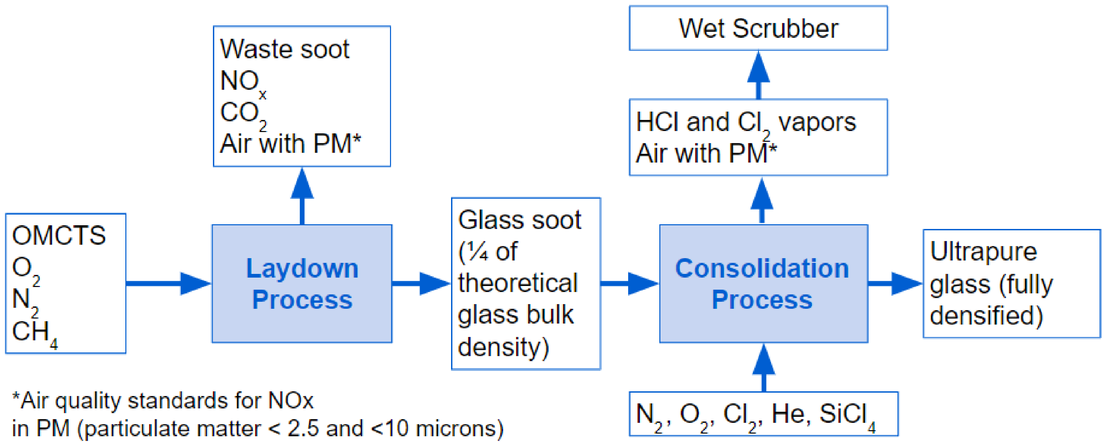
(1) Overview

- The goal of this project was to create a mass balance workbook in Microsoft Excel for the laydown and consolidation steps for a future Corning optical fiber production plant.
- This project examined the environmental impacts of the future plant, ensuring process effluents meet industry standard environmental regulations.

(2) Optical Fiber Process

PROCESS STEPS:
Laydown: Deposition of Cladding glass soot onto Core glass rod.
Consolidation: Removes water and impurities, then fully densifies glass.
Draw: Preforms are drawn into a thin optical fiber for future cabling.





*Air quality standards for NOx in PM (particulate matter < 2.5 and <10 microns)

(3) Environmental Constraints

- The New Source Review (NSR) Permitting Program allows Corning to emit 250 tons per year of NOx. The Clean Air Act from the EPA's Southeastern Region determine which NOx emission permits are given.
- National Emissions Standards for Hazardous Air Pollutants regulates hydrochloric acid (HCl) emissions. Corning abides by the Emergency Planning and Community Right-to-Know Act.

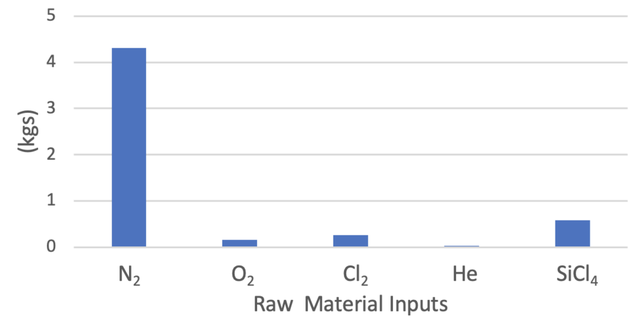
(4) Laydown

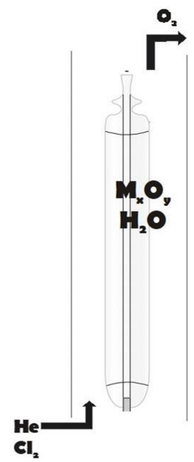
- The OMCTS method is used to deposit silica glass particles onto the core.
- One medium sized tanker truck would be required weekly to transport 3900 gallons of OMCTS.

Materials	Amount
OMCTS Consumption Rate	14 Tonnes/week
NO_x Emission Rate	756 kg/week

(5) Consolidation

- Purify the preform to increase attenuation.
- Equation to remove water: 2H2O + 2HCl2 → 4HCl + O2
- Equation to remove metal: MxO y+ Cl → MxCl + O2





(6) Conclusion

- This lab notebook will serve to efficiently and accurately predict the process effluents in a large scale manufacturing setting for Corning.
- Corning has the capacity to produce about 2 Mkm of glass per machine line.
- The next step would be to add the draw process to our process model with the products of the consolidation process.

(7) Acknowledgments

- This team would like to thank Greg Gausman, Taylor Gherardi, and Steven Arndt for their support throughout the completion of this project. We would also like to thank Lisa Bullard and the entire ChE department.