Glass Wire Cutting Machine
Senior Design Team P16602: Wire Movement

Team: Sarah Brown (ME), Fares El Tin (ME), James Incavo (EE), Jacob Klaus (IE), Hannah Micca (ME), Joseph Oddo (EE), Caleb Weeks (ME)

Faculty Guide: Edward Hanzlik

Customer: Glass Fab of Rochester, NY

Problem Statement: Our team is one of three teams that is tasked to create a scaled down, more energy efficient glass wire cutting machine. Our team specifically, the wire movement team, is responsible for creating the process that the machine uses to spool and unspool wire in order to cut a glass ingot into wafers of desired thicknesses. The wire saw uses a single tensioned wire passed back and forth through a desired wire path. To accomplish this, the wire is passed from a spool at one end of the machine, through the piece of glass and onto the spool at the other end of the machine. This allows hundreds of pieces of glass to be cut from one ingot in a single process with a high level of precision and accuracy.

Key Objectives of P16602:
1. Creating and Maintaining Tension - Proper tension is an integral part of the glass cutting process in order to ensure accurate and precise cuts into the glass ingots
2. Spool out wire - Spool wire from the supply to the take-up in a smooth, controllable motion
3. Rewrap wire – Wrap wire back onto spool in a controlled, even manner that allows for repeated wind and un-wind of the wire

Engineering Requirements:

- Low Power Consumption
- Ability to Index Wire
- Maintain Necessary Wire Speed
- Maintain Necessary Spooling/Unspooling Speeds
- Maintain Constant Wire Tension
- Low Wire Break Detection Time

Final Design:

Fixture Functional Requirements:

- Hold Wire: Supply and Take-up spool hold wire throughout wire movement
- Control Wire: The pulleys within the fixture will control the wire
- Maintain Safety: The fixture needs to operate in an industrial environment while keeping the machine and operator safe
- Move wire: The Supply and Take-up motors will drive the wire movement for the fixture
- Tension Wire: The Dancer Pulley System will apply and control wire tension

Next Steps:
1. Gain Final Approval of Design
2. Purchase Raw Material
3. Manufacture Designed Components
4. Purchase Electrical Components
5. Test Controls Scheme
6. Construct Fixture
7. Test and Refine Overall Fixture

Special thanks to: Glass Fab, Dave Cicero, Ed Hanzlik, John Wellin, ME Machine Shop, Tom Bitter, Russ Phelps.