

# Encoder Automation Table

*Showcasing the power of encoders.*

***360 Designs***

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# Sponsor:



EPC

# Objective

Create a modular display that highlights individual advantages of each encoder and allows for future additions when new technology becomes available. The display should include a user-interface and be “eye-catching” to attract individuals at trade shows, expos, and more.

# Design Goals

Design a display table to showcase four of EPC's encoder products

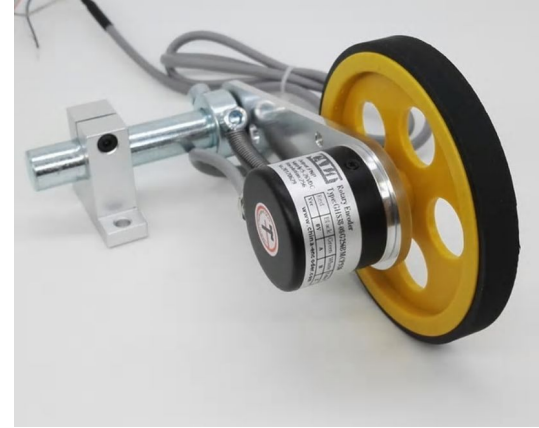
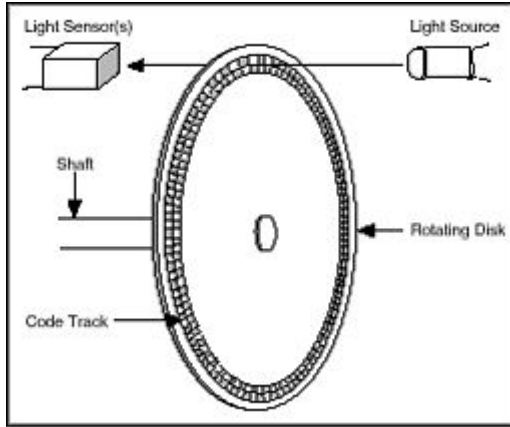
1. Programmable Encoder
2. Absolute Encoder
3. Model 15 - their most popular encoder
4. Model 30M - a hall effect encoder

Use motion control, be eye catching, attract potential customers at trade shows, instruct new EPC employees

# Value Proposition

- Their current display is simple, uses one encoder, and not very eye catching.
- The new display will attract new customers.
- The new display will also more quickly educate new employees saving training time.

# What's an encoder?



Encoders very accurately measure angles which can easily translate to distance, velocity, and acceleration.

# How will the motion be controlled?



Unitronics HMI+PLC Unistream 10.4 Multitouch  
32 bit processor  
Digital and analog input/output modules

# Product Requirements

<b>User Interface Requirements</b>		
<b>General Description</b>	<b>Measure</b>	<b>Target</b>
Easy set-up	set up time and staff	less than 15 minutes for 2 people to set up
Engages audience	attractive, interesting, informative, user friendly	finished (painted, no wires showing), logo(s) applied
HMI Integration	visualize variables, supply inputs, back end programming	motion control works as designed, user interface is self evident for people to use.
Safe	enclosure, user, equipment	no sharp objects or corners, no non-enclosed live current



# Product Requirements

- Must be able to fit onto a display table
- Must be easy to assemble and disassemble
- Must be able to be plugged into standard 120V outlet
- Should be able to display 4 encoders that each demonstrate unique functions
- Must be able to fit in a standard doorway
- Must be able to be packed away easily in a travel case or box

# Project Learning

- Learned about the different uses for encoders in real industry
- Off the shelf technologies we can use to solve our engineering problems:
  - Stepper motors
  - Model 25SP encoder (already in possession)
  - Unitronics PLC+HMI
  - We have found a length actuator that we can purchase and program the 25 SP accordingly.
- Why do we think our design will work:
  - Real industry application.
  - Modifiable.
  - Showcases the 25SP specifically.

# Concept Development - Programmable Encoder

0.0 - Measure and “Cut” a board at varying lengths

0.1 - Mini game: turn a knob to a specific angle with varying angle accuracy

0.2 - Unlock a combination lock with varying motor accuracy

1.0 - Mini Game: Measure a specified length driven by a lead screw. Higher accuracy will more likely reach the exact length, but will operate slower. Fastest time to reach the goal wins.

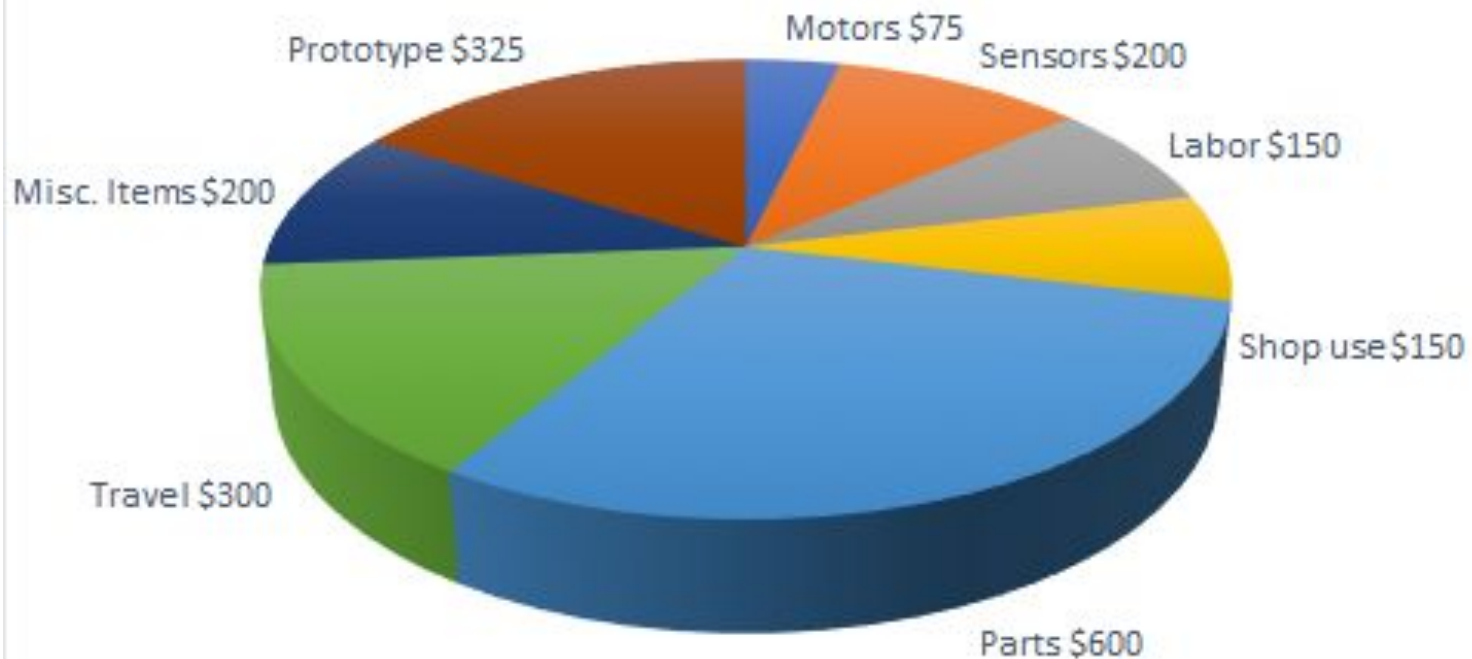
# Project Schedule (Fall Semester)

- Each member present 1 better idea for the programmable encoder  
Thurs, Oct 3, 2019
- **Webex Meeting 1 w/ EPC 3-3:30pm**  
**Thurs, Oct 3, 2019**
- Design 1 idea for the programmable encoders, present purchase list  
Thurs, Oct 17, 2019
- Decide Servo/ Step motors and order/ coordinate donation  
Thurs, Oct 17, 2019
- **Webex Meeting 2 w/ EPC 3-3:30pm**  
**Thurs, Oct 17, 2019**
- Build the programmable encoder design  
Thurs, Oct 31, 2019
- **Webex Meeting 3 w/ EPC 3-3:30pm**  
**Thurs, Oct 31, 2019**
- *If necessary* present significant improvements to programmable design  
Thurs, Nov 14, 2019
- Present purchase purchase list for final programmable design  
Thurs, Nov 14, 2019
- **Webex Meeting 4 w/ EPC 3-3:30pm**  
**Thurs, Nov 14, 2019**
- Build/ text/ validate/ improve final program. encoder design  
Thurs, Nov 21, 2019
- **University of Idaho Thanksgiving Break**  
**Nov 25-29, 2019**
- Present final programmable encoder design for approval  
Thurs, Dec 5, 2019
- **Webex Meeting 5 w/ EPC 3-3:30pm**  
**Thurs, Dec 5, 2019**
- University of Idaho Finals Week  
Dec 16-20, 2019
- Each member present 1 idea for the absolute encoder  
Thurs, Dec 19, 2019
- **\*Webex Meeting 6 w/ EPC 3-3:30pm (\*confirm due to finals week\*)**  
**Thurs, Dec 19, 2019**

# 360 Designs (Draft) Budget

Expense Items	Cost
Motors	\$75
Sensors	\$200
Labor	\$150
Shop use	\$150
Parts	\$600
Travel	\$300
Misc. Items	\$200
Prototype	\$325
Total Expenses	\$2000
Budget Total	\$2000

## Tentative Budget



# Project Visual - Programmable Encoder

