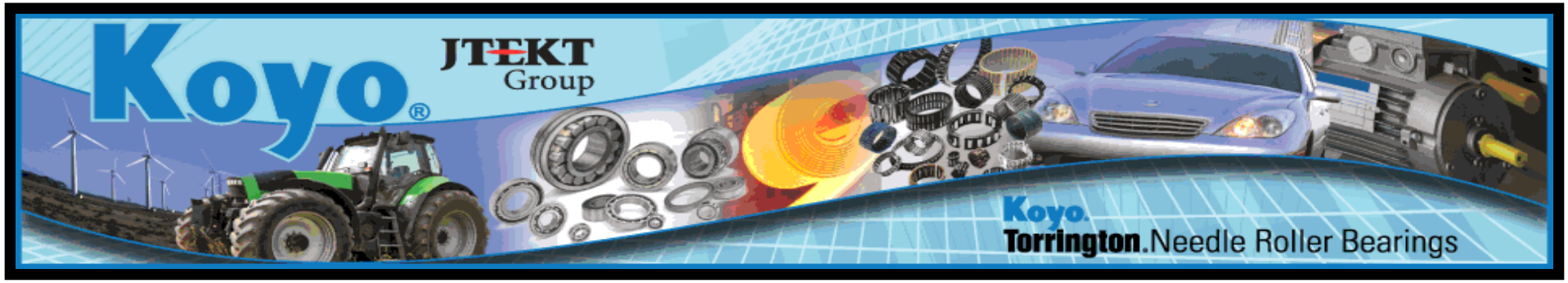


Senior Design Project
Automated High Volume Bearing Bore Gage

Concept Design Review

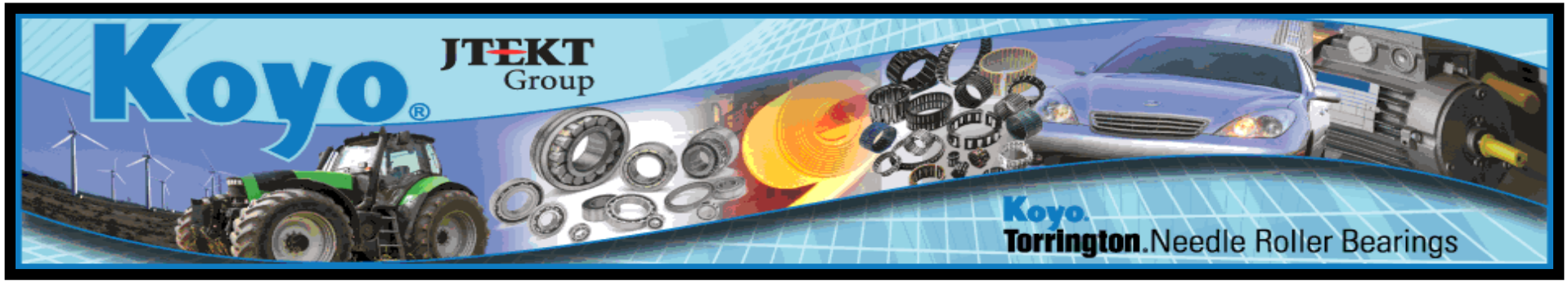
Team 22

Seth Norman - *Project Manager (EE Lead)*
Eric Allgeier - *Webmaster*
Kevin- *Treasurer*
Matthew Boler – *ME Lead*
Christopher Proffett - *Sponsor Liaison*

Team Sponsor
Robert Potts (KOYO Bearings)

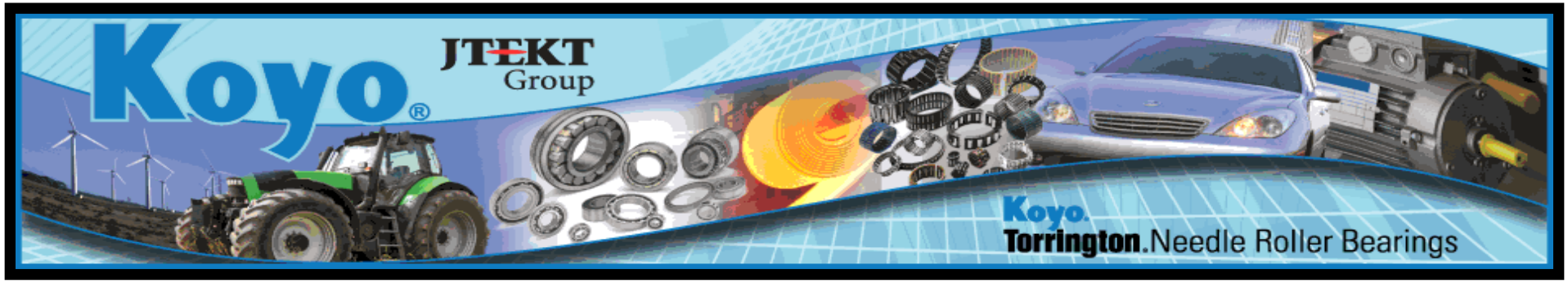
Team Advisor
Dr. Cartes

Instructors
Dr. Shih
Dr. Amin
Dr. Frank



Agenda

Scope of Work
Fall Accomplishments
Design Concept
Safety
Manufacturing
Potential Challenges
Procurement
Spring Schedule
Conclusion



Automated Bearing Bore Gage

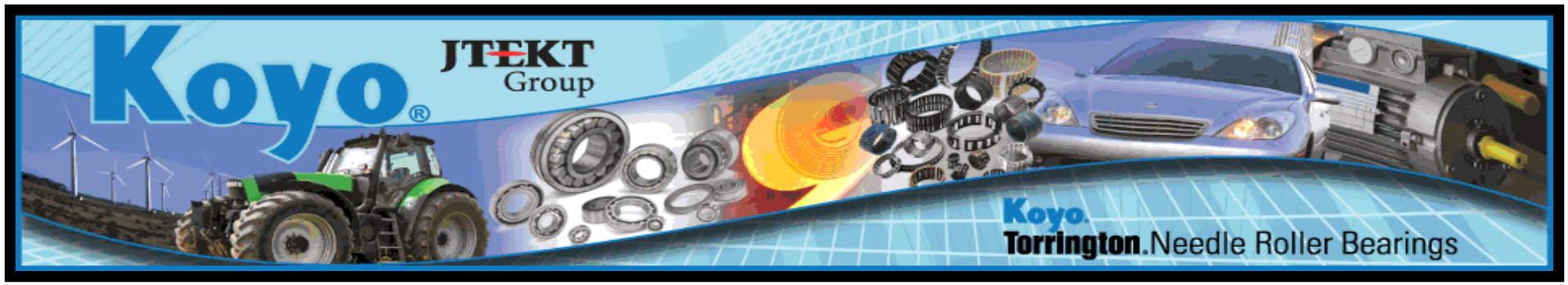
- Measures bore sizes
- Determines pass or fail

Problem Statement

- Update the automated bearing bore gage
- Maintain measuring quality and sampling rate
- Allow for networking with Koyo

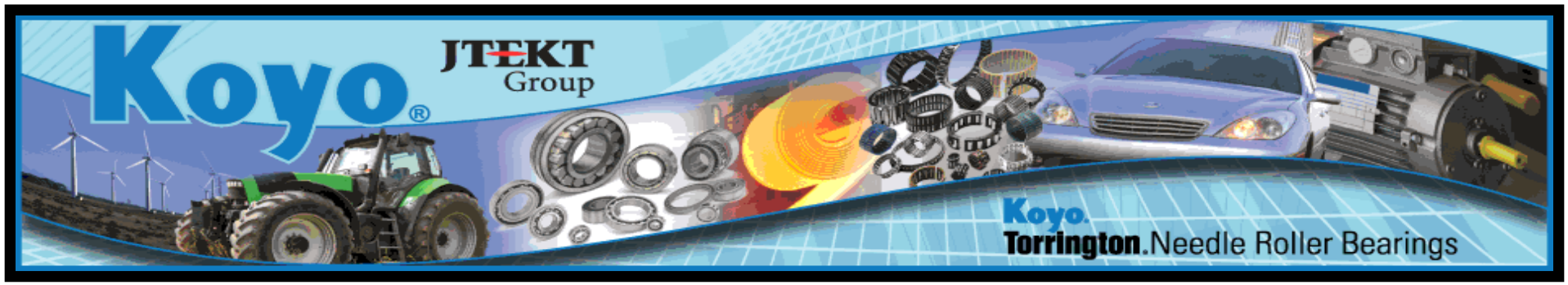
Objectives

- New GUI
- Replace electrical components
- Keep existing pneumatic system



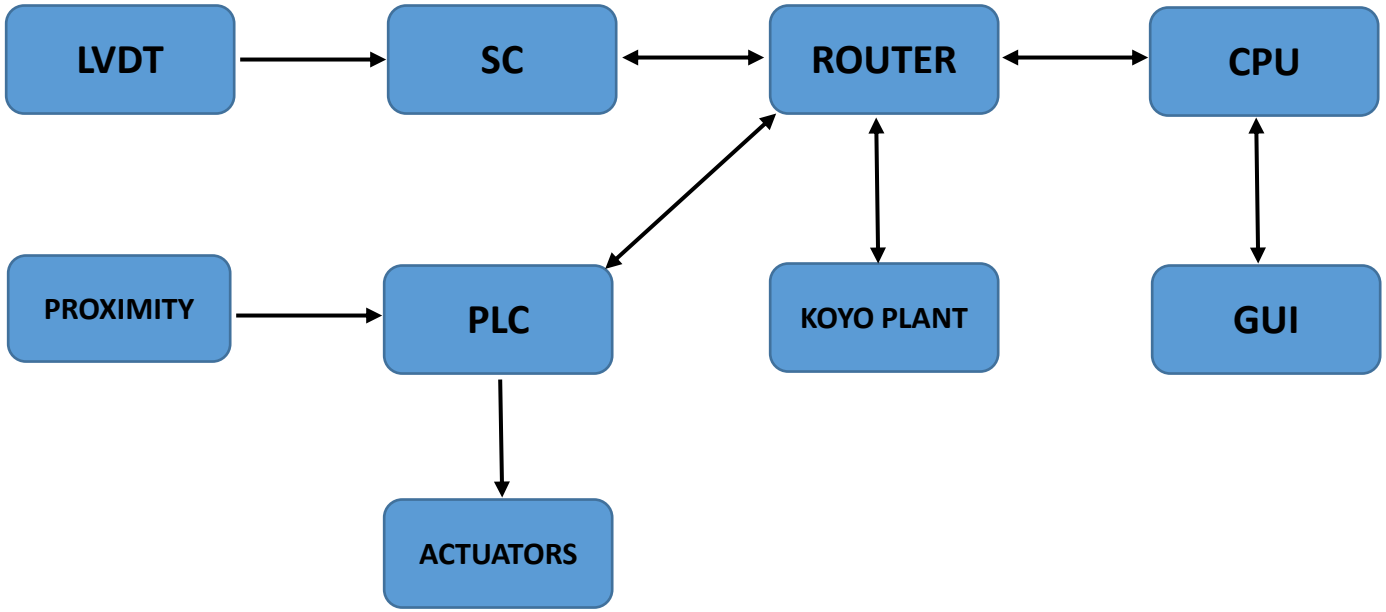
Fall Accomplishments

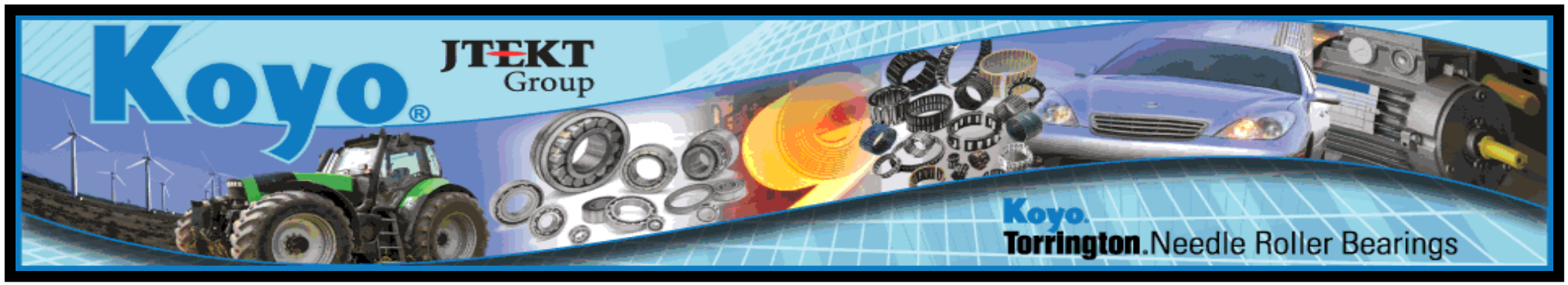
1. Organize Team
2. Contact Sponsor
3. Initial Research
4. Diagnostic Testing
5. Design Concepts
6. Component Research
7. Design/Component Selection
8. Generate Bill of Materials
9. Submit design proposal to Koyo Bearings
10. Create project objectives for Spring Semester



Design Concept

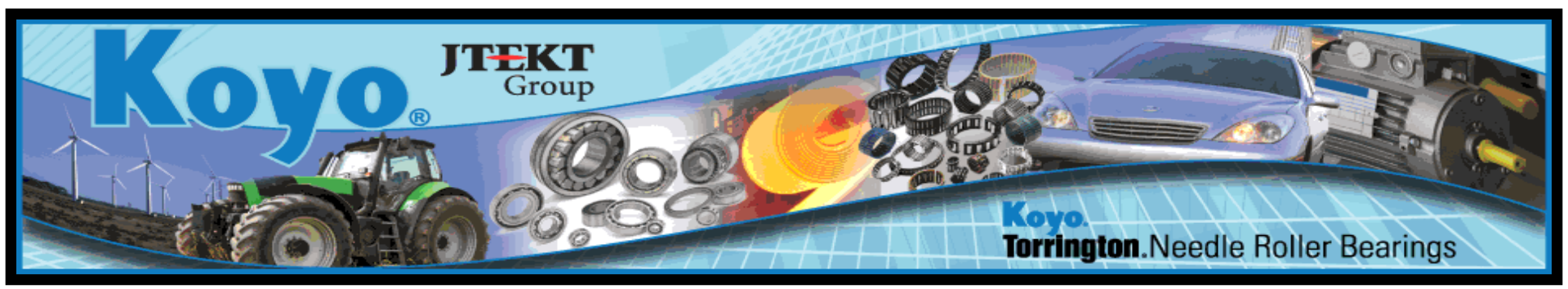
Uses only a signal conditioning module in conjunction with the PLC and CPU.



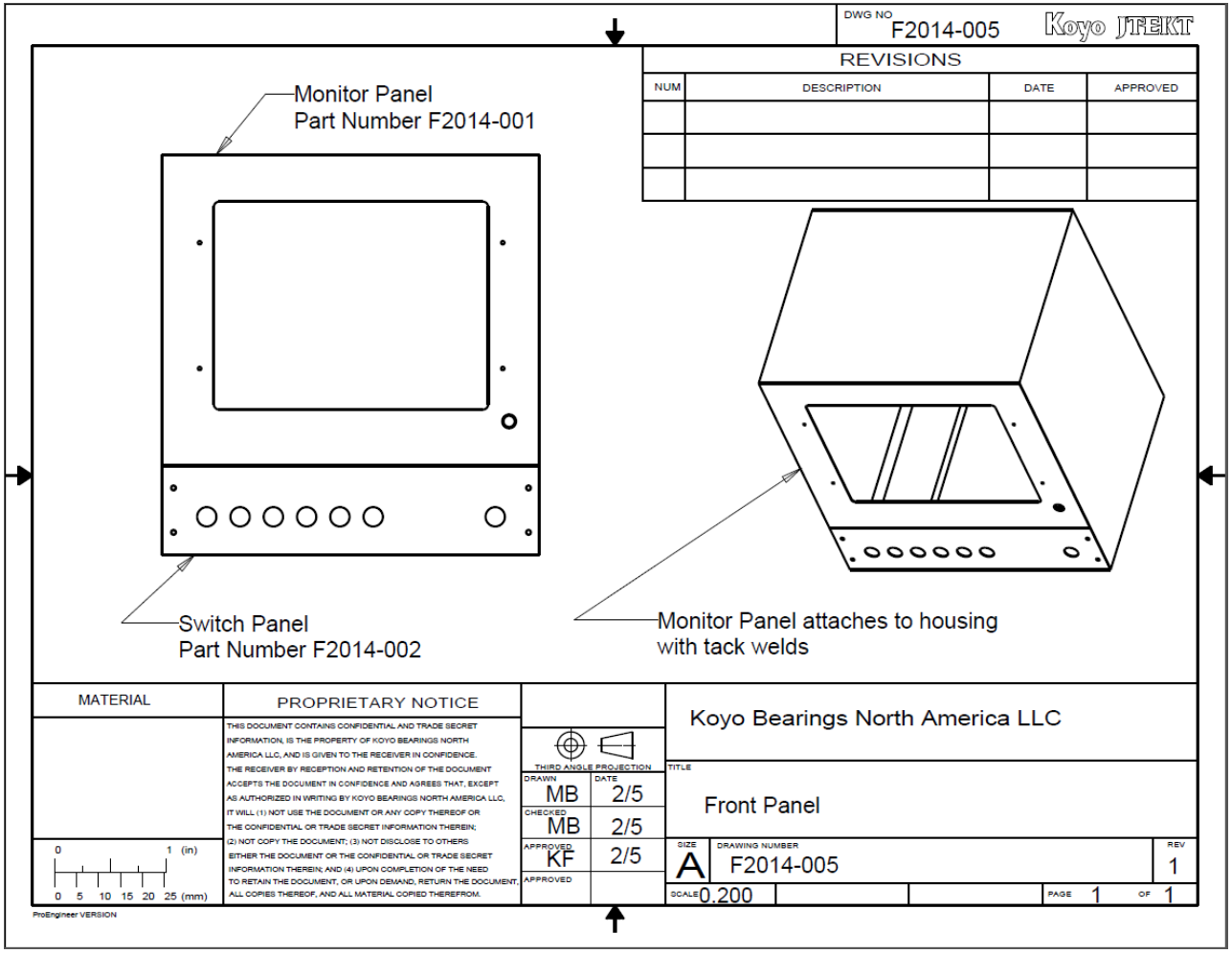


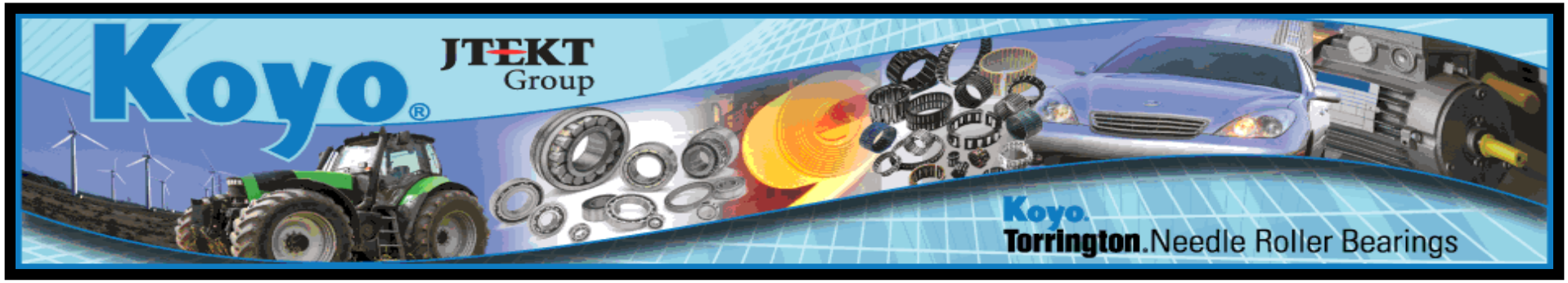
Safety

- All work to be done on this machine will follow a strict LOTO (Lock out tag out) on all sources of potential energy.
- All potential electrical hazards are contained in the two housings on the machine.
- Both housings have locking mechanisms to keep untrained personnel away from any unnecessary hazards.



Manufacturing



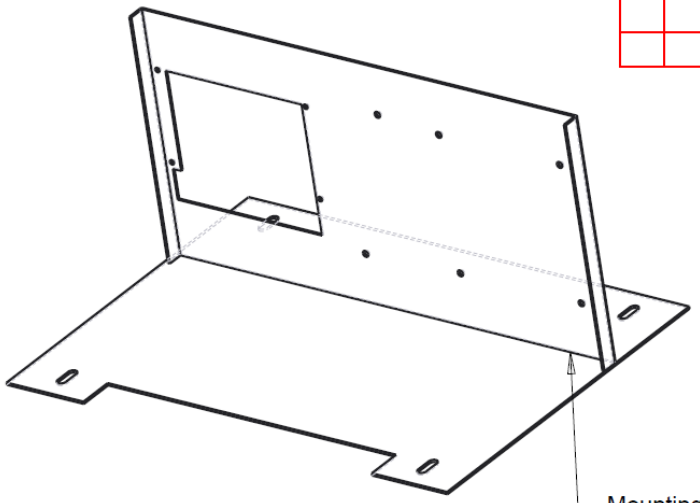


Manufacturing

DWG NO M2014-003 Koyo JTEKT

REVISIONS

NUM	DESCRIPTION	DATE	APPROVED



Mounting Plate Top is to be tack welded to the Mounting Plate Bottom

MATERIAL	PROPRIETARY NOTICE		
A36 Carbon Steel 1/16 inch	THIS DOCUMENT CONTAINS CONFIDENTIAL AND TRADE SECRET INFORMATION, IS THE PROPERTY OF KOYO BEARINGS NORTH AMERICA LLC, AND IS GIVEN TO THE RECEIVER IN CONFIDENCE. THE RECEIVER BY RECEPTION AND RETENTION OF THE DOCUMENT ACCEPTS THE DOCUMENT IN CONFIDENCE AND AGREES THAT, EXCEPT AS AUTHORIZED IN WRITING BY KOYO BEARINGS NORTH AMERICA LLC, IT WILL (1) NOT USE THE DOCUMENT OR ANY COPY THEREOF OR THE CONFIDENTIAL OR TRADE SECRET INFORMATION THEREIN; (2) NOT COPY THE DOCUMENT; (3) NOT DISCLOSE TO OTHERS EITHER THE DOCUMENT OR THE CONFIDENTIAL OR TRADE SECRET INFORMATION THEREIN; AND (4) UPON COMPLETION OF THE NEED TO RETAIN THE DOCUMENT, OR UPON DEMAND, RETURN THE DOCUMENT, ALL COPIES THEREOF, AND ALL MATERIAL COPIED THEREFROM.	THIRD ANGLE PROJECTION	Koyo Bearings North America LLC

0 1 (in)
0 5 10 15 20 25 (mm)

DRAWN	KF	DATE	2/3
CHECKED	KF		2/3
APPROVED	MB		2/3
APPROVED			

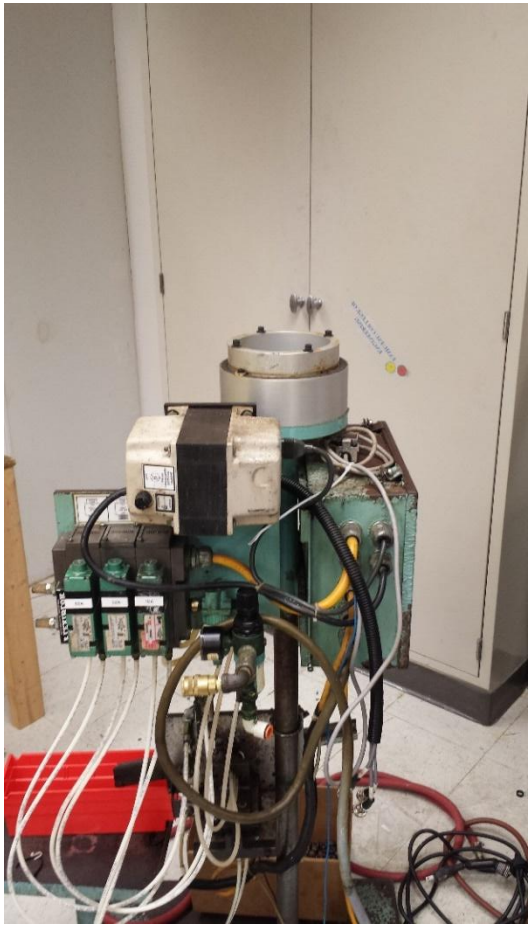
TITLE: MOUNTING PLATE

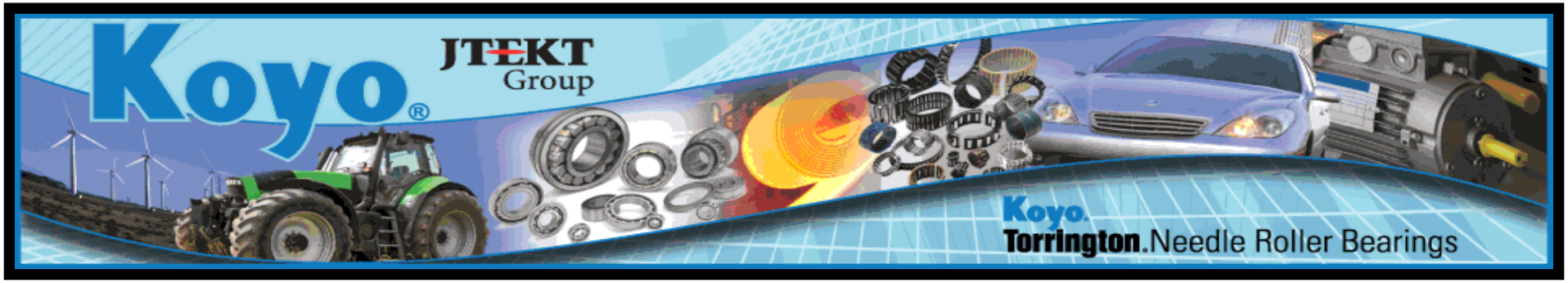
SIZE A | DRAWING NUMBER M2014-003 | REV

SCALE 0.35 | PAGE 1 OF 1

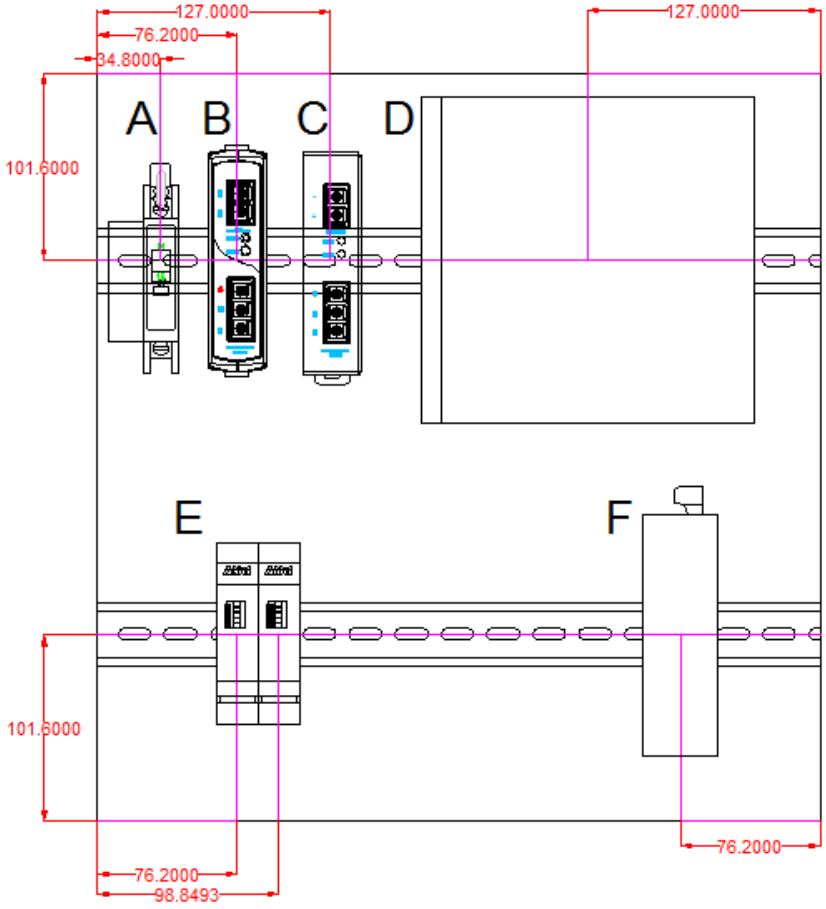
ProEngineer VERSION

Housing Update

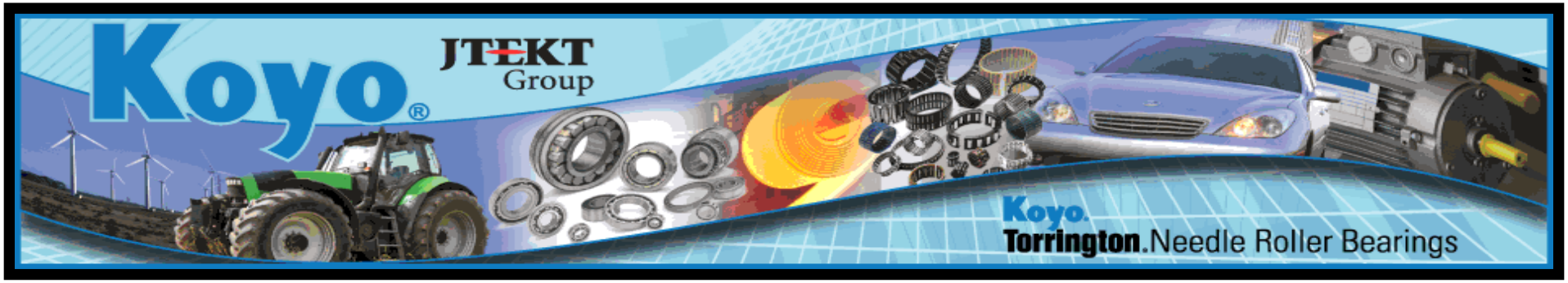




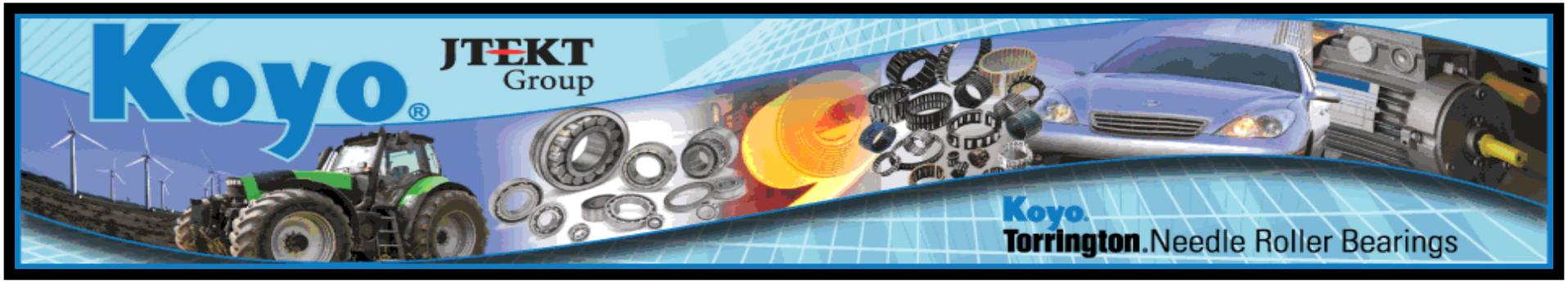
Component Layout



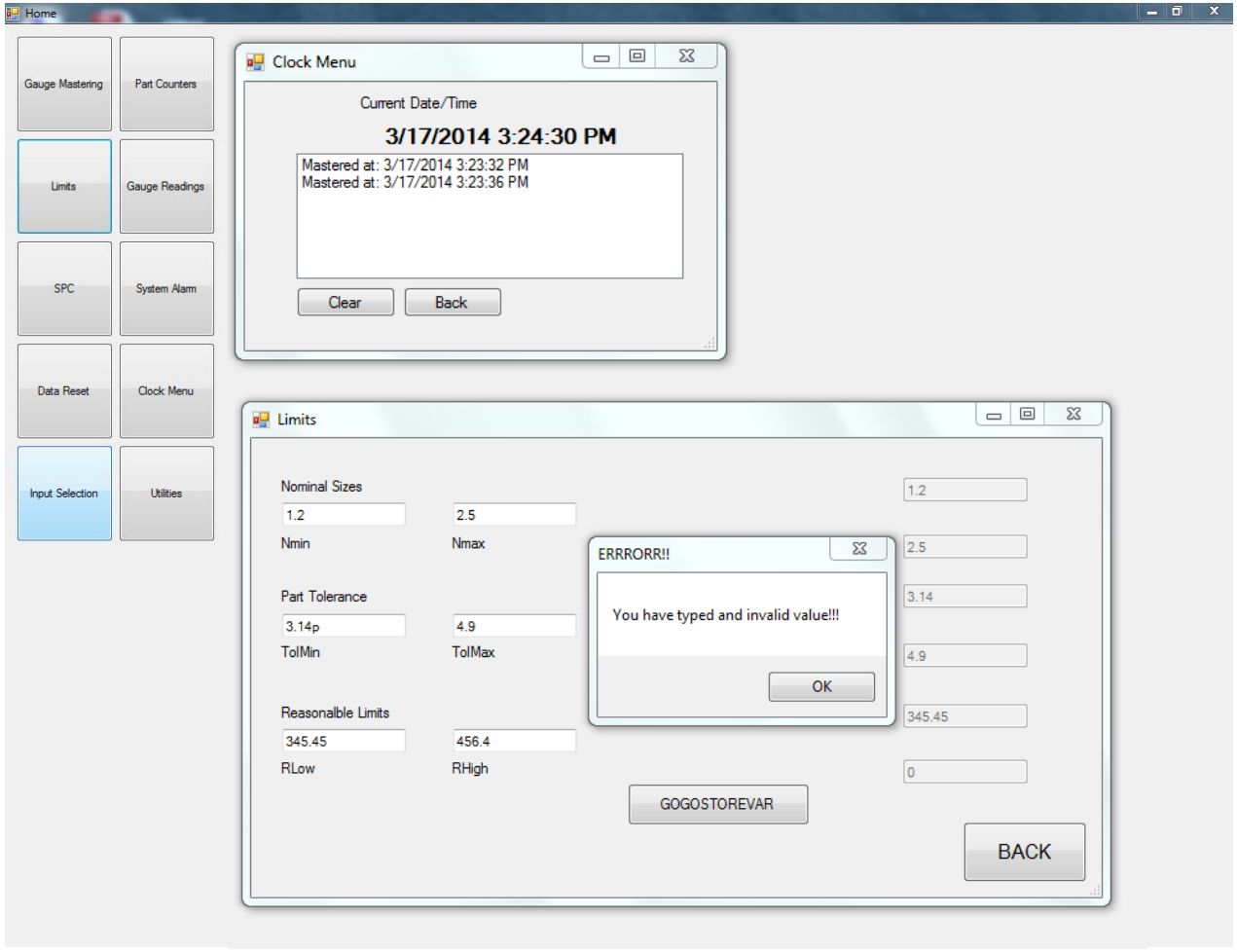
	Part
A	Square D, 10 A single pole breaker
B	12VDC 60W Power Supply
C	24VDC 60W Power Supply
D	ThinkCentre M92p, CPU
E	ANR2 LVDT Signal Conditioner
F	10/100 Ethernet Router



PLC Test-Bed



Graphical User Interface

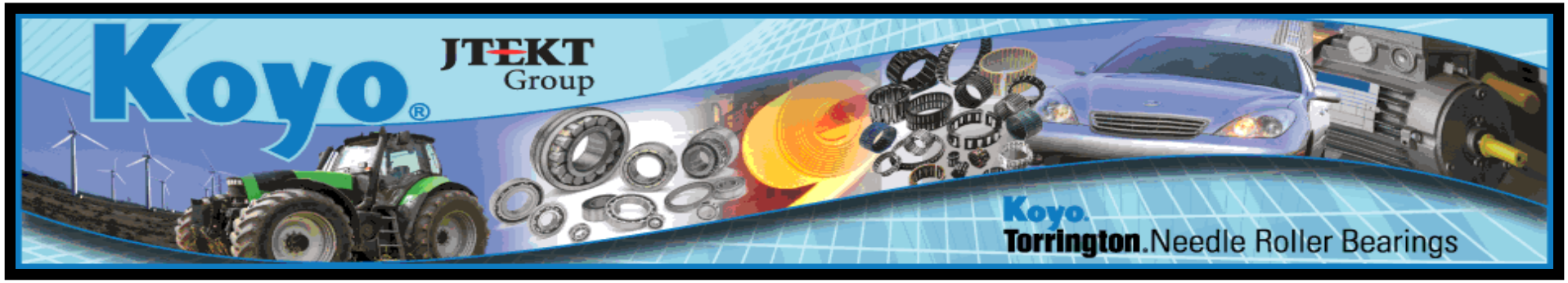


Completed

- Design program menu navigation
- 5 of 7 sub-menus
- Signal Conditioner connection through TCP/IP Port 502 through a socket command

In progress

- Display data as histogram
- Running statistic form

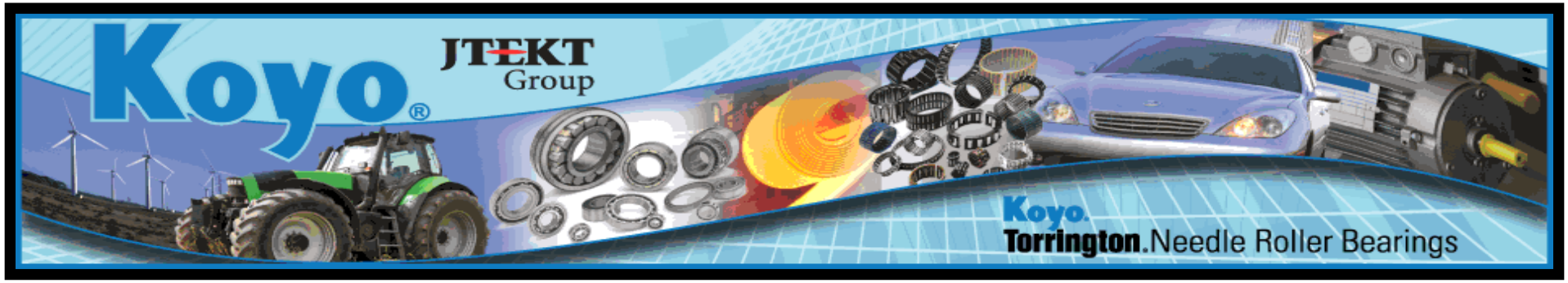


Potential Challenges

Creating Graphical User Interface (GUI)

- Recreating similar user experience for ease of operation
- Recreating desired data acquisition algorithms

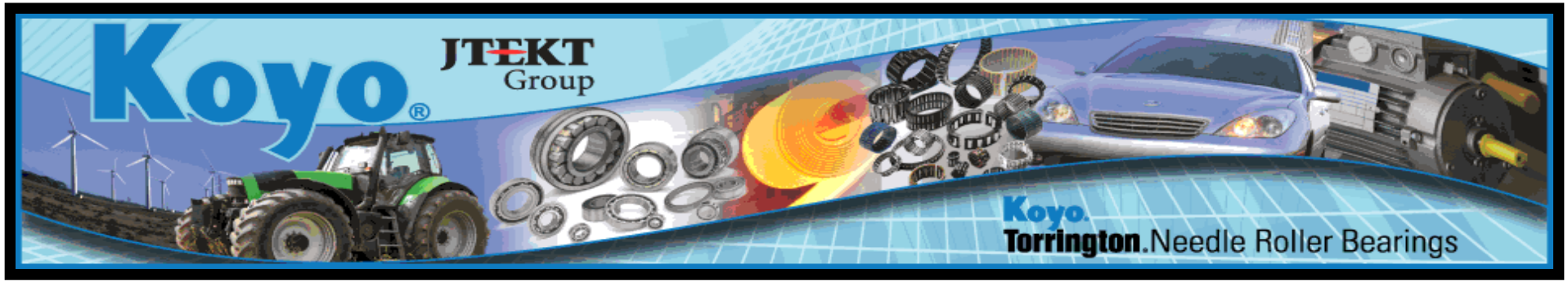
- Electrical noise interference with the LVDT and the signal conditioner
- System integration of the Signal Conditioner and the Graphical User Interface (GUI)



Procurement

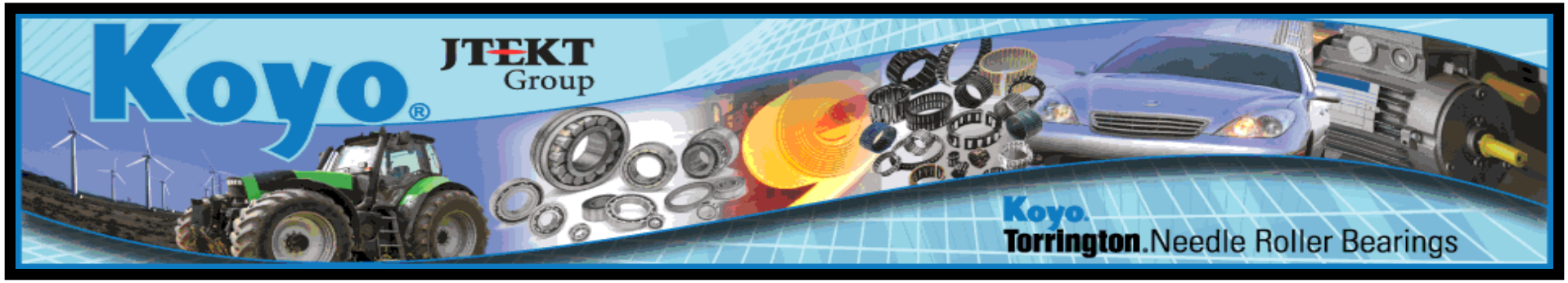
Device	Part Number	Unit Price ($)	Quantity	Price ($)
CPU	LENOVO ThinkCentre M92p	*	1	*
PLC	1762-L24AWA	566.20	1	566.20
PLC - Ethernet Module	1761-NET-ENI	950.00	1	950.00
PLC - Software	RSLogix 500	2050.00	1	2050.00
Signal Conditioner	ANR2	895.00	2	1790.00
Power Supply 24V	PSB24-060-P	28.00	1	28.00
Power Supply 12V	PSB12-060	37.25	1	37.25
Router	CTR-Link EIPR-E	299.00	1	299.00
Monitor	ELO 1537L	527.00	1	527.00
Circuit Breakers	QUO110	30.65	1	30.65
Misc. (DIN Rail…)	TBD	TBD	TBD	~100.00
Total			11	6378.10

* Provided by KOYO



Procurement Status

- PLC and programming software has arrived
- Signal Conditioner ordered early last week
- Misc. parts also ordered early last week
- All parts are expected to be here by the end of this week



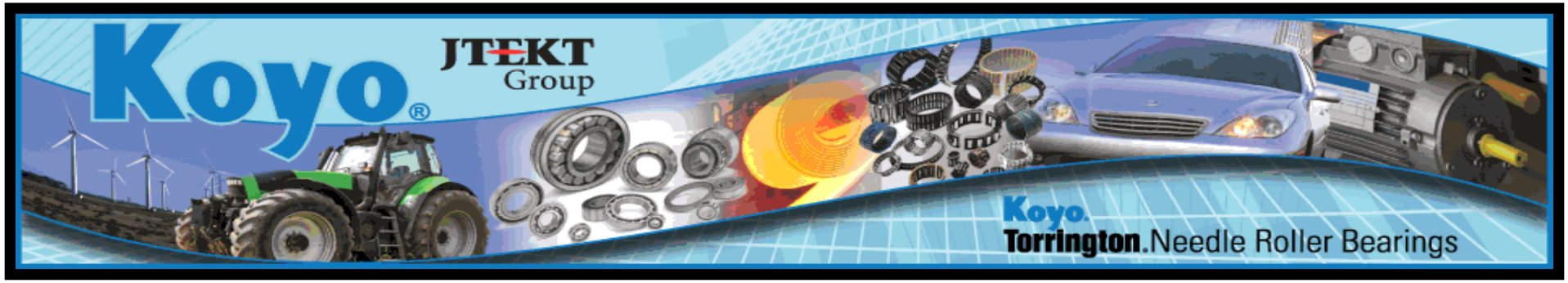
Spring Schedule

March

1. Finish designing the GUI
2. Trace and label old component wiring
3. Install electrical components in the housing
4. Finish the PLC programming
5. Start integrating all components

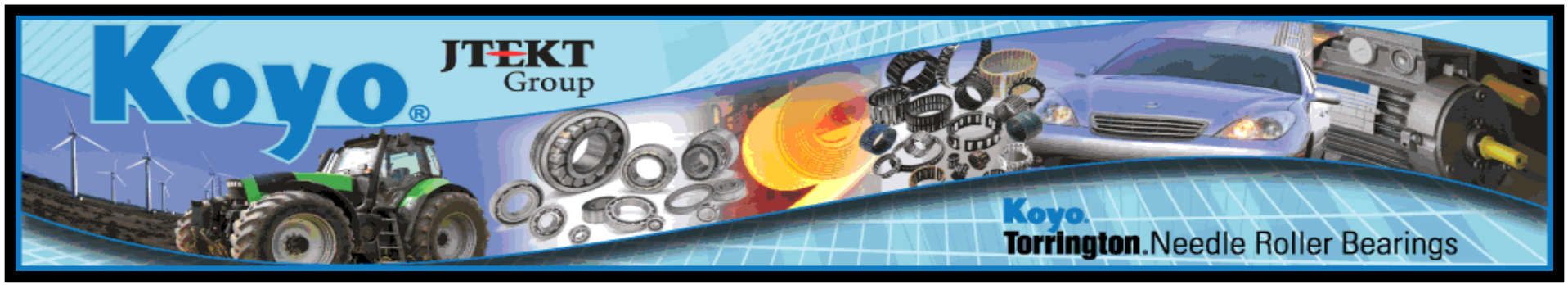
April

6. Debug the GUI
7. Debug the PLC logic



Conclusion

- Mechanical aspects meet Koyo Bearing's standards
- Update the electronic components of an Automated Bearing Bore Gage
- Awaiting arrival of electrical components
- Finish the graphical user Interface (GUI) and the PLC logic



Questions and Comments

References
http://eng.fsu.edu/me/senior_design/2014/team22/