Midterm 1

SENIOR DESIGN TEAM 4: TURBOCOR 1

HIGH SPEED MOTOR TEST-RIG

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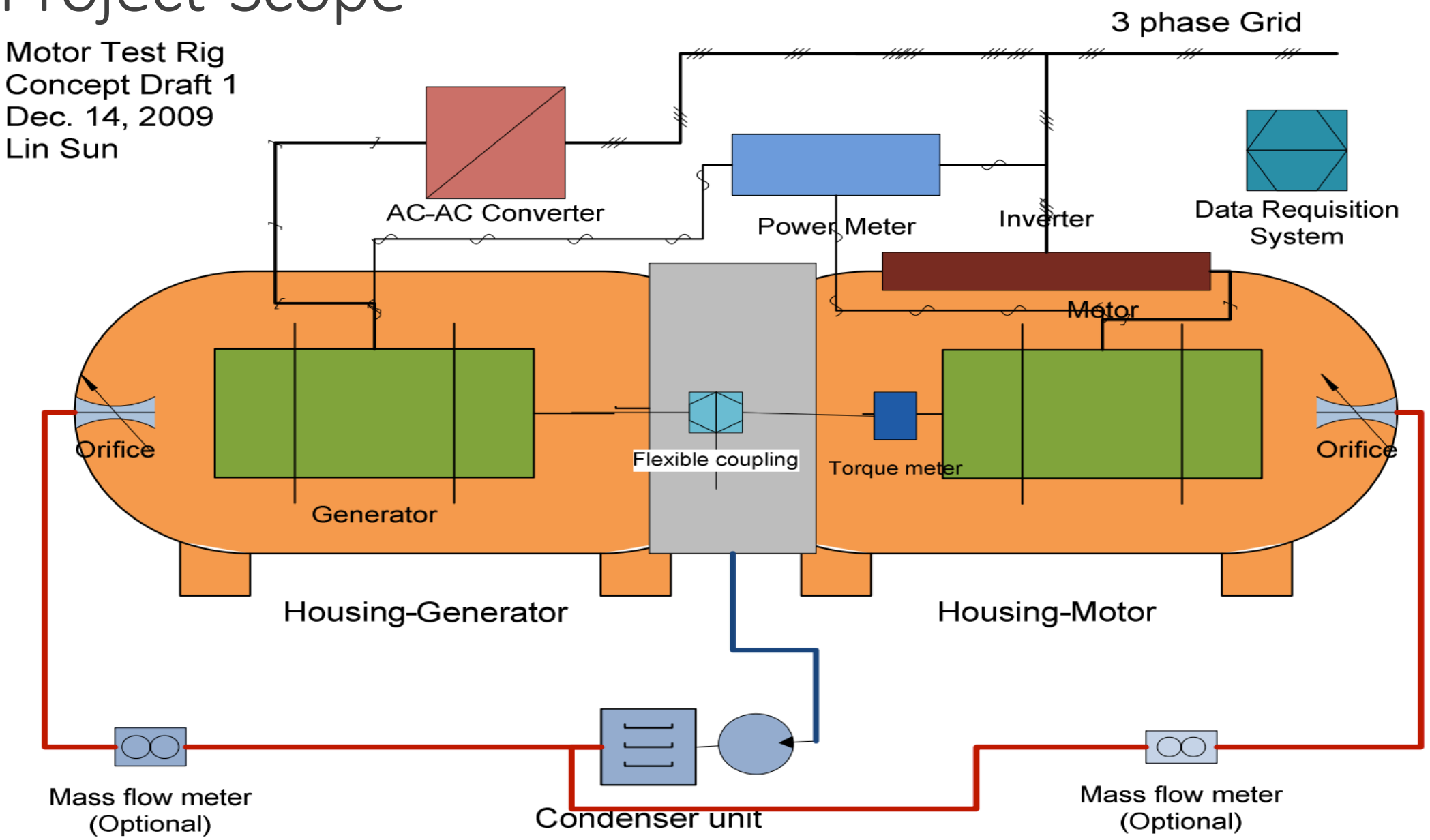
What's The Problem?

1. Danfoss Turbocor needs to qualify their motor's performance
   - Power
   - Efficiency
   - Heat management
2. No motor test rig is capable of qualifying Turbocor's compressor motors
   - Magnetic bearings (radial load issues)
   - High speeds between 20,000-40,000 rpm
   - Misalignment

Project Scope



Project Scope

Precision Alignment
- Misalignment Issues

Coupling the motor and generator shafts
- Coupling must be flexible

Vibrational Effects

Magnetic Bearings
- Issues with radial load

Measuring Torque

Overall Goal and Objectives

GOALS

Design and construct a test rig for Danfoss Turbocor.

Choose the proper coupler and alignment system.

OBJECTIVES

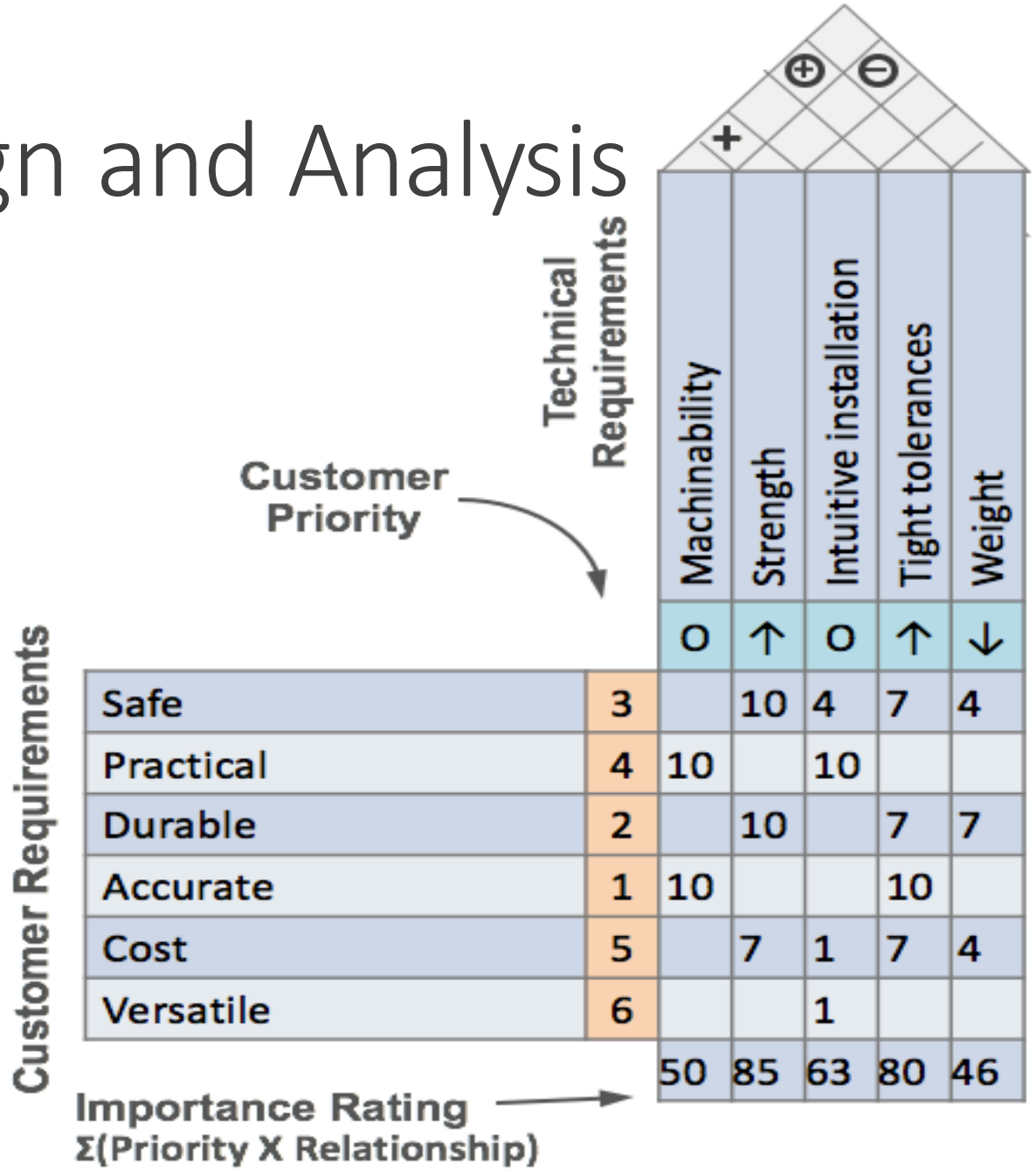
Simple maintenance

High alignment precision

Simple construction

Safety (while operating and building)

Design and Analysis



Correlations:

⊕ Strong Positive

\+ Positive

⊖ Strong Negative

− Negative

Relationships:

Strongest= 10

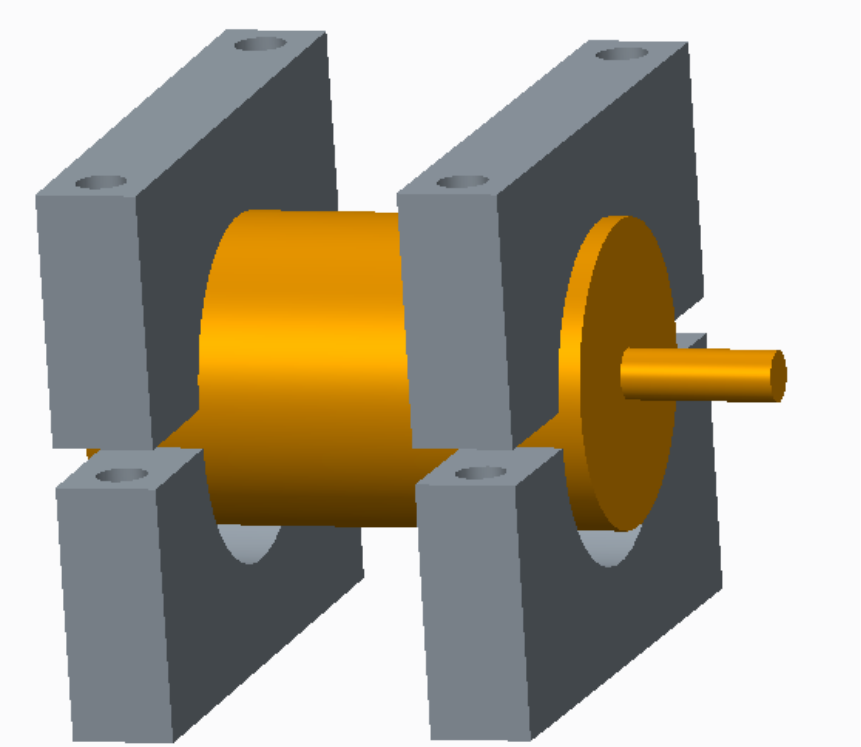
Strong= 7

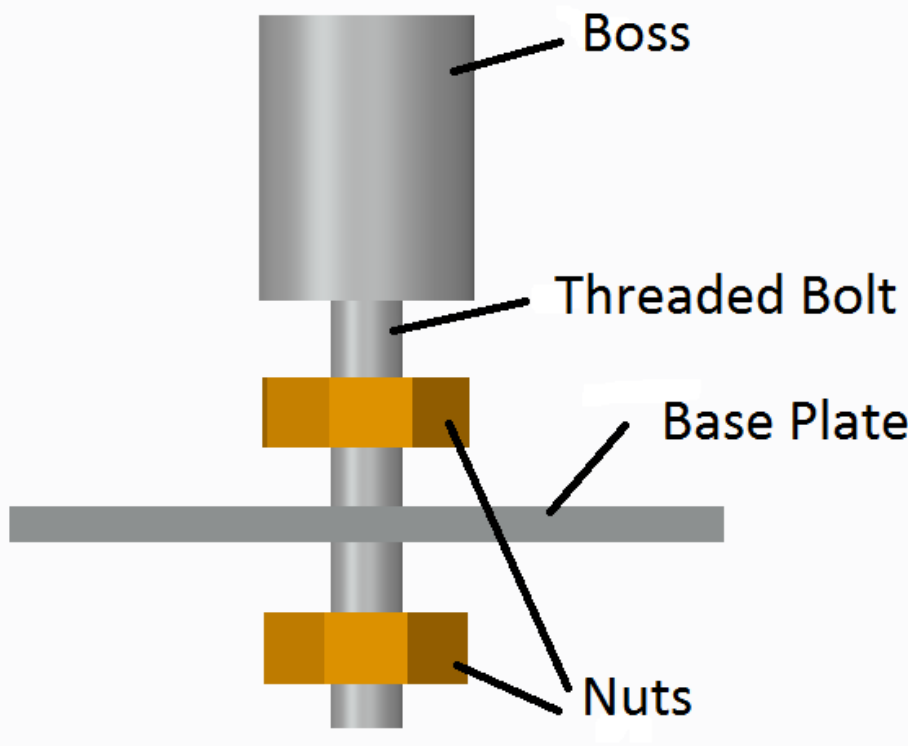
Fair= 4

Weak= 1

Design and Analysis: Concepts

1. DC Motor Test Rig Prototype.
   - Smaller scale compared to actual Turbocor compressors.

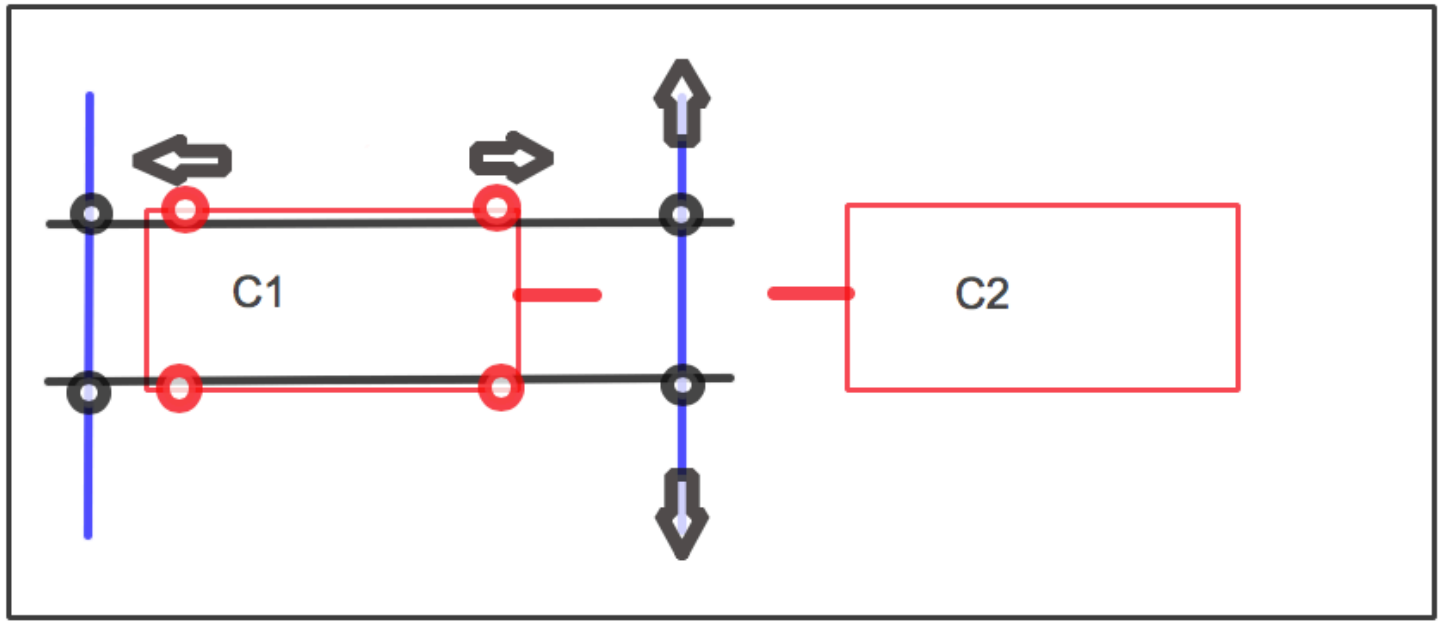




Design and Analysis: Concepts

2. Test Rig with actual compressors.

Use of tracks and rollers for lateral adjustment.

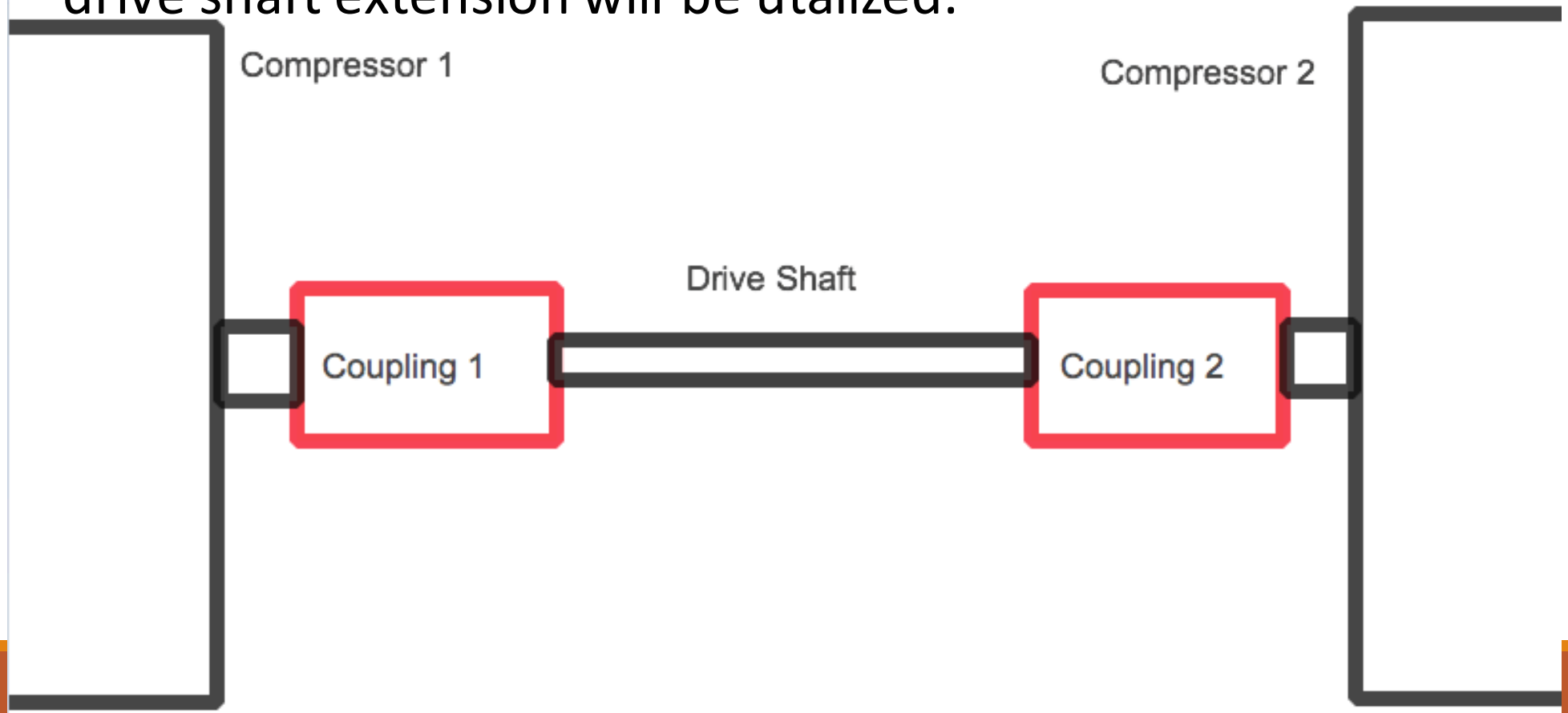


Unknowns:

- Locking track position.
- Lateral angle alignment.

Design and Analysis: Concepts

Due to limited shaft exposure from compressor housing, a drive shaft extension will be utalized.



Scheduling and Resource Allocation

Schedule is subject to change.

- Dependent upon sponsor's approval of concept designs.
- Can change due to customer requirements (COE staff and turbocor) due to physical limitations.

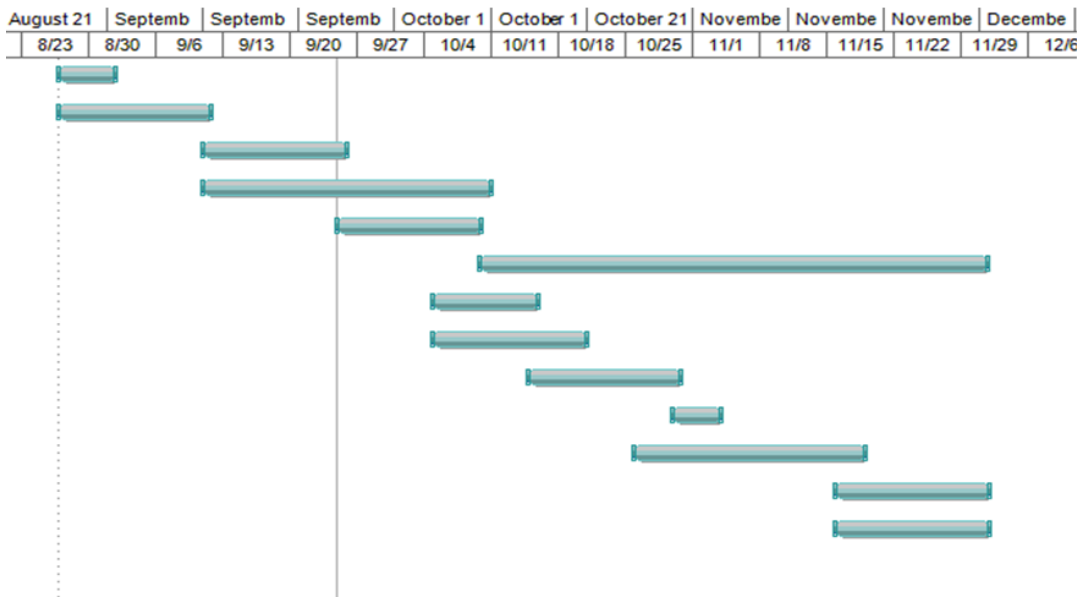
Resource Allocation

- If the resource is beneficial, budget is of no concern.
- The budget is not yet defined.

Scheduling and Resource Allocation

Table 2: Gantt Chart

Task Name	Duration	Start	Finish
Ice Breaker Report	4 days	Thu 8/27/15	Tue 9/1/15
Code of Conducts Report	12 days	Thu 8/27/15	Fri 9/11/15
Needs Assesment	11 days	Fri 9/11/15	Fri 9/25/15
Market Research	22 days	Fri 9/11/15	Sat 10/10/15
Project Plans and Product Spec's.	11 days	Fri 9/25/15	Fri 10/9/15
Conceptual Design Planning	38 days	Sat 10/10/15	Tue 12/1/15
Web Page Design	9 days	Mon 10/5/15	Thu 10/15/15
Midterm Presentaion I: Conceptual Design	12 days	Mon 10/5/15	Tue 10/20/15
Midterm Report I	12 days	Thu 10/15/15	Fri 10/30/15
Peer Evaluation	3 days	Fri 10/30/15	Tue 11/3/15
Final Web Page Design	18 days	Mon 10/26/1	Wed 11/18/1
Final Design Poster Presentaion	12 days	Mon 11/16/1	Tue 12/1/15
Final Report	12 days	Mon 11/16/1	Tue 12/1/15



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Scheduling and Resource Allocation

The team is on the Gantt schedule;

- Meetings during the week with the advisor and customers.
- Cohesive teamwork.
- Task division.

Scheduling and Resource Allocation

Task division:

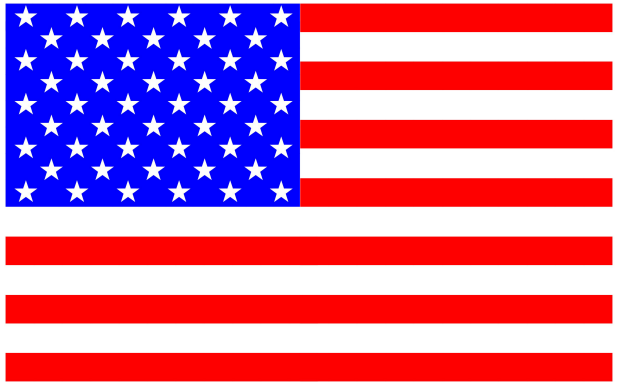
- Matthew Ketchum.
  - Communication with sponsor and with faculty advisor.
- Francisco Barreto
  - Product ordering and outsourcing.
- Leonardo Branco
  - Website development.
- Durval Marques
  - Leading the CAD prototype.
- Thyeasha Joseph
  - Co-Leading the CAD prototype.

Conclusion

Unique parameters requires a unique test rig.

Next steps.

- Benchmarking from CAPS building motor-generator rig.
- Training and acquisition of a Turbocor compressor.
- Focus upon the alignment system design.



References

1. "Motor Test Rig Concept Draft". 10-18-2015 https://campus.fsu.edu/bbcswebdav/pid-7615116-dt-content-rid-43840675_2/courses/EML4551C-0001.fa15/Project%204-Turbocor-1.pdf