Motor Test Rig: Improving Alignment and Incorporating Torque Transducer

Senior Design Team 5

Jack Pullo
Jonathan De La Rosa
Fehintoluwa Aponinuola

10/11/2016

William Sun - Sponsor

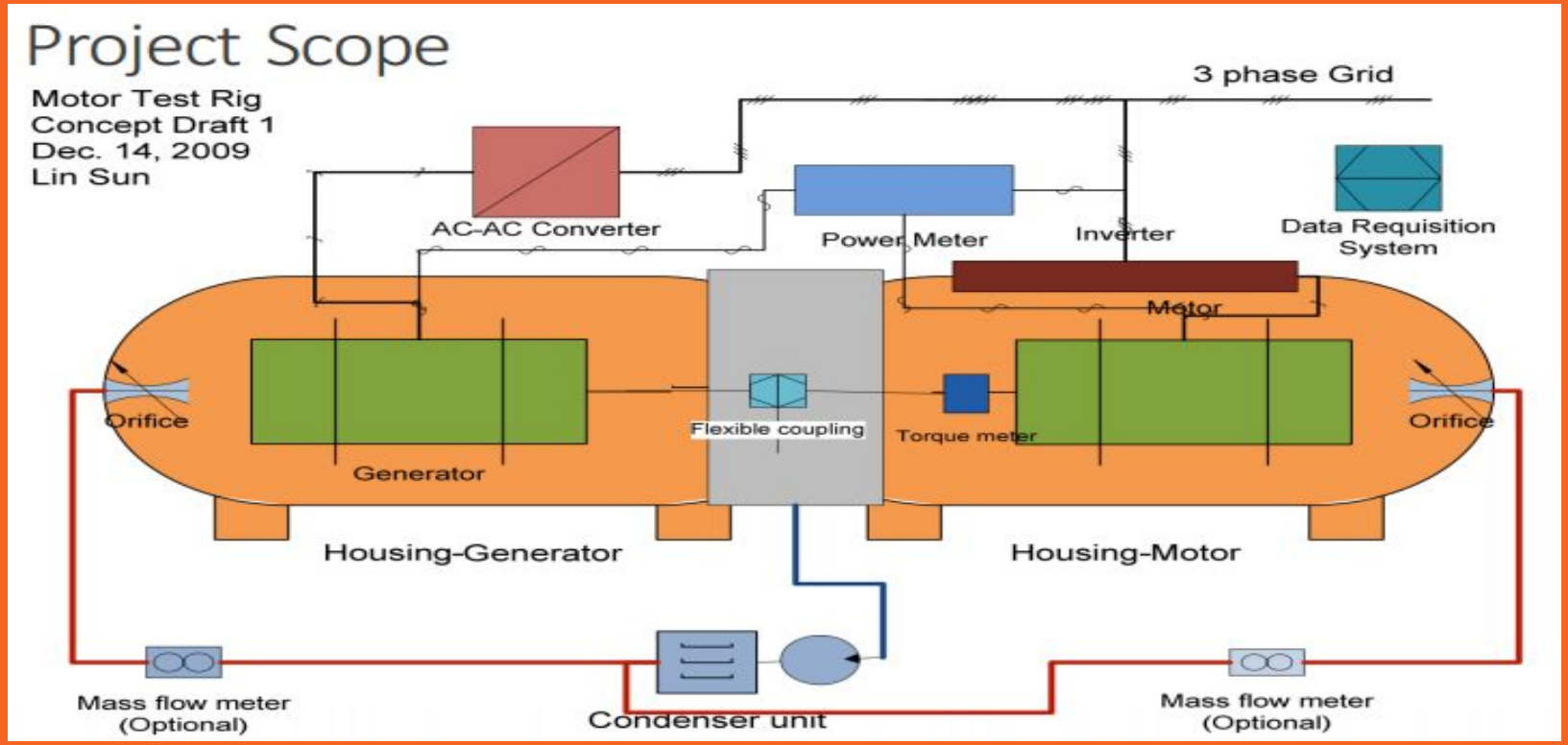
Patrick Hollis - Staff Advisor

Turbocor's Needs (Last Year):

Qualify motor's performance:

- Power
- Efficiency
- Heat Management

Figure 1: Original Project Scope [1]



What They Did

Developed an adjustable frame/stand for the two compressors

Purchased a flexible coupler

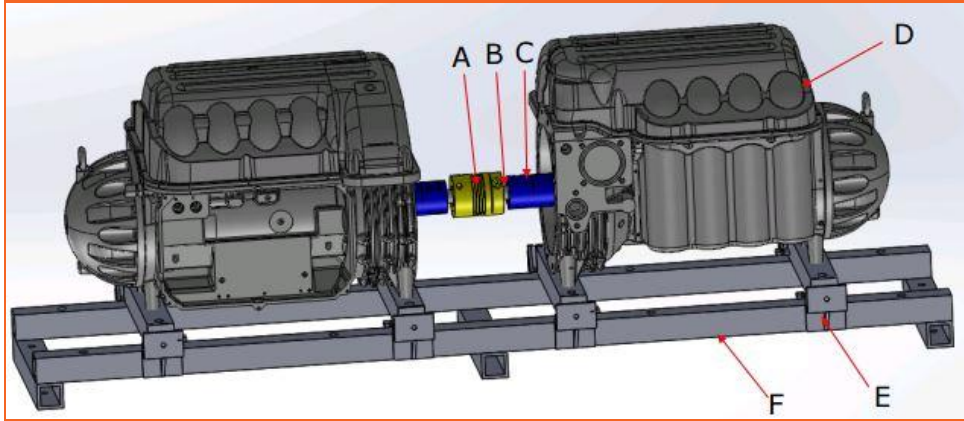
Used a dial alignment system

Budget constraints limited what they could get for their final design

Last Year's Final Design:

A. One Flexible Coupler
B. Two Rigid Couplers
C. Two Extension Shafts
D. Two Compressors
E. Eight Set Screw Brackets (Lateral Alignment)
F. Base Frame

Figure 2: Last Year's Final Design [1]



Turbocor's Needs (This Year):

While incorporating the frame from last year:

- Improve alignment process
- Develop shaft & coupling design for axial displacement (levitation)
- Incorporate torque transducer to system

Goals

Achieve levitation while incorporating a new shaft, coupling, and transducer.

Be able to run the rig at relatively low speeds (Under 10,000 rpm and under 100 N*m torque).

Objectives

Consistent levitation

Precision in alignment

Safety while operating

Alignment Tools:

Laser Alignment Tool (To Be Purchased)

Shims

Lateral Screw Sets

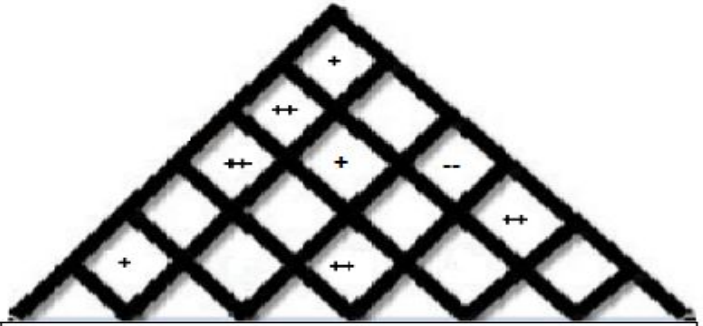
Figure 3: Laser Alignment Tool - SKF TKSA 31 [2]

Shaft:

Unknown factors prevented levitation last year. This could possibly be due to axial displacement.

Design needs to be able to withstand axial displacement so the compressors don’t fight each other

Table 1: HOQ



		Customer Priority	Engineering Characteristics					
			Price	*Efficiency*	*Weight*	*Material*	*Tolerance*	*Strength*
Customer Requirements	*Safety*	2	1		4	7	4	10
	Durability	6	4	4	7	7	1	7
	Within Budget	3	10		1	10	7	4
	Reliability	4	4	4		4	10	7
	Functionality	1	1	4	4	4	10	7
	Mobility	5			10	7		4
	Importance Rating							
	Σ(Customer Priority x Relationship Value)		73	44	107	141	85	129

Correlations	
++	Strong Positive
+	Positive
-	Negative
--	Strong Negative

Relationships	
10	Strongest
7	Strong
4	Fair
1	Weak

Scheduling and Resource Allocation:

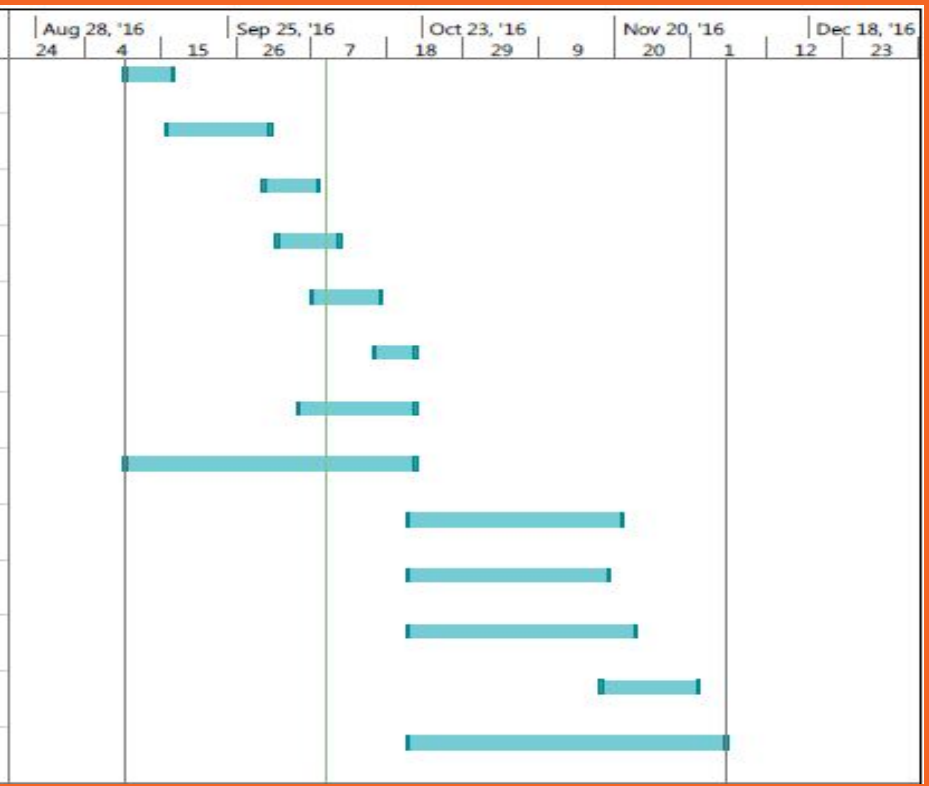
*Schedule Subject to Change

The team is on the Gantt Schedule;

- Meeting during the week with advisor and sponsor
- Cohesive Teamwork
- Task Division

Table 2: Gantt Chart

Task Name	Duration	Start	Finish
Code Of Conduct	6 days	Sat 9/10/16	Fri 9/16/16
Needs Assesment	11 days	Fri 9/16/16	Fri 9/30/16
Revised Code of Conduct	6 days	Fri 9/30/16	Fri 10/7/16
Market Research	7 days	Sun 10/2/16	Mon 10/10/16
Midterm Presentation	7 days	Fri 10/7/16	Sun 10/16/16
Midterm 1 Report	6 days	Sun 10/16/16	Fri 10/21/16
Initial Web Page Design	13 days	Wed 10/5/16	Fri 10/21/16
Peer Evalutation	31 days	Sat 9/10/16	Fri 10/21/16
Midterm 2 Presentation	22 days	Fri 10/21/16	Sun 11/20/16
Peer Evalutation	21 days	Fri 10/21/16	Fri 11/18/16
Final Web Page Design	23 days	Fri 10/21/16	Tue 11/22/16
Poster Presentation	10 days	Fri 11/18/16	Thu 12/1/16
Final Report	32 days	Fri 10/21/16	Mon 12/5/16



Scheduling and Resource Allocation:

Task Division:

- Alex Jurko
  - Communication with sponsor and faculty advisor
- Jack Pullo
  - Product ordering and operating
- Fehintoluwa Aponinuola
  - Website development and management
- Jonathan De La Rosa
  - Leading the CAD Prototype

Fehintoluwa Aponinuola

Conclusion

Next Steps:

- ➔ Complete shaft/coupling/transducer design
- ➔ Purchase a Laser Alignment Tool.
- ➔ Purchase transducer and coupling/shaft.
- ➔ Become familiar with operating the compressors software.

References:

1. "Final Presentation." *Senior Design* (n.d.): n. pag. *Http://eng.fsu.edu/me/senior_design/2016/team04/finalpresentation.pdf*. Web.

2. "Later Alignment System." *SKF*. N.p., n.d. Web. <http://www.tequipment.net/SKF/TKSA-31/Shaft-Alignment/?Source=googleshopping&gclid=CjwKEAjw-Oy_BRDg4Iqok57a4kcSJADsuDK1fV_ByvL5sMk56UAHYAAL1X4Kj7eqTRGIqPlQh4nLKBoC8rnw_wcB>.

Q U E S T I O N S ? ? ?