

Orbital Test Stand

Concept Generation & Selection

Mary Begay, Brett Booen, Calvin Boothe,
James Ellis, and Nicholas Garcia

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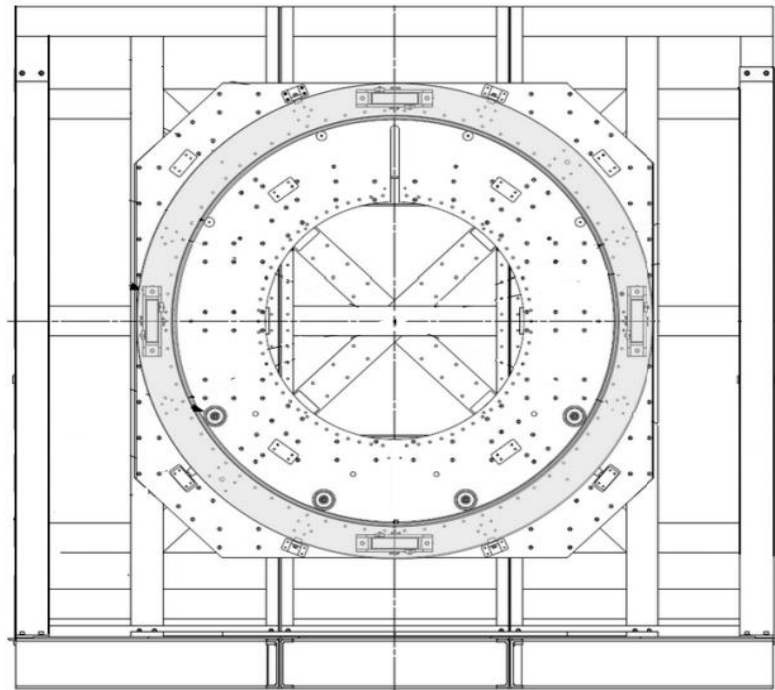


Presentation Overview

- ❑ Introduction
- ❑ Concept Generation
 - ❑ 10 Concepts
- ❑ Concept Selection
 - ❑ 5 Decision Matrices
- ❑ Conclusion

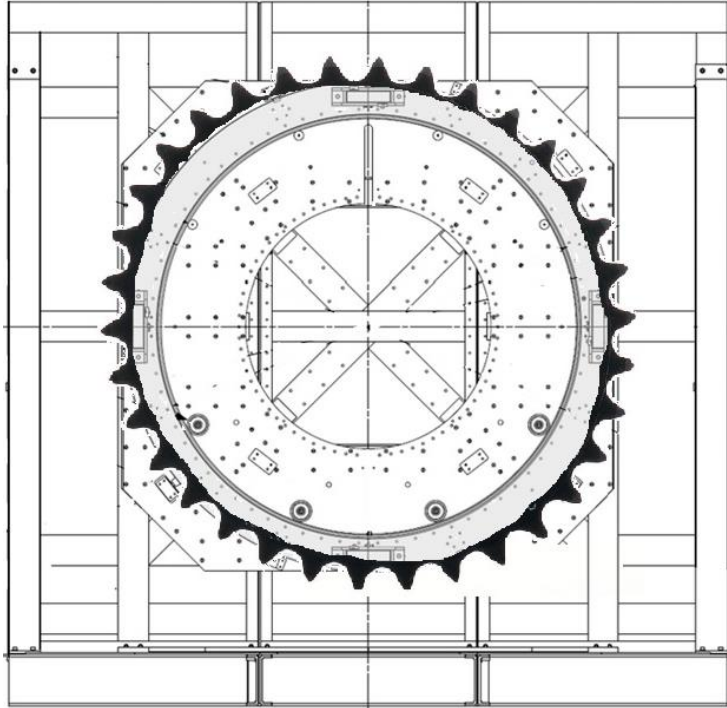
Introduction

CONCEPTS

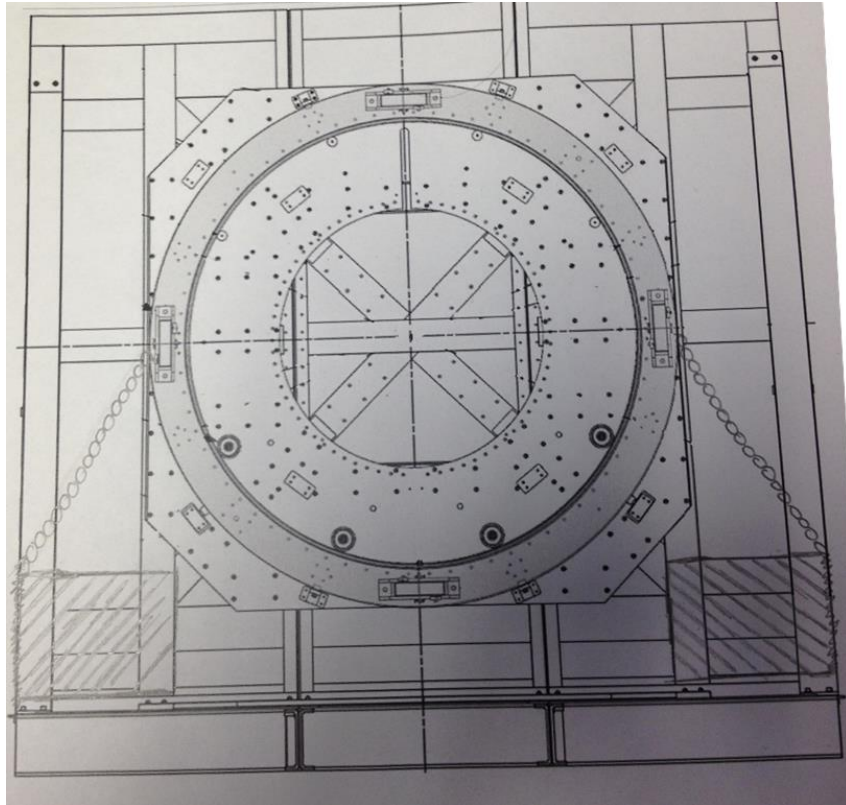


1. Chain
2. Winch
3. Exterior Wheels
4. Interior Wheels
5. Gears
6. Sandwich Wheels
7. Rope Belt
8. Piston
9. Bowling Ball Return
10. Worm Gears

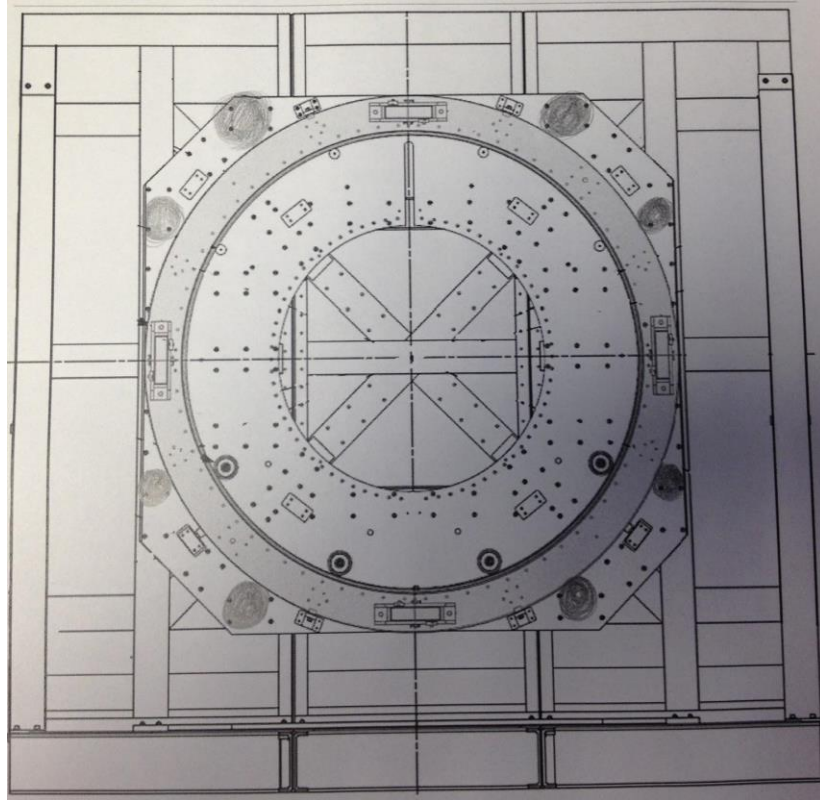
1. CHAIN



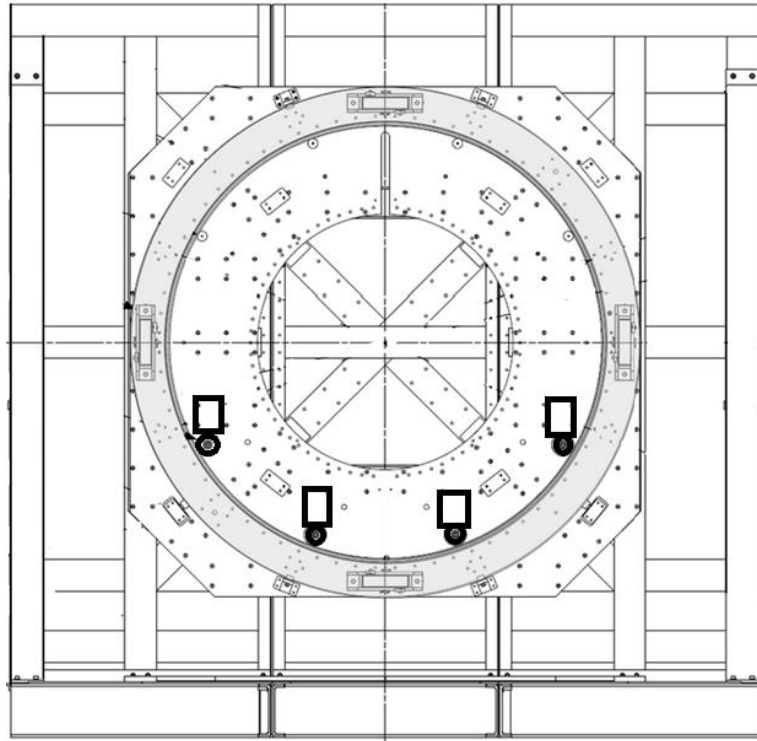
2. WINCH



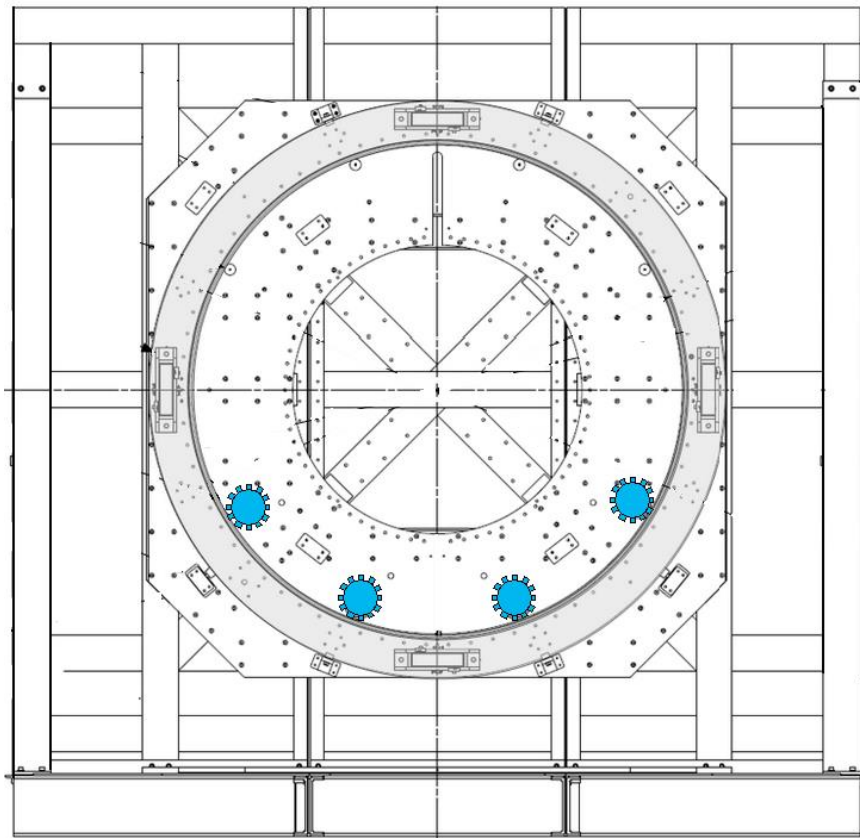
3. EXTERIOR WHEELS



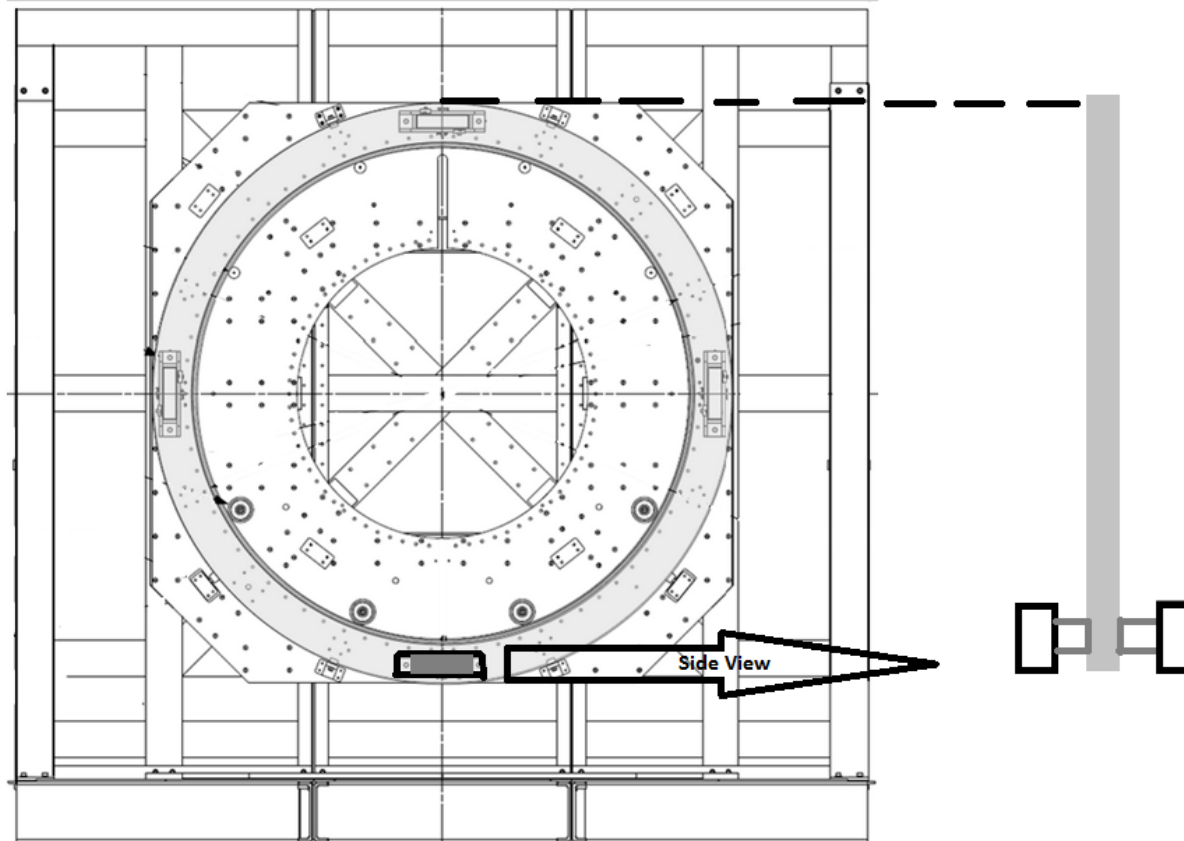
4. INTERIOR WHEELS



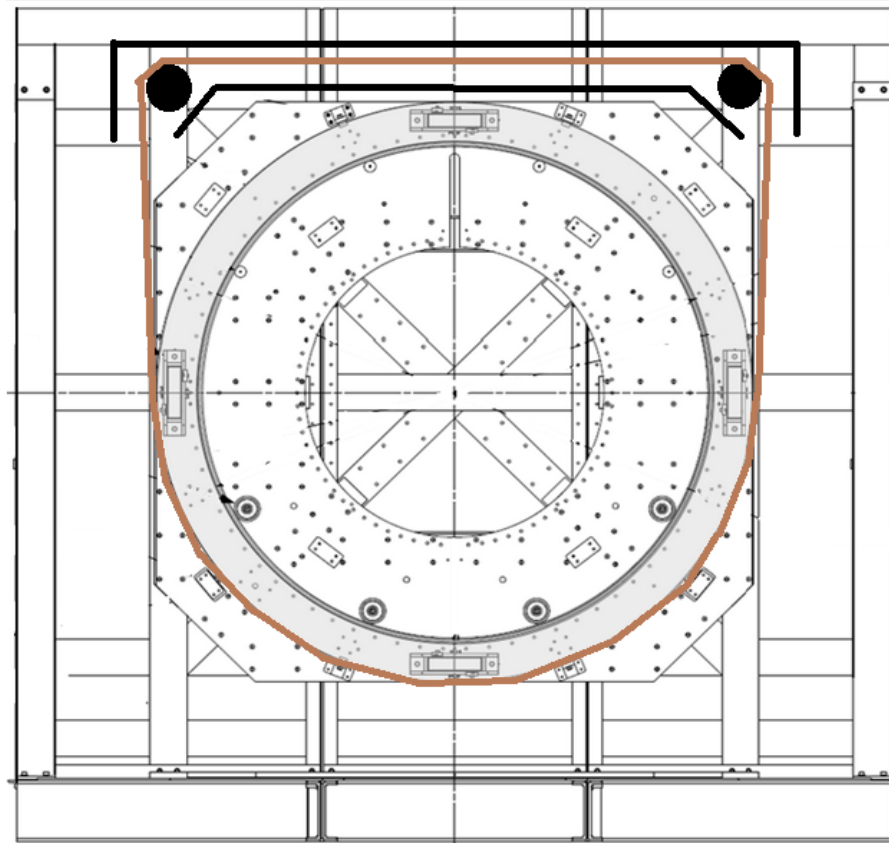
5. GEARS



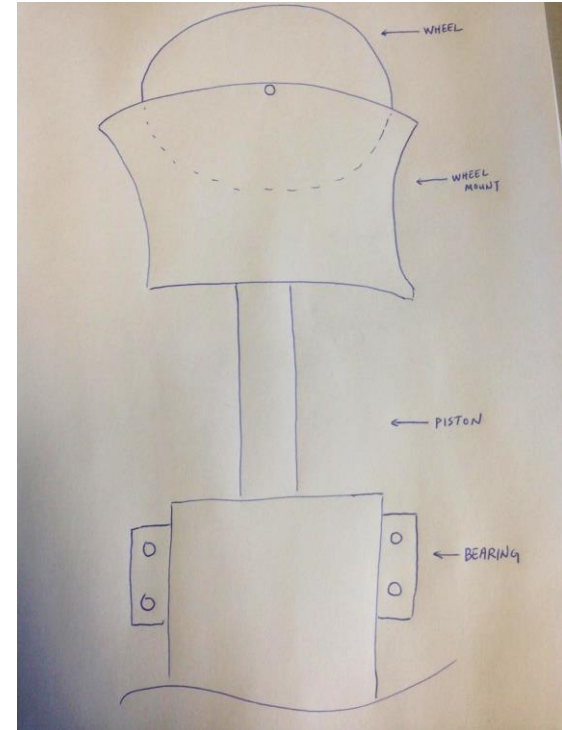
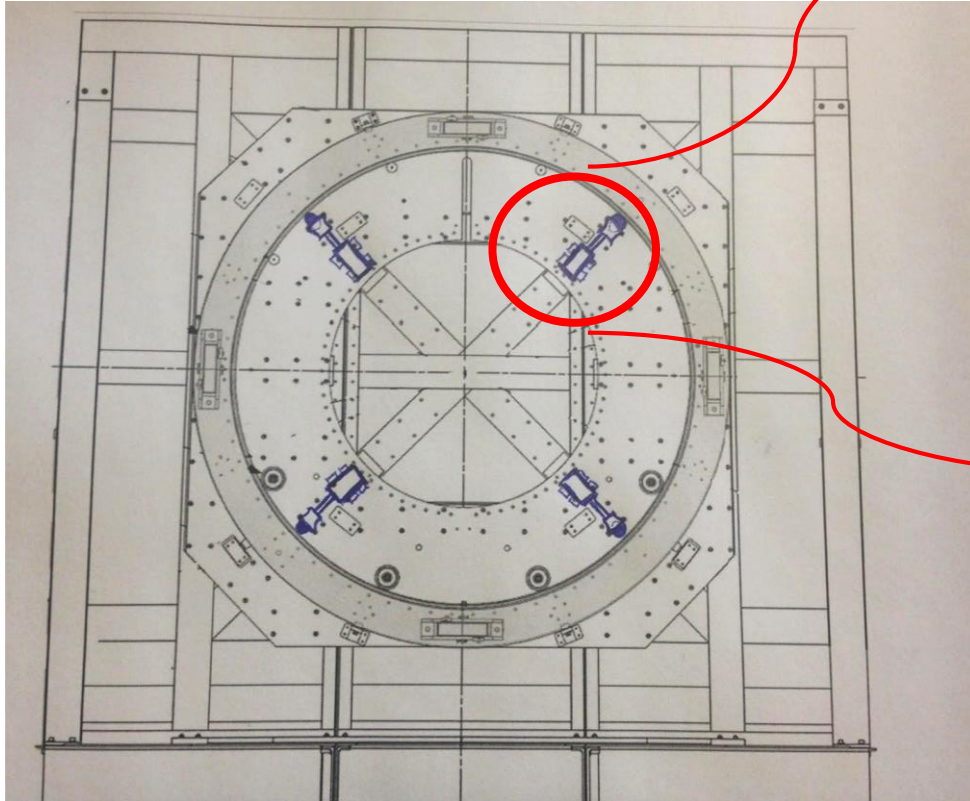
6. SANDWICH WHEELS



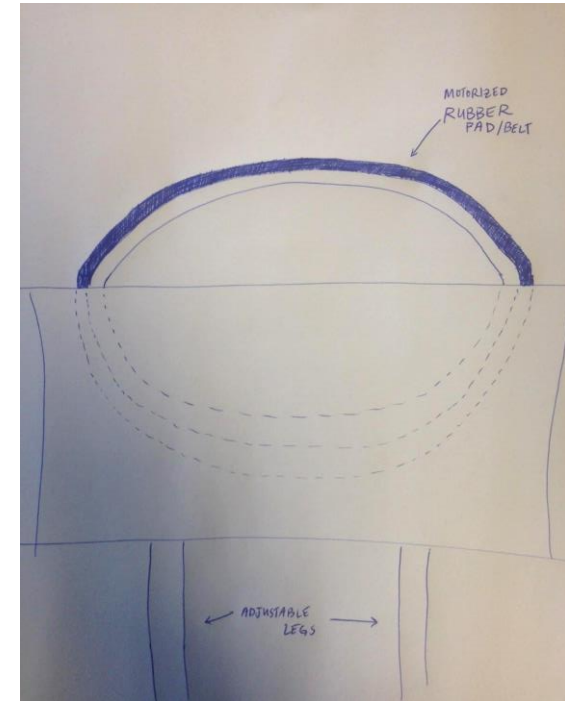
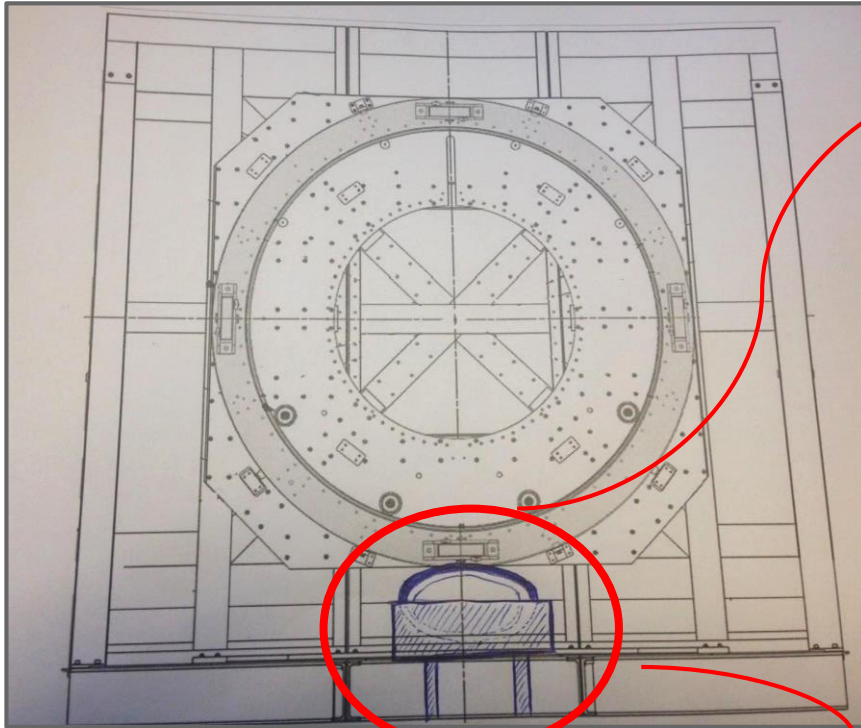
7. ROPE BELT



8. PISTON

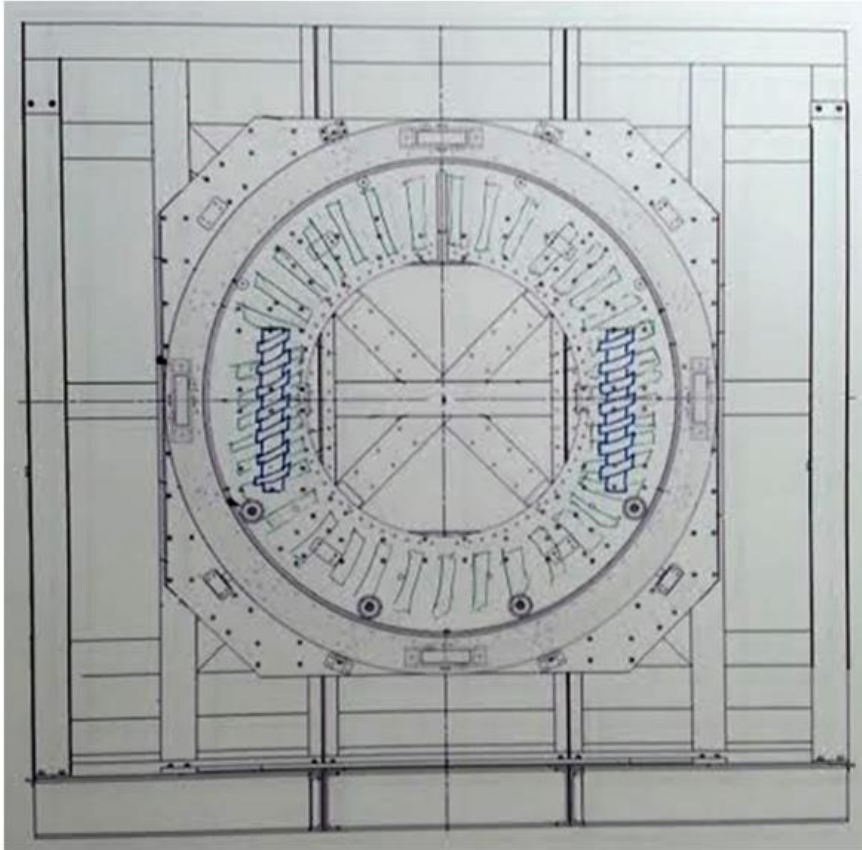


9. BOWLING BALL RETURN



Brett Booen

10. WORM GEARS



Design Selections

5 Decision Matrices

- Completed individually with no knowledge of other selections

Variety of Criteria:

- Maintenance, Cost, Safety, Integration,
Portability, Space, Power, User Friendly, etc.

Decision Matrix #1

Priority: Safety

	maintenance	cost	ease of use	manufacture	safety	Total	Rank
Design	0.2	0.2	0.2	0.1	0.3	1	
Chain	4	6	8	6	8	6.6	9
Winch	8	8	7	8	9	8.1	5
Exterior Wheels	8	9	9	7	8	8.3	4
Interior Wheels	8	8	9	8	9	8.5	1 (tie)
Gears	5	7	8	4	8	6.8	8
Sandwich Wheels	8	8	9	7	9	8.4	3
Rope Belt	7	9	9	8	9	8.5	1 (tie)
Piston	4	2	6	4	7	4.9	10
Bowling Ball Return	7	7	7	6	8	7.2	7
Worm Gears	7	7	9	8	9	8.1	5

Decision Matrix #2

Priority: Modifications

			1	2	3	4	5	6	7	8	9	10
		Weight	Chain	Winch	Exterior Wheels	Interior Wheels	Gears	Sandwich Wheels	Rope Belt	Piston	Bowling Ball Return	Worm Gears-On Ring
Design Requirements	Minimal Modifications	25	2	5	8	8	4	7	6	6	6	5
	Low Cost	5	4	4	7	7	6	7	6	2	5	5
	Easy Manufacture	15	2	5	7	7	5	6	5	4	3	6
	Easy Integration	20	3	5	6	6	5	7	6	4	4	6
	Minimal Materials	10	3	6	7	7	4	6	5	3	3	5
	Portability	10	6	5	6	6	6	6	5	4	4	6
	Easy Maintenance	15	3	4	7	7	6	6	4	6	4	6
	Total	100	295	490	695	695	495	650	535	460	430	560
Ranking			10	7	1	2	6	3	5	8	9	4

Decision Matrix #3

Priority: Space, Modifications

	Brett Booen	Space Req.	Modifications	Power Source	User Friendly	Safety		
	Decision Matrix	25%	25%	20%	15%	15%		
		0.25	0.25	0.2	0.15	0.15	TOTAL	RANK
1	CHAIN	3	10	9	9	4	7	②
2	WINCH	1	9	10	10	6	6.9	③
3	EXTERIOR WHEELS	9	6	4	5	7	6.35	⑤
4	INTERIOR WHEELS	10	5	6	4	10	7.05	①
5	GEARS	7	3	3	3	3	4	⑧
6	SANDWICH WHEELS	8	7	5	6	8	6.85	④
7	ROPE BELT	2	8	8	8	5	6.05	⑦
8	PISTON	5	1	1	1	1	2	⑩
9	BOWLING BALL RETURN	6	4	7	7	9	6.3	⑥
10	WORM GEARS	4	2	2	2	2	2.5	⑨

Decision Matrix #4

Priority: Cost, Safety

	Calvin Boothe	Cost	Modifications	Space Required	Maintenance	Safety		
	Decision Matrix	25%	15%	20%	15%	25%		
		0.25	0.15	0.2	0.15	0.25	TOTAL	RANK
1	CHAIN	4	7	9	9	8	7.2	1
2	WINCH	1	9	10	10	6	6.6	4
3	EXTERIOR WHEELS	9	6	4	5	7	6.45	5
4	INTERIOR WHEELS	4	6	8	7	10	7.05	2
5	GEARS	6	2	5	2	4	4.1	9
6	SANDWICH WHEELS	8	7	5	6	8	6.95	3
7	ROPE BELT	5	6	7	6	7	6.2	6
8	PISTON	7	2	1	2	2	3.05	10
9	BOWLING BALL RETURN	5	4	4	5	8	5.4	8
10	WORM GEARS	8	3	2	4	9	5.7	7

Decision Matrix #5

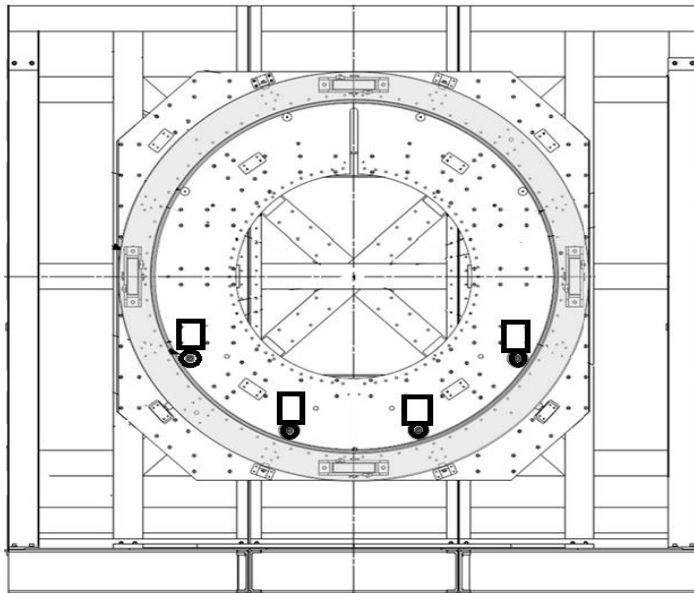
Priority: Modifications, Maintenance, Use

	Nicholas Garcia	Space Req.	Modifications/ Integration	Maintenance	Ease of Use	Cost	Safety		
	Decision Matrix	15%	20%	20%	20%	10%	15%		
		0.15	0.2	0.2	0.2	0.1	0.15	TOTAL	RANK
1	CHAIN	5	4	6	8	3	7	5.7	⑧
2	WINCH	5	5	5	6	6	6	5.45	⑨
3	EXTERIOR WHEELS	7	8	7	9	8	9	8	②
4	INTERIOR WHEELS	8	8	7	9	8	9	8.15	①
5	GEARS	8	4	6	7	2	8	6	⑦
6	SANDWICH WHEELS	6	7	6	9	7	9	7.35	⑤
7	ROPE BELT	6	8	7	8	8	8	7.5	④
8	PISTON	3	6	4	5	4	5	4.6	⑩
9	BOWLING BALL RETURN	8	8	7	8	7	8	7.7	③
10	WORM GEARS	8	6	7	7	5	7	6.75	⑥

Conclusion

- ❑ Developed 10 feasible design concepts
- ❑ Entered designs into 5 decision matrices

1. Interior Wheels

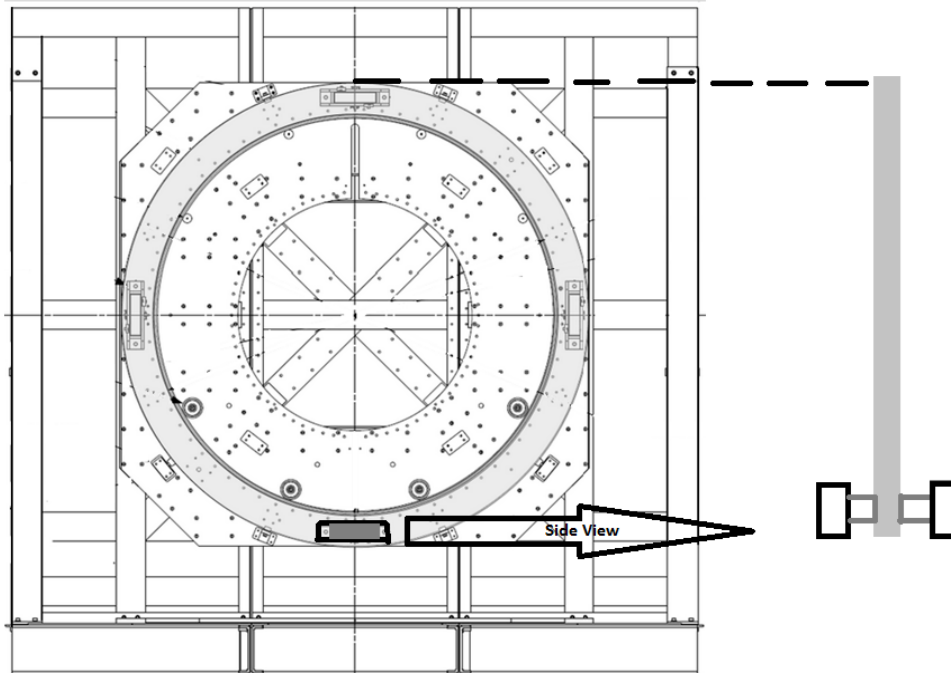


Average Ranking: 1.4

-1st, 1st, 2nd, 2nd, 1st

Conclusion

2. Sandwich Wheels

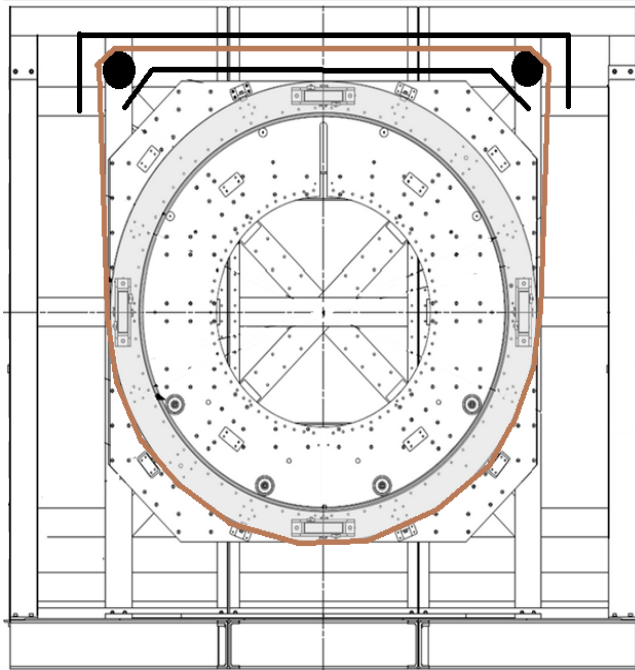


Average Ranking: 3.6

-3rd, 3rd, 4th, 3rd, 5th,

Conclusion

3. Rope Belt



Average Ranking: 4.6

-1st, 5th, 6th, 7th, 4th