

Clinostat Testing

1/20/25

XPP → accelerometer

Testing → Place accelerometer over plant, plant

1st Test → Forces only → Later Test → w/ Plants

a. Purpose of Testing = Verify that the forces acting ~~on~~

① the center of the clinostat cancel out (gravity + centripetal)

ensuring that the machine creates a low-gravity environment

specific design specifications → rotating axes

→ create centripetal force

and no overdrives → shift ~~overdrive~~ ^{centrifugal} acting gravity

b. Environment → no/low wind, humidity / room temp / lighting from all angles

(only w/ plants)
Equipment → clinostat ② full power + full working + ~~XPP~~

Material → ?

Software → Arduino code for clinostat (written by ~~me~~ + board)

Sci. → control / operating ledger post

c. testing equipment → XPP board + batteries + Clinostat

tools (measure) → XPP Board accelerometer (accuracy not yet known)

safety → N/A - just don't touch apparatus

Documentation → camera, data logged by board (unidentified as of right now)

software/digital tools → TBD

Final Report → writing a note on how to place things?

D. Step by Step

1. Attach powered accelerometer to Clino's center

2. Run clinostat for x minutes (start w/ 10)

3. Record acceleration throughout duration w/ XRP board

4. Using mass — calc for Net Force ($F=ma$) (see if XRP gives directional)
accel

Ex.

Ex. Parameters $\rightarrow F < x \rightarrow$ ~~1.875 g~~ (determine x)

Control \rightarrow start clino from ^{same} start point,

Doc require \rightarrow accel data + calculations for Force

Troubleshooting — ?

Emergency — if clino gets stuck — stop, loosen/tube, check power, continue

E. Quant — Force $< x$

Qual \rightarrow XRP board doesn't move around, speed of clino not too fast (centripetal $\frac{v^2}{r}$)

Acceptable ranges / tolerances — TBD

Failure \rightarrow Force is ~~not~~ non-negligible ($F > x$)

Data validation methods — ?

F. Hazard \rightarrow Clino breaks down (center too heavy)

Protective equip \rightarrow N/A

Emergency

Equipment safety — check rear of clino is broken + full power (clino + XRP)

Digital Implementation

Digital tools
- software

- Data Collection — thru XRP website
- Measurement — accelerometer (on XRP)
- Analysis/Processing = TBD (calculations)
- Documentation — Excel (?), Sheets (?)
- Integration plan — code accelerometer thru XRPcode.wpi.edu
- Backup/Contingency - ?
- Data Storage — Excel/Sheets + written notebook

Team Organization

- LDT → lead test, code board, analyze data, Documentation/calculations
- Jack }
- Jose } — N/A - (building next gen clino) — maybe physically record data
- LCC }
- Testing schedule
 - TBD — run test 3+ times for ≥ 10 minutes each
- resource allocation
 - use proto clino + XRP + laptop (to read data)
- Quality control
 - ~~research~~ research benchmark for Forces acting + verify functionality of testing equipment
- Communication → team access to docs + verbal updates

Expert Consultation

Jacob

Clino Source

Electrical

- Experts — Peter Perez (?), Mario Cruz (?), Lorenzo De Toro III (?)
 - other options = TBD (
- communication — email or call/conversation
- Doc for expert feedback — Docs, maybe google Forms
- Plan to incorporate suggestions — add unless hinder
- Follow up procedures — email back with added suggestions + results (?)