NPOI Nitrogen Distribution Midpoint Review

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Overview

- Background information
- Prototype design
- Staff meeting synopsis
- Recent progress
- Prototype testing
- Analysis
- Future planning
- Conclusion

Background Information

- Navy Precision Optical Interferometer
- Used to map stars
- Array telescope
 - 250m arms
 - Stations along arms utilize nitrogen
- Central nitrogen supply system needed

Prototype Description

- 100 ft. section of west arm
- Contains one of each:
 - Astrometric hut
 - Gate valves
 - Imaging station
- Coil to simulate entire arm
- Two reservoir tanks



Staff Meeting Recap

- Installed supply tank near astrometric hut
- Installed astrometric hut purging infrastructure
- All tee fittings soldered
- Installed regulators



Recent Progress (3/5/14)

- Main supply line installed
- Supply line components installed
- Astrometric hut finished
- Main supply line pressurized to 40PSI

Recent Progress/Laying the Line





Recent Progress/Plumbing Installation





Pressure Testing

- NPT plugs used in tee fittings
 - Astrometric hut
 - Gate valve station
- Valve installed at imaging station
- Set to line pressure of 40PSI
 - NPOI staff to monitor gauge reading
- Soap solution can be used to find leaks

Pressure Testing cont.





Numerical Modeling

- The MATLAB pressure drop code was completed using the following:
 - 85ft of supply line
 - 100ft coil with 1.5ft diameter
 - 4 tees in line flow
 - 3 tube to barb fittings
- Max equivalent length= 63.92m=210ft
- Max pressure drop= 0.1729PSI

Future Plans

- Plumb regulators and valves
- Install coils and tanks
- Pressurize and test all solder joints
- Secure tubing in cable tray
- Finish prototype by March 26, 2014



<thomasnet.com>

Gantt Chart

GANTT.	2014 Midnoint Review Midnoint Review																			
project		Week 4	1 Allook E	bi Site-Overview	Verals 7	Vérok 9	Villook 0	Verack 10	Villeek 44	Jacob 40	Week 42	Verali 4.4	Verali 45	Wook 16	Villook 17	Versk 49	Viter to 1	Mook 20	Wook 24	1.04-0
Name		1/19/14	1/26/14	2/2/14	2/9/14	2/16/14	2/23/14	3/2/14	3/9/14	3/16/14	3/23/14	3/30/14	4/8/14	4/13/14	4/20/14	4/27/14	5/4/14	5/11/14	5/18/14	5/25
 Client Update 									_								Cli	ent Update		
 Meet at NPOI Site-Overview) 🔶 I	vleet at NPC	01 Site-Over	view											_				
📍 🔍 Update Design			U	pdate Desig	n															
 Solidworks Drawing 			Solidwor	ks Drawing																
Drawings Reviewed by Client			Dra	wings Revie	wed by Clie	nt														
Project Proposal Update		1000	Pi	roject Propo	sal Update															
📍 🔍 Design Testing I		1000	-			Design 7	Festing I													
Parts obtained		1000			Parts obt	tained														
Hardware Review-Professor		1000				Hardwar	e Review-Pr	rofessor												
Assembly at NPOI Site		1000				_			Assembly at	NPOI Site										
 Solder tee-to-inlet fitting 		0000					So So	Ider tee-to-in	let fitting											
Solder tee in-line with coil		1000					So So	lder tee in-lir	ne with coil											
 Hose run into Astrometric Hut (AH) 								Hose run int	o Astrometric	Hut (AH)										
Nitrogen Tank w/regulator								Nitrogen Ta	nk w/regulate	or										
Regulator fixed as inline with 1/4" barb fiting		-						Regulator fix	ed as inline	with 1/4" b	arb fiting									
 Tee soldering in at gate valve (GV) 		-							Tee solderin	g in at gate	valve (GV)									
1/2" tubing installed in cable tray		-							1/2" tubing i	nstalled in a	cable tray									
 1/2" tube to 1/4" NPT soldered at Imaging Station (IS)								1/2" tube to	1/4" NPT so	dered at Im	aging Statio	n (IS)							
NPT plugs installed at AH and GV									NPT plugs in	stalled at A	H and GV									
Pressure lines set to 40PSI to check for leak									Pressure line	s set to 40F	SI to check	forleak								
Midpoint Review		1000						•	Midpoint Re	view										
P Future Installments		8								Future In	stallments									
 Obtain 1/2" polyvinyl 										Obtain 1	/2" polyvinyl									
Obain 1/2" NPT & Barb Fittings		1000								Obain 1/	2" NPT & Ba	arb Fittings								
Install Loop Clamps on tubing to cable trav		-								install Lo	oop Clamps (on tubina to	cable trav							
 Install coils 										Install co	oils	, i								
Plumb regulators for GV and IS										Plumbre	egulators for	GV and IS						-		
Set Pressure and run for testing										Set Pres	sure and run	for testina								
SPRING BREAK											SPRING	BREAK								
Hardware Review 2-Professor												Hardware	Review 2-P	rofessor					-	-
• Final Nitrogen Testing													Final Nitr	ogen Testin	a				-	-
Run Nitrogen in Final Design		100										E F	Run Nitroaer	n in Final De	sian					-
Update Report											-		Update R	eport				-		
Preparation of Poster-UGRADS								-				_			Prenaratio	on of Poster-	LIGRADS	-		
 Organize Drawings and Analysis 		1000												Organize	Drawings an	d Analysis				
Organize Display								1						Organize	Display					-
Walk-Through Presentations		-												- Sigenize	1 Walk Thro	unh Present	tations		_	
 UGRADS Presentations/Operation Maual Deadline 																UGRADS	Presentation	s/Operation	Maual Dez	adline

Conclusion

- NPOI is in need of a centralized nitrogen supply system.
- The prototype employs one of every pneumatic device on site on a section of the west arm.
- Most of the astrometric hut was complete at the time of the staff meeting.
- Astrometric hut and main supply line have been completed.
- Preliminary pressure testing has begun.
- The prototype is projected to be finished within three weeks.