

MSD Team P17453

Weekly Update

Week 5

2/16/17 - 2/23/17

Weekly Accomplishments:

- Carvey consulted with Rob in the machine shop and we decided to make our own brackets for the solenoid valves instead of using modified 8020 brackets(too small)
- Tested using SignalExpress to activate the solenoids on and off
 - Used 500 ms - 500 ms on-off cycle predicted in theory
- Learned that the studs used to hold together the valve manifold assembly are back-ordered to mid-March
 - Might buy from somewhere else to save time
- Some minor machining started
 - L-brackets & pinhole adjustments
- Discovered that the NPT thread callout was on the wrong side of the pressure collector
- Successful demonstration to our customer and guide using Signal Express to actuate the solenoid valves
- Figured out how to correctly use the pressure transducer
- Learned that our back pressure relief valve will be sufficient
- Preliminary pressure test in the reused pressure vessel from team P16452
 - No apparent leaks other than from where the incorrectly tapped collector plate NPT hole was loosely plug to do the test
- Uploaded some content onto our YouTube channel
- Updated Risk management to include possible problem if solenoids need to actuate for less than 233 ms (the delay present in the SignalExpress looping)

To do by next week:

- Complete machining for L-brackets, pinhole-dowel pin connections, and back pressure collector
- Get studs to hold together the main pressure vessel
- More in depth pressure holding test of main pressure vessel
 - Hold and maintain pressure for at least 30 seconds
- Mount solenoid valves onto 8020 frame
- If possible, start preliminary pressure cycle testing to fill and release air into the main pressure vessel

MSD Team P17453

Meeting Notes

2/21/17

Meeting Accomplishments:

- Carvey consulted with Rob in the machine shop and we decided to make our own brackets for the solenoid valves instead of using modified 8020 brackets(too small)
- Tested using SignalExpress to activate the solenoids on and off
 - Used 500 ms - 500 ms on-off cycle predicted in theory
- Tested putting pressure in back air tank
 - Discovered that pressure relief valve we bought won't hold air pressure after source stops incoming air to vessel
 - Need something that will hold at 40 PSI then pop at 41 PSI until 40 PSI again, etc.
- Tried figuring out how to use the pressure transducer and got it to take data alongside the solenoid valve operations
 - Needed to use external power supply for pressure transducer
- Learned that the studs used to hold together the valve manifold assembly are back-ordered to mid-March
 - Might buy from somewhere else to save time

MSD Team P17453

Meeting Notes

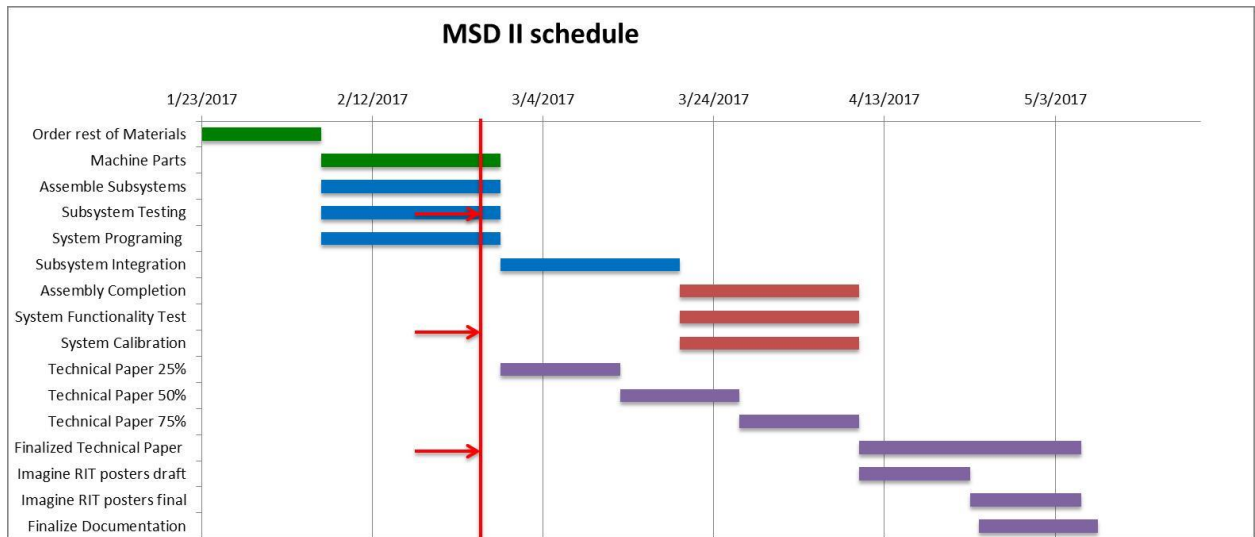
2/23/17

Meeting Accomplishments:

- Carvey continued work on L-brackets to hold the solenoid valves
- A few problems with our drawings were discovered
 - The pin holes were not called out deep enough on the valve seat block
 - The solution is to drill the holes in the valve housing deeper
 - Alex drilled and pressed in one pin so far
 - The NPT thread callout was on the wrong side of the pressure collector
 - The solution is to redrill the hole bigger and use a 1/2" - 3/8" barb adapter
- Successful demonstration to our customer and guide using Signal Express to actuate the solenoid valves
- Talked with Dr. Kolodziej about grounding issues with the pressure transducer
 - Discovered that both the power and signal negative terminals need to be grounded
- Tested activating a solenoid valve while connected to the shop air
- Talked with Dr. Kolodziej about the pressure relief valve not hold air at 40 psi without flow and he said it should be ok, that's similar to how the actual compressor works

Risk Management								
#	Category	Risk	Causes	Effects	Likelihood	Severity	Importance	Action
1	Technical	Disrupted vibration data from airflow	Direct airflow on poppet	Vibration data is useless	3	9	27	Insert diffusers inside the pressure vessel
2	Safety	High pressure vessel may rupture.	Walls too thin for supplied pressure	Potentially fatal hazard/ destroys pressure vessel	1	9	9	Perform analysis to ensure walls are thick enough. Implement a pressure release valve to avoid excessive pressures
3	Resource/ Technical	Unable to copy pressure curve	Not feasible with given parameters and constraints?	Compressor conditions not "perfectly" replicated	3	3	9	Perform analysis on vessel to calculate needed hole sizes for inlet/outlet. 1 Hz cycle instead of 5 Hz cycle may be used.
4	Technical	Valves are not air tight	Custom manifold incorrectly made	Innaccurate test data	1	9	9	Double check dimensions of manifold if custom manifold is required.
5	Resource	Shop air is inconsistent/not high enough pressure	Dependent on shop air system	Limits the accuracy of replicating the pressure curve	1	9	9	Test shop air to see what actual pressure is and note variability.
6	Resource	Team member drops out	Medical or personal reasons	Higher workload on others	1	9	9	Ensure good communication between team members
7	Resource	project doesn't get done on time	Unexpected setbacks, project or team-based	Unsatisfied customer	1	9	9	Stay on schedule to make sure the project can be completed.
8	Technical	Vibration sensors not reading useful information	Vibration transmitted through the system will have noise due to other moving parts	Innaccurate test data	3	3	9	Rubber feet to dampen vibrations. Vessels mounted horizontally, external moving parts mounted perpendicular to poppet valve direction
9	Technical	Parts machined/ordered do not fit together properly	Measurements are incorrect	Parts need to be remade or reordered.	1	9	9	Double check parts dimensions and make assembly models to ensure they will fit together
10	Technical	Both inlet and outlet valve required to be open for less than 233 ms, the delay inherent in the SignalExpress looping	Air pressure increases/decreases faster than expected	0 - 40 PSI pressure cycle will be much more difficult to create	1	3	3	Must duty cycle the solenoid valves in order to limit the flow of incoming/outgoing air
11	Technical	Solenoids/valves are not quick enough to achieve 5 Hz pressure cycle	Possibly unrealistic speeds	Can't copy pressure curve at 5 Hz	1	3	3	If 5 Hz pressure cycle is not achievable, a 1 Hz pressure cycle will be acceptable.
12	Technical	Valves too slow to copy pressure curve	Limitations of available valves	Unable to copy pressure at 5 Hz	1	3	3	Use multiple valves to achieve desired pressures
13	Technical	Can't use existing valve manifold	Doesn't meet design spec	Must find another manifold to hold the valves in place	1	3	3	Machine a custom manifold to use for our design
14	Resource	Project goes over budget	Unexpected costs	May need different design solution	1	3	3	Ensure solution design will be under budget.
15	Safety	Potential injury from machine shop use	Equipment in machine shop can be dangerous	Injured teammates	1	3	3	Be trained while using equipment or get someone who knows what they're doing to do machining.
16	Safety	Injury from high pressure air	Incorrect use of PPE	Injured teammates	1	3	3	Use proper safety precautions while using shop air.
17	Safety	Electric Shock	Exposure to unprotected electrical wires	Injured teammates and/or damaged equipment	1	3	3	Use caution when plugging in equipment, make sure wires are insulated.
18	Technical/ Safety	Pressure vessel gets hot	Air pressure cycle	Disassembly time increases	1	1	1	Implement cooling system(fan, coolant flow, etc.)
19	Resource	Time conflicts with other team/unable to work in room together	Another team is working in small compressor room	Won't be able to work in room at same time as other team	1	1	1	May need to reschedule meeting/working times
20	Environmental	Wasting parts	Incorrect manufacturing of parts/use of valves	Wasted material, very small environmental impact	1	1	1	Double check measurements, don't damage valves unnecessarily

Updated Risk Management: Revision E



Gantt Chart: Team progress through week 5.