HPRT MEETING MINUTES

Client Meeting & Staff Meeting

Tuesday, 31 October 2017
3:00pm to 4:00pm

Minutes recorded by: Myla Azofeifa

Meeting called by: Alex Rustaey

Attendees: Yi Tong Zhang, Jordan Loos, William McGinn, David Trevas, Dave Tournquist (Honeywell), Haley Flenner (Honeywell)

Table 1 - Record of Meeting

3:00pm	**Begin Meeting** ● Meeting started by Alex Rustaey ● Topics ○ What the team has been working on ■ Variable area nozzle ■ Turboexpander	EGR 323
3:05pm	**Updates** ● Focusing on the the following designs: turboexpander, variable area nozzle, and variable area nozzle with electronic actuation ● What sensors are being used? → looking into piezoelectric sensors, appx. $50/sensor	EGR 323
3:10pm	**Turboexpanders** ● Instead of pressure balance, uses magnetic drag ● Issue: How do we control magnetic drag? ○ Seems like an electrical engineering problem, not a mechanical engineering issue ● Use electronic speed control ● Another option is to used a pitch controlled turbine ○ Control the angle of the blades ○ Issue: difficult at such a small size ■ Tournquist commentary: lose efficiency at the blade tips, so they are usually coated to establish a blade clearance	EGR 323

	■ Blade clearance does not scale at all ■ However, losing efficiency when regulating pressure might not be the worse thing ● Follow up with turboexpanders → will be a good learning experience even if it does not pan out	
3:18pm	**Variable Area Nozzle** ● Explained to client using a visual ● Currently cylindrical, but would be easier to build if we made it square ● Do we have a patent lawyer?	EGR 323
3:30pm	**Electronic actuation** ● Explained using a visual ● Change the image cable into something more rigid so that we can push and pull on it ● Nozzle might be doable if you think of it as two pieces ● Could also use an aperture type closure to create variable area ● How do we actuate from outside of the flow? ○ Use magnet ○ Issue → still creates friction in the pipe	EGR 323
3:35pm	**Closing Thoughts** ● Prototype does not have to be at such a small scale ○ Create a proof of concept	EGR 323
3:35pm	**Begin staff meeting** ● Meeting started by David Trevas ● Minutes recorded by Myla Azofeifa ● Topics ○ Patents	EGR 323
3:35pm	**NAU Inventor/Patents** ● Beginning the process of applying for patent through NAU	EGR 323
3:45pm	**Turboexpander** ● Look into matchbox turbines (tiny, appx. the size of a match) ● Rotating seals	EGR 323
3:50pm	**Final Design Report** ● Client does not want us to have just one design ● Still move forward with the ideas that we have ● Go through designs rejected and explain why we rejected them	EGR 323

4:00pm	**Final Design Presentation** ● Emphasize that our client does not currently want us to be focusing on only one design	EGR 323

Table 2 - Action Items (Tasks Assigned)

Tasks	**Person Assigned**	**Due Date**	**Date Complete**
Look into NAU patents. Move forward with application process. (Invention disclosure)	Bill McGinn	11/07/2017	
Keep looking into turboexpanders, matchbox turbines. Making our own turbine (making the cast).	Alex Rustaey - Generator Myla Azofeifa - Turbine	11/07/2017	
Institutional excuses for Honeywell Facility visit.	David Trevas	11/07/2017	
Variable area nozzles.	Jordan Loos	11/07/2017	
Pressure sensors	Yi Tong Zhang	11/07/2017	
Reschedule next semester Honeywell meetings, due to class interferences.			
Complete shop safety training. Must be done on a weekday at 9:30am. Contact Kellan Rothfus for more information.	*Jordan Loos* *Bill McGinn* *Alex Rustaey* *Yi Tong Zhang*	*Spring 2018*	*Alex - 10/24/2017*
Complete Advanced Shop Training (following the completion of shop safety training). Available every other weekend beginning 9/9 & 9/10. Contact Kellan Rothfus for more information.	*Jordan Loos* *Bill McGinn* *Alex Rustaey* *Yi Tong Zhang*	*Spring 2018*	

Next formal meeting: Thursday, 2 November 2017, Engineering Bldg. (#69), Room 108 at 2:15 PM (staff meeting)