RASC-AL SPECIAL EDITION: MARS ICE CHALLENGE

2017 Verbatim Lessons Learned from Participants

- This challenge really showed me the **importance of planning projects out completely and documenting every step**. It also showed how important testing is.
- Always have a **pre-flight check of every system component** before you test. **Never underestimate a single testing condition eithe**r. Prepare for an even fight every time.
- Testing is the most important part of this competition and **more iterations of testing** allow for smoother operations.
- I would have tried to **manage time a little better and to have identified big problems earlier in the process**. Hindsight is always 20/20, but I know I personally as well as my team as a whole would have been much less down to the wire if we had simply addressed issues more quickly. Also, I learned **the value of asking meaningful questions**. It was crucial that I fully understood what I was asking as well as the person's response when trying to solve a problem.
- I would've made a **smaller coring drill** which would've lighten several components of the system and expedited the drilling process. Also, if I were to do this again, I would put **more emphasis on the testing of the system** in order to give ourselves more testing time prior to the competition.
- **Innumerable lessons about project management, team dynamics**, etc.
- I would have tried to **have a full working 3d model and simulations by the end of January** to begin building from. I would also spend the budget in a better manner, buying more expensive higher quality parts from the beginning. We were not used to handling such a large budget.
- Would rework certain design elements, **consult excavation expert during early phases of design**
- 1. Always test entire system before competition begins. 2. **Establish a clear chain of command during operations** to prevent confusion by the operator. 3. **Don't reinvent the wheel**; if someone makes a good drill incorporate it into your design instead of designing your own.
- We would definitely have **focused on developing our controls system first to make it more reliable and robust**. Additionally, the building process allowed us to identify which designs worked and which did not. We would obviously try now to skip to the final design and improve upon its operation. Finally, we would probably incorporate a different drill motor since we initially thought that we were supposed to create our own rather than incorporate pre-existing drills into a final design.
- **Smaller heating element, smaller drill** (the overburden was not nearly as hard as we believed it was going to be), then a **case wall to help prevent collapsing.**
- **Trencher needs a big redesign**. When Kris said scoops were no good in his presentation I thought "well let’s see how this goes" and I wasn't really surprised from the outcome. We needed **more torque** and i would prefer a smaller device, maybe even make it circular like some trencher devices in the industry
- Two things that I learned were that a smaller drill would have been sufficient as well as a smaller heater. Also a different system should be devised to measure the weight on bit.
- More testing. It helps to **test early to work out the bugs**.

- Several lessons learned:
  - **Change the auger drill diameter from 4" to 2".** This would significantly reduce the drilling motor torque required as well as the overall weight (~ 8 Kgs).
  - **Improve the X-Y motion guide-rod and carriage** for a smoother operation.
  - **Make the MW chamber smaller**, more compact.
  - Make most **parts from aluminum/space ready components** like the auger shroud.