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Competition has come and gone. M-Fly headed to Fort Worth, Texas, in early March to compete in the 2017 SAE Aero Design West competition, and the team had a very successful showing. Both the M-9 and the MX-2 flew several times and, more importantly, ended each flight with a landing. Regular Class and Advanced Class each placed higher than ever before, and overall this year has been the team’s most successful yet. This success is the product of our members’ hard work, and they have much to happy about. This edition contains overviews of the competition requirements and objectives, results for each aircraft, and brief interviews with several of our team members about their experiences on M-Fly.
Competition Overview: Regular

The objective of the Regular Class competition is to design an aircraft that can “generate revenue” by carrying as much payload as possible. This payload comes in the form of passengers, or tennis balls, stowed away in the wings of the plane and their luggage, or payload plates, carried in the fuselage. To be competitive, the plane should maximize its takeoff weight and hold as many passengers and their luggage as possible. It is also important to predict the amount of passengers and luggage we can fly with in this configuration, as empty seats are penalized as “lost revenue”.

The plane is constrained to a takeoff distance of 200 feet, and the propulsion system is limited to a 1000 watt motor. There are no dimension constraints. Additionally, the plane cannot use any fiber-reinforced plastics, such as carbon fiber, in its construction. In a competition flight round, the plane must take off, complete one lap around the flying field, and land safely back on the runway.
The objective of the Advanced Class competition is to design an aircraft capable of carrying payload and accurately dropping “humanitarian aid packages” on a target. The aircraft must feature a 0.46 cubic inch displacement glow engine, a data acquisition system, and a first person view (FPV) camera system. There are no dimension or material constraints, meaning it can be made of composites, such as carbon fiber and fiberglass, in addition to traditional R/C aircraft materials. Prior to the competition, the team must provide a video of the plane successfully flying and completing the mission. Points are scored dependent on how much payload is carried as well as the accuracy of the drop.
Regular Class had its best competition performance yet. The team did well in the design report (3rd), oral presentation (5th), and flight rounds, leading to an overall 6th place finish out of 34 teams. They set team competition records for number of successful flights, total aircraft weight, total payload weight, and overall place. Additionally, the M-9 was the only aircraft at competition that stored passengers in the wing, making it one of the more unique entries.

Flight rounds were not without incident, but overall they went well. Here is what happened during each round:

- Round 1: 32 passengers, 16 lbs. Smooth takeoff and landing. However, on landing the plane rolled off into the grass, where the nose gear was caught and ripped out. As a result we were disqualified.

- Round 2: 32 passengers, 16 lbs. Successful takeoff and landing. Damage to the nose gear was sustained but it remained attached to the aircraft, so the flight counted.

- Round 3: Missed the flight round due to repairs to the nose gear.

- Round 4: 38 passengers, 19 lbs. Successful takeoff and landing. The nose gear was again damaged but stayed on.

- Round 5: 42 passengers, 21 lbs (full aircraft). Successful takeoff and landing. The M-9 was cruising at 100+ ft in the air.

- Round 6: 42 passengers, 21 lbs. We determined that we would not lose our 7th place position, but had a remote shot at catching 6th place. However, the receiver battery ran out of charge while we were on the flight line, and we did not fly this round.
The MX-2 placed 3rd in the design report, 4th in presentation, 3rd in flight score, and 3rd in the Humanitarian On Target (HOT) award, leading to an overall 3rd place finish out of 17 teams! This podium finish came with some prize money, and the team will be investing it in future design cycles.

After missing round one due to some initial engine troubles, the team fixed the issue and flew at 5 of the 6 rounds at competition.

- Round 2: The team dropped the payload almost immediately after taking off due to high winds threatening stall. Since the judges deemed this drop to be “uncompetitive”, points were vacated from this round.

- Rounds 3 and 4: We were able to fly to the target zone and drop our payload, but it did not accurately hit the target. The flights were still successful, and the team scored points on static payload alone.

- Round 5: The payload landed within 1 foot of the bull’s eye and scored a 0.75 multiplier, nearly tripling the previous rounds’ score!

- Round 6: Similar to rounds 3 and 4, since the team dropped the payload but missed the target, but had a successful flight.

The MX-2 flew and handled so well that our pilot, Dave, and the rest of the team thought it would be fun to try out some aerobatics after competition. We had a spare plane in the trailer to bring home, so Dave took the MX-2 on a 5 minute aerobatic flight. Although it’s high lateral stability prevented Shamu from flying inverted, it performed several loops, stalls, and dives, and landed in one piece.
Performance Results

Advanced Class:
- 3rd Place in Written Competition
- 4th Place in Oral Competition
- 3rd Place HOT (Humanitarian On Target) Award
- 3rd Place Overall

Regular Class:
- 3rd Place in Written Competition
- 5th Place in Oral Competition
- 6th Place Overall
Member Profiles

Before the SAE competition in early March, members were given the opportunity to reflect on their experiences on M-Fly while building the second iterations of our aircraft. Below are some brief interviews conducted with members about what sub-team they were a part of, why they joined the team, their favorite thing about M-Fly, and the type of community M-Fly has created for them.

**Matt Waldman:** Matt is the Advanced Class structures lead and also spends a lot of time contributing to construction. He was looking for something that he would enjoy spending his time with and knew that planes were something he was passionate about. In addition, he noticed that M-Fly helps to develop important skills that are useful as an engineer. His favorite part about M-Fly is watching something that he helped design come to fruition, and he enjoys the community on the team and each member’s dedication.

**Kelsey Hite:** Kelsey is a member of the propulsion and controls and structures sub-teams and often helps at build. She joined M-Fly because she liked mechanical processes as well as learning about aerospace engineering. Kelsey’s favorite thing about M-Fly is that it lets her do hands-on work outside of class as well as work on a long term project.
Aaron Lu: Aaron is the Regular Class chief engineer, meaning he is in charge of the Regular Class aircraft and ensuring it performs well. He originally joined M-Fly because he thought it would be a great opportunity to be a part of a cool and interesting project. His favorite part of M-Fly is the learning experience that it offers; he says that you can come in without any prior knowledge and leave with a large set of experience. Aaron’s favorite part about the community that M-Fly fosters is that it promotes a culture of mentorship by teaching younger members skills and making sure they are involved in the design and build of the aircraft.

Nick Applegate: Nick is a member of the aerodynamics, business, and P&C sub-teams as well as an active member of construction. He joined because he built R/C aircraft in high school and saw the M-4 on the wall of the Wilson Center on a tour. His favorite part about M-Fly is really how you can join the team with no experience or knowledge and leave an experienced and wholesome engineer with plenty of friends and good memories. Everyone is always trying to help each other learn and do better, and the leads are incredibly nice and understanding. The team also is a collaborative learning experience for new members which creates a good environment.
Nicole Gallant: Nicole Gallant serves as the construction manager for both aircraft. She joined M-Fly because of the great comradery of the team and because the projects M-Fly works on are very interesting and engaging. Her favorite part of M-Fly is build sessions because you can do hands-on work and get to know plenty of people. The community at M-Fly is great because of how involved members are and how supportive they are outside of M-Fly with things like work and studying.