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Rocket Project at UCLA is a student organization that designs, manufactures, tests, and launches two rockets every academic year. The mission statement of the club is to educate undergraduate engineers at UCLA in the field of aerospace engineering, providing opportunities for students of all majors and backgrounds to be exposed to launch vehicle structural design, hybrid and liquid bipropellant chemical propulsion systems, and cutting-edge avionics and ground electronics systems. New students work on Project *Prometheus*, a hybrid propelled rocket (HTPB fuel grain and liquid N2O oxidizer), while returning members contribute to the flagship *Ares* rocket, a liquid bipropellant system (Ethanol / LOx system).

The *Ares* liquid bipropellant system is pressure-fed, using gaseous Helium to pressurize and propel liquid Oxygen and Ethanol through a feed system formed of a multitude of valves as well as dozens of feet of tubing. In order to keep the pressurant, fuel, and oxidizer lines compact and within the seven inch diameter of the rocket structure, the propulsion team uses many flared fittings and bends tubing in-house to redirect and orient our system efficiently while minimizing fluid pressure drop across lines and components. However, this results in a final product with many unions that is prone to debilitating leak rates, and due to the complexity and compactness of the system as a whole, it can be difficult to access and address them as they appear.

As a result, the propulsion team at UCLA Rocket Project has spent a fair amount of development time looking into the best method of reducing leaks on their flight system. While NPT-style fittings are easier to address through the use of anti-leak PTFE tape on the threads, 37-degree flared fittings have posed a more difficult challenge. Additional thread lubrication and following proper tightening specifications have reduced the number of leaks seen, but the team routinely ran into cases where even when proper procedure and techniques were followed, the use case of either high-pressure Helium gas or cryogenic liquid Oxygen would result in leaks throughout the system. The team was at a loss, as their in-house solutions were unable to deliver a leak-free system.

Luckily, one of the more experienced propulsion engineers at Rocket Project at UCLA had the opportunity to intern at a notable aerospace company in the past, where he had been exposed to new methods of addressing and preventing leaks in flight plumbing hardware. The best of these new solutions was using SECO7 37 degree flared seals from Seco Seals, which produces aerospace-grade conical seals for tube fitting adaptations. The seals are easy to apply- simply placing them on the male flare of the fitting, using a sealing lubricant, and torquing the fitting to the proper specification results in a leak-free adaption. Ever since the first application of Seco Seals onto the liquid propulsion test system, the team saw a notable decrease in fluid leaks and hasn't looked back since.

The team at Seco Seals has been an amazing supporter of Rocket Project at UCLA, sponsoring our system development by supplying us with SECO7 seals for use in both our test and flight propulsion systems which has directly correlated to a decrease in leaks at fitting adaptions. Between personal experience using Seco Seals products and the fact that they are the industry standard for reducing leaks in aerospace propulsion systems, the team at Rocket Project at UCLA will proudly continue to use SECO7 seals to produce the highest quality fluid assemblies possible.

Recently, the liquid propulsion team conducted its first static fire test of the 2022-23 academic year just north of Mojave, CA. Thanks to Seco Seals, the team was able to combat leaks effectively both prior to and during the test campaign. The testing concluded with the firing of this year's iteration of the heritage UCLA DC-650 injector, with a thin-walled combustion chamber and student-machined graphite nozzle. Burn time was just over 12 seconds, with a recorded thrust of 600 lbf. With more testing to come, as well as the development of the flight propulsion system in the coming months, Rocket Project at UCLA is thrilled to continue to use Seco Seals products to ensure top quality and performance on its liquid bipropellant propulsion systems!