Universally adjustable spacecraft thruster mount

Attitude control thrusters on our SS/L spacecraft must be optimally pointed for each spacecraft depending on its center of gravity, geometry, and layout constraints. Currently, we predict early in a spacecraft program where the CG is going to be, before anything is actually built. We determine from that the insert locations for thruster mounting to optimally point our thrusters, and then build the specific uniquely configured brackets to mount them. When the real CG is finally known we generally live with the inevitable offset, incurring some fuel budget penalty. We would like to avoid that penalty and allow more design flexibility by making the thruster mounting configuration adjustable.

The clinic project would devise an approach that standardizes the spacecraft attachment points by designing a mounting bracket that is adjustable both in tilt and clocking. This also involves making propellant line service loop provisions to avoid overstressing the lines and their weld joints as these adjustments are made. We are currently doing something like this at SS/L on a fast track for a new thruster configuration that we are just now inserting into our product line. We would like the clinic project to address this for our heritage thruster design, which we expect to continue to use for many spacecraft as it is less expensive. The clinic project can benefit from the work with the new thruster, but we would hope it could devise some creative approaches for the heritage thruster that our fast-track approach for the new thruster does not have time for.

The project will involve designing a mounting system with positively lockable adjustment features, analyzing and measuring the structural and dynamic performance, considering alternative propellant line stress relief configurations and measuring their effectiveness (with strain gauges etc), and recommend techniques and materials for cost-effectively building these mounting brackets in quantity given that they will have become standardized and no longer individually configured.