

Professional Portfolio – Ryan Stueber

Note: Some of the following projects were developed during my time at Quest Diagnostics as part of an internal R&D initiative to improve lab operations using 3D printing. These examples demonstrate my ability to identify inefficiencies and design practical, effective solutions in real-world lab environments.

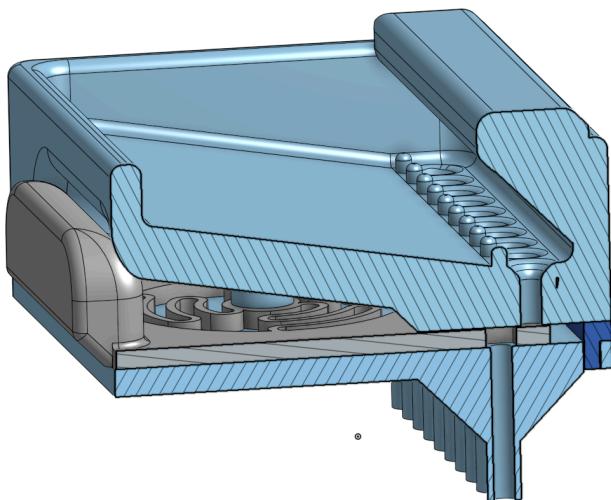
Project: Angled MagBead Rack for 1.5mL Eppendorf Tube

- **Company:** Quest Diagnostics
- **My Role:** Lead Designer and Manufacturer (R&D Mass Spec)
- **Problem:** Current Mag-Bead racks align magnets parallel to the tube upper half; however, the area in which Mag-bead-bound antibodies accumulate is actually along the cone-shaped bottom portion, which is approximately 10°. Additionally, the magnets used are weak, so the tube is angled 10° away from an already weak magnet, resulting in slow magbead separation and a wider bunching of mag beads. This then can result in these magbead-bound antibodies being either lost during washes or being carried down towards later steps, causing contamination.
- **Solution:** Designed a 3D-printed Mag-Bead Rack with the sample tubes angled at 10°, also utilizing Neodymium magnets.
- **Impact:**
 - 50% faster Mag-bead separation
 - 15% Tighter Mag-bead grouping
 - ~20x lower cost



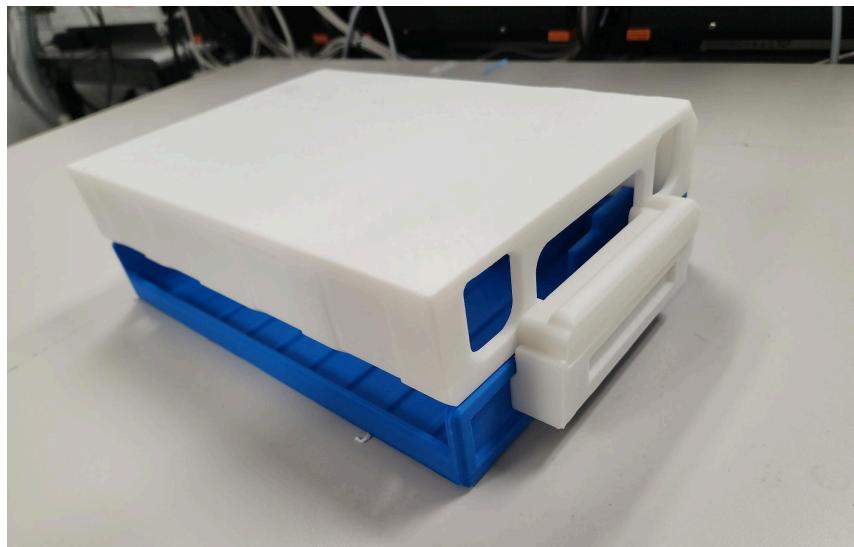
Project: Ball Bearing Loader - Kidney Stone Disolver

- **Company:** Quest Diagnostics
- **My Role:** Lead Designer and Manufacturer (R&D Mass Spec)
- **Problem:** Assay required 2 ball bearings loaded into a set of 60 tubes (12x5 rack), and were loaded by hand. The process was slow, tedious, and strained hands loading ~2.5mm ball bearings into tubes with 5 mm opening.
- **Solution:** Created a tool allowing the user to load a whole row of tubes, 2 ball bearings each, by depressing and releasing a spring-loaded button. Balls may be poured directly into the upper reservoir.
- **Impact:**
 - 80% reduction in ergonomic strain
 - Increased the accuracy of ball loading
 - Reduced a 10-minute task down to 10 seconds.



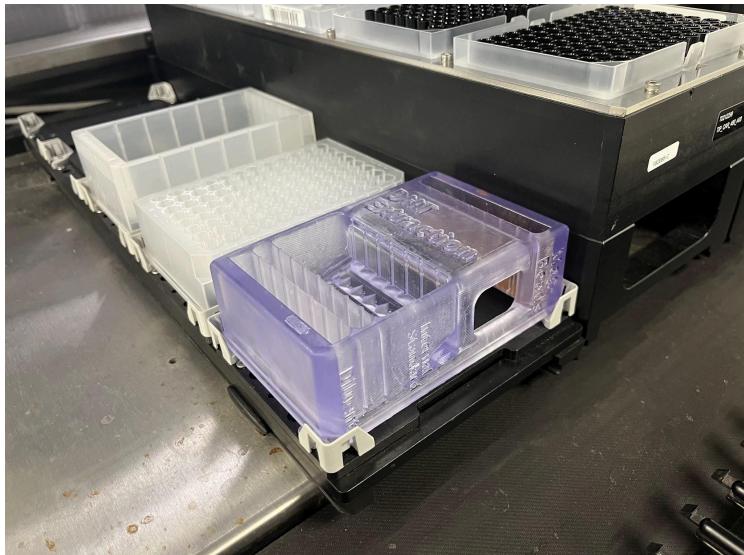
Project: Sample Manual Inversion Mixing Rack

- **Company:** Quest Diagnostics
- **My Role:** Lead Designer and Manufacturer (R&D Mass Spec)
- **Problem:** Lab techs used cardboard cutouts to hold down 12 racks of 10 samples, leading to spills, contamination, and ergonomic strain.
- **Solution:** Designed a 3D-printed reagent rack with stackable units, a secure lid, and ergonomic handles, to allow easy inversion and handling.
- **Impact:**
 - Reduced spills chance by 85%
 - Reduced Method time by 20%
 - Reduced ergonomic strain by 50%



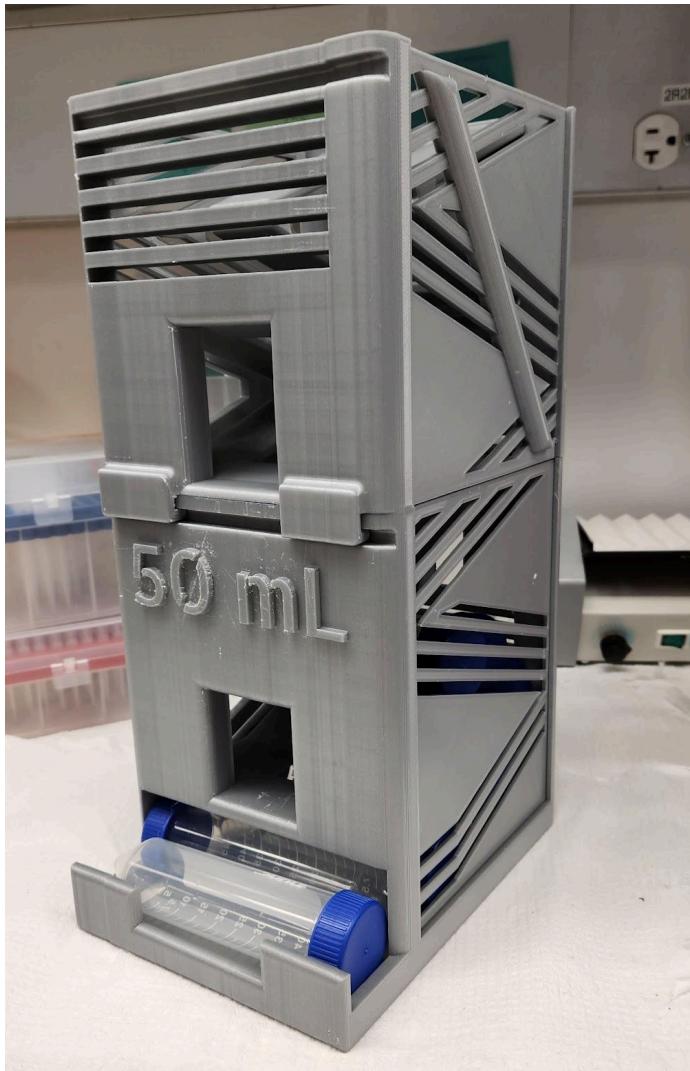
Project: Custom Reagent Reservoir - Steroid Assay, On Liquid Handler

- **Company:** Quest Diagnostics
- **My Role:** Lead Designer and Manufacturer (R&D Mass Spec)
- **Problem:** A Typical 12x25mL reagent reservoir was not sufficient for the assay on the Liquid Handler. It required an internal standard portion holding 50mL, a section for plasma diluent, and one section for suspended Mag-Beads. At the same time, space was needed between each to ensure no cross-contamination.
- **Solution:** Created a modified version of the 12x25mL reagent reservoir, 3 sized to hold 25 mL, one for diluent, Mag beads, and one extra for spacing. Then one reservoir holding up to 65mL. This 65mL reservoir has an angled bottom, 33 degrees, so that when volume is used, it consolidates to a single row, which allows the liquid handler to aliquot from a single position. Utilized a validated biocompatible resin from Formlabs, using the Form 4B SLA printer.
- **Impact:**
 - Simplified liquid handler steps for liquid aliquot
 - Reduced cross-contamination.
 - Engraved labels allowed for improved user experience and avoided contamination



Project: 50 mL Storage

- **Company:** Quest Diagnostics
- **My Role:** Lead Designer and Manufacturer (R&D Mass Spec)
- **Problem:** Current 50mL tube storage was a large, wide tub or in the original packaged bag. This wasted a lot of space on the lab bench.
- **Solution:** Created a narrower, vertically stacked storage system that allows easy access to individual 50 mL tubes. The size holds one full package of 50 mL tubes.
- **Impact:**
 - 30% reduced footprint from original storage bag
 - Reduced reaching strain for staff



Project: 2 mL Aliquot Measuring Rack With Cap Depressor

- **Company:** Quest Diagnostics
- **My Role:** Lead Designer and Manufacturer (R&D Mass Spec)
- **Problem:** The Original rack used to measure 2 mL in these specific sample tubes only held 8 tubes with a solid plastic upper portion that made it difficult to see the meniscus of the added liquid, and needed a 30-tube rack. Lab techs also had to depress caps onto tubes individually, which caused high ergonomic strain.
- **Solution:** Created a 30-slot, numbered, labeled tube rack with cutouts for each tube slot, allowing better and quicker liquid level visibility. Also made a depression tool that would allow for the sealing of 16 tubes at once instead of individual sealing.
- **Impact:**
 - Improved accuracy of liquid aliquot
 - Reduced ergonomic strain, sealing tubes by 40%.
 - Reduced assay set-up time by 20%

