

Case Study: Housing and Frame for Benchtop Biomolecular Analyzer

Client: Life Science Equipment Supplier

Client Problem: The development of a new biomolecular analysis process was to be commercialized. The laser based analysis engine required a compact, benchtop system design for use in life science laboratories. The benchtop unit was to provide a simple user experience for loading a biologic sample with touch screen processing and data collection. A solid base and frame was necessary for mounting the sensitive optical analysis engine and a stylish housing was necessary for market placement.

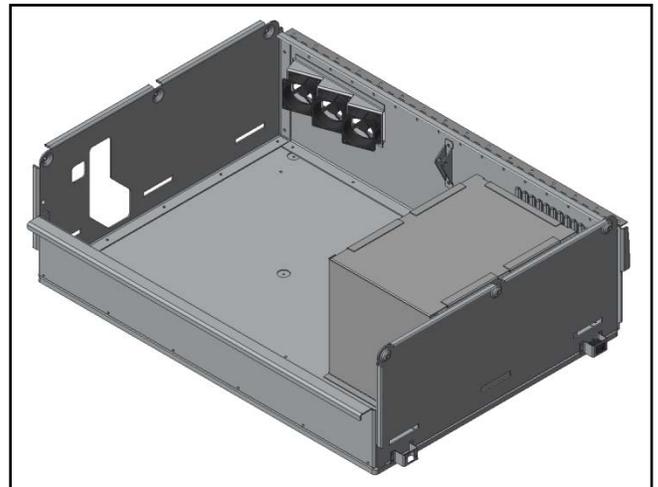
GEOMETRIXDESIGN Solution: Define a rigid base and frame structure for mounting the sensitive optical analysis engine and system components. Use polyurethane RIM (Reaction Injection Molding) housing components mounted to the frame with lift up top panel for internal system access. Design a simple user interface for loading and processing biologic samples.

Design Details: The optical based analysis engine design was provided from the supplier with requirements on size, power, and cooling and the desired footprint and layout of the benchtop system. The design of the frame and housing were to correspond to these inputs.

A large base plate was used to provide inertial stability for mounting the optical analysis engine. The base plate defined the layout and mounting of a structural frame and system support components, such as card cage and power supplies.

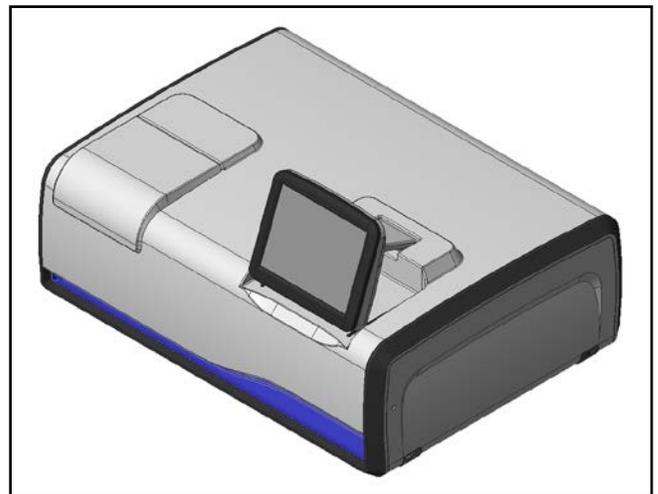
The structural frame was designed from sheet metal to provide features for internal mounting of the housing components. As access was required inside the system, a front lift up housing design was used. The frame was designed with fixed sides and back panel and a half height front panel for

open access to the internal systems. Screw fasteners were used to secure the sheet metal panels together and to the base plate. The frame also supports the cooling fans, power and interface connectors, and power switch.



Base plate and sheet metal structural frame with card cage and cooling fans

The housing components consisted of two side panels, a single unit top and front panel, and lower front light panel with trim. A two piece LCD monitor cover, monitor support cover, and sample loading door completed



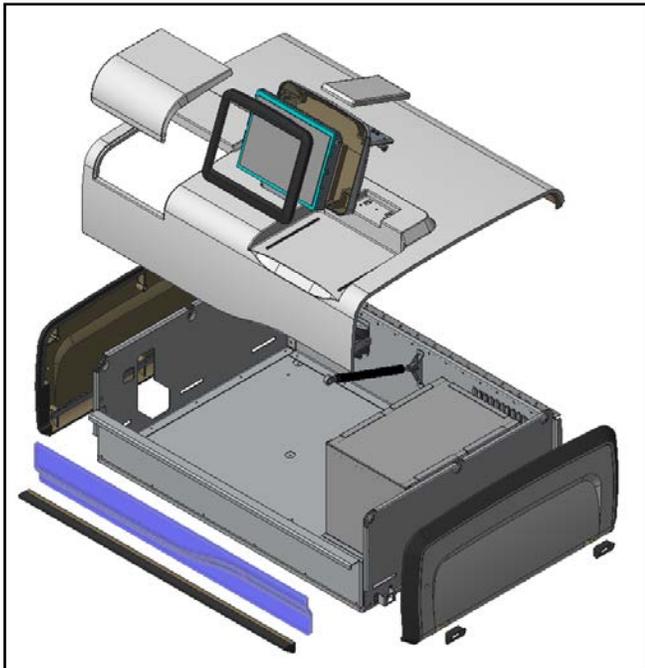
Model of Benchtop Biomolecular Analyzer showing sample loading cover and fold-down LCD monitor

the housing components.

The side panels, top panel, lower front trim and LCD monitor covers were designed for the RIM process and molded in a two-part rigid polyurethane. The lower light panel was pressure formed from an translucent acrylic and the sample loading door and monitor support cover were pressure formed in ABS.

The side covers utilized a lower sheet metal bracket with tabs for insertion into slots in the side frame. Upper screws secured the side covers to the frame, resulting in all hidden fastening. The lower front trim was fastened internally to the front frame with screws which secured the light panel.

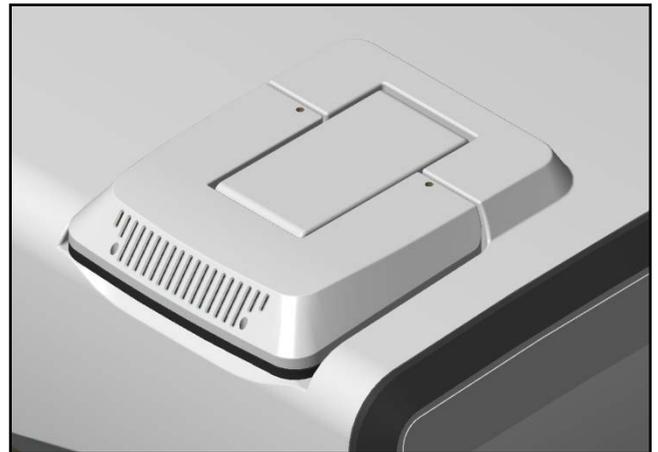
The top panel was connected to the back frame with a piano hinge to allow raising for internal system access. A gas spring was mounted in the center between the back frame and top panel to support the cover when open. Two keyed quarter-turn latches through the side panels allowed opening of the top panel.



Exploded assembly model showing the separate housing components and attachment to the frame.

Polyurethane RIM parts require painting to obtain a high quality finish. The side panels were painted in two colors of the body and dark trim. The top panel and monitor covers were painted in a single color. The pressure formed parts were made from colored resin.

The LCD monitor was designed to fold flat and integrate into the housing--useful for long data collection analyses or for safe storage and transport. A rear support bracket with top and bottom hinges connects the monitor to the housing. Lifting and tipping the monitor face down places it in flat configuration.



Close up view of monitor in integrated flat configuration



Photo of Benchtop Biomolecular Analyzer

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