












## Proteomics Instrument

# MPR Develops First-of-its-Kind Proteomics Device

### Practice Areas

-  Medical Devices
-  Diagnostics
-  Laboratory Instruments
-  Analytical Instruments
-  Biotechnology
-  Pharmaceuticals

### Product Types

-  Durables
-  Disposables
-  Packaging

### Service Areas

-  Research and Development
-  Voice of the Customer
-  Conceptualization
-  Proof-of-Concept
-  Detailed Engineering
-  Industrial Design
-  Design for Manufacturing
-  Supply Chain
-  Regulatory
-  Intellectual Property
-  Scale-Up
-  Fundraising
-  Device Certification

### CHALLENGE

A life sciences company sought to leverage expertise in imaging mass spectrometry (IMS) to enable pharmaceutical and biotech customers to gain new, important insights into disease progression, drug treatment and metabolic response. The company's goal was to rapidly transfer a conceptualized proteomics laboratory device into a commercially viable bench-top instrument, capable of simultaneously and independently processing 96 mechanically and electrically isolated samples contained within disposable sample cartridges.

### SOLUTION

Using its distinctive product development process, MPR's multi-disciplinary team first identified and developed requirements for the instrument and disposable cartridges, based on the client's proof of concept.

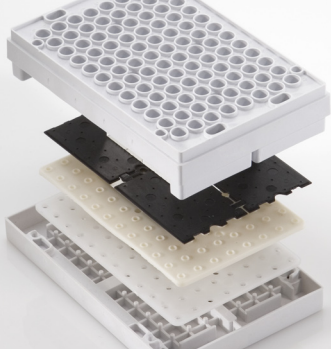
The project team then developed a conceptual design for testing and evaluation of both the device and the disposable cartridges. Design and production of the cartridges were particularly critical to the success of this project. Novel plastic technology was applied, enabling production of cartridges with 200 independent seals, compatible with various hydro-gels and chemical buffers, and a plastic layer with tightly controlled conductivity. MPR then constructed 12 identical prototype instruments and 50 cartridges for beta testing.

### RESULTS

Despite numerous design challenges and a resulting system with extensive complexity, the new device met and exceeded the design and performance parameters. The device is equipped with custom-designed, Ethernet-based software and a graphical user interface that allows highly flexible, real-time operator interaction with the 96 separate channels of the instrument. The product development process, from initial proof of concept to operational prototype production and evaluation, was completed in just under one year.

### TIMELINE 11 Months





## PDI Disposable

# MPR Designs Disposable Microplate for Novel Protein Separation Technique

### Practice Areas



Medical Devices



Diagnostics



Laboratory Instruments



Analytical Instruments



Biotechnology



Pharmaceuticals

### Product Types



Durables



Disposables



Packaging

### Service Areas



Research and Development



Voice of the Customer



Conceptualization



Proof-of-Concept



Detailed Engineering



Industrial Design



Design for Manufacturing



Supply Chain



Regulatory



Intellectual Property



Scale-Up



Fundraising



Device Certification

### CHALLENGE

A venture-backed proteomics company had licensed a novel technology for a protein separation technique from Oak Ridge National Laboratory. The separation process involved electrophoretic separation with ionic capture in a polymer matrix. Once captured, samples can be analyzed by Matrix-Assisted Laser Desorption Ionization Mass Spectrometry (MALDI MS). The client desired to implement this technology in a 96-well microplate format to support high throughput screening processes. The critical challenge was to design a disposable unit meeting the requirements of the separation process, while also providing 96 separate, independent channels in a standard microplate footprint.

### SOLUTION

To implement the technique, a “sandwich” of reagents, gels, and the capture matrix was required with fluid sealing and means to apply a 300 volt potential for the electrophoresis process. MPR deconstructed the problem into functional elements – sample loading, gel electrophoresis, capture, and recovery – then designed solutions for each element. Each component required careful consideration of material properties, mechanical features, protein interaction, and cost. Key technical requirements drove the need for polymer material properties that had never been achieved before but that were satisfied by rigorous engineering and close cooperation with leading polymer suppliers. The need for isolation of each of the 96 individual channels from each other, including both electrical and fluid isolation, required meticulous care. To successfully meet these requirements with the sandwiched design, MPR’s solution had to include nearly 500 perfect seals.

### RESULTS

MPR developed the design of the product and its manufacturing process, established the supply chain, and produced 1,000 units in 10 months. MPR’s solution resulted in new intellectual property for the client and patents were awarded based on MPR’s work. The product is now in commercial production.

### TIMELINE 10 Months

