

Headmounted Device Enables Earlier Detection of Age-Related Macular Degeneration

MacuLogix Collaboration Case Study

Summary

When MacuLogix® set out to build their third-generation dark adaptation device to help eye care professionals detect and monitor age-related macular degeneration, they needed a trusted team of professionals to collaborate with before moving forward. MacuLogix chose PTA Plastics as their [injection molding](#) solutions provider and [MPR Associates](#) as their product development partner – this successful collaboration resulted in the introduction of the revolutionary [AdaptDx Pro®](#) in record time. This device garnered both MacuLogix and MPR the prestigious [Platinum A' Design Award](#), the world's largest design competition.



Project Highlights

- Close Partnership
- Successful Collaboration
- Compressed Timelines
- 30 Discrete Injection Molded Components
- Highly Technical Part Designs
- Complex Assemblies
- Design for Manufacturability and Assemblies (DFMA)
- Tight Tolerances
- Lens Molding
- Over-Molding
- Heat Stake Assembly
- Post Molding Secondary Machining
- Texture
- Painting
- Pad Printing
- Assembly
- Full ISO 13485:2016 Validation

Advanced **Technology** for Earlier Detection

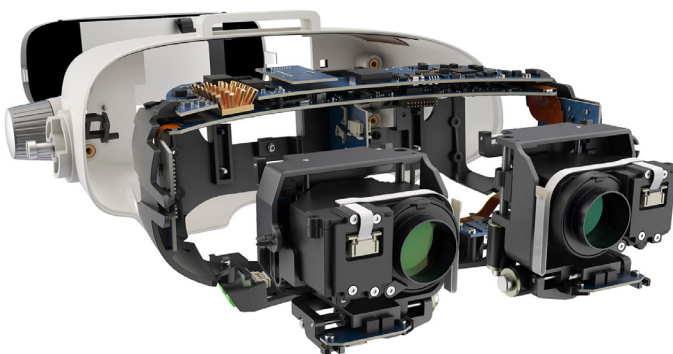
According to a [2020 study](#), approximately 11 million people in the United States are affected by age-related macular degeneration every year. Current projections predict that the number will double by the year 2050. Early detection and treatment of age-related macular degeneration is critical, and with the automated dark adaptation technology developed by MacuLogix, age-related macular degeneration can be detected at least three years earlier than any other technology on the market.

PTA Steps Up to the Design Challenge

There were numerous technical challenges to the project. Work on the AdaptDx Pro for MPR Associates included several critical engineering activities, including:

1. Industrial design of the eye cups for universal one-size-fits-all use and ergonomic design of the head strap and handheld controller
2. Optical design optimization with rapid prototyping of optical assemblies for light testing to characterize performance
3. Circuit board design for 20 PCB/Flex circuits
4. Mechanical design for approximately 30 injection molded parts

The design had to be lightweight, aesthetically pleasing, comfortable, and provide precision required for optical component assemblies.



11 MILLION PEOPLE

in the United States are affected by age-related macular degeneration every year



3 YEAR

EARLIER DETECTION

With MacuLogix technology, doctors can identify macular degeneration significantly sooner

~30

**INJECTION
MOLDED PARTS**

Crafted by PTA Plastics present in the MacuLogix AdaptDx Pro



PTA Steps Up to the Design Challenge

PTA Plastics worked closely with the engineers at MacuLogix and MPR providing detailed design for manufacturing feedback, design for assembly feedback along with Moldflow® filling, and warp analysis on all 30 discrete injection molded components. PTA also provided significant materials support identifying potential resins for the application that would meet biocompatibility requirements.

One of the more challenging [assemblies](#) was the top overmolded assembly for the controller. This assembly comprises of a rigid top housing, rigid center button and rigid middle ring button that get connected by a single over-molded membrane. PTA provided significant design assistance on this assembly as the design of the membrane, durometer of the membrane material, membrane thickness and adhesion of the over-molded assembly were all critical to success.

The eight injection molded components comprising the optics module required complex geometries and extremely tight tolerances. PTA worked in detail with MacuLogix and MPR on these designs to optimize the designs for injection molding so the critical tolerances could be achieved and in some cases the need for post molding secondary machining operations was eliminated.

Other challenges we faced include the front lens that required lens molding and then post molding painting, pad printing, and the head strap assembly which required a complex heat staking assembly with multiple rigid components and a flexible fabric strap.



“ MPR appreciated the willingness of PTA to take on this ambitious project and their collaboration with the MPR / MacuLogix team. PTA provided insights into part geometries to optimize moldability, material selection to meet the needs of medical device biocompatibility and other safety requirements. ”

Craig Mauch, Director Product Design, MPR Associates

Delivering Award-Winning Results

With close collaboration amongst everyone involved, PTA managed to complete production tooling in a record 12 weeks and provided fully textured, painted and pad printed production units for all 30 injection molded components, as well as with a full ISO 13485:2016 medical [validation](#).

As a result of all their hard work, [MPR](#) and MacuLogix were recognized with the Platinum A'Design Award, the world's largest design competition established to create awareness of design practices and principles, for their work on the AdaptDx Pro. This device builds upon its predecessor the AdaptDx to enable eye care professionals to effectively diagnose and monitor patients with age-related macular degeneration by measuring their dark adaptation speed.



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