

MS Makes Ultra-Narrow Bezels A Reality



CHIMEI
a step up

**KEY CLIENT / INDUSTRY /
APPLICATION INFO**

Leading TV Brand

OPPORTUNITY

- Create world's first ultra-narrow bezel TVs
- Save costs and space within TV sets by finding an alternative to PMMA

CHALLENGES

- High water absorption of standard PMMA demands a minimum width in screen bezel
- Finding the right polymer that balances high optical properties and low water absorption

SOLUTION

CHIMEI developed a new MS resin and light guide plate that balance the high optical properties of PMMA and the low water absorption of PS

RESULTS

By switching from PMMA to MS, our customer could cut TV bezel widths by two-thirds

Balancing Optical Properties And Water Absorption To Take TV Tech Into The Future

A leading TV-maker wanted to achieve a world-first: ultra-narrow TV bezels. However, the mission had hit a roadblock: the mura effect. A key material within a TV screen's light guide plate, polymethyl methacrylate (PMMA) expands when it absorbs water vapor. If the TV bezel is too thin, there is no room for that expansion and the PMMA bends against the side casing. This creates the mura effect, blurring the screen.

The obvious solution was to replace the PMMA, but there was no alternative readily available at that time. Therefore, the leading TV brand tasked us at CHIMEI, their biggest supplier, with finding a suitable alternative.

MS: The Best Of PMMA And PS

We quickly rejected polystyrene (PS) as an alternative due to its low optical properties, despite its low water absorption. Instead, we decided to see what we could achieve with MS, a transparent copolymerization of methyl methacrylate (MMA, also used in PMMA) and styrene monomer (SM, also used in PS). In short, we wanted to find a middle ground between the optical properties of PMMA and the low water absorption of PS.

Over the next year, we experimented with different ratios of MMA and SM, made equipment modifications, and optimized our process conditions. After multiple rounds of sample testing conducted directly with our customer, we created a new grade of MS resin and a new MS light guide plate (MS LGP) that could deliver the performance required: MS PM-500G and MS PM-500X.

Creating A World First

With CHIMEI's optical MS grade, the leading TV-maker could trim its bezel width by two-thirds, to produce the world's first ultra-narrow bezel TVs. Soon, other leading LCD TV and LCD panel-makers from Mainland China, Japan, and Taiwan also sought out our industry-leading MS and MS-based light guide plates, to create next-generation TV technologies.

“ *If customers change from PMMA to MS, they can save two-thirds of the space at the edge of the screen. Then it's easy to design for ultra-narrow bezels.* ”

Yu-Ching Yang,
Project Manager at CHIMEI



ACRYSTEX MS PM-500G & MS PM-500X

Low water absorption polymer

Water Absorbency in PMMA vs MS

PMMA is a key material inside most TV screens' light guide plates, but has relatively high water absorbency at 0.45%. PMMA expands when it absorbs water vapor, meaning the TV screen will become blurry if the PMMA hits and bends against the TV's side casing. CHIMEI's optical MS has much lower water absorbency at 0.15%, meaning it expands much less than PMMA. By using our MS, TV-makers can cut the extra space at the side of the TV (which is covered by the bezel) by two-thirds.