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Global Freeform Surface Precision Molding Machine Market 2026 by Manufacturers, Regions, Type and Application, Forecast to 2032

https://marketpublishers.com/r/G64FB40C6D4CEN.html
Date: October 2026
Pages: 74
Price: US$ 3,480.00 (Single User License)
ID: G64FB40C6D4CEN

Abstracts

According to our (Global Info Research) latest study, the global Freeform Surface Precision Molding Machine market size was valued at US$ 24.08 million in 2025 and is forecast to a readjusted size of US$ 83.33 million by 2032 with a CAGR of 19.6% during review period.

Freeform surface precision molding machine is degined to manufacture freeform surface optical components by glass molding press (GMP) technolgoy. The process heats a glass preform to a controlled temperature, applies precisely regulated force and displacement in a vacuum or inert atmosphere, and then cools under control to transfer the three-dimensional figure and surface finish with stability. In industrial practice the category centers on Precision Glass Molding (PGM/PCM) and extends to challenging materials such as fused silica and chalcogenide glasses.

Market Opportunities & Drivers — What forces are pushing freeform glass molding toward automotive-grade volume?

The acceleration of cockpit displays and the industrialization of AR-HUD create demand for larger fields of view, longer virtual image distances and more compact optics—conditions under which freeform mirror assemblies become the dominant design choice and, in turn, raise requirements for molding systems in figure control, thermal management and automation. OEM disclosures frame AR-HUD as a human-machine interface tightly coupled with perception, reinforcing demand for high-consistency freeform parts. The challenge is that high-temperature material sets (including fused silica) impose tougher constraints on tool coatings and thermal fields, while takt time and yield must be protected via automation and in-process control. These dynamics are

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visible in public actions by leading players and institutes: Shibaura's 2024 exhibition program highlights its optical glass molding line; Fraunhofer IPT launched EffiMaIR to advance machine technology and digitization for efficient glass-optics manufacturing; and Ricoh publicly confirmed AR-HUD module mass production alongside a Tier-1 partner, signaling downstream pull.

Supply Chain Linkage — How does the chain close from molds to metrology and into Tier-1s and automakers?

Upstream, mold materials and coatings, along with thermal and force control, are decisive. Moore positions the 170GPM together with its ultra-precision grinding platforms (WC/SiC mold materials) as a "mold manufacturing + glass molding" cell, an explicit equipment-level linkage across the chain. On the press side, Shibaura's GMP specifications document vacuum capability, IR heating and optional auto-loader for molded parts and glass charges—features that stabilize volume consistency. Research platforms such as Fraunhofer IPT actively publish on molding technology, non-isothermal strategies and coating life, and in 2023 announced an automated glass molding system for small-series and wafer-level optics as well as large single pieces up to ~150 mm. Downstream corroboration comes from producers that publicly list installed assets: Plant for Optics reports a clean-room GMP-311V (vacuum type) on its replicative molding line—providing traceability between equipment, process and freeform-capable part families.

Segmentation Trends — AR-HUD, HUD, ADAS-IR/ToF: how is demand reshaping across use cases?

By end use, AR-HUD continues to lift requirements for complex mirror stacks and higher integration, strengthening preference for glass freeform parts and automated molding cells. Conventional HUD remains a steady lane where freeform mirrors and fold mirrors benefit from auto-loaders and, where applicable, multi-cavity approaches. ADAS-IR/ToF elevates reliance on molded glass and chalcogenide families across the infrared spectrum, with institutes and vendors showcasing examples of IR-capable molding and post-form metrology/figure control. Across public communications from equipment makers and institutes, AR-HUD stands out as the incremental growth arena for freeform-capable glass molding systems. Shibaura's official examples explicitly include fused-silica/high-temperature molding; Fraunhofer IPT profiles molding within its glass-manufacturing portfolio; automotive disclosures underscore AR-HUD adoption in serial products.

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Regional Trajectories — North America, China & broader Asia-Pacific, Europe, and other regions: where is momentum building?

North America is represented by Moore Nanotechnology, which integrates molding presses with in-house mold-making equipment to deliver a coherent cell-level solution. China shows public-facing engineering narratives that speak plainly to “free-form hot pressing” for HUD optics, exemplified by Kingding’s product page. Japan sustains deep PGM know-how; Shibaura Machine’s GMP documentation covers vacuum environments, IR heating and large-diameter molds with multiple examples of molded optics. Europe advances via Fraunhofer IPT’s adoption of an automated glass-press line to support small-series/wafer-level research and pre-series manufacturing, seeding local supply-chain learning and introduction. Public moves across these regions converge on integrated equipment-plus-process chains for freeform optics as the next competitive front.

Latest Developments

Apr 1, 2024 — Shibaura Machine (SIMTOS 2024): The company announced it would exhibit at SIMTOS 2024 in Seoul, highlighting machine-tool and related equipment; within this context Shibaura publicly maintains a dedicated GMP optical glass molding line.

May 1, 2024 — Fraunhofer IPT (EffiMaIR launch): The institute introduced EffiMaIR, a program to manufacture high-precision glass optics more efficiently by combining innovative machine technology and digitization, underscoring continued investment in glass-molding capability.

Oct 13, 2021 — Ricoh (AR-HUD module): Ricoh Industrial Solutions announced mass production of HUD projection units (PGUs), jointly developed with Nippon Seiki—an indicator of AR-HUD’s path to series adoption and the associated demand for consistent freeform optics.

This report is a detailed and comprehensive analysis for global Freeform Surface Precision Molding Machine market. Both quantitative and qualitative analyses are presented by manufacturers, by region & country, by Materials and by Application. As the market is constantly changing, this report explores the competition, supply and demand trends, as well as key factors that contribute to its changing demands across many markets. Company profiles and product examples of selected competitors, along with market share estimates of some of the selected leaders for the year 2025, are

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provided.

Key Features:

Global Freeform Surface Precision Molding Machine market size and forecasts, in consumption value ($ Million), sales quantity (Units), and average selling prices (K US$/Unit), 2021-2032

Global Freeform Surface Precision Molding Machine market size and forecasts by region and country, in consumption value ($ Million), sales quantity (Units), and average selling prices (K US$/Unit), 2021-2032

Global Freeform Surface Precision Molding Machine market size and forecasts, by Materials and by Application, in consumption value ($ Million), sales quantity (Units), and average selling prices (K US$/Unit), 2021-2032

Global Freeform Surface Precision Molding Machine market shares of main players, shipments in revenue ($ Million), sales quantity (Units), and ASP (K US$/Unit), 2021-2026

The Primary Objectives in This Report Are:

To determine the size of the total market opportunity of global and key countries

To assess the growth potential for Freeform Surface Precision Molding Machine

To forecast future growth in each product and end-use market

To assess competitive factors affecting the marketplace

This report profiles key players in the global Freeform Surface Precision Molding Machine market based on the following parameters - company overview, sales quantity, revenue, price, gross margin, product portfolio, geographical presence, and key developments. Key companies covered as a part of this study include Guangdong Kingding Optical Technology Co., Ltd., Shibaura Machine, Moore Nanotechnology Systems, SYS, Puris, etc.

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This report also provides key insights about market drivers, restraints, opportunities, new product launches or approvals.

Market Segmentation

Freeform Surface Precision Molding Machine market is split by Materials and by Application. For the period 2021-2032, the growth among segments provides accurate calculations and forecasts for consumption value by Materials, and by Application in terms of volume and value. This analysis can help you expand your business by targeting qualified niche markets.

Market segment by Materials

Oxide Optical Glass

Fused Silica

Chalcogenide Glass (IR)

Other

Market segment by Application

HUD

ARHUD

ADAS-IR/ToF

Others

Major players covered

Guangdong Kingding Optical Technology Co., Ltd.

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Shibaura Machine

Moore Nanotechnology Systems

SYS

Puris

Market segment by region, regional analysis covers

North America (United States, Canada, and Mexico)

Europe (Germany, France, United Kingdom, Russia, Italy, and Rest of Europe)

Asia-Pacific (China, Japan, Korea, India, Southeast Asia, and Australia)

South America (Brazil, Argentina, Colombia, and Rest of South America)

Middle East & Africa (Saudi Arabia, UAE, Egypt, South Africa, and Rest of Middle East & Africa)

The content of the study subjects, includes a total of 15 chapters:

Chapter 1, to describe Freeform Surface Precision Molding Machine product scope, market overview, market estimation caveats and base year.

Chapter 2, to profile the top manufacturers of Freeform Surface Precision Molding Machine, with price, sales quantity, revenue, and global market share of Freeform Surface Precision Molding Machine from 2021 to 2026.

Chapter 3, the Freeform Surface Precision Molding Machine competitive situation, sales quantity, revenue, and global market share of top manufacturers are analyzed emphatically by landscape contrast.

Chapter 4, the Freeform Surface Precision Molding Machine breakdown data

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are shown at the regional level, to show the sales quantity, consumption value, and growth by regions, from 2021 to 2032.

Chapter 5 and 6, to segment the sales by Materials and by Application, with sales market share and growth rate by Materials, by Application, from 2021 to 2032.

Chapter 7, 8, 9, 10 and 11, to break the sales data at the country level, with sales quantity, consumption value, and market share for key countries in the world, from 2021 to 2026.and Freeform Surface Precision Molding Machine market forecast, by regions, by Materials, and by Application, with sales and revenue, from 2027 to 2032.

Chapter 12, market dynamics, drivers, restraints, trends, and Porters Five Forces analysis.

Chapter 13, the key raw materials and key suppliers, and industry chain of Freeform Surface Precision Molding Machine.

Chapter 14 and 15, to describe Freeform Surface Precision Molding Machine sales channel, distributors, customers, research findings and conclusion.

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