

2026

Top 10 Technology Trends in Plastics and Rubber



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PREFACE

You can't discover new continents with old maps.

In 2026, the plastics and rubber industry is experiencing a fundamental cyclical shift. Supply chains are restructuring, geopolitical tensions are disrupting raw material markets, the EU's Packaging and Packaging Waste Regulation (PPWR) has taken effect, and artificial intelligence (AI) is adopted into every stage of production. These are not minor adjustments to adapt to; they are seismic changes rewriting the industry's playbook.

In the past, scale was the ultimate goal. Now, it can bring rigid structural burdens.

Every executive board now faces compounding pressures from critical technology choices, escalating green compliance costs, and chronic demand uncertainty. In such a market environment, strategic direction far outweighs speed, and the price of a wrong turn has never been higher.

This is precisely why Adsale Plastics Network continues to publish its annual "Top 10 Technology Trends in Plastics and Rubber Report". In an era of uncertainty, we analyze frontline industry transformations to provide a clear roadmap for the future.

Following the launch of the 2026 Top 10 Technology Trends, we received 122 case studies from 106 companies across 13 countries. In this report, we dive deep into the breakthroughs shaping the future of the plastics and rubber industry.

TOP 10 TECHNOLOGY TRENDS IN PLASTICS AND RUBBER 2026

01 FAST AI EVOLUTION

#AI Systems #Collaborative Robots
#Adaptive #Quick Mold Change
#Visual Inspection

03 MULTI-MATERIAL COMPATIBILITY OF RECYCLING EQUIPMENT

#Enzymatic Recycling #Mechanical Recycling
#Textile-to-Textile #Chemical Recycling
#Carbon Capture #Intelligent Sorting

05 FUNCTIONAL FILMS DESIGNED FOR THINNESS, STRENGTH, AND SPEED

#Composite #Mono-Material Films
#Printing #High-Barrier Films
#High-Speed Film Processing #Optical Films

07 MULTIFACETED ADVANCES IN MEDICAL PLASTICS

#Skin-Friendly Materials #Soft Materials
#Specialty Engineering Plastics #Biocompatibility
#Antibacterial Materials #Polyolefins
#Chemical Resistance #Stability

09 MULTI-MATERIAL MOLDING AND INTEGRATED FUNCTIONALITY

#Multi-Material Injection Molding
#Multi-Layer Blow Molding
#Multi-Layer Vacuum Forming
#Integrated Injection and Compression Molding

02 MULTIPLE PATHWAYS FOR CLIMATE-FRIENDLY MATERIALS

#Non-Food Biomass #Recycled Plastics
#Bio-Based Polyolefins #Bioplastics
#Recycled Polyurethane #Recyclable Materials

04 SUSTAINABILITY AND PERFORMANCE UPGRADES FOR ADDITIVES

#Antimony-Free #UV Resistant #Conductive
#Fluorine-Free #Heat Resistant
#Flame Retardant #Color Masterbatches

06 LIGHTWEIGHT MATERIALS FOR EMERGING INDUSTRIES

#Humanoid Robots #Fiber Reinforcement
#Automotive #Foaming
#Low-Altitude Economy

08 OPTIMIZATION OF ENERGY-SAVING TECHNOLOGIES

#All-Electric Machines #Injection Molding
#Energy Recovery #Blow Molding
#Compact Design #Extrusion
#Auxiliary Equipment #Thermoforming

10 ENHANCED PRECISION AND DURABILITY OF HOT RUNNERS

#Coating
#High-Cavity Molds
#High-Precision Hot Runners



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China has become a hub of innovation in plastics and rubber technology as well as industrialization of applications. At the same time, European and North American companies continue to make key contributions to innovation in areas such as high-end equipment and advanced materials. Overall, the case studies underscore China's strong industrial foundation and application strengths, while also reflecting an emerging global innovation pattern in the plastics and rubber industry, one marked by value chain collaboration and shared growth.

01 | FAST AI EVOLUTION

#AI Systems #Adaptive #Visual Inspection #Collaborative Robots #Quick Mold Change

From human-dependent to system-driven

This represents the most structurally significant evolution of AI within the industry. Rather than merely introducing discrete software functions, it codifies production processes that once depended on individual expertise and tribal knowledge into intelligent, scalable systems.



From experience-based to data-driven

While visual inspection and sorting represent some of the earliest mature AI applications in the plastics and rubber industry, the year 2026 marks a distinct paradigm shift. Instead of merely functioning as "static defect detection tools", modern AI vision systems have entered a self-optimizing loop characterized by "continuous learning, automated refinement, and deep system integration".

From robotic arms to adaptive execution units

AI is transforming automation equipment from "deterministic motion execution systems" into "intelligent, task-oriented execution platforms". At its core, this shift reflects a new industrial reality: as manufacturing environments become increasingly unpredictable, traditional automation systems relying solely on fixed, pre-programmed pathways are no longer sufficient.

From human-dependent to system-driven

First, AI is capturing the most hard-to-replicate "experience".

Haitian: X-Injection

By leveraging "dual-model intelligence" (first-principle model + distilled empirical model), it converts implicit process experience into algorithmic features. With an AI-powered first-mold setup recommendation and a defect-resolution module, new technicians can achieve mold-setting capabilities at a "senior-technician" level. In blind tests, it helps resolve 75% of defects and reduces defect rates by 90%.

EXPERT
COMMENT

The AI Coach model effectively addresses key pain points, including the experience-dependence in injection mold-setting and the "black-box" nature of process troubleshooting. With its strong intelligent value, high industry compatibility, and proven real-world results—backed by an industry leader—it has significant potential to be widely adopted across the industry.

Industry Leadership Award

COROPATE MEMBER

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MoldBao: AI-Based Optimization Solution

By further pushing AI into the mold-processing design stage and integrating knowledge graphs, reinforcement learning, and RAG technologies, the solution shortens the process-planning cycle by 20%-30% and increases first-pass yield by 15%-20%.

EXPERT
COMMENT

This solution digitizes mold-processing expertise, helping shorten the process-planning cycle and improve machining consistency, with a clear AI application focus. However, its commercial maturity still requires further validation.

Breakthrough Innovation Award

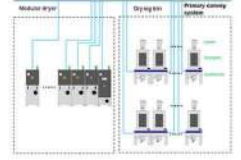


Moreover, AI is making the production process inherently more stable and self-regulating.

motan: Uninterruptible Neural System

Industry Leadership Award

With true distributed intelligence and a triple-redundancy mechanism, the auxiliary equipment achieves "nuclear-grade" reliability and provides high-quality data for carbon-footprint tracing.



The nuclear-grade redundancy mechanism and true distributed intelligence enhance the auxiliary equipment's data security and operational stability, delivering clear commercial value. However, the innovation of its underlying architecture is relatively limited.

B&R: MHelp

Outstanding Achievement Award

By integrating offline AI with natural-language interaction, it reduces traditional on-site commissioning time from 3-7 days to one day or even several hours, enabling field maintenance personnel to independently perform complex diagnostics.



Deploying natural-language interaction alongside offline AI effectively shortens equipment commissioning and maintenance response times, improving operational efficiency, ease of use, and safety, with clear application prospects.

Windmüller & Hölscher: Easy2 Run

Outstanding Achievement Award

Introducing the "co-pilot" concept into film production lines, it automatically pushes production towards maximum capacity within safe limits by real-time identification of the frost line, bubble shape, and power reserves.



One-click automatic capacity maximization and precise frost line monitoring deliver strong process-optimization value. The co-pilot improves capacity utilization with a clear energy-saving orientation and a high level of maturity.

Ultimately, once single-point intelligence reaches a certain maturity level, AI evolves into a factory-level collaborative layer.

Shuyilink: Global Digital Factory Solution

Breakthrough Innovation Award

Leveraging 5G, industrial big data, APS advanced scheduling, and AI industrial models, it enables cross-factory and cross-equipment data connectivity and collaborative decision-making. Among enterprises where the solution has been implemented, order delivery efficiency increased by 35%, changeover time was reduced by 50%, and the per-unit product traceability rate reached 99.9%.



The industrial model-driven digital factory solution has delivered outstanding results in parameter tuning and production scheduling, comprehensively improving the production efficiency of injection molding enterprises. It demonstrates strong technical sophistication and broad applicability.

From experience-based to data-driven

Yuzhen: Integrated Inspection and Packaging Machine

Industry Pioneer Award

Adopting a vertically integrated modular design and a zero-shot industrial foundation model, it addresses the challenge of deploying AI quality inspection for small and medium-sized manufacturers, achieving an inspection accuracy of over 99.5%.

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The combination of zero-shot AI quality inspection and integrated inspection-packaging design significantly lowers barriers to production deployment. Its space-saving integration offers clear advantages and strong practical value, although the defect-recognition mechanism still needs further elaboration.

Techik: Intelligent AI Chute-Type Visual Sorter

Breakthrough Innovation Award

Featuring multi-spectral and ultra-high-definition AI visual algorithms, this system extends sorting capabilities to recycled plastics and complex material scenarios while supporting self-evolving recognition accuracy.



While these advanced self-evolving algorithms significantly improve sorting and recognition accuracy, their application could be more explicitly linked to core plastics and rubber processing.

From robotic arms to adaptive execution units

Simcheng: Intelligent Packaging Robot

Industry Pioneer Award

Through deep integration with ERP systems, this solution connects slitting, packaging, labeling, and palletizing into a streamlined workflow, transforming material-handling from simple mechanical motions into intelligent, process-driven tasks.



Engineered to address the heavy-duty packaging challenges of large film rolls, this digital packaging robot enables automated, continuous production. By integrating seamlessly with ERP systems, the system delivers proven efficiency gains and represents a highly mature commercial application.

Topstar: Wheeled Humanoid Robot

Breakthrough Innovation Award

Equipped with the GLM-4.5 large model, it combines mobility, advanced recognition, and multi-task switching to elevate post-injection-molding processes from rigid, fixed-station automation to highly flexible execution units.



While integrating wheeled humanoid robots with large language models in injection molding demonstrates a forward-looking approach to industrial robotics, the actual necessity and competitive advantages of this system over traditional automation still require further market validation.

Conclusion

The true value of AI in the plastics and rubber industry lies not in the compounding of standalone features, but in the fundamental redistribution of manufacturing capabilities.

By institutionalizing experience, ensuring process stability, automating quality control, and enabling flexible execution, AI elevates individual machine intelligence to comprehensive, factory-level collaboration.

Ultimately, AI is shifting the industry's competitive paradigm from operational excellence to systemic autonomy—marking the most significant implication of AI in 2026.

02 | MULTIPLE PATHWAYS FOR CLIMATE-FRIENDLY MATERIALS

#Non-Food Biomass #Bio-Based Polyolefins #Recycled Polyurethane #Recycled Plastics #Bioplastics #Recyclable Materials

Designing for recycling: Lowering recycling barriers through structural design

This represents the most foundational pathway for climate-friendly materials. The core issue is not simply "how a product is recycled after use", but rather "whether it was designed with recyclability in mind from the start".

For many flexible plastic and packaging products, the primary obstacles to recycling do not stem from a lack of downstream technology. Instead, overly complex material structures and the excessive use of multi-material laminates continue to drive up sorting and recovery costs, often making recycling economically or logistically unfeasible.

Advancing recycling: From "recyclable" to "high-value circularity"

This pathway represents the most industrially mature approach to climate-friendly materials currently available. Its primary objective is to determine whether recycled materials can be reused at an equivalent performance level and successfully upcycled into higher-value applications.

Bio-based substitution: Achieving decarbonization at feedstock level

The bio-based substitution pathway drives low-carbon transformation right from the source. By replacing conventional fossil-based feedstocks with renewable resources like crops and biomass, this approach reduces lifecycle carbon emissions from the very outset of production.

Complementing recycling and circularity initiatives, this strategy works hand in hand with regeneration pathways to form the industry's dual-track decarbonization framework.

Biodegradable materials: Filling gaps in specific disposable and distributed applications

There is no single, catch-all pathway for material transformation. In application scenarios where conventional recycling systems have limited reach, material structures are highly complex, or end-use collection is highly fragmented, biodegradable materials are emerging as an essential, complementary solution.



Designing for recycling: Lowering recycling barriers through structural design

ExxonMobil: Recyclable Plastic Barrier Lami-Tube

Industry Leadership Award

ExxonMobil's recyclable plastic barrier lami-tube replaces conventional three-ply aluminum-plastic laminate with a simplified two-ply PE/EPE structure (EPE: PE-EVOH co-extruded film). This approach removes aluminum foil while maintaining barrier performance, heat sealability, and a balance of stiffness and toughness. The composite tube thickness was reduced from 300 µm to 250 µm, providing a design solution that combines material reduction with recyclability for toothpaste, cosmetics, and condiment tubes.



EXPERT
COMMENT

This recyclable plastic barrier lami-tube offers significant benefits in terms of material thinning, cost reduction, barrier performance, and design for recyclability, providing a feasible pathway for green transformation of personal care tubes. However, large-scale adoption remains constrained by the availability of recycling infrastructure.

ExxonMobil: TPO Solution with Vistamaxx™ Performance Polymers

Breakthrough Innovation Award

Vistamaxx™ performance polymers provide a polyolefin alternative to traditional PVC products, offering advantages in lightweighting and single-material design across applications such as transparent flexible sheets, films, and components. TPO sheets and films can reduce weight by approximately 30% compared with PVC at the same thickness, while also facilitating subsequent recycling and reprocessing.



EXPERT
COMMENT

This polyolefin-based alternative to traditional PVC combines lightweighting benefits with a design optimized for recyclability. However, its commercial viability has yet to be fully proven in the market.

Advancing recycling: From “recyclable” to “high-value circularity”

Borouge International: Recleo™ Advanced Mechanically Recycled Polyolefins

Industry Leadership Award

Borouge's Recleo™ advanced mechanically recycled polyolefin portfolio is applicable across storage crates, automotive components and air cushion packaging. The grades retain consistent product performance and batch-to-batch stability even with elevated PCR content. Its storage crate formulation containing 49% recycled PP cuts carbon footprint by roughly 35%, while RD209APC has secured commercial adoption for automotive component production.



EXPERT
COMMENT

The project leverages high-quality mechanically recycled polyolefins to expand applications in automotive and storage, balancing functional performance with sustainability, meeting global demand for recycled packaging materials, and delivering notable environmental value.

Ausell: Large-Scale, High-Efficiency, High-Quality Recycling Technology for Discarded Automotive Headlight PC Components

Outstanding Achievement Award

Shanghai Ausell Material Technology Co., Ltd. resolves three core technical challenges: surface coating stripping, high-viscosity rubber separation and foreign contaminant removal, enabling high-performance closed-loop recycling of transparent PC from discarded automotive lamps. Through automated cleaning, AI identification, and digital traceability, the project enables stable large-scale production of PCR material at the ten-thousand-ton level.



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This recycling technology of PC for end-of-life automotive headlamps achieves high-quality, closed-loop regeneration. By excelling in both processing efficiency and same-grade upcycling, the solution has secured prestigious international certifications and boasts a high level of commercial maturity.

Daicel HPP: PCR-Derived POM

Outstanding Achievement Award

Through its PCR-derived POM initiative, Daicel HPP successfully extends mechanical recycling into the engineering plastics sector. By establishing a domestic, closed-loop collection and production system across China, the project achieves a 30% PCR content rate for natural-color grades and has launched four distinct material grades tailored for automotive and machinery components.



EXPERT
COMMENT

The PCR-Derived POM broadens the scope of mechanical recycling and delivers pioneering value for the industry. However, the project remains at prototype sampling and pre-commercialization stage, requiring further improvement in commercial maturity.

Wanhua Chemical: PCR PMMA

Outstanding Achievement Award

Focused on automotive optical and exterior applications, Wanhua Chemical's mechanical recycling process converts acrylic waste into high-quality PMMA pellets. Formulated with 30% PCR content, the resulting material retains high gloss, low haze, outstanding weatherability, and strong thermal shock resistance, and is currently undergoing validation for automotive headlamps and exterior trim.



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EXPERT
COMMENT

While PCR PMMA demonstrates significant exploratory value in optical-grade recycling and shows clear potential for automotive applications, its overall level of technological innovation and commercial maturity remains relatively conservative.

Tianqiang Environmental Protection Technology: High-Value Recycling Solution for Waste Plastics

Industry Pioneer Award

Based on a closed-loop renewable resource framework, Shanghai Tianqiang Environmental Protection Technology Co., Ltd. builds a three-in-one high-value waste plastic recycling solution featuring "dual network integration + digitalization + modification technology".

The company boasts an annual plastic waste processing capacity exceeding 100,000 tons, generating annual revenues of more than RMB 400 million. Its recycled products retain over 95% of the performance of virgin materials. Across applications spanning courier bags, heavy-duty packaging, and plastic pallets, the company has successfully translated the closed-loop concept into a commercially viable, scalable business mode.



EXPERT
COMMENT

By utilizing a closed-loop model, this project enables high-value plastic recycling while effectively balancing economic and environmental benefits. Robust market validation underscores the project's significant business model innovation and highly practical commercial value.

Re-mall: Low-Value Food Delivery Packaging

Industry Pioneer Award

Through process innovation, Shanghai Re-mall Environmental Protection New Material Co., Ltd. enables recycled polyolefins (r-PP/r-PE) to deliver key mechanical properties comparable to virgin materials, shattering the conventional stereotype that recycled plastics are limited to downcycled applications. This breakthrough qualifies these grades for premium, high-demand scenarios, including toys and food packaging.

The company has also established a full-chain digital traceability system and a product-level carbon footprint accounting model. Every batch is backed by verifiable carbon reduction data, cutting carbon emissions by more than 80% compared to virgin equivalents. Backed by international certifications such as GRS and OBP, these environmental gains are seamlessly converted into actionable carbon labels and valuable ESG assets for brand clients.



EXPERT
COMMENT

The project establishes a closed-loop pathway that transforms low-value takeaway packaging waste into food-grade recycled materials and green design applications. It showcases outstanding performance in supply chain collaboration and recycled material upcycling, serving as a highly valuable blueprint for the wider industry.

Yuantian Biotechnology: Enzymatic Recycling Technology

Breakthrough Innovation Award

This enzymatic recycling technology addresses two critical industry bottlenecks. First, it overcomes the limitations of conventional recycling methods, which cannot process blended textiles. This technology offers exceptional depolymerization capabilities by precisely targeting and breaking down the PET components within complex fiber blends, demonstrating unmatched feedstock adaptability.

Second, it eliminates the quality degradation issues inherent in mechanical recycling. This enzymatic process delivers virgin-grade quality on par with petroleum-based materials. Verified by SGS testing, the product fully meets strict regulatory limits for critical impurities, including 4-carboxybenzaldehyde (4-CBA), benzoic acid, and p-toluic acid (p-TA), and passes Bisphenol A (BPA) testing at the ultra-strict 1 ppb threshold. By complying with the latest EU regulations, this technology enables true closed-loop upcycling for waste plastics.



EXPERT
COMMENT

This enzymatic recycling technology stands out for its remarkable innovation and environmental value in blended fabric depolymerization and high-purity material recovery. Backed by solid progress in pilot testing and order placement, the solution boasts bright commercial prospects.

Bio-based substitution: Achieving decarbonization at feedstock level

Covation Biomaterials: CovationBio® bioPTMEG

Breakthrough Innovation Award

CovationBio® bioPTMEG acts as a 100% bio-based alternative to conventional fossil-based PTMEG. It delivers equivalent performance against fossil counterparts in high-end applications such as spandex, polyurethane and thermoplastic elastomers while substantially cutting greenhouse gas emissions.

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COMMENT

Bio-based PTMEG represents a clear pathway for low-carbon feedstock substitution and can support the green upgrading of materials such as PTT and TPU. However, application partnerships are still under development, and its commercial maturity remains to be validated.

Polymax: Bio-Based TPE Cable Material

Breakthrough Innovation Award

Nantong Polymax Elastomer Technology Co., Ltd. has developed a bio-based TPE for cable applications featuring a bio-based content exceeding 40%, verifiable through Carbon-14 testing. Combining a VW-1 flame-retardant rating with superior high/low-temperature resistance and stable extrusion performance, these materials are ideal for USB cables, headphone cables, and consumer electronics wiring.



While this bio-based TPE cable material offers strong low-carbon attributes and reliable baseline performance that align well with the industry trend toward green cabling, its real-world application cases remain limited, and its market maturity requires further development.

Runye: ABS & PC/ABS

Breakthrough Innovation Award

Runye (Chongqing) New Materials Co., Ltd. has pioneered an advanced compatibilization technology that seamlessly fuses biomass waste such as coffee grounds and buckwheat husks with polymer matrices. Utilizing a proprietary "temperature-controlled drying, modification, and coating" process, the company has achieved stable mass production and launched the world's first coffee-ground-reinforced composite for computer housings, successfully upcycling agricultural waste into high-value sustainable materials.



These coffee-ground composite ABS and PC/ABS products showcase highly distinctive and innovative characteristics in both the utilization of recycled resources and advanced material functionalization.

Biodegradable materials: Filling gaps in specific disposable and distributed applications

Boxai Biomaterials: F1012 PHA Barrier Biodegradable Cast Film

Breakthrough Innovation Award

Zhejiang Boxai Biomaterials Co., Ltd.'s F1012 PHA barrier cast film is formulated from 100% bio-based feedstock featuring home compostability and marine biodegradability for diversified packaging applications. It delivers outstanding water and oxygen barrier performance alongside waterproof and oil-resistant traits, high transparency and superior printability, suitable for packaging of tea, coffee, cosmetics and compostable tableware.



This PHA barrier biodegradable cast film aligns with the development trend of biodegradable packaging, striking a favorable balance between barrier capability and eco-friendly attributes with positive certification progress and market feedback.

Green Fill: Starch Foam Granules and Related Cushioning Packaging Products

Breakthrough Innovation Award

Green Fill Material Technology Co., Ltd. develops starch-based foam granules and related cushioning packaging products using a combined process of reactive extrusion and steam foaming. This completely eco-friendly foaming system boasts a starch content exceeding 90%, delivers an expansion ratio of up to 150-fold, features 100% natural biodegradability, and contains zero microplastics.

To eliminate the excessive storage and logistics costs inherent to traditional cushioning materials, the firm's proprietary single/twin-screw, two-stage composite extrusion setup successfully decouples masterbatch preparation from the foaming process. This enables flexible, on-demand, just-in-time manufacturing.



Fully biodegradable starch-based foaming materials offer significant environmental value as a replacement for conventional cushion packaging. However, their feedstock sourcing strategy and large-scale market adoption must be managed prudently, taking practical industrial conditions into account.

Conclusion

Climate-friendly capabilities have matured into a mandatory baseline for materials competing in the global market, moving far beyond a mere competitive advantage.

The industry has shifted its focus away from isolated breakthroughs in single, standalone low-carbon technologies. Instead, a comprehensive decarbonization framework has emerged, driven by four complementary, scenario-specific pathways: upstream design for carbon reduction, midstream recycling and circularity, bio-based feedstock substitution, and end-of-life biodegradable solutions. Each pathway serves a distinct role and demonstrates its own unique level of commercial maturity.

03 | MULTI-MATERIAL COMPATIBILITY OF RECYCLING EQUIPMENT

#Enzymatic Recycling #Textile-to-Textile #Carbon Capture #Mechanical Recycling #Chemical Recycling #Intelligent Sorting

AI and intelligent sorting

Accurately separating material streams is the critical first step in processing multi-material waste, making advanced sorting essential for achieving high-purity recycled plastics. Historically, sorting relied predominantly on color and shape. Today, however, high-resolution hyperspectral and near-infrared (NIR) sensing—powered by AI algorithms and intelligent agents—enable equipment to detect the precise chemical composition of individual plastic flakes, driving intelligent quality control across the entire processing lifecycle.



Textile-to-Textile Closed Loop

While appliance and fishing net recycling follow relatively mature pathways, the textile industry faces a critical bottleneck: blended fabrics. Modern garments are rarely composed of a single material, frequently combining cotton with polyester or polyester with spandex. At the end of life, these blends present severe recycling challenges; manual sorting is impractical, and conventional mechanical recycling remains ineffective. Consequently, massive volumes of textile waste are incinerated, landfilled, or downcycled, leaving true fiber-to-fiber recycling virtually non-existent.

Today, a clear technical roadmap has emerged: separation followed by reconstruction. Front-end chemical or physical separation disassembles the blends, while back-end viscosity enhancement restores the polyester's performance, enabling it to be respun into high-quality fibers.

Flexible crushing, washing, filtration, and melt extrusion

Plastic recycling is inherently challenging because feedstock characteristics, such as shape, moisture content, and density, vary significantly with every batch. Traditional equipment often struggles to maintain consistency across these variations; lightweight materials may fail to feed properly, highly contaminated waste frequently clogs screens, and any fluctuation in incoming feedstock can trigger a disruptive chain reaction. This volatility ripples from crushing through washing and filtration to melt extrusion, ultimately compromising the quality of the recycled pellets. To address this, equipment manufacturers are shifting their design philosophy. Rather than focusing solely on maximizing throughput, they are prioritizing flexibility and compatibility at each stage of the process. Acknowledging that the ability to handle mixed and contaminated waste is what recycling facilities genuinely require, processing these complex streams is fast becoming a core competitive advantage.

AI and intelligent sorting

TOMRA: New INNOSORT™ FLAKE/Tray-to-Tray Closed-Loop Recycling

Breakthrough Innovation Award

TOMRA's new INNOSORT™ FLAKE sorter utilizes patented FLYING BEAM™ technology to accurately identify various plastic materials and distinguish differences among PET, PETG, PC, PS, etc. Meanwhile, it employs a high-resolution RGB camera to effectively remove colored flakes. The mechanical design of the sorter has been optimized, enhancing throughput by 20-40% while maintaining sorting efficiency. Additionally, the FLYING BEAM™ technology can reduce energy consumption and incorporating passive cooling, ensuring continuous and stable operation in high-temperature and high-humidity environments.



EXPERT
COMMENT

The new flake sorter targets PET tray closed-loop recycling and aligns well with industry needs. However, its business model and scalability still require further validation in the market.

Meyer Optoelectronic Technology: Recycling Intelligent Sorting Agent Matrix

Outstanding Achievement Award

Hefei Meyer Optoelectronic Technology Inc. has developed a matrix of intelligent sorting agents powered by a proprietary large model. The matrix includes five specialized agents: raw material inspection, whole-bottle sorting, color selection, spectral material verification, and online quality control.

The system enables real-time inspection of bottle-brick feedstock and automatically generates quality reports. It can be rapidly upgraded to handle new bottle types. It also performs highly precise sorting of contaminants, such as tiny black spots as small as 0.5 mm and extremely light-colored impurities.

With spectral technology, the system can distinguish among multiple materials, including PET, PP, ABS, and flame-retardant plastics, while addressing the challenges of sorting small plastic particles ranging from 0.5 to 3 mm. Finally, the online quality-control analyzer continuously monitors finished products and issues quality alerts.



Intelligent sorting agents powered by a large model show strong innovation in achieving precise separation across multiple material types. Overseas deployments have demonstrated solid verification results, providing a relatively advanced technical pathway for intelligent recycling.

Sesotec: MAG FLAKE

Breakthrough Innovation Award

MAG FLAKE sorting equipment demonstrates advantages in removing metal impurities from crushed plastic flakes. Its detection accuracy reaches 99%, enabling it to accurately remove both magnetic and non-magnetic metal contaminants, including black plastics. It performs well even for very small impurities, such as residual aluminum foil left around bottle openings.

The equipment also offers a strong set of operational benefits, including high sensitivity, low material loss, low energy consumption, and high throughput. The equipment is currently in use at Zhejiang Haili Environmental Technology Co., Ltd.



The metal sorting system plays a clear role in improving the purity of recycled materials and supporting auxiliary quality control. Its accuracy and application maturity are strong. However, the range of applications is relatively limited.

Flexible crushing, washing, filtration, and melt extrusion

► Crushing

ENMA: EnMa 1 Shaft Modular Crusher

Breakthrough Innovation Award

ENMA has developed a modular single-shaft shredder with a design that is easy to disassemble and reassemble. This reduces production complexity, supports standardized, large-scale manufacturing, and significantly shortens delivery lead times. The equipment also allows configuration customization, providing tailored solutions for specific materials and capacity requirements.

Energy-efficient and highly adaptable, the equipment supports intelligent maintenance and environmentally compatible operation. It can process plastic materials of different types, shapes, sizes, and weights, demonstrating strong versatility and adaptability. It is suitable for customers worldwide and for production facilities of various scales, and has been successfully adopted by recycling companies in Japan, the US, and China.



The modular single-shaft design is flexible and efficient, with strong performance in terms of ease of operation and maintenance and solid export applications. Its commercial value is also high.

► Washing

Boretech: PET Tray Washing Line

Industry Pioneer Award 

Zhejiang Boretech Environmental Engineering Co., Ltd. has delivered a PET tray washing solution (Compatible with PP) with four major technical breakthroughs: (1) an efficient material dispersion technology that handles high-density feedstock without easy breakage; (2) an intensive hot washing process that achieves a glue and label removal rate of over 90%; (3) a mega aspirator with a label separation rate above 99% and a flake carryover rate below 1%; and (4) enhanced yield that keeps PET material loss at below 10%.

The final product meets food-grade requirements, with residual adhesive below 2,000 ppm and PVC content below 50 ppm, aligning with FDA and EFSA standards.

The solution offers low-loss, high-cleanliness, modular design, and fully automated continuous production. It has been installed and used in a demonstration plant in Zhejiang, China.



The PET tray washing solution addresses a niche but difficult sector effectively. However, it is still in the early stage of operation, so its commercial maturity needs further validation.

GET Recycling: Fishing Net Recycling Line

Breakthrough Innovation Award 

GET Recycling has developed technologies for washing and purifying discarded fishing nets, building a closed loop: discarded fishing nets → recycled raw materials → circular applications.

The project achieved three breakthroughs: (1) addressing the "ghost net" problem that drives marine plastic pollution; (2) reducing recycling costs through an efficient recycling system; and (3) increasing the purity of recycled material to 99.5% or higher, expanding application scope.

The system was deployed in two lines—one for washing PA + HDPE mixed materials and another for washing PP ropes/cables. It uses a closed-loop water-circulation system to overcome the challenges of separating mixed materials while maintaining stable throughput.



This fishing net washing line is particularly significant for targeted recycling of marine waste plastic. Its washing and purification approach is well-aligned. However, large-scale commercial adoption still needs to expand further.

Dyun Environmental Technology: High-Quality PP Rigid Product (Food Container) Crushing and Washing Line

Finalist Award 

Changzhou Dyun Environmental Technology Co., Ltd. has developed a PP food container washing line featuring a compound process: flexible crushing + high-temperature hot washing + multi-stage rinsing + high-efficiency friction washing. The system deeply removes grease, sauce residues, and odors. The full line integrates modules such as dewatering, hot-air drying, and color sorting separation, enabling end-to-end automation that reduces labor dependence and material losses.

The system can be flexibly customized. Its enclosed design operates with low noise and controllable emissions. The resulting PP recycled material delivers high cleanliness, low loss, and strong stability, enabling seamless integration with downstream pelletizing. It addresses industry pain points such as heavy-oil contamination, weak feedstock compatibility, and poor line-to-line coordination.



The PP food container crushing and washing line targets food-service recycling scenarios, with strong capabilities in washing and odor removal. However, the real-life applications remain limited.

► Filtration

Tianhong: TX650 S-G Dual-Station

Industry Pioneer Award 

Huizhou Tianhong Machinery Manufacturing Co., Ltd. offers the TX series no-screen filters based on a cylindrical micro-hole filter cartridge and a high-frequency intelligent scraper self-cleaning system. This design supports uninterrupted continuous operation for 30 days or more, eliminating downtime and avoiding losses caused by filter changing.

With the company's proprietary micro-hole processing technology (drilling speed up to 200 holes/sec), the filter cartridge achieves precision up to 250 mesh (60 μm). Compared with traditional multi-layer mesh solutions, filtration costs are reduced to a fraction of the original level.

The system is widely compatible with various contaminated thermoplastic recycling feedstocks such as PE, PP, ABS, and PET, and it does not require pre-washing. The filter cartridge life exceeds two years with no performance degradation. It has been operating stably for more than 12 months at a site in Hunan, where product pass rates improved from 88% to 99.5%.



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This high-precision, no-screen filtration system enables uninterrupted continuous production and performs well for recycling plastics. Its value is clear in lowering costs and ensuring stable supply, and its commercial maturity is relatively high.

► Melt extrusion

Starlinger Recycling Technology: recoSTAR Dynamic Art Recycling System

Industry Leadership Award 

Special features of the new recoSTAR dynamic art recycling systems include the spin-feed technology and the Dynamic Automation Package (DAP). Technically sophisticated design elements, such as the newly conceived ribs in the SMARTfeeder, where the input material is prepared for extrusion, and the special geometry of the cone bushing and the feed zone of the extruder, ensure that the material is held longer and enters the extruder with more pressure and spin. The DAP ensures maximum production efficiency by detecting fluctuations in the input material due to differences in bulk density, size, or moisture content, and regulates the extruder speed accordingly. It also responds to interruptions in the material feed by automatically putting the system into standby mode and restarting it when production resumes.



The recoSTAR dynamic art recycling system handles a wide range of waste plastic with excellent efficiency, stability, and a proven track record in the field. However, breakthroughs in its core technology remain relatively incremental.

battenfeld-cincinnati: STARextruder Planetary Roller Extruder

Finalist Award 

The battenfeld-cincinnati STARextruder planetary roller extruder eliminates the energy-intensive pre-drying step, significantly reducing operating costs. By pairing the planetary roller section with a high-vacuum system, it efficiently removes moisture and volatiles while minimizing any drop in intrinsic viscosity (IV).

The versatile extruder processes flakes, pellets, and agglomerates, and it can switch seamlessly between PET, PP, and PS without requiring screw changes. Its energy-saving performance has already been validated on customer production lines in China and Vietnam.



This planetary roller extruder performs well in eliminating drying steps, saving energy, and maintaining stable quality, backed by successful commercial applications. That said, its overall innovation reflects engineering optimization rather than a technological leap.

Vary Tech: Waste Household Appliance Plastic via Mechanical Recycling

Outstanding Achievement Award 

Hunan Vary Tech Co., Ltd. has achieved three major technological breakthroughs with its appliance plastic mechanical recycling and end-to-end PCR traceability project: (1) its high-purity sorting process uses a dual-axis shredding and vertical crushing combination to achieve a 98% sorting purity; (2) its closed-loop mechanical recycling converts waste plastic into high-purity rHIPS, rABS, and rPP pellets with a 99% purity rate and a color variance of $\Delta E \leq 0.3$, which are then reused in keyboards and small appliances; (3) its digital traceability system provides complete tracking from raw material to finished product, supporting Digital Product Passport and PPWR compliance.

This system works alongside a batch management tool to monitor impact strength, flame retardancy, and other metrics in real time. The resulting products are already used by top brands like Bosch, Lenovo, Ford, NIO, and Estée Lauder.



By combining high-purity sorting with complete end-to-end traceability, this project successfully upcycles waste appliance plastic. The process is comprehensive, well-executed, commercially mature, and serves as an excellent benchmark for the industry.

Comy Environmental Technology: Plastic-to-Oil, Pyrolysis Oil, PTO, and PTP Technologies

Finalist Award 

Zhejiang Comy Environmental Technology Co., Ltd. enables molecular-level recycling of waste plastic through its two proprietary technologies: PTO (Low-temperature & Low-pressure Catalytic Pyrolysis with Synchronous Reforming) and PTP (High-selectivity Catalytic Cracking & Olefin Reforming).

Supported by over 90 patents, the process reduces carbon emissions by approximately 2 tons per ton of plastic processed. It yields products of identical quality to virgin, petroleum-based plastics, making them suitable for high-end applications. With multiple projects already deployed in China and Europe, Comy has successfully closed the loop from mixed plastic waste to food-grade plastics.



The plastic-to-oil, PTO, and PTP technologies offer versatile solutions for high-value recycling. However, their energy consumption, environmental impact, and economic viability at scale require further validation.

Textile-to-Textile Closed Loop

TOMRA: AUTOSORT™ Multifunctional Sorting Machine

Industry Leadership Award

AUTOSORT™ multifunctional sorting system integrates high-precision near-infrared (NIR), visible light spectroscopy, laser, and metal sensing technologies with artificial intelligence. This combination enables the precise identification of textile materials and colors, including cotton, polyester, wool, acrylic, and various blends, overcoming the industry bottleneck where manual sorting fails to handle complex, mixed materials.

Backed by 30 years of technological expertise, this equipment serves as a critical enabler for industrial-scale textile recycling and fiber-to-fiber recycling. TOMRA has established a mature ecosystem encompassing multi-material identification, high-precision sorting, and end-to-end closed loops. The technology is successfully deployed in the world's first fully automated textile sorting plant, as well as multiple industrial projects across the UK and France.



EXPERT COMMENT The AUTOSORT™ machine excels in high-precision sorting and large-scale recycling of post-consumer textiles, offering high automation with strong commercial maturity.

Aceretech Machinery: Textile-to-Textile Recycling Technology

Industry Pioneer Award

Aceretech Machinery's textile-to-textile technology focuses on high-efficiency, closed-loop recycling for waste fibers, fabric scraps, and textiles. Its core advantage lies in an inline, one-step viscosity enhancement process that boosts intrinsic viscosity (IV) by 0.15–0.2 within 20 minutes, eliminating the need for offline treatment.

By integrating shredding, friction compaction, melt filtration, and pelletizing into a single highly automated line, the complete solution achieves a "waste fabrics in, spinning-grade chips out" workflow. These recycled chips can be fed directly back into chemical fiber production to guarantee premium circular quality. The solution has already been successfully deployed at a Turkish chemical fiber company.

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EXPERT COMMENT This textile-to-textile technology aligns perfectly with circular economy trends, achieving a notable breakthrough in the recycling of mono-material waste textile. However, its commercial application requires further expansion.

Mingshen New Materials: Applications of Multi-Functional Polymers in Complex Recycled Plastic Systems

Breakthrough Innovation Award

By introducing reactive functional groups including hydroxyl, carboxyl, epoxy, amino and anhydride, Guangzhou City Mingshen New Materials Co., Ltd. controls molecular chain degradation, phase separation and impurity interference in recycled plastics.

This technology tackles industry pain points in multi-material blends, high-impurity matrices, and highly degraded systems where the mechanical properties of recycled materials typically plummet, compatibility is poor, and processing is unstable. It significantly boosts the recycling efficiency and added value of recycled plastics.

When applied to chain extension recycling for spunbond fabric waste containing PP and PET, the material achieves an impact strength of over 7.

COROPATE MEMBER

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EXPERT COMMENT The approach of modifying complex recycled plastic systems using multi-functional polymers shows unique promise in improving the performance of recycled materials. That said, its current applications and commercial validation remain limited.

Conclusion

In the long run, multi-material compatibility is no longer merely a premium feature for recycling machinery; it has become a core competitive advantage for companies operating within the circular economy. The recycling sector will continue to advance toward higher sorting precision, broader feedstock tolerance, lower operating costs, and stronger closed-loop capabilities.

Through the deep integration of hardware and software, the industry is steadily shifting from isolated, single-feedstock recycling toward the large-scale, high-value circular utilization of mixed waste streams, driving sustainable growth across the entire circular ecosystem.

04 | SUSTAINABILITY AND PERFORMANCE UPGRADES FOR ADDITIVES

#Antimony-Free #Fluorine-Free #Flame Retardant #UV Resistant #Heat Resistant #Conductive #Color Masterbatches

Halogen-free and high-effectiveness flame retardants

As safety standards for EV batteries and E&E components tighten, flame retardant development has shifted from basic functionality to high-efficiency performance. Driven by requirements for thinner coatings, higher temperature resistance, and halogen-free formulations, the industry now focuses on balancing low loading levels and high processing stability with comprehensive material performance.



Green processing

Driven by regulatory compliance and sustainability demands, additive innovations have expanded from end-market functionality into the processing phase. The industry must now balance the increased use of recycled materials and lower consumption with processing efficiency, stability, and regulatory mandates.

Application durability

As applications expand across NEVs and charging infrastructure, materials have evolved beyond merely meeting single standards to prioritizing real-world processing performance. Consequently, critical material properties—such as heat, wear, and fatigue resistance—are now evaluated with a stronger emphasis on long-term stability in real-life applications.

Halogen-free and high-effectiveness flame retardants

Clariant: Exolit OP Halogen-Free Flame Retardant for High GWIT Polyamide

Industry Leadership Award 🏆

Clariant's Exolit OP offers ultra-thin part protection, with UL 94 V-0 classification down to 0.4mm thickness, achieving GWIT 775°C and GWFI up to 960°C, as well as outstanding electrical properties of CTI values up to 600V.

Exolit OP also achieves compliance at approximately 20% loading with minimal impact on mechanical properties. Its halogen-free formulation was GreenScreen certified and recyclable. It can be applied to connectors, switches, consumer electronics housings, and charging infrastructure.



Clariant's Exolit OP delivers outstanding performance in flame retardancy for high GWIT and ultra-thin components. This is a successful response to the E&E market demand on halogen-free upgrading; it is also more mature in the market.

Yulong Technology: PY-6205ME Halogen-Free Masterbatch

Breakthrough Innovation Award 🏆

Guangdong Yulong Technology Co., Ltd. has developed a novel, melamine-free compounding system for its PY-6205ME halogen-free masterbatch. It requires 15% less loading than traditional MPP blends, shows no ignition at 775°C, and has a decomposition temperature of 410°C. It prevents yellowing in high-temperature materials such as PPA and LCP, with loading only 10-12%. It is suitable for automotive parts, electrical parts, and wire harness terminals.



Yulong Technology's halogen-free masterbatch performs well in high-temperature resistance, VOC and GWIT performance, which makes it suitable for automotive and E&E applications. Its application potential is high.

Liside New Material: Upgrade of Classic Flame Retardant Solution with Lower Dosage and Superior Performance

Industry Pioneer Award 🏆

The upgraded classic flame retardant solution from Jiangsu Liside New Material Co., Ltd. reduces 30-40% loading and remains high rigidity and flexibility at the same time, reducing 20-30% overall cost. This multiple-patented, world-first solution is applicable for PPA, PA66, PA6, and PBT, and is suitable for multiple high-end application areas.



This upgraded classic flame retardant offers significant performance in enhancing efficiency even in lower dosage, striking a balance between cost and performance. It has a good foundation for applications.

Green processing**Clariant: AddWorks PPA PFAS-Free Polymer Processing Aids**

Breakthrough Innovation Award 🏆

Clariant's PFA-free polymer processing aid (PPA) series reduces melt fracture and die build-up. It is free of inorganic, silicone, and siloxane substances. It is regulatory compliant to food contact applications. AddWorks PPA PFAS-free PPAs can be widely used in extrusion processes including polyolefin blown film, cast film, multi-layer co-extruded film, HDPE pipe, and polyolefin artificial turf.



PFAS-free PPAs follow the regulatory trends and add values in improving melt fracture problem and food contact applications. It is more mature in the market.

Huaxin Nano Technology: Environmentally Friendly Functional Color Masterbatch

Finalist Award 🏆

The environmentally friendly functional color masterbatch from Shandong Huaxin Nano Technology Co., Ltd. features an antimony-free, fluoride-free formula system, integrating functions including UV resistance and heat resistance to achieve coloring and function. It meets strict standards such as REACH, and it has improved weather resistance by more than 30%.

The color masterbatch can be used in high-end applications such as food packaging, medical packaging, and outdoor building materials, simplifying downstream processing and reducing overall cost.



This environmentally friendly color masterbatch eliminates the use of heavy metal and fluoride. Suitable for high-end applications, it simplifies processing and lowers production cost, with stable performance and mature and reliable applications. However, its innovation and commercial value is relatively common in the market.

Colloids Plastic: Graphanced® Graphene Enhanced Materials

Industry Pioneer Award 🏆

Colloids Plastic and the National Graphene Institute in the UK collaborated to develop these graphene masterbatches. With low loadings, the materials deliver improved tensile strength, tear strain and elongation without compromising optical clarity. The nanoscale reinforcement stabilizes recycled polymers, supporting higher PCR incorporation.

These materials are applied across a broad range of flexible packaging including polyolefin blown and cast film, as well as multi-layer co-extruded film.



Graphene and 2D enhanced materials demonstrate a certain degree of innovation in terms of downgauging and high recycled content in film. They offer both enhanced performance and lightweighting benefit, and they are more mature in the market.

Application durability

LG Chem: Ultra-High Molecular Weight PVC

Outstanding Achievement Award

LG Chem increases the flexibility of the material by about 30%. Its H RTP 4000 limit oxygen index is 26 levels, with flame-retarding performance better than TPE and TPU. Its excellent heat resistance satisfies UL 125 class. In addition, board made of 30% ultra-high molecular weight PVC has increased wear resistance by about 40%. Ultra-high molecular weight PVC can be recycled and reused when discarded. It is applied in EV charging station cable, flame-retardant cable, environmentally friendly flooring, and leather automotive seating.



Ultra-high molecular weight PVC offers outstanding performance in flexibility, flame retardancy, and wear resistance. It can be applied in multiple applications like EV charging cable.

Miracll Chemicals: TPU for Wire & Cable

Breakthrough Innovation Award

Miracll Chemicals' TPU for wire and cable significantly enhances tensile strength and tear strength through optimized molecular structure design, which improves scratch resistance, wear resistance, and fatigue resistance. After three years of market validation, the product has achieved zero complaint, with key performance indicators comprehensively surpassing industry competitors. It is applied in automotive wiring harnesses and charging pile cables.



TPU for wire and cable features outstanding performance in mechanical strength, wear resistance and application compatibility. It has a good foundation for applications.

Conclusion

These eight case studies demonstrate a clear trend: the development of low-dosage additives, the optimization of halogen-free flame retardants, the adoption of green production practices, and the improvement of processing durability all point to a single conclusion. Additives are no longer just auxiliary formulation components; they have become critical variables that determine material performance and application feasibility.



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05 | FUNCTIONAL FILMS DESIGNED FOR THINNESS, STRENGTH, AND SPEED

#Mono-Material Films #High-Barrier Films #Optical Films #High-Speed Film Processing #Composite #Printing

Mono-material design:

Balancing high barrier performance and recyclability

Strict regulations, such as the PPWR, now impose mandatory recyclability requirements on flexible packaging. Traditional multi-material composite films, particularly those incorporating aluminum foil, present severe processing challenges during end-of-life recycling.

In response, eight case studies in this category focus on all-PE, all-PP, or mono-polyolefin structures. The primary objective is to engineer multiple critical functions, such as high barrier properties, secure heat sealing, and high-quality printability, into a single material system. This allows the films to maintain premium functional performance while remaining fully compatible with closed-loop recycling systems.



High-performance specialty films: Thinner gauges, greater functionality

In advanced applications, such as new energy, consumer electronics, pharmaceuticals, cold-chain logistics, and display technologies, films have evolved far beyond basic packaging. Today, they serve as critical, highly specialized functional layers. These include advanced battery separators, optical protective substrates, high-barrier preservation films, durable electronic labeling, and structural interlayers for safety glass.

Advancing stability and consistency: Enabling reliable film manufacturing

As films become thinner, structures grow more sophisticated, and application requirements intensify, the industry's ultimate challenge has shifted. The core question is no longer whether an advanced film can be produced, but whether its quality and performance can remain stable and consistent throughout high-speed, continuous, and large-scale manufacturing processes.

Mono-material design: Balancing high barrier performance and recyclability

Reifenhäuser: Cast MDO Meets Intelligent Edge Encapsulation

Industry Leadership Award 🏆

Reifenhäuser's cast MDO technology and intelligent edge encapsulation integrate MDO stretching with encapsulation bolts directly inside the coextrusion adapter. This configuration restricts the EVOH barrier layer strictly to the film's core, leaving the edges composed entirely of pure PE or PP. By reducing total EVOH content to less than 5% of the overall packaging weight, this technology enables the cost-effective mass production of all-PE or all-PP mono-material high-barrier pouches. Furthermore, it slashes the required capital investment by up to 95% compared to conventional production setups.



EXPERT
COMMENT

This solution establishes a highly viable pathway toward recyclable, high-barrier mono-material pouches, demonstrating strict alignment with evolving environmental regulations. By successfully balancing barrier performance, cost efficiency, and manufacturing flexibility, it delivers significant industrial value in accelerating the global transition to sustainable flexible packaging.

LG Chem: UNIQABLE™ Sustainable Packaging Materials

Outstanding Achievement Award 🏆

LG Chem's sustainable packaging material, UNIQABLE™, facilitates extreme lightweight downgauging for all-PE mono-material films. In partnership with Reifenhäuser, LG Chem initiated the mass production of an 18 µm MDO-PE film in 2024, and successfully reduced this thickness to a world-leading ultra-thin standard of 12 µm in 2025. Compared to standard 25 µm mono-material alternatives, this solution reduces total plastic consumption by approximately 44%.



EXPERT
COMMENT

This ultra-thin mono-material film delivers substantial source reduction in plastic usage, yielding exceptional environmental benefits alongside strong commercial viability. The all-PE formulation ensures stable processing characteristics and robust mass-production capabilities, driving a highly positive upgrade in both lightweighting and sustainability for the flexible packaging industry.

MACCHI S.p.A.: 7-Layer Blown Film Extrusion Line

Outstanding Achievement Award 🏆

MACCHI's 7-layer blown film extrusion line enables the high-volume manufacturing of true mono-material barrier films through the precise control of a 7-layer coextrusion process and ultra-thin EVOH barrier layers. These films can be laminated with reverse-printed MOPE to create entirely mono-material structures. The primary target markets for this technology include food packaging and high-performance agricultural films.



EXPERT COMMENT This mono-material barrier film represents an advanced technical approach, utilizing superior 7-layer coextrusion capabilities and highly precise control over ultra-thin EVOH layer distribution. It achieves an optimal balance between high-barrier protection, full recyclability, and cost efficiency.

Hualong Membrane Material: MDO-PE Film

Industry Pioneer Award 🏆

Jiangmen Hualong Membrane Material Co., Ltd. produces mono-material PE films utilizing advanced MDO processing. The resulting films integrate into existing downstream workflows, including high-speed printing, lamination, and pouch-making, while remaining fully recyclable. The solution has been successfully deployed at scale across mainstream flexible packaging applications, such as pet food, coffee beans, and laundry detergent pouches.



EXPERT COMMENT This mono-material PE film aligns perfectly with the global shift toward recyclable flexible packaging. It offers an excellent balance of printability, lamination efficiency, and pouch-making performance, backed by high degree of commercial maturity.

Zhengyi Packaging: High Barrier ALOx MDO-PE Film

Breakthrough Innovation Award 🏆

Guangdong Zhengyi Packaging Co., Ltd.'s high-barrier ALOx MDO-PE film achieves exceptional protection through advanced aluminum oxide vacuum metallization and specialized coating design. The film maintains an oxygen transmission rate (OTR) below $1.0 \text{ cm}^3/(\text{m}^2 \cdot \text{day})$ while preserving its fully recyclable, eco-friendly mono-material PE structure.



EXPERT COMMENT By leveraging aluminum oxide metallization and coating technologies, this solution imparts outstanding barrier properties to polyethylene films without compromising their fully recyclable, mono-material identity. It features a wide range of applicability

HySum Flexibles: High-Barrier PE-Based Coated Film

Breakthrough Innovation Award 🏆

Through the synergistic engineering of substrate and coating formulations, HySum Flexibles allows polyethylene films to achieve high-barrier performance with OTR below $1.0 \text{ cm}^3/(\text{m}^2 \cdot \text{day})$. The films are fully printable and laminable, directly resolving chronic industry pain points associated with conventional co-extruded films, such as poor barrier performance, separation difficulties during recycling, and cost-prohibitive equipment requirements.



EXPERT COMMENT This high-barrier mono-PE solution provides a clear, recycling-friendly development pathway for the industry. It successfully balances processing adaptability with practical application feasibility, demonstrating robust potential for snack food and beverage packaging.

HySum Flexibles: Heat-Sealable High-Barrier Vacuum-Metallized Paper

Finalist Award 🏆

This innovative solution integrates printing, oil repellency, heat-sealing, and high-barrier performance into a single aluminum-coated paper structure. Both its OTR and water vapor transmission rate (WVTR) are maintained below 1.0. Compared to conventional multi-layer functional composites, this paper-based solution significantly simplifies material structure while enabling easy recycling.



EXPERT COMMENT The product achieves an impressive level of functional integration, balancing barrier performance with recyclability requirements. Moving forward, its market impact could be further amplified by enhancing its technological differentiation and tailored suitability for high-end applications.

Decro Film New Materials: BOPP Co-Extruded Thermal Film

Breakthrough Innovation Award

Guangdong Decro Film New Materials Co., Ltd.'s BOPP co-extruded thermal film features an integrated thermal lamination layer produced via a one-step co-extrusion molding process, enabling direct lamination onto paper substrates without the need for oven drying.

This streamlined manufacturing process consumes only about 40% of the energy required by traditional water-based adhesive lamination, slashing CO₂ emissions by 102.48 kg per 10,000 m² of finished product. The film has achieved widespread mass adoption in the dairy packaging of leading brands such as Yili and Mengniu.

EXPERT
COMMENT

This adhesive-free thermal lamination technology delivers outstanding energy conservation and carbon reduction. By simplifying production workflows and cutting operational costs, it offers powerful environmental and economic advantages for paper-plastic composites. This solution holds exceptionally high commercial value across the dairy and paper packaging sectors.

High-performance specialty films: Thinner gauges, greater functionality**Brückner: Ultra-Thin and Ultra-Wide Battery Separator Production Line**

Industry Leadership Award

Brückner operates the world's widest 8.7-meter biaxial stretching production line for power and energy-storage lithium-battery separators. The system reliably mass-produces ultra-thin 5 µm separators while maintaining a thickness tolerance of just ±0.2 µm and a puncture strength exceeding 100 gf. This technological breakthrough significantly reduces production costs per unit area.

EXPERT
COMMENT

This ultra-thin and ultra-wide separator production line represents an industry-leading technical milestone. It delivers a combined competitive edge of high quality consistency, immense output capacity, low energy consumption, and exceptional safety margins. Fully optimized for the mass-production demands of power and energy-storage lithium batteries, this line possesses immense industrialization potential.

TopOlefin Technology: TAMT®/SOOC® Special Cycloolefin Copolymer

Outstanding Achievement Award

Developed and manufactured by TopOlefin Technology (Quzhou) Co., Ltd., TAMT® is a high-purity amorphous cyclo-olefin copolymer (COC). It integrates multiple high-performance functionalities, including superior gas barrier properties, excellent thermal resistance, a high elastic modulus, exceptional optical clarity, and precise, biaxial linear easy-tear performance. The product is fully REACH and FDA certified, making it highly versatile for easy-tear films, shrink sleeves, barrier packaging, medical functional films, optical displays, and automotive electronic films.

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COMMENT

This high-performance COC material showcases a highly distinctive performance profile, combining robust barrier properties and linear easy-tear mechanics with high transparency and thermal stability. Its versatile application footprint spans packaging, healthcare, and advanced electronics. However, its demonstrable advantages regarding green credentials and low-carbon metrics remain relatively limited.

Huntsman: KRYSTALFLEX® Optical Aliphatic TPU Film

Outstanding Achievement Award

Huntsman's KRYSTALFLEX® is an optical-grade aliphatic TPU film specifically engineered for demanding laminated glass applications. It delivers a combination of impact absorption, blast resistance, UV stability, weather resistance, exceptional optical clarity, and robust substrate adhesion.

Compatible with multiple transparent structural materials, including glass, PC, and PMMA, it has established the global industry benchmark for laminated glass in the architectural, high-security, and transportation sectors.

EXPERT
COMMENT

This optical-grade TPU film offers a mature, reliable performance that blends transparency and strong adhesion with excellent weatherability and robust structural protection. It maintains a secure and stable application footprint across the architectural, security, and transport sectors, though its overall ecological and eco-friendly performance metrics are relatively limited.

ExxonMobil: High-Clarity and High-Toughness Tubular Water Quench PE Substrate Film

Industry Pioneer Award

Jointly developed by ExxonMobil and Chengdu Boshikerui, this high-clarity, high-toughness tubular water-quench PE substrate film combines ExxonMobil's Exceed™ Tough+ series high-performance PE resins with Boshikerui's downward water-cooled blown film technology.



Supported by collaborative innovation in material formulation and manufacturing processes, this film balances high transparency with superior puncture resistance and freeze-damage tolerance under cold-chain conditions. It well satisfies the demanding requirements of visible seafood vacuum packaging and secure transportation, possessing strong potential for broader applications.

COACE: Tie Resin for Multi-Layer Co-Extruded Barrier Packaging Film

Industry Pioneer Award

COACE's tie resin for multi-layer co-extruded barrier packaging film is specifically engineered for 5-, 7-, and 9-layer co-extruded barrier packaging films. It resolves chronic adhesion deficiencies between PE and high-barrier layers like PA6 and EVOH, while optimizing processing stability to support the industry trend toward extreme film downgauging. For typical clients utilizing 7-layer structures, this solution enables a 20% reduction in film thickness, enhances barrier performance, boosts production speeds by 15%, and cuts raw material consumption by 15% to 30%.



This tie resin delivers substantial improvements in interlayer adhesion and processing stability for down-gauged multi-layer co-extruded films. The product strikes a balance between barrier performance, processing efficiency, and production reliability, offering outstanding value for lightweight packaging applications.

Molecular Intelligent Machinery: Line for Battery Separator Film Sequential Process

Breakthrough Innovation Award

The line for battery separator film sequential process (multilayer high tensile nano-film) from Molecular Intelligent Machinery (Guangzhou) Co., Ltd. features a multi-layer composite structure combining high-modulus and high-toughness layers, together with precisely coordinated biaxial stretching. This configuration delivers simultaneous improvements in tensile strength, modulus, and elongation at break, while markedly suppressing microcrack propagation and pinhole penetration to enhance puncture strength and thermal stability. This technology has successfully achieved full-scale industrialization.



This production line achieves outstanding results in separator structural design and process coordination. It strikes an optimal balance between performance enhancement and mass-production stability, bearing positive implications for the industrial advancement of high-safety, high-performance battery separators.

Boxai Biomaterials: F3003 CPET/EVOH High-Temperature Resistant Barrier Cast Film

Finalist Award

The F3003 CPET/EVOH high-temperature resistant cast barrier film from Zhejiang Boxai Biomaterials Co., Ltd. features a co-extruded CPET/EVOH structure. It withstands temperatures up to 200°C and adapts to refrigerated and frozen conditions, with water vapor transmission rate and oxygen transmission rate both below 5. This performance envelope enables a seamless full-chain workflow of "Refrigeration/Freezing - Heating - Consumption", tailored specifically for the emerging demands of pre-cooked meals and pulp-based food container lamination.



The product delivers clear application value through its high thermal resistance, robust barrier protection, and wide temperature adaptability. However, the underlying technical route is relatively mature, there remains room for further innovation within the core material system.

Zhengyi Packaging: High Barrier ALOx Film

Finalist Award

The high-barrier ALOx film from Guangdong Zhengyi Packaging Co., Ltd. achieves ultra-high barrier performance, keeping both its OTR and WVTR at or below 0.2, thanks to advanced aluminum oxide coating technology. It features high transparency, printability, excellent lamination suitability, colorless clarity, and eco-friendly properties. Additionally, the film is microwave-safe and metal-detector compatible, making it suitable for a broad range of applications across the food, cosmetics, and industrial packaging sectors.



This product boasts barrier performance that ranks at a relatively high industry level, combined with favorable transparency and broad application adaptability. Nevertheless, its technical strengths lie primarily in the integration of functionalities, meaning there is still room to enhance the uniqueness of its core innovation.

Decro Film New Materials: Eco-Friendly Scratch-Resistant Electronic Printing Label Film

Finalist Award

Guangdong Decro Film New Materials Co., Ltd.'s eco-friendly scratch-resistant electronic printing label film is formulated entirely free of inorganic mineral matting agents, preventing surface abrasion on electronic products. The film features high stiffness and delivers excellent die-cutting performance. It is designed for variable-information and personalized labeling applications utilizing roll-to-roll and sheet-fed UV inkjet digital printing processes.

EXPERT
COMMENT

This label film effectively addresses practical requirements for scratch resistance and processing compatibility in electronic labeling applications. It demonstrates practical value for personalized digital printing scenarios, though its overall level of technological innovation remains relatively limited.

Advancing stability and consistency: Enabling reliable film manufacturing**COMERIO ERCOLE: PLASTICAL® High-Performance PVC Calendering Lines**

Industry Pioneer Award

The PLASTICAL® high-performance PVC calendering line from COMERIO ERCOLE delivers micron-level precision and long-term stability for ultra-thin PVC films. The system is equipped with high-rigidity mechanical frames, thermally stable calender rolls, and advanced hydraulic gap control.

Its ultra-fast roll change solutions drastically cut downtime when switching between different film thicknesses, surface finishes, and textures. Compatible with a complete spectrum of PVC formulations ranging from highly plasticized flexible grades to semi-rigid and rigid compounds, it serves premium markets including furniture, automotive interiors, visual communications, medical supplies, and adhesive tapes.

EXPERT
COMMENT

This calendering line demonstrates outstanding precision and long-run stability, combined with excellent capabilities for ultra-thin gauges, high throughput, rapid grade changeover, and broad formulation adaptability. It fully satisfies the demands for continuous production of premium PVC films across multi-sector applications.

JCtimes: IM SYSTEM Intelligent Precision Die Series

Industry Pioneer Award

Developed by JCtimes, the IM SYSTEM intelligent precision die series is tailored for flat extrusion lines with ultra-wide widths exceeding 3,500 mm. Integrated with online thickness gauges and left-right dual-drive synchronous adjusting bolts, it establishes a closed loop of "measurement – calculation – adjustment". This configuration greatly accelerates the response speed of extra-long die heads, cuts raw material waste and reject rates, and supports 24/7 autonomous production in smart factories.

COROPATE MEMBER

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COMMENT

This intelligent die fine-tuning system balances high precision, rapid response times, and superior automation. It markedly boosts thickness control efficiency for ultra-wide products, minimizes material loss and defective output, and delivers immense practical value for production lines.

Pengxiang Machinery: Integrated Automatic Air Ring for Three-in-One Film Blowing Machine

Breakthrough Innovation Award

The Integrated automatic air ring for three-in-one film blowing machine from Zhejiang Pengxiang Precision Machinery Manufacturing Co., Ltd. realizes precise coordinated regulation of air volume, wind speed and air temperature via combined mechanical linkage and intelligent electronic sensing control. It addresses longstanding drawbacks of conventional air rings including decoupled air temperature-air volume adjustment, turbulent airflow, and inflexible tuning capacity. It also sustains stable, consistent performance during high-speed film blowing production.

EXPERT
COMMENT

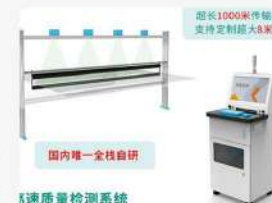
The machine's coordinated control logic for air temperature, air volume, and wind speed represents an innovative approach. It well satisfies industry demands for improved film blowing process stability and energy efficiency, with strong adaptability across diverse applications and promising prospects for wide popularization and deployment.

Good Vision & Motion: High Speed Quality Inspection System

Industry Pioneer Award

Developed by Good Vision & Motion (Shenzhen) Co., Ltd., this high-speed quality inspection system is the only fully proprietary, full-stack industrial vision inspection solution engineered in China. The system supports operating speeds of up to 800 m/min, ultra-wide formats up to 10 meters, long-distance fiber-optic transmission over 1,000 meters, and micron-level imaging precision.

The system's AI algorithms identify more than 20 types of defects and support split-track inspection, forward detection, and reverse rejection. The system also connects to MES systems to realize complete defect traceability. It has already achieved large-scale commercial deployment with leading global enterprises, including SIG Combibloc.



This system delivers powerful, full-stack, high-speed visual inspection capabilities, distinguishing itself through its extra-wide format compatibility, ultra-high precision, intelligent defect identification, and robust traceability. It significantly elevates comprehensive quality control standards, generating tangible commercial value by reducing scrap rates and boosting overall production efficiency.

Moma Technology: Bubble Detection Method for Acoustic Adhesive Film

Breakthrough Innovation Award

Developed by Shenzhen Moma Technology Co., Ltd., this bubble detection method for acoustic adhesive films targets the critical industry pain points of incomplete curing and solvent residue in speaker diaphragm damping films.

By inducing bubble generation through extreme high-temperature testing, the system performs real-time, online batch quality evaluations. This approach eliminates the issue of unpredictable curing periods caused by seasonal temperature fluctuations and prevents large-scale defects during downstream hot-press forming, significantly mitigating the risks of acoustic failure and material loss.



This inspection method addresses the critical challenges of insufficient curing and solvent residue in damping adhesive films. Featuring logical evaluation parameters and strong practical utility, it effectively minimizes bubbling risks and acoustic failures, dramatically boosting product yields while preventing catastrophic material waste.

Hewlett-Packard: HP Indigo Digital Printing

Industry Leadership Award

HP Indigo digital printing technology is built upon liquid electrophotography (LEP) printing. It facilitates version changeovers and highly consistent color output without cylinder replacement, delivering a broad color gamut that covers over 97% of the Pantone spectrum.

The technology supports flexible printing formats, including proofing, prototyping, short-run production, multi-versioning, personalization, variable data printing, anti-counterfeiting, and one-item-one-code markings. It provides scalable, customized packaging solutions for leading global brands such as Coca-Cola, Nestlé, Oreo, and Heineken.



HP Indigo digital printing technology is highly mature, offering premium print quality, high automation level, and exceptional manufacturing flexibility. It is widely utilized across personalized packaging, variable data applications, and short-run production, delivering a combination of sustainability, operational efficiency, and commercial value.

Conclusion

The competitive landscape of functional films is undergoing a fundamental shift from performance-driven metrics to a system-level capability competition.

In the past, evaluating a film manufacturer was relatively straightforward: success was measured by thinner gauges, higher barrier properties, and superior mechanical strength. However, this year's 23 submissions show that leadership in a single performance metric is no longer a decisive market advantage.

Recyclability is rapidly evolving from a value-added feature into a market entry requirement. At the same time, high-end applications are redefining films from simple packaging materials into critical functional carriers that ensure battery cell safety, enable cold-chain visualization, and reinforce structural security glazing. Amid these shifts, the ability to maintain stable, large-scale mass production has emerged as the definitive moat for product competitiveness.

The leaders of the next industrial phase will not be defined by a single technological breakthrough. Instead, the ultimate winners will be the enterprises capable of consistently delivering across three dimensions: a fully recyclable product architecture, a high-end application-oriented portfolio, and an engineering foundation that guarantees stable, scalable mass production.

06 | LIGHTWEIGHT MATERIALS FOR EMERGING INDUSTRIES

#Low-Altitude Economy #Humanoid Robots #Automotive #Fiber Reinforcement #Foaming

High-rigidity lightweight materials

To achieve mainstream adoption, lightweight materials must be successfully integrated into critical structural components. For emerging sectors such as low-altitude aviation and NEVs, weight reduction is merely the baseline; the primary objective is maintaining structural rigidity, stability, and safety under lightweight conditions.

Scalable manufacturing

While many advanced lightweight materials shine in laboratory trials, transitioning from prototype to stable mass production remains the true industry challenge. Companies capable of manufacturing lightweight materials through continuous, low-carbon, and highly repeatable processes are the ones that will truly drive the

Functional integration

Another defining trend among next-generation lightweight materials is the shift toward multi-functional integration. Instead of merely addressing weight reduction, these advanced materials consolidate diverse functionalities,

Green applications

As industry and regulatory standards rise, lightweighting alone is no longer sufficient. Next-generation material design must integrate additional sustainability features, such as bio-based content, low VOC emissions, recyclability, and a strict focus on health and environmental safety—all while being tailored to specific end-use applications.

High-rigidity lightweight materials

Evonik: Product Solutions for eVTOL

Industry Leadership Award

Evonik's VESTAMID PA12 three-layer thermal management tubing delivers over 50% weight reduction compared to EPDM, with thinner walls, smaller diameter, less space use, lower cost, better dimensional stability, and stronger deformation resistance. It also has wider temperature tolerance and outstanding aging performance. The company's ROHACELL foam is widely used in multiple eVTOL prototypes around the world, creating lighter and stronger sandwich structures for rotor blades, fuselage skins, doors, engine housings, and complex shapes.



Evonik's solutions for eVTOLs deliver exceptional performance by balancing lightweight design, structural rigidity, and material compatibility. Offering stable performance, ease of processing, and extensive customization options, these solutions are highly suited for emerging industries like low-altitude aviation and mature markets such as NEVs.

Shunyan New Material: Carbon Fiber Reinforced PA66

Breakthrough Innovation Award

Guangdong Shunde Shunyan New Material Co., Ltd.'s carbon fiber-reinforced PA66 solution successfully transforms lightweight materials into high-rigidity structural components. This material delivers exceptional mechanical performance alongside enhanced recyclability and a reduced carbon footprint. Its applications span diverse sectors, including NEV chassis and sunroof sliders, low-altitude aircraft propeller blades, running shoe shanks, and foldable smartphone hinge brackets.



Carbon fiber-reinforced PA66 delivers substantial value by simultaneously optimizing lightweight design and structural performance. Its recyclability and low-emission profile align seamlessly with "dual-carbon" goals and green developments. Offering a mature and highly impactful commercial application, this solution is ideally suited for both NEVs and low-altitude aircrafts.

Weifang Dongsheng HiNNY: Long Carbon Chain Nylon PA612

Finalist Award

Weifang Dongsheng Plastic Technology Co., Ltd.'s long carbon chain nylon PA612 features a density of only 1.06g/cm³, achieving a weight reduction of over 50% when replacing conventional metals. It combines high toughness, low moisture absorption, and excellent dimensional stability with superior chemical resistance. Main applications include drone motor brackets, rotor clips, landing gear, fuselage frames, as well as hydraulic piping of NEVs.



While long carbon chain nylon PA612 possesses an established commercial foundation, it currently lacks a decisive competitive advantage over comparable domestic and international alternatives.

Functional integration

Cabot: CABELEC® XS6652A Conductive Concentrate

Industry Leadership Award

Cabot's CABELEC® XS6652A Conductive Concentrate is a chemical cross-linked polyethylene conductive foam, with long-term antistatic property of which surface resistance is stable at 10^5 - $10^9 \Omega$, and unaffected by humidity. Compared to traditional metal shielding materials, it offers the advantage of lightweight design. Its secondary processability, including die-cutting and adhesive-backing, enables adaption to complex structures, such as irregular gaskets for mobile phone mid-frames. The material has been applied to electrostatic-sensitive devices packaging, electromagnetic shielding and grounding, and protective gaskets for precision electronic components.



This conductive concentrate provides an effective alternative for electromagnetic shielding by successfully combining stable conductivity with a lightweight profile. The solution holds immense potential for new energy and E&E applications, backed by a mature commercial track record.

KRAIBURG TPE: TPE Lightweight Technology with Excellent Sealing Properties

Outstanding Achievement Award

By embedding microscopic hollow glass microspheres within the polymer matrix, this TPE solution achieves an approximate 21% weight reduction compared to conventional EPDM/PP. The material maintains stable sealing performance even after 1,000 hours at elevated temperatures, supports multi-component injection molding, and complies fully with EU ELV (End-of-Life Vehicles) regulations. It has been used in automotive door gap seals for premium electric and passenger vehicles, with applications expanding into wheel arch liners and sunroof seals.



This TPE door sealing solution delivers both weight reduction and performance upgrade through the innovative integration of hollow glass microspheres. It directly addresses the automotive industry's escalating demand for lightweight design, long-term sealing integrity, and processing efficiency. Furthermore, the material is 100% recyclable and reduces the carbon footprint, satisfying stringent sustainability and regulatory standards within a mature commercial framework.

KUMHO-SUNNY: Ultra-Low Gloss PC/ABS and ABS

Outstanding Achievement Award

KUMHO-SUNNY's ultra-low gloss PC/ABS and ABS has a low gloss value on both smooth and textured surfaces compared to conventional ABS. Crucially, they maintain the scratch resistance, mechanical performance, and thermal stability of standard grades, meeting strict OEM factory requirements. In trial productions of automotive rear threshold trim strips, the material achieved a gloss level of approximately 1.5 GU, visually matching the finish of mass-produced PP-based materials.



While these ultra-low gloss PC/ABS and ABS materials serve a specific niche in automotive interior and exterior trims, the solution lacks distinct competitive uniqueness in the current market.

Scalable manufacturing

ENGEL: Innovative One-Piece Composite Bicycle Cockpit for High-Volume Production

Industry Pioneer Award

This innovation introduces a one-piece, fully integrated bicycle cockpit produced by injection molding and locally reinforced with continuous carbon fiber tapes. The combination of short glass fiber-reinforced polyamide and locally placed continuous fiber reinforcement delivers mechanical performance comparable to aluminum. A fully automated 60-second production cycle eliminates assembly and post-processing. The system integrates functions such as handlebar, stem, cable routing, and mounting features. Primary application is urban and commuter bicycles. Beyond bicycle cockpits, the manufacturing concept is applicable to bicycle frames, seat, steering and control modules, and other load-bearing components in micro-mobility and transport products.



This system promotes scalable manufacturing of bicycle cockpit through injection molding and locally reinforced with continuous carbon fiber tapes. It achieves impressive weight reduction and introduces a highly innovative approach to systematic design. The technology holds immense application potential for green, lightweight transportation, backed by a mature commercial framework optimized for high-volume production.

JWELL Plate & Sheet & Film Intelligent Machinery: Supercritical Continuous Extrusion Foaming Equipment

This supercritical continuous extrusion foaming equipment can process various crystalline/amorphous polymers, such as PP, PET, and PLA. Through process optimizations including high-precision temperature & pressure control and homogeneous dissolution of supercritical fluid, this technology enhances single-line capacity fivefold, boosts yield rate from 68% to 96%, as well as reduces unit energy consumption by 35% and carbon footprint by 41%.

Breakthrough Innovation Award



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This supercritical continuous extrusion foaming equipment replaces traditional chemical foaming agents with VOC-free eco-friendly foaming agents. It offers benefits like lightweight, higher yield, and energy consumption optimization. From a sustainability standpoint, it is eco-friendly, VOC-free, recyclable, and significantly lowers carbon emissions. Furthermore, the equipment is compatible with various materials and application sectors. Its modular design adapts to various manufacturing methods. It offering high utility for diverse lightweight applications.

Green applications

Weifang Dongsheng HiNNY: Bio-Based Transparent Nylon

Industry Pioneer Award

Weifang Dongsheng Plastic Technology Co., Ltd.'s bio-based transparent nylon combines sustainability with high rigidity, heat resistance, and low density. With density as low as 1.02g/cm³, this material features exceptional transparency, chemical resistance, and low water absorption. Its main applications are electronic device housings, battery casings, and automotive dashboard display panel covers.



This bio-based transparent nylon balances both sustainability contribution and mechanical performance. Its combination of heat resistance, high rigidity, and low density provides a valuable contribution to automotive lightweighting. The material demonstrates a certain degree of potential for expanding its footprint across both the automotive and consumer electronics sectors.

Polymax: Ultra-Low Odor/VOC TPE Material

Finalist Award

Nangtong Polymax Elastomer Technology Co. Ltd.'s ultra-low odor and low-VOC TPE material is completely plasticizer-free and recyclable. The material's hardness can be customized with the range of Shore A 10-90, making it highly versatile for various processing methods, including injection molding and extrusion. Main applications include pillow fillers and automotive interiors. Features ultra-low odor, this TPE material achieves a Grade 6.5 rating under Geely's automotive standards and a Grade 7.0 rating for consumer and medical applications.



By eliminating plasticizers and ensuring recyclability, this ultra-low odor/VOC TPE material aligns with the sustainability criteria required for automotive seating. However, there remains room for further improvement regarding its core technical parameters and overall technological innovation.

Conclusion

Lightweight materials have moved far beyond the primary demand for weight reduction. Today, their development is deeply embedded across the entire value chain, dictating product structural design, multi-functional integration, high-volume manufacturing processes, and regulatory compliance across diverse end-use applications.

Consequently, the focus of market competition has shifted from isolated weight reduction to a comprehensive, all-around upgrade across four critical pillars: high-strength structural integrity, multi-functional integration, cost-effective and scalable mass production, and low-carbon, green application compatibility.

07 | MULTIFACETED ADVANCES IN MEDICAL PLASTICS

#Skin-Friendly Materials #Antibacterial Materials #Soft Materials #Specialty Engineering Plastics
#Polyolefins #Biocompatibility #Chemical Resistance #Stability

Faced with high compliance barriers, highly fragmented application scenarios, multi-functional requirements, and stringent safety standards, the selection logic for medical plastics has fundamentally shifted. Companies are moving away from a “good enough for a single performance” approach toward a “multi-dimensional, comprehensive reliability” assessment.

LYB: Purell – Trusted Solutions for Everyday Healthcare

Industry Leadership Award 🏆

LyondellBasell's Purell portfolio of healthcare materials solution embodies a competitive strategy. Its applications span medical devices and medical packaging, supporting products like syringes, rigid device components, laboratory ware, rigid containers, blow-fill-seal (BFS) bottles, and ampoules.

Rather than offering a single material grade, this portfolio emphasizes long-term regulatory expertise, global supply chain capability, and continuous technical service. For healthcare companies, the value lies in a significant reduction of material selection risks, rather than just gaining another product option.



Anchored by long-term regulatory validation and global supply capabilities, the Purell portfolio shows strong competitive advantage in reliability, compliance, and supply stability, earning high recognition across the medical industry.

Chambroad: RP348P Transparent Polypropylene Grade for Medical Syringes

Outstanding Achievement Award 🏆

Shandong Chambroad Polyolefin Performance Materials Co., Ltd.'s RP348P transparent polypropylene is a specialized grade engineered for thin-walled medical syringes. It addresses the brittle cracking issues that syringes face during winter low temperatures and transport in cold northern regions, while maintaining transparency, low extractables, and processing efficiency. This material has been successfully adopted for medical syringe barrels by industry leaders, including WEGO Group and Henan Shuguang Jianshi Medical Equipment Group.



This specialized material targets high-standard transparent polypropylene applications, effectively solving the low-temperature brittle cracking challenge. It delivers outstanding performance alongside strong commercial success.

SHINY Advanced Material: TPE, TPR, TPV, and TPU

Industry Pioneer Award 🏆

SHINY Advanced Material Technology (Guangdong) Co., Ltd.'s TPE, TPR, TPV, and TPU materials deliver a combination of skin-safe safety, ultra-soft comfort, and highly effective, long-lasting antibacterial performance. These materials can be directly injection-molded or extruded without post-processing, and production scrap is fully recyclable.

Compared to traditional rubber, they shorten production cycles by more than 30%, reduce cross-infection risks, and streamline manufacturing. Designed for medical applications like maternal and infant products, wound dressings, catheters, and surgical instrument handles, these materials also extend to consumer electronics and smart robot



By integrating skin-safe, antibacterial, ultra-soft, and recyclable functionalities into a mature TPE platform, these materials effectively meet the multi-faceted demands of safety, user experience, and sustainability across medical, daily consumer, and consumer electronics industries. It demonstrates strong potential for large-scale adoption and high commercial readiness.

Congshui New Materials: Matrix-Compatible (Guanidine-Based) Plastic Antibacterial Agent

Breakthrough Innovation Award

Shanghai Congshui New Materials Technology Co., Ltd.'s matrix-compatible (guanidine-based) plastic antimicrobial agent, HPGAA, utilizes molecular recombination technology to modify guanidine salts into shaped copolymers capable of withstanding high temperatures up to 300°C.

This breakthrough solves traditional challenges associated with guanidine salts, such as easy decomposition and poor compatibility with plastics. It also avoids the drawbacks of silver ions, including leaching toxicity, agglomeration, and antibacterial degradation.



EXPERT
COMMENT

By embedding antimicrobial functionality directly into the material's structural units through molecular restructuring, HPGAA successfully resolves the migration and degradation issues common in traditional antimicrobial agents. It exhibits strong potential for long-term safety and seamless processing compatibility.

Conclusion

The current competition in medical plastics has evolved far beyond a single-performance matchup. As the pharmaceutical and medical device industries advance toward high-end, high-precision manufacturing, the core differentiators have become comprehensive application capabilities, end-to-end compliance assurance, and scenario-specific customization.

Moving forward, relying solely on standalone material metrics will no longer guarantee success. Instead, building an integrated system that encompasses material R&D, regulatory services, supply chain stability, and precise application adaptation will serve as the ultimate competitive advantage in the medical sector.



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08 | OPTIMIZATION OF ENERGY-SAVING TECHNOLOGIES

#All-Electric Machines #Energy Recovery #Compact Design #Injection Molding #Blow Molding #Extrusion
#Thermoforming #Auxiliary Equipment

High-efficiency becomes the main driver

In recent years, the evolutionary path for injection molding equipment has become clear, with energy-saving efforts shifting heavily toward molding efficiency. By increasing machine speed, shortening cycle times, and improving yield rates, manufacturers can effectively reduce the energy consumption allocated per unit of product. Consequently, advancements in drive systems, molding controls, and automation integration are now progressing in tandem.

Importance of system synergy continues to rise

Auxiliary systems were viewed as support equipment, but the recent case studies demonstrate that long-term, stable, and reproducible energy savings are increasingly driven by these systems. If material feeding, water circuits, temperature control, networking, and remote maintenance are poorly executed, even the most efficient primary processing machinery cannot fully translate its performance into production line productivity.

High-speed cycling and automation drive efficiency

Stable throughput and material savings take center stage

Energy consumption in extrusion equipment is inherently systemic. A fluctuation in any single stage—whether feeding, plasticizing, temperature control, gravimetric dosing, hauling, or cooling—directly impacts power consumption, scrap rates, and the need for manual intervention. While discussions around extrusion energy efficiency often focus on the extruder itself, success actually depends on stability of the whole production line.

Energy optimization in continuous production gains increasing traction

The energy-saving logic for blow molding equipment differs fundamentally from that of injection molding and extrusion. Parison control, wall thickness distribution, cooling efficiency, and downstream automation integration all directly impact overall machine energy consumption and production line efficiency. In blow molding applications, greater continuous production capabilities typically open up more opportunities for energy optimization.

Injection molding: High-efficiency becomes the main driver

ENGEL: victory Electric Injection Molding Machine

The ENGEL victory electric injection molding machine features cutting-edge drive components and a redesigned injection unit, delivering faster injection speeds, higher operational efficiency, and significant energy savings. Its layout is more streamlined, simplifying maintenance. Models starting at 80 tons of clamping force come standard with an integrated hydraulic system. Compared to external solutions, this design is more compact, offers better cost-effectiveness, and satisfies the hydraulic auxiliary requirements of diverse molds.



The tie-bar-less design integrates seamlessly with precision electric injection, delivering exceptional energy efficiency and high automation compatibility. It reflects the pinnacle of high-end injection molding equipment development, while the integrated hydraulic system enhances overall cost-effectiveness.

Industry Leadership Award



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LKIMM: 5th-Generation FA Two-Platen Injection Molding Machine

LKIMM's 5th-generation FA two-platen injection molding machine leverages a brand-new hydraulic design, ANI technology, lightweight moving components, and an electro-hydraulic servo pump control system to further maximize efficiency and energy savings in large-scale two-platen machinery. In the production of large components like NEV bumpers, it pushes yield rates above 99.5% and accelerates cycle times by over 25%.



Centered on a new hydraulic design and ANI technology, this machine excels in lightweighting, energy reduction, and adaptability to NEV applications for large two-platen machines. It is well-supported by patents and demonstrates strong commercial maturity.

Industry Pioneer Award

COROPATE MEMBER



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Tederic: INNOVA 250 Electro-Hydraulic Hybrid Packaging Machine

Industry Pioneer Award

Tederic's INNOVA 250 features a self-developed "direct-drive clamping + injection accumulator" system, achieving an ultra-high injection speed of 700 mm/s and an ultra-fast cycle time of 2.9s, while consuming 15% less energy than comparable models. Daily production capacity is increased by 20%, allowing for thinner-walled products and saving approximately 80 tons of PET/PP material per machine annually. Equipped with closed-loop pressure and position control, the machine maintains reliable precision at high speeds, reduces procurement costs by 30%, and shortens maintenance response times to 48 hours.



EXPERT
COMMENT

This machine delivers an impressive 700 mm/s injection speed and a rapid 2.9-second cycle time. Its electro-hydraulic hybrid design balances high throughput with low energy consumption, making it highly viable for high-volume production of thin-walled packaging and caps. However, the long-term stability of the closed-loop control under such extreme cycle times requires further field validation.

FCS: HB3500R Super-Large Capacity Horizontal Rotary Table Multi-Component Injection Molding Machine

Outstanding Achievement Award

Designed to meet the trend of integrated molding, the FCS HB3500R utilizes a horizontal rotary carrier and a dual-mold rotational positioning framework. It breaks through critical technical barriers, including an ultra-large mold capacity length of up to 3,000 mm, position and attitude control for heavy molds, dual-sided mold thermal management, and synchronized control of multiple injection units. This enables ultra-large, highly flexible, and highly efficient injection molding, fulfilling the requirements for the integrated production of automotive interior and exterior components such as bumpers and dashboards.

COROPATE MEMBER



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EXPERT
COMMENT

This machine overcomes key challenges in accommodating ultra-large mold capacities and controlling heavy molds. Its multi-component integrated molding capability is outstanding, aligning closely with the manufacturing demands for large parts in NEVs, and demonstrating strong innovation.

Extrusion: Stable throughput and material savings take center stage

ST: IBC Ton-Bucket Continuous Extrusion Equipment

Industry Leadership Award

As the first continuous extrusion system of its kind in China, the IBC ton-bucket continuous extrusion equipment by ST Machinery Technology (Foshan) Co., Ltd. utilizes a fanless extrusion system and insulated extruders to dramatically reduce energy consumption. Fluid dynamics analysis is used to optimize the mold water channels, boosting cooling efficiency by 50%.

The continuous extrusion process ensures high-efficiency, uninterrupted production, while the integration of PWDS+SFDR intelligent wall thickness optimization technology further minimizes material consumption. It supports 100% recycled material extrusion in the middle layer, achieving high-quality, low-energy manufacturing.



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EXPERT
COMMENT

As the first domestic continuous extrusion solution for IBC ton buckets, this system demonstrates strong innovation, low per-unit energy consumption, and a significant boost in cooling efficiency. Its energy-saving performance is outstanding, backed by excellent commercial maturity.

battenfeld-cincinnati: soLEX NG Series Single-Screw Extruder

Industry Leadership Award

The battenfeld-cincinnati soLEX NG 75-40-C single-screw extruder features an optimized brushless AC drive system that delivers 5% overall energy savings. Paired with an innovative screw geometry and a unique grooved feed liner increases throughput by 25% and lowers melt temperature by 10°C, effectively eliminating wall thickness fluctuations in pipe production.

Core components are treated for wear resistance, and the system is equipped with the BCtouch UX intelligent control system to enable precise closed-loop control over throughput and weight per meter.



EXPERT
COMMENT

This equipment excels in energy conservation, throughput enhancement, and melt temperature control, achieving an excellent balance between energy efficiency and output while demonstrating high commercial maturity.

battenfeld-cincinnati: Next-Generation of Caterpillar Haul-Off for Pipe Extrusion

Breakthrough Innovation Award

The battenfeld-cincinnati R 160-3E WS next-generation haul-off units for pipe extrusion features a modular design that allows for the flexible combination of functional components. Its high-precision electronic control system ensures stable and synchronized operation. Multi-stage pneumatic regulation combined with a counter-pressure system provides high gripping force without damaging the pipe surface. A self-lubricating system and an automatic chain tensioning device improve precision and service life, ensuring a consistently high yield rate.

COROPATE MEMBER



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This equipment offers improvements for traditional haul-off pain points such as indentation markings and synchronization lag. The modular configuration and counter-pressure system effectively enhance synchronization precision and pipe surface quality. It delivers notable stability and material-saving value alongside established commercial readiness..

Liansu Machinery: Application of Leading-Type Gravimetric Control in PVC Pipe Extrusion

Industry Pioneer Award

Guangdong Liansu Machinery Manufacturing Co., Ltd. has developed an industrial IoT closed-loop gravimetric system that integrates leading-type gravimetric control, weight-per-meter hardware, and AI modeling. Utilizing a patented anti-bridging mechanism to prevent material flooding, the system automatically adjusts screw speeds to maintain constant extrusion output and stable weight per meter.

Operators can directly set target throughput, allowing the extrusion and hauling stages to match automatically. This reduces extrusion output error from 1.7% to 0.8% and improves raw material utilization by 0.9%, saving approximately RMB 240,000 in material cost per line annually.



By combining closed-loop gravimetric control with AI modeling, this project successfully addresses industry pain points such as material fluctuations in high-filler formulations, bridging, and material flooding. It delivers significant benefits in throughput stability, energy reduction, and material savings. The application is commercially mature and contributes positively to the green upgrading of traditional pipe manufacturing.

Useon Technology: EC Twin-Screw Extruder

Breakthrough Innovation Award

The EC Series twin-screw extruder from Useon Technology features a system-level energy-saving design. It utilizes a direct-drive structure combined with high-efficiency permanent magnet synchronous motors (efficiency >96%) to deliver approximately 15% overall energy savings.

By optimizing torque delivery and load matching, the system enhances torque stability to ensure a stable processing window during long, continuous production runs.

Equipped with the company's intelligent control system, it provides real-time monitoring of process parameters and full data traceability. This reduces manual intervention and makes the machinery well-suited for the continuous production of high-end modified plastics, masterbatches, and biodegradable materials.



This extruder showcases a clear system-level energy-saving concept. The coordinated optimization between the direct-drive motor and the overall machine yields a notable 15% energy reduction. Furthermore, the transparency of the process data helps maintain consistency in continuous manufacturing, offering broad application adaptability and strong commercial maturity.

KYmach: SK36 MT Twin-Screw Extruder

Breakthrough Innovation Award

The SK36 MT twin-screw extruder from Nanjing KYmach Technologies Corp., Ltd. is equipped with an original German SEW power system, delivering a specific torque of up to 15 Nm/cm³. It integrates AI-driven condition monitoring system for real-time monitoring of vibration, temperature, and oil condition, enabling predictive maintenance that significantly lowers the risk of unscheduled downtime.

The system maintains precise temperature control within ±1°C and keeps housing vibration under 0.1 mm. Complemented by modular integrated vacuum and cooling systems, it simplifies operation and maintenance while improving product consistency.

The extruder features a compact footprint and handles the compounding and modification of diverse formulations, including polyolefins, engineering plastics, biodegradable materials, and cable compounds. It is especially ideal for R&D and production environments that require high devolatilization and strict temperature control.



Integrating AI-based monitoring capabilities, precision temperature control, and a modular design, this extruder excels in operational stability and maintenance convenience, making it highly suitable for continuous, heavy-duty production. While it demonstrates strong market maturity, its patent accumulation requires further strengthening.

Sanyi Plastic Machinery: Slight Conical Parallel Twin-Screw Extruder

Finalist Award

The slightly conical parallel twin-screw extruder from Qingdao Sanyi Plastic Machinery Co., Ltd. combines the design advantages of both parallel and conical twin-screw configurations. When applied to rPET flooring material production, this setup mitigates high energy consumption and drives the industry forward by replacing wood materials with recycled plastics.



By successfully merging the structural benefits of parallel and conical twin-screws, this extruder effectively addresses energy-intensive challenges in rPET flooring material production. It strikes a balance between recycled material application and energy-saving value, showing an established level of commercial readiness. However, its core technical highlights and competitive differentiators need to be further articulated and refined.

Konrun Intelligent Machinery: New Multifunctional PE/PPR/PPH/PP Smart Pipe Production Line

Breakthrough Innovation Award

Konrun Intelligent Machinery (Ningbo) Co., Ltd.'s smart pipe production line offers high operational flexibility, enabling seamless adjustments across configurations ranging from two to four layers. Driven by intelligent Siemens or B&R control systems, it can store over 1,000 formulation recipes.

The system integrates rheologically optimized screws with an energy consumption range of 0.36 to 0.38 kWh/kg and utilizes infrared wall thickness feedback to maintain tolerances within ± 0.05 mm, successfully meeting the high-precision requirements of the semiconductor and hydrogen energy sectors. It also delivers an integrated "material-equipment-process" solution alongside remote operations and maintenance support.



This system excels at combining flexible multi-layer raw material switching with intelligent process control, offering comprehensive data monitoring and clear precision enhancements. While the direction of energy-saving is clear, the real-world performance requires further validation.

MAAG: CC-PET® Process for Production of Bottle-Grade PET Pellets

Outstanding Achievement Award

The MAAG CC-PET® process consolidates pelletizing, drying, and crystallization into a single, integrated operation for producing bottle-grade PET pellets. This process reduces energy consumption to below 5.00 kWh per ton of PET while simultaneously conserving process and cooling water. Compared to traditional strand pelletizing technologies, it reduces carbon dioxide emissions by 20%.



This process successfully integrates PET pelletizing, drying, and crystallization. It stands out for its energy and carbon reductions, water conservation, and steady output of premium bottle-grade pellets, demonstrating leading environmental indicators and clear advantages for industrial-scale deployment.

JWELL: Diversified Extrusion Production Lines

Finalist Award

Changzhou Jwell Plate & Sheet Equipment Co., Ltd. offers a comprehensive portfolio spanning polymer compounding and pelletizing to specialized production lines and core components for pipes, profiles, sheets, cast films, nonwovens, and blow molding applications.

By combining custom lines for specialty plastics, ultra-wide equipment setups, smart control systems, and industrial IoT modules, the company elevates manufacturing efficiency, process stability, and energy saving across high-end production environments.



JWELL's projects deliver clear value in specialized plastics production lines and domestic import substitution. They feature a transparent path toward smart energy conservation and hold established commercial maturity, though its core technical highlights could be further emphasized.

Blow molding: Energy optimization in continuous production gains increasing traction

KAUTEX: KCC Blow Molding Machine

Breakthrough Innovation Award

The KCC Series blow molding machine from Foshan Kautex Machinery Co., Ltd. features a hydraulic drive system that is compatible with single-layer to multi-layer co-extrusion parisons. It seamlessly integrates deflashing, leak testing, and linear article take-out systems, making it well-suited for the stable production of consumer goods and industrial packaging.

The machine delivers consistent energy savings by combining a robust mechanical design with seamless automation and reliable operational continuity.



Upholding German engineering standards, this blow molding machine delivers reliable hydraulic performance alongside mature multi-layer co-extrusion and structural adaptation capabilities. It balances flexibility with cost-effectiveness, offering a solid foundation for commercial applications. However, the technical documentation leans toward basic functionality, and its specific energy-saving and innovative highlights could be further emphasized.

Frigosystem: High-Performance Air Cooling for Blown Film Applications

Breakthrough Innovation Award

Specifically engineered for blown film lines, the new high-performance air cooling system from Frigosystem builds on decades of specialized film cooling expertise to guarantee stable production parameters, superior film quality, and reduced energy consumption.

Available in three professional configurations—KBFC, KITE DEX, and KITE—the product range spans from modular heat exchangers to compact all-in-one solutions. This variety satisfies diverse factory cooling requirements, delivering precise, reliable, and energy-efficient cooling performance.



The integration of free-cooling technology effectively reduces energy consumption during hot summer months, maintaining excellent stability for blown film production parameters. This highly specialized cooling system plays a proactive and positive role in enhancing film quality and driving down energy consumption.

Auxiliaries: Importance of system synergy continues to rise

SHINI: Central Integrated System for Smart Injection Molding Plants

Industry Pioneer Award

The central integrated system for smart injection molding factories from Shini Group offers multiple operational advantages. First, an automatic central material distribution station enables fully automated switching across multiple staging points. Second, a centralized water system balances utility loads and works alongside an energy monitoring module to provide real-time power consumption metrics. Third, the system adopts dynamic perception of the molding process combined with smart process control technology to enhance injection molding precision and stability.



SHINI's central integrated system offers a high degree of completeness, providing distinct synergistic advantages across automated material feeding, auxiliary networking, and energy management. Backed by proven sales volumes and mature commercial applications, it represents a highly viable solution. However, the specific methodology behind the central water system balance requires further elaboration.

Husky: Advantage+Elite™ Proactive and Predictive Remote Support Service

Outstanding Achievement Award

Husky Technologies™ leverages its Advantage+Elite™ proactive and predictive remote service to continuously capture hundreds of machine-level KPIs via localized computing systems, shifting troubleshooting and maintenance from a reactive approach to pre-emptive intervention.

In real-world deployment, this service successfully raised a factory's fleet overall equipment effectiveness (OEE) from 77% to 85% within two years, with several machines jumping from roughly 85% to nearly 95%.



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Corporate Information



Husky successfully transforms raw machine data into actionable maintenance strategies. The predictive service framework is highly mature, significantly boosting OEE while minimizing the energy losses associated with operational fluctuations. It is backed by a solid commercial foundation.

Husky: Altanium® 6 Series Mold Controllers

Powered by the proprietary second-generation Active Reasoning Technology (ART 2.0), Altanium® Matrix6 Mold Controllers upgrade hot runner control into a highly efficient, self-adaptive system. Cutting heating times by 42% and energy use by 31%, it proves that precision control is the key to energy saving.

Outstanding Achievement Award 🏆

Scan to View
Corporate Information



Relying on the ART 2.0 algorithm, the Altanium® Matrix6 Mold Controller delivers outstanding performance in shortening heating times, reducing energy consumption, and improving temperature control stability. Balancing intelligence with practicality, it represents a highly viable, enterprise-ready solution.

Weiqian Intelligent Equipment: Hot-Runner Temperature Control Box, Mold Temperature Controller, and Timer Controller

Guangdong Weiqian Intelligent Equipment Co., Ltd. utilizes high-precision temperature control to keep plastics consistently molten within the runner system. This enables zero-waste processing and slashes raw material costs. Simultaneously, the system eliminates traditional molding defects such as weld lines and cold slug marks, enhancing both dimensional precision and product consistency to satisfy the stringent requirements of the medical and electronics sectors.

Furthermore, eliminating the need to clear cold runner scraps shortens injection cycles by approximately 30% and allows for seamless integration into fully automated production lines, delivering a significant boost to manufacturing efficiency.

Finalist Award 🏆

Precision temperature control demonstrates clear practical value in reducing waste, accelerating production, and guaranteeing the quality of high-precision medical injection molding. However, the core innovation of the project requires further development.

Onlytec: Bottle Labeling System

The bottle labeling system from Shanghai Onlytec Equipment Co., Ltd. replaces traditional labeling with label-free direct coding. This approach eliminates label consumables at the source and vastly simplifies downstream bottle recycling.

Finalist Award 🏆

This label-free coding solution effectively eliminates labeling consumables at the source, offering clear value for bottle recycling and delivering outstanding material and carbon reductions. It aligns perfectly with the sustainable upgrading trends in beverage packaging, demonstrating strong potential for commercial adoption. Nevertheless, the provided technical documentation is relatively brief, and the unique innovative aspects of the technology need to be further clarified.

Thermoforming: High-speed cycling and automation drive efficiency**Kiefel: SPEEDFORMER KTR 6.2 Speed****Breakthrough Innovation Award** 🏆

The Kiefel SPEEDFORMER KTR 6.2 Speed thermoforming machine features the SpeedGuard™ film guide system and a ProSpacing™ unit. By proactively optimizing film feeding and stacking—the two stages most prone to instability during high-speed thermoforming—the system accelerates production line speeds while maintaining absolute process stability.



The machine's high-speed cycling and automation architecture offer distinct advantages, demonstrating excellent compatibility with recyclable and bio-based materials alongside high innovative value. However, further elaboration is required regarding its specific technical details and real-world energy performance.

Conclusion

Ultimately, energy efficiency in plastics machinery is no longer an isolated equipment metric; it has evolved into a comprehensive manufacturing capability that directly ties together cycle times, yield rates, material utilization, and continuous operational stability. Moving forward, core competition in the plastics machinery industry will shift away from comparing standalone energy consumption figures. Instead, success will be defined by the capability to deliver scalable, reproducible green manufacturing ecosystems—systems that seamlessly adapt to alternative raw materials like recycled resins and high-filler compounds while simultaneously balancing low-carbon energy footprints with high-quality mass production.

This holistic capability will machinery manufacturers to break through market competition, integrate into high-end global manufacturing supply chains, and redefine their competitive advantage.

09 | MULTI-MATERIAL MOLDING AND INTEGRATED FUNCTIONALITY

#Multi-Material Injection Molding #Multi-Layer Blow Molding #Multi-Layer Vacuum Forming
#Integrated Injection and Compression Molding

Accelerating functional integration of monolithic plastic components

The traditional logic of multi-material molding centers on combining disparate materials. However, two case studies in this year's selection take the opposite approach—engineering a single plastic component to carry more functions. One approach reduces complexity at the material level by extending a single material system to satisfy more diverse operating conditions and multiple processing requirements. The other adopts an additive strategy at the printing process, directly embedded electronic functionalities—previously required separate components—into the plastic part itself.



Advancing multi-material molding

While multi-material molding is not a new concept, the capability itself is undergoing a major evolution—becoming significantly more cost-effective, precise, productive, and optimized for high-throughput manufacturing.

Inline compatibility of heterogeneous composite materials

While multi-layer co-injection and co-extrusion processes are well-established, introducing recycled content, bio-based resins, EVOH barrier layers, or glass-fiber reinforcements creates new technical hurdles, such as interlayer adhesion instability and differential shrinkage. Consequently, ensuring that these distinct materials can stably coexist and bond within a single molding cycle has become a primary challenge for next-generation co-injection and co-extrusion technologies.

Accelerating functional integration of monolithic plastic components

Victrex: Unique VICTREXTM PEEK Microparticles

Industry Leadership Award 🏆

Victrex's high-performance PEEK microparticle material has an operating temperature range of -259°C to 200°C . A single grade of material can satisfy sealing requirements for ultra-low-temperature and wide-temperature-fluctuation applications such as LNG and liquid hydrogen. This single material is compatible with three processing routes: injection molding, compression molding, and extrusion. It enables manufacturers to use single material to replace multiple material grades and avoid frequent process changeovers. Its microparticle form also improves feeding consistency, reduces dust pollution, and further simplifies component integration and assembly procedures.



This material addresses sealing challenges under extreme conditions down to -259°C . One single material is applicable to diverse working conditions and compatible with injection molding, compression molding, and extrusion processes, facilitating the industrial development of hydrogen energy and LNG sectors.

TK Group: Antenna Solutions

Outstanding Achievement Award 🏆

TK Group utilizes PDS (Printed Antenna Design System) silver pad printing technology to deposit antennas directly onto the inner surfaces of plastic housings, enabling structural plastic components to inherently perform electronic functions.

By eliminating the three-dimensional space constraints and complex soldering assembly associated with coil antennas, this solution frees up valuable internal space for larger batteries without altering the product's exterior aesthetics. Furthermore, its unobstructed signal range is extended from 20 meters to 39 meters, boosting communication efficiency by 95%. This technology has achieved commercial deployment in consumer electronics products, including the WB1 Music Stick wireless audio device.



This technology serves as a prime example of cross-domain functional integration. By integrating antennas under the PDS framework, it optimizes internal hardware volume, enhances signal transmission efficiency, and eliminates assembly steps. It effectively resolves chronic industry pain points, such as restrictive antenna layouts, device miniaturization bottlenecks, and the difficulty of balancing ultra-portable form factors with long battery life.

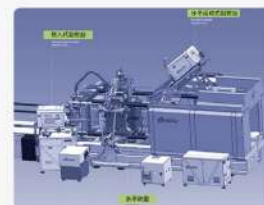
Advancing multi-material molding

Deeplus Machinery: Transforming Single-Shot Injection Molding Machine to 3-Shot Machine for Cube Mold

Industry Pioneer Award

Shenzhen Deeplus Machinery Co., Ltd. enables the retrofitting of mature, single-color European injection molding machines into equipment capable of continuous, three-color Cube Mold injection molding. This is achieved through a modular upgrade that integrates a horizontal turntable, two auxiliary injection units, and a secondary clamping mechanism.

This breakthrough eliminates the industry's technical dependency on completely imported machinery for Cube Mold multi-color injection molding. Output efficiency can be doubled within the same clamping tonnage. Furthermore, the system supports flexible switching among single-color, two-color, and three-color molding modes, drastically lowering capital investment thresholds and project risks.



This project achieves high-efficiency Cube Mold three-color molding by leveraging modular upgrades on existing machinery, successfully breaking reliance on imported systems. It delivers a combination of cost reduction, enhanced productivity, and manufacturing flexibility, backed by a high degree of commercial maturity.

Push Mold: 4x48 Cavity Four-Sided Rotating Multi-Color Multi-Material Molding System

Industry Pioneer Award

Sichuan Yibin Push Mold Co., Ltd. has pioneered a domestic 48-cavity, four-sided cubic rotating mold technology. Its four-station parallel operation transforms conventional sequential processing into synchronized, overlapping production. This lifts production efficiency to over 300% compared to standard single-station molds, while cutting specific energy consumption by approximately 20%.

With a rotational repeatability and positioning accuracy controlled within $\pm 0.01^\circ$, this technology has achieved full mass production for high-volume applications, including dual-material wine closures and two-color drinking water caps.



As a domestically pioneering high-cavity cubic rotating mold, this system delivers remarkable efficiency gains and energy savings through multi-station parallel operation. It showcases outstanding processing precision and high-volume mass-production capacity, demonstrating prominent value in engineering innovation.

Chen Hsong: LSR Electric Twin-Injection Injection Molding Machine

Industry Pioneer Award

The Chen Hsong LSR electric twin-injection molding machine adopted a specialized plunger-type injection structure with servo motor control, achieving a precise injection positioning tolerance of just 0.02 mm. The plunger design eliminates the check ring, which minimizes shear heat and prevents material caking inside the barrel. Consequently, no cleaning is required even after extended shutdowns.

The system allows barrel system switching for diameters ranging from 12 mm to 40 mm within 20 minutes, making it suitable for hard-soft dissimilar material products such as two-color silicone cups combining LSR and plastic substrates.



The combination of a plunger-type injection design and servo control significantly improves molding precision, cleanliness, and changeover efficiency during LSR processing. It effectively resolves chronic industry pain points regarding material caking during downtime, offering substantial practical value.

Wittmann Battenfeld: Speaker Diaphragm

Industry Pioneer Award

Wittmann Battenfeld applies micro-precision injection molding technology to the production of loudspeaker diaphragms. The system relies on a thermally homogeneous injection process, a first-in, first-out injection sequence, a tiny melt cushion, and a miniature sprue design, enabling shot weights as low as 50 mg.

By featuring an extremely short flow path to minimize injection pressure loss and eliminating the shut-off valve to drastically reduce material degradation, this technology fits precision multi-material applications. These include 3C connectors, medical syringes, micro-gears, and automotive electrical connectors.



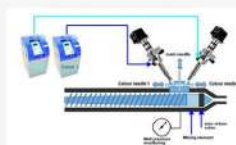
This micro-injection molding solution delivers favorable performance regarding material homogeneity, dynamic response, and long-term operational stability, making it highly compatible with precision multi-material manufacturing. Nevertheless, its current technical description remains functionally oriented; its unique and distinctive innovation highlights could be further elaborated.

Demag Plastics Machinery: Active Color Change

Outstanding Achievement Award

Demag Plastics Machinery (Ningbo) Co., Ltd. adopts liquid coloring instead of masterbatch in its innovative injection molding color change system. The pigment dosage is reduced from 3% to 1%. It realizes rapid, homogeneous mixing without increasing screw load or heating power, yielding remarkable energy savings.

For production requiring up to four color changes per day, this solution drastically shortens changeover downtime and eliminates dispose work for wax waste, while improving demolding performance and color saturation.

EXPERT
COMMENT

Replacing masterbatch with liquid coloring delivers measurable benefits in material conservation, shortened color-change downtime, and energy efficiency. It balances color flexibility and cost optimization, possessing strong potential for widespread commercial replication.

PackSys Global: noSho

Outstanding Achievement Award

PackSys Global's noSho shoulder-cap integrated technology leverages an innovative mold design to combine two traditionally separate procedures—tube head forming and cap assembly—into a single compression molding step. This approach allows the tube head and closure to be formed simultaneously within a single molding cycle.

By consolidating these steps, the system eliminates the need for separate cap procurement, warehousing, feeding systems, and specialized mechanical handling components. At the same time, it delivers high design flexibility, supporting round or oval geometries, stand-up caps, and various tamper-evident structures specifically tailored for premium applications such as cosmetic tubes.

EXPERT
COMMENT

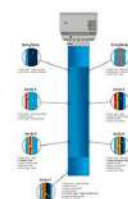
The one-step integrated forming of the tube shoulder and cap streamlines the tube manufacturing process. It delivers benefits in material conservation, production efficiency, and aesthetic design flexibility, providing distinct practical value for the cosmetic packaging industry.

Inline compatibility of heterogeneous composite materials**Bekum: Tri-Extrusion Technology**

Industry Leadership Award

Bekum's tri-extrusion system is engineered specifically for hollow blow-molded containers. The structure utilizes a three-layer configuration: the outer layer provides mechanical properties; the middle layer serves as a functional core to integrate barrier protection, recycled polymers, or bio-based resins; and the inner layer provides medium resistance and product compatibility.

Equipped with high-performance multi-layer extrusion heads and an optimized flow-channel design, the system delivers precise layer thickness control and stable processing performance, even when handling high percentages of recycled content. Its versatile application footprint spans food and beverage packaging, industrial drums, sustainable packaging, high-value brand packaging, and automotive fuel tanks.

EXPERT
COMMENT

This three-layer extrusion system demonstrates exceptional precision in layer thickness control, recycled material integration, and regulatory compliance, successfully balancing material efficiency with process stability. It delivers robust, repeatable, and industrially reliable processes capable of handling complex material combinations and high-proportion recycled inputs.

YUDO: Co-Injection Hot Runner System

Breakthrough Innovation Award

YUDO (Suzhou) Hot Runner System Co., Ltd.'s co-injection hot runner system sequentially injects two distinct materials within a single molding cycle to create a skin-core sandwich structure. This decoupling allows manufacturers to optimize aesthetic, performance, and cost.

Typical material pairings include a PET/PP skin with an EVOH core for high-barrier preservation packaging; a TPV skin with a PP or recycled material core for automotive interiors (satisfying tactile requirements and restrictions on exposed recycled materials); and a PP skin with a glass-fiber-reinforced core for home appliances (encapsulating the glass fibers to prevent warpage). This technology significantly accelerates the large-scale industrial adoption of recycled materials.

EXPERT
COMMENT

By matching skin and core materials, this co-injection hot runner system balances aesthetic, performance, cost efficiency, and circular economy objectives with clear practical utility. However, the developer should further highlight its unique technical differentiation.

COSTAR: Multi-Layer High-Barrier Blown Film Machinery

Breakthrough Innovation Award

Guangdong Corstar Machinery Technology Co., Ltd. has developed a 7-layer co-extrusion symmetric/asymmetric high-barrier film production line. The system's output has been increased by more than 50% compared to its 2024 predecessor, achieving an optimized die-to-output ratio of approximately 0.9. When equipped with a $\phi 450$ mm die, the system's throughput can exceed 400 kg/h.

By adopting a specialized PE screw design and dedicated barrier-layer screws, together with a customized die cavity ratio and optimized flow channels, the line achieves compatible processing across diverse raw materials, including adhesive, PE, and PA. It is applicable for transparent seafood packaging, food packaging, and protective air column bags.



This multi-layer high-barrier blown film line delivers outstanding performance regarding high throughput and multi-material processing compatibility, helping manufacturers improve their ROI. While it carries high market and commercial value, further technical evidence is required to fully substantiate its unique technological innovation.

Amcor: Airfree Bag in Bottle Vacuum Packaging Series

Breakthrough Innovation Award

Amcor's Airfree bag-in-bottle vacuum packaging series leverages multi-layer co-extrusion technology. By exploiting the incompatibility between EVOH and other materials, the system forms a distinct bag-in-bottle structure within a single co-extrusion process. The independent inner bags are reversely designed by interfacial material behavior, achieving a material utilization rate above 95% while delivering superior barrier protection and minimal residual volume.

Additionally, the process reduces the need for antioxidant additives, ensures a uniform EVOH distribution, and allows for thinner inner pouch gauge. The solution has achieved commercial deployment in personal care products, such as Uniskin Smile Eye Cream.



This bag-in-bottle vacuum packaging solution combines excellent barrier performance and low residue content with material-saving benefits, providing an enhanced consumer experience and promising application potential in the personal care and cosmetics sectors. While it showcases an innovative packaging design via multi-layer co-extrusion, the underlying technical complexity is relatively straightforward, and it possesses a moderate level of commercial maturity.

Conclusion

Multi-material molding technologies have moved beyond the early stage of simple, assembly-based combinations and are entering a new development phase characterized by internal optimization, system-wide efficiency enhancement, and cross-domain compatibility. The focus of technological innovation has shifted from basic structural execution to the continuous building of competitive moats across three key dimensions: functional integration, manufacturing processes, and material applications. These three technological pathways are closely interconnected and collectively drive the industry toward high-end development, lean manufacturing, and sustainability. Looking across downstream sectors such as NEVs, consumer electronics, and high-end packaging, companies equipped with integrated and system-level technological capabilities will become the key players navigating industry cycles and securing premium market positions.



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10 | ENHANCED PRECISION AND DURABILITY OF HOT RUNNERS

#Coating #High-Cavity Molds #High-Precision Hot Runners

As industries like healthcare, optical films, food packaging, and daily chemical packaging demand higher yields, faster cycle times, and precision molding, mold capabilities are evolving toward complex structural synergy, high-cavity consistency, and long-term operational stability.

Driven by the rise of multi-component molding, multi-process integration, high-cavity counts, and extreme precision, the molding industry is shifting its focus toward hot runner balance, flow control, wear resistance, and long-term stability.

HASCO: DOMINO Project

Industry Leadership Award

The DOMINO project, co-developed by HASCO, ARBURG, and POLAR-FORM, utilizes a 3D-printed hot runner system to achieve in-situ injection molding of numerous 2-component parts within one compact family mold. This design philosophy expands design freedom for product designers, end customers, and mold manufacturers alike. Simultaneously, the system shortens cycle times, accommodates smaller machinery, and reduces equipment footprint, providing sustainable momentum to boost enterprise competitiveness.



EXPERT
COMMENT

3D-printed hot runners offer greater freedom in mold design, successfully achieving in-situ injection molding for multiple two-color components. The innovative concept is distinct, and the foundation for commercial application is well-established.

Amcor: IMBM Injection Blow Molding Technology

Outstanding Achievement Award

Amcor's IMBM technology integrates traditional injection and blow molding processes into a single injection molding machine equipped with a specialized mold, creating a more compact production workflow for small bottled containers. This technology is currently utilized in P&G Mexico's laundry detergent measuring caps.



EXPERT
COMMENT

By integrating injection and blow molding on a single machine, IMBM technology breaks traditional process boundaries to deliver both production efficiency and logistical cost reductions, demonstrating clear commercial readiness. However, the underlying technical mechanisms and differentiated advantages require further elaboration.

Unistar: Mold for Medical Parts, Food Packaging, and Cosmetic Packaging

Industry Pioneer Award

Suzhou Unistar Mold Technology Co., Ltd. optimized and upgraded single-face multi-cavity molds, implementing a 128-cavity, full hot runner, side-gate structure for medical products like needle hubs, which shortens cycle times by three to five seconds while ensuring stable molding.

In stack mold configurations, their 96+96 cavity design allows a single injection molding machine to nearly double its output. For cube molds, a 4×48 cavity two-color structure is applied to food pull-ring caps to achieve multi-station molding integration. Additionally, they developed a 32-cavity high-precision mold for medical syringe barrels made of COC/COP materials, effectively covering high-precision medical applications.



EXPERT
COMMENT

The company demonstrates outstanding capabilities in multi-cavity, stack, cube, and multi-color molds, achieving strong breakthroughs in high cavity counts and cycle times. However, these technologies are not fully consolidated into a single project, the overall cohesion could be strengthened.

Judexin New Material: Ultra-High Precision Rubber Roller

Breakthrough Innovation Award

Zhejiang Judexin New Material Technology Co., Ltd.'s ultra-high precision rubber rollers are engineered for the coating and molding of optical films, privacy filters, and diffusion films. By delivering superior precision control, these rollers significantly improve molding consistency and have been successfully integrated into high-end consumer electronics supply chains, specifically for privacy film production.



EXPERT
COMMENT

These ultra-high precision rubber rollers demonstrate strong capability in meeting the strict precision requirements for critical optical film components. The commercial application is highly focused, successfully serving premium electronics clients. However, the technical description remains brief.

Conclusion

These four case studies clearly demonstrate that molds are evolving from simple “shaping tools” into “hubs of efficiency and precision”. On one hand, high cavity counts, stack molds, and multi-station structures continue to drive up output efficiency per unit. On the other hand, the convergence of advanced processes, such as 3D-printed hot runners and integrated injection blow molding, is actively reshaping manufacturing. Concurrently, the deployment of ultra-precision components is strengthening consistency control over long production cycles.

Ultimately, the core competitive edge in mold has shifted from simply “making the product” to “sustaining highly efficient, intensive, and stable continuous production”.



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SUMMARY AND INSIGHT

Through the Top 10 Technology Trends in the Plastics and Rubber 2026 and the 122 case studies, we identify not only the direction of technological evolution but also the process by which global plastics and rubber companies are reshaping the future competitive landscape through R&D innovation.

First, the integration of smart manufacturing and cost reduction with efficiency improvement are accelerating.

Together, AI advancements (10), energy-efficient machinery (22), and advanced mold and hot runner systems (4) made up 36 case studies, accounting for nearly 30% of the total selection. This reflects a clear shift from isolated automation toward a deep integration of AI, big data, and production efficiency. Smart manufacturing is obviously transitioning from concepts to real-world deployment.

Second, sustainability and circular economy remain the industry's defining pillars.

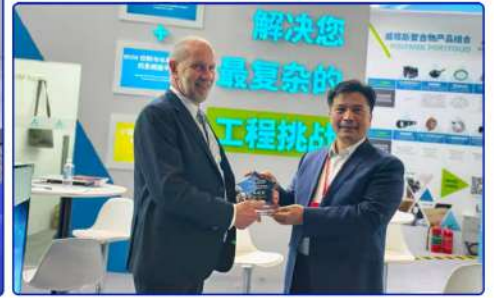
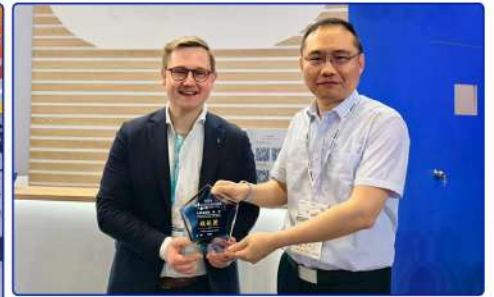
A combined 60 case studies focused on functional films (23), recycling equipment (15), climate-friendly materials (14), and eco-friendly additives (8) accounted for nearly half of the total selection. Driven by tightening regulations like the PPWR, sustainability is no longer just a marketing hype. It has sparked a comprehensive overhaul spanning raw materials, machinery, and the entire manufacturing ecosystem.

Meanwhile, demand for high-tech manufacturing and emerging industries continues to surge.

Advanced medical plastics (4), multi-material molding (12), and lightweight materials (10) together made up 26 case studies. Emerging sectors, such as NEVs, healthcare, and the low-altitude economy, are pushing plastics and rubber toward higher performance, more complex processing, and greater premium value.

The implication of technology trends goes far beyond predicting the future. Their true value lies in helping the industry pinpoint emerging directions, enabling companies to proactively build their core capabilities ahead of the curve.

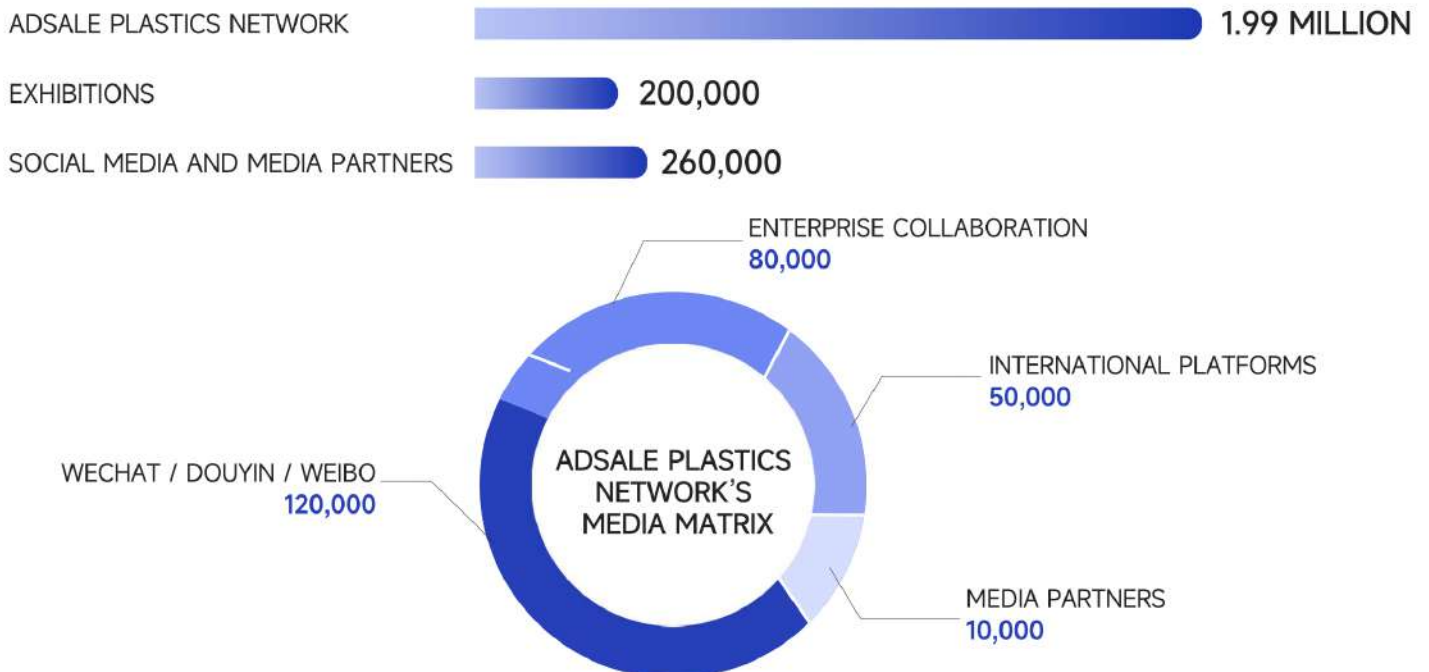
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Adsale Plastics Network's "Top 10 Technology Trends in Plastics and Rubber" has become an important platform for showcasing industry innovation. Promoted in both Chinese and English, this year's initiative generated over 2 million online views, spanning professional trade journals, general media, and social platforms like WeChat, LinkedIn, and Facebook.

"Top 10 Technology Trends in Plastics and Rubber"

2026 Top 10 Technology Trends in Plastics and Rubber generated a total of 2.45 million views



"2026 TOP 10 TECHNOLOGY TRENDS IN PLASTICS AND RUBBER" CASE STUDIES REVIEW PANEL



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AMAPLAST, Italian Plastics and Rubber Processing Machinery and Moulds Manufacturers' Association

INDUSTRY LEADERSHIP AWARD

TECHNOLOGIES	COMPANIES	CASE STUDIES
Fast AI Evolution	motan Taicang Co, Ltd.	Uninterruptible Neural System
	Haitian Plastics Machinery Group Co , Ltd.	X-Injection: Haitian AI Solution for Injection Molding
Functional Films Designed for Thinness, Strength, and Speed	Brückner Maschinenbau GmbH	"Bruckner Latest-Generation Ultra-Thin and Ultra-Wide Battery Separator Production Linebattery separator production line (BSF)"
	Hewlett-Packard Inc.	Indigo Digital Printing
	Reifenhäuser Group	Cast MOO Meets Intelligent Edge Encapsulation
Multifaceted Advances in Medical Plastics	LYB	Purell: Trusted Solutions for Everyday Healthcare
Multi-Material Compatibility of Recycling Equipment	Starlinger Recycling Technology	New recoSTAR dynamic art Recycling System
	TOMRA Sorting Technology (Xiamen) Co., Ltd.	AUTOSORT™ Multifunctional Sorting Machine / Textile to Textile Recycling
Optimization of Energy-Saving Technologies	ENGEL	victory Electric Injection Molding Machine
	battenfeld-cincinnati (Foshan) Extrusion Systems Ltd.	solEX NG 75-40-C, the Next Generation of High Performance Extruders
	ST Machinery Technology (Foshan) Co, Ltd.	IBC Ton-Bucket Continuous Extrusion Equipment
Multi-Material Molding and Integrated Functionality	Bekum Maschinenfabriken GmbH	Tri-Extrusion Technology
	Victrix High-performance Materials (Shanghai) Co., Ltd.	Ultra-Low Temperature System Solution: Unique VICTREX™ PEEK Microparticles
Multiple Pathways for Climate-Friendly Materials	Borouge International	Recleo™ - New Global Brand from Borouge for Advanced Mechanically Recycled Polyolefins
	ExxonMobil (China) Investment Co., Ltd.	Recyclable Plastic Barrier Lami-Tube
Enhanced Precision and Durability of Hot Runners	HASCO Trading (ShenZhen) Co , Ltd.	DOMINO PROJECT
Sustainability and Performance Upgrades for Additives	Clariant Chemicals Technology (Shanghai) Ltd.	Exolit OP: Halogen-Free Flame Retardant for High GWIT Polyamide
Lightweight Materials for Emerging Industries	Cabot (China) Limited	CABELEC® XS6652A Conductive Concentrate
	Evonik Specialty Chemicals (Shanghai) Co , Ltd.	Evonik Product Solutions for eVTOL

OUTSTANDING ACHIEVEMENT AWARD

TECHNOLOGIES	COMPANIES	CASE STUDIES
Fast AI Evolution	Windmoeller & Hoelscher Machinery (Taicang) Co., Ltd.	Easy2 Run
	B&R Industrial Automation (China) Co., Ltd.	Mhelp - Machine AI Assistant
Functional Films Designed for Thinness, Strength, and Speed	LG Chem	Sustainable Packaging Materials: UNIQABLE™
	MACCHI S.p.A.	7-Layer Blown Film Extrusion Line for Mono-Material Barrier Structures
	Shanghai Huntsman Polyurethanes Specialties Co., Ltd.	KRYSTALFLEX® TPU Film
	TOPOLEFIN TECHNOLOGY (QUZHOU) CO, LTD.	TAMT/SOOC (Special Cycloolefin Copolymer)
Multifaceted Advances in Medical Plastics	Shandong Chambroad Polyolefin Performance Materials Co., Ltd.	RP348P Transparent Polypropylene Grade for Medical Syringes
Multi-Material Compatibility of Recycling Equipment	Hefei Meyer Optoelectronic Technology INC.	Meyer Recycling Intelligent Sorting Agent Martix
	HUNAN VARY TECH CO., LTD.	Vary Tech PCR Whole-Process Traceability Project for Waste Household Appliance Plastics
Optimization of Energy-Saving Technologies	FCS Group	HB3500R Super Large Capacity Horizontal Rotary Table Multi-Component Injection Molding Machine
	Husky Technologies™	Advantage+Elite™ Proactive and Predictive Remote Support Service
	MAAG Group	CC-PET® Process for High Energy Savings in Production of PET Bottle Grade Pellets
Multi-Material Molding and Integrated Functionality	PackSys Global AG (A member of Brückner Group)	"noSho"
	TK Group (Holdings) Limited	Antenna Solutions
	Demag Plastics Machinery (Ningbo) Co., Ltd.	Active Colour Change
Multiple Pathways for Climate-Friendly Materials	Daicel HPP (Formerly known as Polyplastics)	PCR-Derived POM Redefines the Boundaries of Mechanical Recycling
	Wanhua Chemical Group Co, Ltd.	PCR PMMA
	Shanghai Ausell Material Technology Co., Ltd.	Recycling Technology for Discarded Automotive Headlight PC Components
Enhanced Precision and Durability of Hot Runners	Amtcor	IMBM Injection Blow Molding Technology
Sustainability and Performance Upgrades for Additives	LG Chem	Ultra-High Molecular Weight PVC
Lightweight Materials for Emerging Industries	SHANGHAI KUMHO-SUNNY PLASTICS CO., LTD.	Ultra-Low Gloss PC/ABS, ABS
	KRAIBURG TPE	TPE Lightweight Technology with Excellent Sealing Properties

INDUSTRY PIONEER AWARD

TECHNOLOGIES	COMPANIES	CASE STUDIES
Fast AI Evolution	Guangdong Simcheng Plastic Machinery Co., Ltd.	Intelligent Packaging Robot
	Suzhou Yuzhen Automation Technology Co., Ltd.	AI-Powered Integrated Inspection and Packaging Machine
Functional Films Designed for Thinness, Strength, and Speed	COMERIO ERCOLE S.P.A.	PLASTICAL® - High-Performance PVC Calendering Lines
	Good Vision & Motion (Shenzhen) Co., Ltd.	Good Vision & Motion HighSpeed Quality Inspection System
	ExxonMobil Chemical Services (Shanghai) Co., Ltd.	High-Clarity, High-Toughness Tubular Water Quench PE Substrate Film
	Jiangmen Hualong Membrane Material Co., Ltd.	MDO-PE
	Zhejiang JCTimes Technology Co., Ltd.	IM SYSTEM Intelligent Precision Die Series
	COACE Chemical Co., Ltd.	Tie Resin for Multi-Layer Co-extruded Barrier Packaging Film
Multifaceted Advances in Medical Plastics	SHINY ADVANCED MATERIAL TECHNOLOGY (GUANGDONG) CO., LTD.	TPE, TPR, TPV, TPU Raw Materials
Multi-Material Compatibility of Recycling Equipment	Huizhou Tianhong Machinery Manufacturing Co., Ltd.	TX650 S-G Dual-Station
	ZHEJIANG BORETECH ENVIRONMENTAL ENGINEERING CO., LTD.	PET Tray Washing System
	Aceretech Machinery Co., Ltd.	Textile-to-Textile Recycling and Regeneration Technology for Waste Silk, Waste Cloth and Waste Textiles
Optimization of Energy-Saving Technologies	SHINI GROUP	Central Integrated System of Smart Injection Molding Plant
	LKIMM	Fifth-Generation FA Two-Platen Injection Molding Machine
	Guangdong Liansu Machinery Manufacturing Co., Ltd.	Application of Leading-Type Gravimetric Control in PVC Pipe Extrusion
	Tederic Machinery Co., Ltd.	INNOVA 250 Electro-Hydraulic Hybrid Packaging Machine
Multi-Material Molding and Integrated Functionality	Sichuan Yibin Push Mold Co., Ltd.	4x48 Cavity Four-Sided Rotating Multi-Color Multi-Material Molding System
	Wittmann Battenfeld (Shanghai) Co., Ltd.	Speaker Diaphragm
	Shenzhen Deeplus Machinery Co., Ltd.	Tranform Single-Shot Injection Molding Machine into 3-Shot Injection Molding Machine for Cube Mold

INDUSTRY PIONEER AWARD

TECHNOLOGIES	COMPANIES	CASE STUDIES
Multi-Material Molding and Integrated Functionality	CHENHSONG GROUP	LSR Electric Twin-Injection Injection Molding Machine
Multiple Pathways for Climate-Friendly Materials	Shanghai Tianqiang Environmental Protection Technology Co., Ltd.	High-Value Recycling Solution for Waste Plastics
	Shanghai Re-mall Environmental Protection New Material Co., Ltd.	Whole-Chain Collaborative High-Value Closed-Loop Project of Large-Scale Recycling, Food-Grade Regeneration, and Green Design
	Covation Biomaterials	CovationBio® bioPTMEG
Enhanced Precision and Durability of Hot Runners	Suzhou Unistar Mold Technology Co., Ltd.	Mold R&D for Medical Parts, Food Packaging, and Cosmetic Packaging
Sustainability and Performance Upgrades for Additives	Jiangsu Licide New Material Co., Ltd.	Upgrade of Classic Flame Retardant (FR) Solution: Lower Dosage, Superior Performance
	Colloids Plastic (Suzhou) Ltd.	Graphanced®: Graphene and 2D Enhanced Materials
Lightweight Materials for Emerging Industries	ENGEL	Innovative One-Piece Composite Bicycle Cockpit for High-Volume Production
	WEIFANG DONGSHENG PLASTIC TECHNOLOGY CO., LTD.	Bio-Based Transparent Nylon

BREAKTHROUGH INNOVATION AWARD

TECHNOLOGIES	COMPANIES	CASE STUDIES
Fast AI Evolution	Techik Instrument (Shanghai) Co., Ltd.	Intelligent AI Chute-Type Visual Sorter
	Ningbo Shuyilink Technology Co., Ltd.	Global Digital Factory Solution Powered by AI Industrial Models
	Guangdong Topstar Technology Co., Ltd.	Wheeled Humanoid Robot
	Shenzhen MoldBao Technology Co., Ltd.	AI-Based Optimization Solution for Mold Machining Process Parameters
Functional Films Designed for Thinness, Strength, and Speed	Molecular Intelligent Machinery (Guangzhou) Co., Ltd.	Line for Battery Separator Film Sequential Process (Multilayer-High Tensile Nano-Film)
	Guangdong Decro Film New Materials Co., Ltd.	BOPP Co-Extruded Thermal Film
	GUANGDONG ZHENGYI PACKAGING CO., LTD.	High Barrier ALOx MDO-PE Film

BREAKTHROUGH INNOVATION AWARD

TECHNOLOGIES	COMPANIES	CASE STUDIES
Functional Films Designed for Thinness, Strength, and Speed	Zhejiang Pengxiang Machinery Manufacturing Co., Ltd.	Integrated Automatic Air Ring for Three-in-One Film Blowing Machine
	HySum Flexibles Limited	High Barrier Polyethylene-Based Coated Film
	Shenzhen MOMA TECHNOLOGY CO., LTD.	Bubble Detection Method for Acoustic Adhesive Film
Multifaceted Advances in Medical Plastics	Shanghai Congshui New Materials Technology Co., Ltd.	Matrix-Compatible (Guanidine-Based) Plastic Antibacterial Agent HPGAA
Multi-Material Molding and Integrated Functionality	Sesotec Shanghai Co., Ltd.	MAG FLAKE
	Guangzhou City Mingshen New Materials Co., Ltd.	Applications of Multi-Functional Polymers in Complex Recycled Plastic Systems
	ENMA GRANULATOR (CHINA) CO., LTD.	EnMa 1 Shaft Modular Crusher
	JIANGSU GET RECYCLING TECHNOLOGY CO., LTD.	Fishing Net Recycling Line
	TOMRA Sorting Technology (Xiamen) Co., Ltd.	New INNOSORT™ FLAKE / Tray-to-Tray Closed-Loop Recycling
Optimization of Energy-Saving Technologies	Frigosystem S.r.l.	High-Performance Air Cooling for Blown Film Applications
	battenfeld-cincinnati (Foshan) Extrusion Systems Ltd.	R 160-3E WS, Next Generation of Caterpillar Haul-Offs for Pipe Extrusion
	FOSHAN KAUTEX MACHINERY CO., LTD.	KCC Series Blow Molding Machine
	KIEFEL GmbH (A Member of Brückner Group)	SPEEDFORMER KTR 6.2 Speed
	Nanjing KYmach Technologies Corp., Ltd.	SK36 MT Twin-Screw Extruder
	KONRUN INTELLIGENT MACHINERY (NINGBO) CO., LTD.	New Intelligent Multi-Functional PE/PPR/PPH/PP Pipe Material Production Line
	Useon Technology Limited	EC Twin Screw Extruder
	Husky Technologies™	Altanium® 6 Series Mold Controllers
Multi-Material Molding and Integrated Functionality	Amtcor	Airfree Bag in Bottle Vacuum Packaging Series

BREAKTHROUGH INNOVATION AWARD

TECHNOLOGIES	COMPANIES	CASE STUDIES
Multi-Material Molding and Integrated Functionality	Guangdong Corstar Machinery Technology Co., Ltd.	Multi-Layer High Barrier Blown Film Machinery
	YUDO (SUZHOU) HOT RUNNER SYSTEMS CO., LTD.	Co-Injection Hot Runner System
Multiple Pathways for Climate-Friendly Materials	NANTONG POLYMAX ELASTOMER TECHNOLOGY CO., LTD.	Bio-Based TPE Cable Material
	ExxonMobil Chemical Services (Shanghai) Co., Ltd.	TPO Solution with Vistamaxx™ Performance Polymers
	Green Fill Material Technology Co., Ltd.	Starch Foam Granules and Related Cushioning Packaging Products
	Zhejiang Boxai Biomaterials Co., Ltd.	F1012 PHA Barrier Biodegradable Cast Film
	RUNYE (CHONGQING) NEW MATERIALS CO., LTD.	ABS, PC/ABS
	Yuantian Biotechnology (Tianjin) Co., Ltd.	Enzymatic Recycling Technology Pioneers a New Paradigm for the Plastic Circular Economy
Enhanced Precision and Durability of Hot Runners	Zhejiang Judexin New Material Technology Co., Ltd.	Ultra-High Precision Rubber Roller
Enhanced Precision and Durability of Hot Runners	Guangdong Yulong Technology Co., Ltd.	High-Temperature Resistant Non-Migration High-Glow Fire HFFR PY-6205ME
	Clariant Chemicals Technology (Shanghai) Ltd.	AddWorks PPA, PFAS-Free Polymer Processing Aids
	Miracll Chemicals Co., Ltd.	TPU for Wire & Cable
Multiple Pathways for Climate-Friendly Materials	GUANGDONG SHUNDE SHUNYAN NEW MATERIAL CO., LTD.	Carbon Fiber Reinforced PA66
	CHUZHOU JWELL PLATE&SHEET&FILM INTELLIGENT MACHINERY CO.,LTD	Supercritical Continuous Extrusion Foaming Equipment

 FINALIST AWARD

TECHNOLOGIES	COMPANIES	CASE STUDIES
Functional Films Designed for Thinness, Strength, and Speed	Guangdong Decro Film New Materials Co., Ltd.	Eco-Friendly Scratch-Resistant Electronic Printing Label Film
	GUANGDONG ZHENGYI PACKAGING CO., LTD.	High Barrier ALOx Film
	Zhejiang Boxai Biomaterials Co., Ltd.	F3003 CPET/EVOH High-Temperature Resistant Barrier Cast Film
	HySum Flexibles Limited	Heat-Sealable High-Barrier Vacuum-Metallized Paper
Multi-Material Molding and Integrated Functionality	battenfeld-cincinnati (Foshan) Extrusion Systems Ltd.	starEX 120-40-C, Single Screw Extruder for PET/PP/PS Sheet or Board Production Line
	Changzhou Dyun Environmental Technology Co., Ltd.	High-Quality PP Rigid Product (Food Container) Crushing and Washing Line
	Zhejiang Comy Environmental Technology Co., Ltd.	Plastic-to-Oil, Pyrolysis Oil, Plastic-to-New Plastic, PTO Technology, PTP Technology
Optimization of Energy-Saving Technologies	Shanghai Onlytec Equipment Co., Ltd.	Bottle Labeling System
	Changzhou Jwell Plate & Sheet Equipment Co., Ltd.	Poduction Lines and Core Components for Polymer Blending and Production of Pipes, Profiles, Sheets, etc.
	GUANGDONG WEIQIAN INTELLIGENT EQUIPMENT CO., LTD.	Hot-Runner Temperature Control Box, Mold Temperature Controller, and Ttimer Controller
	QINGDAO SANYI PLASTIC MACHINERY CO., LTD.	Slight Conical Parallel Twin-Screw Extruder
	Shandong Huaxin Nano Technology Co., Ltd.	Color Masterbatch
Sustainability and Performance Upgrades for Additives	Nantong Polymax Elastomer Technology Co., Ltd.	Ultra-Low Odor/VOC TPE Material
Lightweight Materials for Emerging Industries	WEIFANG DONGSHENG PLASTIC TECHNOLOGY CO., LTD.	Long Carbon Chain Nylon PA612

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